Part 1: Introduction to Project Evaluation
Guide to Project Evaluation
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Summary
Part 1 of the Guide to Project Evaluation provides the context in which project evaluation is carried out. It provides an introduction to project evaluation and anticipates a link-point with the wider area of road transport planning, a very complex and demanding area that sets the appropriate context for project evaluation. Context and criteria in economic evaluation are needed to help the practitioner succeed in evaluating projects. Transport practitioners charged with the task of evaluating a transport project need to have an understanding of the physical system and political context in which the project was conceived. Understanding of the strategic planning context from which the project has been derived is particularly important as it defines broad outcomes of the transport system such as efficiency, safety and sustainability. A three-stage evaluation process is recommended for evaluation of transport projects: (i) test strategic fit (i.e. assessment against broader strategies, policies and plans); (ii) investigate and analyse project options (solutions) that pass the strategic fit; and (iii) develop a business case for the preferred option. Part 1 also provides an outline (roadmap) of evaluation tools and methodologies presented in subsequent parts of the guide.

Keywords
Project evaluation context, project evaluation criteria, the project evaluation process

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Authors
Dimitris Tsolakis
Katrina Preski
Sarah Patrick

Published by Austroads Incorporated
Level 9, Robell House
287 Elizabeth Street
Sydney NSW 2000 Australia
Phone: +61 2 9264 7088
Fax: +61 2 9264 1657
Email: austroads@austroads.com.au
www.austroads.com.au

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Austroads purpose is to contribute to improved Australian and New Zealand transport outcomes by:

- providing expert advice to SCOT and ATC on road and road transport issues
- facilitating collaboration between road agencies
- promoting harmonisation, consistency and uniformity in road and related operations
- undertaking strategic research on behalf of road agencies and communicating outcomes
- promoting improved and consistent practice by road agencies.

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Austroads membership comprises the six state and two territory road transport and traffic authorities, the Commonwealth Department of Infrastructure, Transport, Regional Development and Local Government in Australia, the Australian Local Government Association, and New Zealand Transport Agency. Austroads is governed by a council consisting of the chief executive officer (or an alternative senior executive officer) of each of its 11 member organisations:

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- Roads Corporation Victoria
- Department of Transport and Main Roads Queensland
- Main Roads Western Australia
- Department for Transport, Energy and Infrastructure South Australia
- Department of Infrastructure, Energy and Resources Tasmania
- Department of Planning and Infrastructure Northern Territory
- Department of Territory and Municipal Services Australian Capital Territory
- Department of Infrastructure, Transport, Regional Development and Local Government
- Australian Local Government Association
- New Zealand Transport Agency.

The success of Austroads is derived from the collaboration of member organisations and others in the road industry. It aims to be the Australasian leader in providing high quality information, advice and fostering research in the road sector.
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1 INTRODUCTION

The Austroads Guide to Project Evaluation (the guide) provides a series of guidelines, tools and techniques for use in the evaluation of projects. The eight parts of the guide assemble knowledge on project evaluation methods, parameters and tools into a readily available and accessible resource for planners and decision-makers. The parts offer guidance to practitioners seeking advice for ‘beyond the standard benefit-cost analysis (BCA) or multi-criteria analysis (MCA)’ evaluations, that is, project risk assessment, the national and regional impacts of projects, distributional (equity) effects of projects, and project post-evaluation analysis.

It is recognised that project evaluation procedures will vary between jurisdictions and that in many cases procedures will be determined by central government agencies to ensure consistent investment evaluation across portfolios. For this reason the Austroads guide does not prescribe particular processes. Instead it seeks to provide guidance on good practice, a consistent approach to key data used in analysis, and state-of-the-art tools to assist practitioners.

This Austroads guide is aimed at practitioners in the roads sector. It is complementary to the National Guidelines for Transport System Management in Australia published by the Australian Transport Council, and available at: http://www.atcouncil.gov.au/documents/NGTSM.aspx (ATC 2005). The ATC National Guidelines are multi-modal in nature, with the first edition focusing on non-urban land transport planning and infrastructure investment analysis. The ATC Guidelines will be used by the Australian Government for its AusLink program. They are also expected to guide consistent practice across states and territories in multi-modal transport planning, assessment and project appraisal. The Austroads Guide to Project Evaluation and the ATC National Guidelines are complementary. Both publications are expected to improve overall practice in jurisdictions.
2 OVERVIEW OF THE PROJECT EVALUATION PROCESS

2.1 Understanding the Problem to be Solved and the Strategic Context

Solutions to transport problems need to be developed with an understanding of the nature of the particular problem being addressed and the prevailing transport policies and strategies for management of the wider transport network and services.

The specific problem being addressed must be clearly defined, preferably in consultation with stakeholders. For example:

- if it is a safety problem, it is important to research the nature of crashes contributing to the problem and then to understand the causal factors
- if it is a congestion (or travel delay) problem, it is important to understand specifically where the delays occur, how it affects and is affected by the traffic patterns on the adjoining network, and the nature of the trips being undertaken
- if it is a deficiency in transport services (e.g. public transport), it is essential to understand the existing transport demand patterns and the likely impacts if levels of service change.

It is also important that problems are analysed in the context of the outcomes sought by broader transport policies and strategies. These outcomes are usually expressed as goals that are directed towards a sustainable economic, social and environmental system – i.e. a system that benefits the generations of today without compromising the benefits to future generations.

Examining issues at the strategic level will often bring a broader view to the solutions that should be investigated, including the influence of:

- current and planned land use
- the current and planned network and hierarchy of roads
- the role of public transport and current and planned routes and services
- policies for access management, traffic management and demand management for both passengers and freight.


2.2 Establishing the Purpose of the Project and Relevant Assessment Criteria

It is important to distinguish between the purpose of a project and the other criteria which will need to be taken into consideration when evaluating alternative solutions.

The purpose of the project will usually relate specifically to the particular problem(s) being addressed. For example, the purpose may be to:

- reduce casualty crashes along a length of road, or
- reduce travel delays for a particular set of road users (e.g. freight operators, public transport passengers), or
• remove heavy truck traffic from a town centre, or
• reduce traffic and travel delays to a particular destination.

The ultimate value of the proposed solution will depend on how well it achieves the intended purpose of the project. A range of assessment criteria will usually be considered to demonstrate the value of the solution. These criteria would include descriptions (quantitative and qualitative) of project:

• benefits and costs (usually demonstrated by a carefully performed benefit cost evaluation), or
• cost options (usually demonstrated by performing a cost-effectiveness evaluation), or
• impact analysis (could include economy-wide modelling/analysis for special projects). Examples of these effects can be impacts on adjoining land use, landowners and local communities, or matters related to broader policies such as protection of flora and fauna and water quality.

The purpose of the project and the assessment criteria should generally be developed in consultation with stakeholders, i.e. transport users, adjoining landowners and local communities and interest groups. In the consultation process it is useful to consider the criteria into the three 'triple bottom line' categories of economic (financial), social and environmental outcