

**Submission No. 12
AG Reports Nos 39 (2009-10) to 15 (2010-11)**

JOINT COMMITTEE OF PUBLIC ACCOUNTS AND AUDIT
Auditor-General's Reports Nos 39 (2009-10) to 15 (2010-11)
Public Hearing
Monday 21 March 2011

Questions on Notice

Audit Report No. 02 (2010-11): Conduct by Infrastructure Australia of the First National Infrastructure Audit and Development of the Infrastructure Priority List

1. Proof Hansard Transcript – p. 8

Mr FRYDENBERG—I am conscious that we have got limited time, but I would just be interested in maybe putting this question on notice. Can you spell out how you apply your cost-benefit analysis, the various steps that you do?

Infrastructure Australia's *Better Infrastructure Decision Making* Guidelines (attached) spell out how cost benefit analysis is applied by Infrastructure Australia.

- **Table 1 at page 5 of the guidelines summarises the reform and investment framework including the role of cost benefit analysis at stages 6 and 7 of the framework.**
- **Pages 8 and 9 outlines Infrastructure Australia's approach to assessing initiatives including the following in relation to cost benefit analysis:**

"The second stage – economic viability - seeks to establish whether a proposal's economic, social and environmental benefits outweigh its costs to society, in a triple bottom line assessment. The bedrock of this assessment is a traditional, and widely understood, monetised benefit-cost assessment, complemented by qualitative assessment of impacts where monetisation is not feasible.

In process terms, independent cost-benefit experts scrutinise submissions to ensure they are robust and comparable, using a standardised pro-forma of 'issues for investigation' prepared by Infrastructure Australia, as well as bringing their own expertise to identify issues in any aspect of the business case."

Infrastructure Australia also publishes detailed templates to assist proponents in providing relevant information for assessment, including detailed cost benefit analysis information. A copy of the templates is also attached.

The Better Infrastructure Decision Making Guidelines and templates are also available on the Infrastructure Australia website at <http://www.infrastructureaustralia.gov.au/publications/>

2. Audit Report No. 02 – p. 67

The ANAO was advised by Infrastructure Australia that there were ‘considerable gaps in the national systems for collecting, holding and analysing the data used to inform infrastructure investment decisions’.

Have any steps been taken to implement a national system for collecting, holding and analysing appropriate data so as to enable a more comprehensive approach to auditing infrastructure across Australia?

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Yes. The question of a nationally consistent and relevant data for port and for freight are raised in the national ports strategy and land freight strategy discussion paper. The national ports strategy has a series of recommendations regarding publication of data, including forecasts and performance indicators. The land freight strategy discussion paper raises similar matters regarding data and forecasts for the principal land freight routes and nodes in Australia.

INFRASTRUCTURE AUSTRALIA

REFORM AND INVESTMENT FRAMEWORK TEMPLATES FOR USE BY PROPONENTS

(To be read in conjunction with Infrastructure Australia's
Better Infrastructure Decision-Making guidelines)

Summary Template and Templates for Stages 1-6

October 2010

Proposal Summary (2 pages, excluding maps)

Initiative Name:	
Location (State/Region(or City)/ Locality):	
Name of Proponent Entity:	
Contact (Name, Position, phone/e-mail):	
Description of Initiative:	<ul style="list-style-type: none"> • Provide a 2-3 paragraph description of the initiative and the capability it will provide. The description needs to provide a concise, but clear description of the initiative's scope. • Include two maps (in pdf format) showing the location of the proposal, one showing the broader area within which the initiative sits, and one showing the initiative in more detail. • As part of the submission, attach Geographic Information System data for the initiative (either in Mapinfo tab or mif format, or ESRI shape file or geo-database format), where available.
Theme alignment	<ul style="list-style-type: none"> • With reference to Infrastructure Australia's themes, describe the strategic planning or decision-making task for which assessment against the Reform and Investment Framework is being undertaken eg. Transforming [City X], Water Security for [], Developing the national energy market through []. • Outline how the initiative could contribute to these themes and create national benefits.
Pipeline category nominated by proponent (please indicate one category only):	Early Stage/Real Potential/Threshold/Ready to Proceed
Capital Cost of Initiative by Proponent (\$M, nominal, undiscounted):	
Commonwealth contribution sought by Proponent, and cash flow in financial years – including any requests for project development funding (\$M, nominal, undiscounted):	
Other funding (source/amount/cash flow) (\$M, nominal, undiscounted):	
BCR by Proponent excluding Wider Economic Benefits	
High level development and implementation program	<ul style="list-style-type: none"> • Show key steps, eg planning, the initiative's development, business case consideration, environmental approvals, procurement, and construction, with expected start and end dates.
Confidentiality	<ul style="list-style-type: none"> • Indicate which part(s) of the submission have been submitted to Infrastructure Australia on a confidential basis, and provide a brief explanation of the reason(s) for the confidentiality request.

Stage 2: Problem Identification

<p>Problem Identification:</p> <p>Current issues</p>	<p><i>List those current problems, issues or challenges that the proponent considers will limit the ability to achieve the goals and objectives identified in Stage 1:</i></p> <p><i>This could be accessibility, availability, prices/cost, capacity, emissions, safety etc. Identification should be based on empirical observations and could be generated based on surveys, interviews or studies from a wide range of sources.</i></p>
<p>Problem identification:</p> <p>Future scenarios</p>	<p><i>Outline the 'drivers of change' that are likely to have the greatest impact on the relevant infrastructure network(s), for example:</i></p> <ul style="list-style-type: none"> • <i>Socio-demographic change</i> • <i>Economic change</i> • <i>Energy prices</i> • <i>Climate change</i> • <i>Technological change</i> • <i>Governance change</i> <p><i>What are the uncertainties around these 'drivers'?</i></p> <p><i>Outline any scenarios that have been generated from the drivers of change, i.e. High-oil prices scenario, High-population scenario etc – detailing the horizon year, data sets, models used, outcomes)</i></p> <hr/> <p><i>List potential <u>future</u> problems or challenges from the scenarios. Are they same as the current problems? Have some problems disappeared? Would new problems arise under some scenarios?</i></p> <p><i>This could be accessibility, availability, prices/cost, capacity, emissions, safety etc. Identification should be based on empirical observations and could be generated based on surveys, interviews or foundation studies from a wide range of sources.</i></p>

Stage 3: Problem Assessment

<p>Problem assessment</p>	<p><i>To what extent does (or will) the problem impact upon the goals and objectives?</i></p>
<p>Current problems</p>	<p><i>How is the problem currently affecting the nation/ state/ region (city)/ locality?</i></p> <p><i>Quantify the extent to which the problems may affect the attainment of the goals/objectives.</i></p> <p><i>List the data and evidence available to support the quantification.</i></p>
<p>Future problems</p>	<p><i>How is the problem likely to affect the nation/ state/ region/ city/corridor?</i></p> <p><i>Quantify the extent to which the problems may affect the attainment of the goals/objectives.</i></p> <p><i>List the available data and evidence to support the quantification.</i></p>

Stage 4: Problem Analysis

<p>Problem analysis</p>	<p><i>Outline the underlying causes of the problem.</i></p> <p><i>Give the policy argument explaining the genesis of the problem (e.g. market failure, incorrect pricing, lack of investment signals, governance).</i></p> <p><i>Provide data and other evidence to back up the policy arguments.</i></p>
<p>Identify fundamental cause, not symptoms, of the problem</p>	<p><i>Focus on the fundamental cause of the problem, e.g. the root cause of road congestion should not simply be claimed as a “lack of capacity” – what has caused the lack of capacity?</i></p> <p><i>It may, for example, be a demand/supply mismatch caused by incorrect pricing and excess demand, or a lack of supply side investment due to the absence of price signals or targeted revenue streams.</i></p>
<p>Problem Prioritisation</p>	<p><i>Identify why this problem has been prioritised against other problems across that network and/or region – i.e. demonstrate which problems are most likely to hinder the achievement of goals and objectives.</i></p>

Stage 5: Option Generation

REFORM (ESSENTIALLY NON-CAPITAL INVESTMENT) OPTIONS

Option 1

Short description of the option, and how it is likely to achieve the goals/objectives.

Option 2

Short description of the option, and how it is likely to achieve the goals/objectives.

Option_n

Short description, etc.

INVESTMENT OPTIONS

Option 1

Short description of the option, and how it is likely to achieve the goals/objectives.

Option 2

Short description of the option, and how it is likely to achieve the goals/objectives.

Option_n

Short description, etc.

Stage 6: Options Assessment

Infrastructure Australia is not mandating a particular process for moving from a long list of potential options to a short list of lead candidates. The following three-step process is an indicative guide.

Long list	<p>Explain how an original full list ('long list') of options was initially narrowed down to an interim list.</p> <p>Summarise the results of this process, for instance the scores from a high level Multi Criteria Analysis process.</p> <p>Where possible, explain how this process incorporated different scenarios.</p>
Interim list	<p>Explain how the interim list of options was then narrowed down to a short list.</p> <p>Summarise the results of this process, for instance the scores from a detailed Multi Criteria Analysis process and the headline results of Rapid Economic Appraisals.</p> <p>Where possible, explain how this process incorporated different scenarios.</p>
Short list	<p>Explain how the interim list of options was finally narrowed down to a lead option.</p> <p>Summarise the results of this process, for instance the scores from a detailed Multi Criteria Analysis process and the main results from a detailed economic appraisal of two or three lead contenders (presenting, for instance, the Appraisal Summary Table for each lead option).</p> <p>Where possible, explain how this process incorporated different scenarios.</p>

INFRASTRUCTURE AUSTRALIA

REFORM AND INVESTMENT FRAMEWORK TEMPLATES FOR USE BY PROPONENTS

(To be read in conjunction with Infrastructure Australia's
Better Infrastructure Decision-Making guidelines)

Templates for Stage 7

October 2010

Stage 7: Solution Prioritisation

In Stage 7, Infrastructure Australia requires substantial supporting evidence to justify the proposal.

Supporting evidence for Infrastructure Australia's assessment of an initiative's strategic fit (the profiling step) will be drawn from information provided in the templates covering stages 1-6 of the Reform and Investment Framework.

Two proformas are provided here, for the appraisal and delivery steps of Infrastructure Australia's assessment.

DETAILED APPRAISAL

This section sets out Infrastructure Australia's requirements for detailed appraisal of transport options. Specific information on the appraisal of transport proposals is being set out here, as the vast majority of initiatives presented to Infrastructure Australia to date have been in the transport sector.

For other sectors a similar level of detail should be provided using relevant sector practice, in particular those required by independent regulators.

Introduction

Infrastructure Australia will be using Cost Benefit Analysis (CBA) as a key tool in the solution prioritisation stage of the framework.

Infrastructure Australia will be working collaboratively with stakeholders to assist and guide them in preparing appraisals and presenting the key results and assumptions.

The following material provides guidance on:

- what costs and benefits to include in the appraisals;
- what assumptions and key variables should be used; and
- how to present the appraisal results and assumptions.

Infrastructure Australia expects that the information requested in the templates, and referred to in this guidance, should already be available in economic analyses which proponents will have had prepared (and considered) as part of their normal infrastructure planning processes. In other words, any credible economic appraisal would address the matters set out below and have considered the information required in the tables that follow.

Demand Forecasting

Levels of demand are crucial to the economic viability of infrastructure initiatives. Infrastructure Australia needs to understand the basis upon which demand estimates have been created. For each initiative, the following information should therefore be provided:

1. A comprehensive list of the detailed assumptions which drive demand, including the rate of population growth, employment growth, private vehicle demand, public transport demand; and how these change over the appraisal period;
2. The underlying justification for these assumptions and growth rates, particularly the expansion, annualisation and extrapolation factors used and sensitivity testing of core assumptions such as Gross Domestic Product (GDP) growth rates;
3. Detail of any changes in land use with the initiative such as residential densification or Transport Orientated Developments (TODs) assumed in the demand modelling, including any commitments to rezoning or other planning law changes which would be necessary to facilitate those land use changes;

4. The methodology used to estimate demand – the nature of the transport model used and how 'knock-on' and wider network effects are calculated; plus an explanation of the independence of forecasts and the degree of external or independent scrutiny of the forecasts. This should include full details on how the model forecasts 'generated' demand; and
5. A detailed disaggregation - by year, date and user type - of the results of the demand modelling, including all the information set out in Appraisal Summary Table 2 below.

Typically, this information will be contained in a detailed transport modelling report, which will have been prepared by proponents for initiatives. Wherever possible, in addition to completing the tables included in Appraisal Summary Table 2, proponents must submit this report and then provide page references to the key sections containing this information.

Appraisal Methodology

The methodology used to conduct the appraisal is crucial in determining the economic viability of the initiative. Therefore, for each initiative, a detailed report of the economic methodology used, including all parameters and values used, assumptions and algorithms should be provided.

Detailed guidance on the methodology is provided in Appraisal Summary Tables 1 - 4 below.

Monetised Benefits and Costs - scope

The following table provides a list of the potential costs and benefits that Infrastructure Australia expects to be monetised and included in a CBA of any initiative.

All direct benefits and costs arising from an initiative should be included in the appraisal. This is to ensure that the full impact of an initiative is understood by decision-makers. For example, the assessment of a freight road should not be limited to freight impacts, but should also include the impact upon non-freight road users such as private vehicles.

Typical benefit / cost items	
Benefits / Costs to users	Benefits / Costs to non users
<ul style="list-style-type: none"> • Changes in external costs (e.g. crashes costs, noise, air pollution, GHG emissions, visual amenity etc...) • Changes in in-vehicle time (IVT) • Changes in out-of-vehicle time (OVT) e.g. (e.g. wait, access and transfer/boarding) • Changes in vehicle operating costs (perceived and unperceived) • Changes in crash costs (internalised effects) • Changes in crowding (rollingstock and platform) • Changes in amenity (e.g. station, rollingstock) • Changes in 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 etc.) • Maintenance and replacement costs • Operating costs • Road network decongestion • Changes in revenues / fare box • Residual value • Decommissioning or rehabilitation costs

Cost Estimation

The capital and operational costs of initiatives play a fundamental role in determining the economic viability of a proposal. It is therefore imperative that the capex and opex estimates used in the economic appraisal are robust.

Therefore, proponents should detail full year by year costs for the lifetime of the initiative to at least a P90 standard where appropriate. In addition, the basis for those costs, including specialist engineering and operations reports, should be provided, and the P90 should be based on detailed probabilistic cost estimates, not the incorporation of large contingencies to claim a degree of certainty that is in fact not justified by the stage of analysis. For the avoidance of doubt, P90 estimates created by the inclusion of large contingencies will not be treated as P90 estimates.

Key Parameters

A CBA includes a number of key attributes including the discount rate, the appraisal period and the Base Case.

Literature on CBA contains a number of debates about the key assumptions that should be used in different circumstances. For example, there are a range of views about the method that should be used to set the public sector's real discount rate for different asset types.

Infrastructure Australia will generally consider appraisals that have been prepared in accordance with Commonwealth, State and Territory guidelines. Infrastructure Australia will not be providing separate detailed technical guidelines on appraisal that will resolve all of these debates.

Assumptions and methodologies used in appraisals will be carefully scrutinised by Infrastructure Australia to prevent the overstatement of benefits or understatement of costs. Unrealistic or inappropriate assumptions will be discounted by Infrastructure Australia in its analysis.

In order to provide consistency of presentation of appraisals being prepared for Infrastructure Australia, stakeholders should follow the following advice for the selection of key parameters.

Value of Carbon used in appraisals

According to the Australian Transport Council guidelines, the recommended parameter for greenhouse gases are based on a value of carbon that remains at \$10 per tonne in real terms through time. However, scenario analysis prepared in 2008 by the Australian Treasury finds that the estimated carbon price rises in real terms over time, rising to between \$80-\$130 per tonne in 2040 (in 2005 real dollars) depending on the scenario used.¹

Infrastructure Australia is of the view that the price of carbon will indeed rise in real terms over time, and therefore all submissions should include a price of carbon which rises in real terms, utilising the lower series of the Australian Treasury projections in the core benefit-cost ratio (BCR) estimate, with sensitivity testing utilising the upper series of the projections.

¹ See Chart 6.3 at http://www.treasury.gov.au/lowpollutionfuture/report/chart_listing.asp

Base Case and Project Case

Appraisals compare the costs and benefits of doing something – the ‘Project Case’ (for example, building infrastructure), with a ‘Base Case’ (or the situation that would have occurred without the initiative, which is not, importantly, the same as a “do nothing” scenario).

Appraisal Summary Table 1 should include a clear and specific explanation of the base case, including reference to the key planning documents and transport plans which inform it.

Discount Rates

Summary results should be presented for the following real discount rates:

- 4 per cent;
- 7 per cent; and
- 10 per cent.

This is in accordance with the majority of national, state and territory guidelines on CBA. In cases where a different real discount rate is used in an appraisal, the Summary of Appraisal Key Results and Assumptions should specify the basis for doing so and stakeholders should contact Infrastructure Australia for specific advice in each case.

Benefit-Cost Ratio

Infrastructure Australia is aware that two equations are sometimes used to derive the benefit-cost ratio (BCR). The first approach treats operating costs as negative benefits, i.e.:

$$BCR = (Benefits - Operating costs) / Construction costs$$

The second approach treats operating costs as costs, i.e.:

$$BCR = Benefits / (Construction costs + Operating costs)$$

The benefit and cost measures above are incremental to the Base Case and discounted over the evaluation period.

Whilst there are arguments in favour of both approaches in different circumstances, ultimately Infrastructure Australia seeks to understand an initiative’s intrinsic lifetime merits, that is, the initiative’s lifetime benefits set against the lifetime costs. In particular, Infrastructure Australia believes that the method of analysis should not make a distinction between the value of construction and operating costs. As a result, the second equation should be used for all submissions to Infrastructure Australia.

Appraisal Period and Residual Values

Appraisals of significant infrastructure should typically be conducted using a thirty (30) year timeframe. This timeframe is measured from the first year in which the benefits of the initiative accrue.

In cases where a different appraisal period is used (such as a telecommunications initiative with a shorter asset life), the Summary of Appraisal Key Results and Assumptions should specify the basis for doing so, and stakeholders should contact Infrastructure Australia for specific advice in each case.

For infrastructure assets with a life of more than 30 years, a residual value should be included, where appropriate. There are two potential methodological approaches: first, for the residual value to be calculated using an approach which estimates the Net Present Value of the future benefit stream provided by the asset (to the end of the asset life); second, more traditional approaches based around straight line depreciation of asset values. Infrastructure Australia is receptive to both approaches.

Appraisal Summary Table 1 should list the residual value and the assumptions which underpin it.

Other Parameters

Where best practice & standard parameter values are available (e.g. Austroads report for road appraisals), their use is encouraged. Departures from standard parameters will not be accepted unless a clear case is made.

Sensitivity Testing

Sensitivity testing of the CBA is a key element of risk assessment. The purpose of the sensitivity analysis is to acknowledge that there is always a degree of uncertainty and ultimately risk surrounding an initiative. Typically there are four sources of uncertainty surrounding an initiative:

- Capital costs;
- Construction duration and therefore opening date;
- Operating (including maintenance) costs; and
- Under and over estimation of the benefits (typically demand for the service).

A risk assessment should be undertaken to estimate the typical variations around these inputs with the sensitivity testing undertaken based on the variations. In addition, the sensitivity tests should include:

- Changes in global oil prices;
- Fluctuations in carbon prices; and
- Different population growth/decline scenarios.

Innovative Appraisal Techniques in the Transport Sector

Appraisal methodology techniques are subject to constant development, both in Australia and worldwide, reflecting a welcome emphasis on improving the understanding of an initiative's total costs and benefits. However, it is important to achieve an appropriate balance between, on the one hand, the desire to be as comprehensive as possible, and on the other hand, maintaining the methodological rigour of the appraisal process. There are a number of recent developments being currently debated, and Infrastructure Australia's approach to each is outlined below.

In all cases, Infrastructure Australia will consider these additional benefits/costs separately to the traditional and widely accepted benefit/cost analysis (treating each case on its merits), *and the results should be presented separately in the documentation.*

Social Capital, health and other benefits of Active Transport initiatives

Infrastructure Australia believes that Active Transport initiatives (walking and cycling) can make a significant impact on Australia's transport problems. It also believes that Active Transport initiatives should be subject to the same analytical rigour as other infrastructure initiatives.

Infrastructure Australia is also aware of a set of impacts commonly associated with such initiatives, such as social capital and health benefits, that are less commonly included in traditional appraisals. However, the methodology underpinning their assessment is in development. Therefore, where justified, such benefits should be included in submissions, with full detail on the rationale for the parameters chosen and the prediction of the scale of the benefits, so that Infrastructure Australia can treat each case on its merits.

Outline of Approach to the Monetisation of "Wider Economic Benefits"

Infrastructure Australia will use the national and State and Territory guidelines on economic appraisal as the primary framework in which to assess the economic costs and benefits of all transport initiatives. The main area of departure from the existing guidelines is that where appropriate, Infrastructure Australia may take into consideration what have been referred to as "wider economic benefits" (WEBs) of initiatives, such as agglomeration effects.

WEBs are improvements in economic welfare that are acknowledged, but which have not been typically captured, in traditional CBA. Importantly, WEBs are not the same as the economic benefits determined by CGE (computable general equilibrium) or input – output models. WEBs can be disaggregated into a number of specific sources of benefit. The most significant is agglomeration, the notion that similar firms are drawn towards to the same location since 'proximity generates positive externality'.² These are the benefits derived from

² Head, Ries, Swenson, 1995, 'Agglomeration benefits and location choice: Evidence from Japanese manufacturing investment in the United States', *Journal of International Economics*, 38, pp. 223-247.

face to face contact, information exchange and networking only available to industries working close to each other.

Another source of benefit covered by WEBs is that related to imperfect competition in the labour market. Travel time savings are used as a measure of improved productivity following the reduction in journey time associated with a transport improvement. However, if the labour market is imperfect, the value of the travel time change is not equal to the production change, so that the travel time benefit will underestimate the true production improvement.

Finally, WEBs can include changes in welfare which result from a deepening of the labour market and changes in productivity which result from improved job matching when they are directly attributable to the transport initiative.

While it is recognised that the calculation of these wider benefits is still in its infancy, both in Australia and internationally, Infrastructure Australia believes the correct interpretation and accurate calculation of WEBs (using the most suitable data available) can add texture to the decision making process for certain initiatives. However, it is crucial to acknowledge that:

- Only certain initiatives, addressing a specific set of economic fundamentals, will generate WEBs;
- Significant WEBs will only be found in initiatives with strong traditional benefits, since WEBs require high levels of behaviour change, e.g. strong demand for the new asset
- WEBs may be negative for some initiatives; and
- the availability of Australian specific data needed to calculate WEBs is currently sub-optimal.

Therefore, Infrastructure Australia will treat WEBs separately to the traditional CBA. It is recommended that any proponent seeking to calculate WEBs consults with Infrastructure Australia before proceeding with the analysis. Any subsequent study should base the justification for inclusion of WEBs on the economic theory and applicability of this to the initiative's strategic objectives and impacts upon the transport and labour market. The quantitative analysis should follow the latest guidance and use well informed assumptions about the most appropriate, initiative 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.

The following links provide additional information on WEB and their calculation to assist those preparing economic appraisals:

- General guidance on wider economic benefits is included at the UK Department of Transport site: <http://www.dft.gov.uk/pgr/economics/rdg/webia/>
- Specific technical guidance on the calculation of wider economic benefits is in the UK Department of Transport document titled, Transport, Wider Economic Benefits and Impacts on GDP, June 2006, and The Wider Impacts Sub – Objective, April 2009, available at the following site:
http://www.dft.gov.uk/webtag/webdocuments/doc_index.htm.

Urban consolidation benefits and TODs

There is increasing interest in assessing the benefits/costs of different urban densities. These benefits/costs may arise in addition to the time savings and other impacts currently captured in appraisal: in particular, the higher cost of providing a basket of infrastructure services, such as water, electricity and gas, to less dense urban environment as compared to denser environments has been the subject of considerable recent research.

While it is recognised that the calculation of these impacts is also still in its infancy, both in Australia and internationally, Infrastructure Australia believes the correct interpretation and accurate calculation of the benefits/costs of different densities, using the most suitable data available can add texture to the decision making process for certain initiatives. Therefore, Infrastructure Australia will treat such benefits separately to the traditional CBA.

In this context, it should be noted that the primary influence of successful urban consolidation schemes, such as Transport Orientated Developments (TODs), upon the economic viability of public transport initiatives will be in boosting demand for the public transport service. The demand forecasts for the initiatives should therefore reflect the density of development to the extent justified, which will in turn feed through to initiative benefits.

Equity and Distributional Impacts

Other important impacts, especially equity and distributional effects, should be assessed and reported separately from the above net benefit assessment.

No detailed guidance is provided here for undertaking equity and distributional analyses. Stakeholders should describe and assess as best as possible who the gainers and losers are as a result of the initiative. An indication of the scale of those effects is also desirable. This will be key information for assessing an initiative's performance.

Regeneration can be an important public policy goal. The economic benefits of regeneration are already captured in cost-benefit analysis, since such an approach appraises an initiative's economic costs and benefits. However, the specific spatial element is not fully described, and where this is a policy objective it may be appropriate to describe this impact qualitatively alongside the cost-benefit analysis.

Non-Monetised Benefits and Costs

The following are benefit and cost categories that are relevant to the determination of net benefits of an initiative, are not generally monetised.

Benefit / Cost
Visual / landscape
Social amenity, e.g. parklands
Social cohesion
Heritage or cultural impacts

These non-monetised benefits/costs should be discussed after the monetised CBA results. Refer to Appraisal Summary Table 4 for the required template.

Each non-monetised benefit/cost shall be rated using the rating scale in the table below. The descriptions in the following table will assist in making appropriate rating selections.

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

The Use of Computable General Equilibrium (CGE) Models

The outputs of CGE (computable general equilibrium) models do not usually play a role in CBA. CGE models focus on 'economic activity impacts', which are not a measure of efficiency effects.

Infrastructure Australia does not encourage stakeholders to undertake CGE modelling. However, it recognises that some initiatives will have CGE information available which will be included in submissions to Infrastructure Australia.

Infrastructure Australia will primarily use CBA data for measuring the benefits of an initiative and will not consider CGE benefits as additive or complimentary to CBA benefits.

Reporting and Documentation

The results of the appraisal need to form a central element of the business case for each initiative submitted to Infrastructure Australia. The appraisal needs to comply with this guide. Proponents need to provide Infrastructure Australia with:

- Completed templates as set out in appraisal summary results Tables 1 -5 below;
- Full Business Cases; and
- Where available, a series of supporting documentation, including:
 - A detailed, independent, report setting out predicted demand and the basis/drivers for any changes in demand;
 - A detailed, independent specialist cost estimation report, which provides at least a P90 level cost estimation where appropriate; and
 - A detailed report of the economic appraisal methodology, including a full explanation of all parameters used and sensitivity tests applied.

Appraisal Summary Table 1

KEY ASSUMPTIONS UNDERPINNING THE DEMAND FORECASTING AND ECONOMIC MODELLING	
Criteria	Assumptions / inputs
1. Demand Modelling, assumptions and results	Outline the key drivers of demand, and describe the situation 'without' the initiative, i.e. the base case, including future works and associated capital, maintenance and operating costs
2. Land use, population and employment forecasts	<p>Describe and / or list the policy statements and plans which support the land use forecasts and existing commitments regarding any necessary re-zoning; and who undertook the land use forecasts?</p> <p>What is the ABS historical 5 year and 20 year employment and residential growth rate for the area in question?</p> <p>List the low, medium and high population and employment projections over the period for which forecasts are generated and which was used in the economic appraisal? What are the annual employment and residential growth rates implied by these land use forecasts?</p> <p>If relevant, have specific land use forecasts been undertaken for this initiative? If so, what is the difference in terms of number of jobs and residents compared to the base case land use in the last year the forecasts are produced for? Has there been any redistribution of jobs and residents and if so, what are the assumptions underpinning this redistribution?</p>
3. Demand modelling outputs	<p>What demand model was used to generate the forecasts and who undertook the demand modelling?</p> <p>What time period was modelled (for example a one hour AM peak on an average weekday, 24 hour period on an average weekday, etc.) What expansion factor was used to translate the period of the day modelled into a daily observation? (Note – this is not applicable if a 24 hour period was modelled). What sources informed this expansion factor?</p> <p>What expansion factor was used to translate the daily observation into an annual observation? What sources informed this expansion factor and / or what logic underpins it?</p> <p>Does the model calculate new or “generated” trips (as opposed to using a fixed trip matrix)? How does the demand model deal with the issues of induced demand?</p>

KEY ASSUMPTIONS UNDERPINNING THE DEMAND FORECASTING AND ECONOMIC MODELLING

Criteria	Assumptions / inputs
4.Economic model parameters - costs	<p>First year of construction / Last year of construction.</p> <p>State real discount rates used (if not 4, 7 and 10%), and the basis for any variation from these standard DRs.</p> <p>State appraisal period in years, and basis for its selection.</p> <p>Remaining life of the initiative at the end of the appraisal period</p> <p>Describe the basis for estimating all capital costs (for both base and project cases). Confidence level: are the construction costs P50, P90, P95? What is the basis for this estimate? What is the magnitude of contingency included in capital cost estimates (as a % of total costs)? What rate of escalation has been assumed over the construction period? What is the profile of the capital cost spend, for example: year 1 – 10%, year_n – X%. Who were the capital cost estimates prepared by? Have they been independently verified?</p> <p>Describe the initiative's outturned costs (\$M, nominal, undiscounted)</p> <hr/> <p>Economic costs:</p> <p>Describe and justify any adjustments made to the initiative's outturned costs to generate an economic project cost.</p> <p>Economic cost - \$M, real, undiscounted; and \$M, real, discounted (using a real 7.0% discount rate)</p> <p>Residual value - State the size of the residual value, economic lives of the assets included in the residual value and the methodology used to generate it (see note above for methodology).</p> <p>Maintenance costs - Describe the basis for estimating all maintenance costs, including growth rates over time (for both base and project cases). Are the maintenance costs P50, P90, P95? What is the basis for this estimate and who were the maintenance cost estimates prepared by?</p> <p>Replacement - Is there a need to replace or refurbish major components of the infrastructure / rolling stock during the appraisal period? If so, how are these replacement or refurbishment costs captured?</p> <p>Operating costs - Describe the basis for estimating all operating costs, including growth rates over time (for both base and project cases). Who were the operating cost estimates prepared by? Have they been independently verified?</p>

KEY ASSUMPTIONS UNDERPINNING THE DEMAND FORECASTING AND ECONOMIC MODELLING

Criteria	Assumptions / inputs
5.Economic model parameters - benefits	<p>Benefits ramp up - Describe how benefits ramp up over the construction period, ie year 1 – 35%,year_n– X%. What source and/or assumptions inform this ramp up?</p> <p>Benefit components - Describe the basis for estimating each benefit component, including growth rates over time.</p> <p>Cost and benefit time streams - Attach an appendix showing the time stream for each benefit and cost component (\$M, real, undiscounted).</p> <p>Generalised trip cost - has generalised trip cost (GTC) been calculated on an origin – destination (OD) basis within the demand model, or using aggregate outputs from the demand model?</p>
	<p>Value of travel time:</p> <p>Commuter travel - What is the value of travel time used for this initiative? Does this value differ between modes? Is this value based on resource cost or willingness to pay?</p> <p>Business travel - Has a specific value been applied to business travel? If so, what was this value?</p> <p>Growth - Has any rate of escalation been applied to these values?</p> <p>Source - What are the sources for the values used and any assumptions incorporated into the value of travel time?</p>
	<p>Weightings - Describe the weightings which have been used to calculate the generalised trip cost</p> <p>Wait / Access / Egress - What weighting has been applied to egress time? What is the source for this?</p> <p>Transfer - What transfer penalty has been applied? What is the source of this?</p> <p>Boarding penalty - Has a boarding penalty been applied during the demand modelling and / or economic appraisal? If so, what is the magnitude of this boarding penalty (minutes) and how does it differ between modes?</p>
	<p>Benefit parameters - List the value and source of all benefit parameters relevant to the appraisal. For example decongestion; Vehicle Operating Costs (for all classes of vehicles); Crash costs etc</p> <p>Related initiatives - Are the benefits and costs closely related to, dependent upon or potentially influenced by another initiative(s)? If so, explain how that has been accounted for in the BCR.</p>

Appraisal Summary Table 2

MONETISED COST BENEFIT ANALYSIS RESULTS

Demand Model Outputs

Please provide the following demand model outputs for the core option. (Please also state if whole-of-network modelling was not used.)

Please provide, for the Year of opening and the Final forecast year, the model outputs:

- Base Case
- Option
- % Change between the two figures

Please provide this information for:

- Number of trips.
- Average journey time (total trips / total hours travelled)
- PT mode share (where relevant to the initiative)
- Freight mode share (where relevant to the initiative)
- Public transport fare revenue
- Number of kilometres travelled

Please break results down where relevant, e.g.: car, bus, light commercial, heavy vehicle, heavy rail, and light rail.

Benefit Cost Analysis Result

Complete the following table:

	Real Discount Rate (%)		
	4%	7%	10%
BCR
NPV (\$m, 2010) i.e. 'Net Benefit'
NPV / \$
IRR

Monetised Cost and Benefits

Complete the following table:

- Column 1 - List all cost and benefit elements that have been monetised
- Column 2 - State the \$ value of each cost and benefit element (\$M, real, discounted)
- Column 3 - Include the % contribution of each cost and benefit element – adding to a total of 100% across costs; and 100% across benefits

Monetised Costs and Benefits	Value	Percentage
COSTS (broken down by element)...	...	...
Total	<i>(sum of above) (\$, real, discounted)</i>	100%
BENEFITS (broken down by element)...	...	...
Total	<i>(sum of above) (\$, real, discounted)</i>	100%

Detailed Monetised Benefits

(\$m, real, undiscounted)

Complete the following table and set out the values in the base case and the option case from which the benefit is calculated for each forecast year. Please reproduce this table for all modes.

	Base Case			Option		
	20XX	20XX	20XX	20XX	20XX	20XX
Benefit 1 (\$M, real, undiscounted)
Benefit N (\$M,real, undiscounted)

*Complete the following table by providing full details on the methodology used to **calculate each benefit stream**. You should reproduce this table for each benefit item for one forecast year.*

Benefit 1, 2, 3 etc.	Base Case Forecast Year (20XX)	Option Forecast Year (20XX)
Demand model output(s)	<i>(e.g. wait time, IVT, VKTs etc)</i>	<i>(e.g. wait time, IVT, VKTs etc)</i>
Valuation parameter used and source	<i>e.g. VOC \$/VKT, VOTT, Value of serious injury</i> <i>Source?</i>	<i>e.g. VOC \$/VKT, VOTT, Value of serious injury</i> <i>Source?</i>
Algorithm used to calc. values in base case and option case	<i>(combine model outputs and economic parameters to replicate value in the Detailed Monetised Benefits Table above)</i>	<i>(combine model outputs and economic parameters to replicate value benefit in the Detailed Monetised Benefits Table above)</i>
\$M (undiscounted)	....	....

Appraisal Summary Table 3

Benefit Cost Ratio Sensitivity Testing

Complete the following table for all core options as a summary of the results of the sensitivity testing undertaken. The Appraisal Guidelines refer to seven types of area of uncertainty to test:

- Capital costs
- Construction duration and therefore opening date
- Operating (including maintenance) costs
- Under and over estimation of the benefits (typically demand for the service)
- Changes in global oil prices
- Fluctuations in carbon prices; and
- Different population growth/decline scenarios and set out the value of each benefit for each forecast year.

Additional sensitivity tests are recommended on key parameters, such as the annualisation factors or the value of travel time adopted. Worst case scenarios should also be tested (costs +30%, benefits -30%).

Sensitivity test #	Variation	Benefit-Cost Ratio (BCR)
0	Starting result	....
1	Discount rate 4%	....
2	Discount rate 10%	....
3	....	....
4	....	....
5	....	....
etc	Etc	....

Appraisal Summary Table 4

NON-MONETISED BENEFITS AND COSTS

Complete the following table:

- List and briefly describe any “non-monetised” benefits and costs.
- Rate the size of each non-monetised cost and benefit element using the rating scale given in Appendix C.

Cost/Benefit	Description	Rating
e.g. Visual Amenity		
e.g. Biodiversity		
Etc.		

Appraisal Summary Table 5

INFORMATION SOURCES

List and detail the sources of information used in this economic appraisal.

DELIVERABILITY ASSESSMENT

Criteria	Questions, Documentation and Responses
<p>1. Is the risk being managed appropriately?</p>	<p><i>Key questions on Risk Management:</i></p> <ul style="list-style-type: none"> • <i>Have risks been formally identified, assessed and addressed through a management strategy?</i> • <i>Can the initiative be staged to reduce risks / improve manageability?</i> <p><i>Information and documentation to provide includes:</i></p> <ul style="list-style-type: none"> • Risk assessment reports; • Risk management strategy; • Peer review of risk assessment and management strategy; and • Analysis of staging options: <ul style="list-style-type: none"> ○ Factors taken into account – economies of scale (for procurement and usage); and ○ Best time to deliver relevant stages – taking into account future demand forecasts, flexibility for other stages of the initiative. <hr/> <p><i>Key questions on Construction Risks:</i></p> <ul style="list-style-type: none"> • <i>Does the initiative pose any significant construction risks due to its location, geology, design, etc?</i> • <i>Are those risks reflected in the construction cost estimate?</i> • <i>Is there sufficient capacity (including relevant skills and expertise) to ensure the delivery of the initiative and realisation of benefits?</i> • <i>Are there any significant consequential risks to the wider network?</i> • <i>Are those risks reflected in the initiative's cost estimate and cost/benefit analysis?</i> • <i>Will delivery require associated works to enable initiative to succeed in practical terms?</i> <ul style="list-style-type: none"> ○ <i>What is the scale and cost of likely works?</i> ○ <i>Who will fund the works?</i> ○ <i>How will they be delivered?</i> • <i>How will interface risks with the initiative be managed?</i> • <i>What requirements will need to be satisfied prior to construction of the initiative, including relevant planning and environmental approvals, land acquisition?</i> <p><i>Information and documentation to provide includes:</i></p> <ul style="list-style-type: none"> • Detailed engineering report; • Peer review of engineering report; • Detailed risk-based construction cost estimate, including probabilistic modelling, that reconciles with the risk assessment; and • Independent review of construction cost estimate.

DELIVERABILITY ASSESSMENT

	<p><i>Key questions on Environmental Risks:</i></p> <ul style="list-style-type: none"> • <i>What are the significant environmental risks?</i> • <i>Are they reflected in the initiative's cost estimate?</i> • <i>What community engagement/consultation have been undertaken?</i> • <i>What land use/environmental/planning approvals need to be obtained?</i> • <i>What approvals/licences have already been obtained?</i> <p><i>Information and documentation to provide includes:</i></p> <ul style="list-style-type: none"> • Environmental reports (noise, amenity, etc); • Environmental impact statement; and • Conditions of approval.
	<p><i>Key questions on Other Risks</i></p> <ul style="list-style-type: none"> • <i>Are there any significant social or political risks?</i> • <i>Are there any significant risks posed by (or for) other levels of government?</i> • <i>Are there any other significant risks?</i> • <i>Are they reflected in the initiative's cost estimate?</i> <p><i>Information and documentation to provide includes:</i></p> <ul style="list-style-type: none"> • Political risk analysis; • Risk-based project estimate (preferably using Monte Carlo simulation); and • MOUs with other levels of government.
<p>2. Is there a need for government funding?</p>	<p><i>Key questions:</i></p> <ul style="list-style-type: none"> • <i>Does a market exist or can a market be introduced, ie, where users pay for services?</i> • <i>If a mix of private and public funding or full public funding is proposed, what are the market failures that require this?</i> • <i>Can the market failures be remedied through reforms rather than non-market interventions?</i> • <i>If supplemental public funding is proposed, is it clear that the level of contribution reflects the impact of market failure?</i> • <i>If supplemental public funding is proposed, what form of contribution is proposed – grant, debt, equity – and why?</i> • <i>If public financing is proposed, what are the public policy objectives being pursued?</i> <p><i>Information and documentation, eg a detailed business case including:</i></p> <ul style="list-style-type: none"> • Analysis of scope for private funding (eg: feasibility of recovery of full or partial costs from users).

DELIVERABILITY ASSESSMENT

<p>3. Is there a need for Commonwealth funding?</p>	<p><i>Key questions on the case for Commonwealth Funding:</i></p> <ul style="list-style-type: none"> • <i>Why should the Commonwealth rather than State/Territory or Council fund the initiative – what is the national interest?</i> • <i>Is Commonwealth funding likely to lead to a displacement of State/Territory infrastructure spending?</i> • <i>What is the proposed State/Territory/Council funding contribution for the initiative?</i> • <i>What other sources of Commonwealth funding are being provided for the initiative?</i> • <i>Where a mix of funding sources is envisaged, does the mix reflect the respective interests of the funders and is risk allocated appropriately?</i> • <i>Outline the proposed timing of cashflows for each contributor and what the each contributor's funds will be used for (include details of the inflator used to derive nominal amounts)?</i> • <i>Where Commonwealth funding is being sought how is it envisaged that funding would be provided, e.g. grant, equity, loan?</i> <p><i>Information and documentation to provide includes:</i></p> <ul style="list-style-type: none"> • <i>Where Commonwealth funding is sought, projected State infrastructure spending with and without Commonwealth funding; and</i> • <i>Financial model of the initiative's cashflows, including real, nominal and discounted dollars.</i>
<p>4. Does the delivery strategy provide confidence that the initiative benefits will be delivered?</p>	<p><i>Key questions on Delivery Strategy Issues:</i></p> <ul style="list-style-type: none"> • <i>At what stage is the initiative in its development, eg, one option to address a need, preferred option, concept design, business case, committed funding, inclusion in Strategic Infrastructure Plan or similar, procurement.</i> • <i>What are the initiative's key milestones?</i> • <i>What is the proposed delivery strategy, including source of finance, contract type and procurement process?</i> • <i>Can the private sector add value by financing and delivering the infrastructure and related services?</i> • <i>If so, is private financing proposed?</i> • <i>Where private financing is envisaged, is a competitive market for the provision of private capital likely given the location and type of initiative?</i> • <i>What is the proposed strategy for operations and maintenance of the infrastructure?</i> • <i>Does the delivery strategy effectively deal with the risks identified?</i> • <i>Does the delivery strategy introduce new risks, eg, design, construction or operation interfaces?</i> <p><i>Information and documentation to provide includes:</i></p> <ul style="list-style-type: none"> • <i>Procurement strategy report, including analysis of options considered; and</i>

DELIVERABILITY ASSESSMENT

	<ul style="list-style-type: none"> • Results of market soundings on: <ul style="list-style-type: none"> ○ Level of interest in the initiative; ○ Proposed delivery strategy; ○ Proposed financing/ownership model; and ○ Timing and staging of the initiative.
<p>5. Does the initiative's governance model provide confidence that claimed benefits will be delivered?</p>	<p><i>Key questions on the Initiative's Governance include:</i></p> <ul style="list-style-type: none"> • <i>What are the proposed governance arrangements for the project? What has been used until now, and what is proposed between now and commitment to proceed, during procurement and delivery, during operations?</i> • <i>What role is envisaged (if any) for the Commonwealth if it contributes to the initiative?</i> • <i>Who are the key stakeholders and what role will they play in the initiative's governance?</i> • <i>Is the initiative subject to a Gateway or similar review process?</i> <p><i>Information and documentation to provide includes:</i></p> <ul style="list-style-type: none"> • Governance plan; • Independent review of governance plan; and • Reports from independent reviews of the initiative, e.g. gateway reviews.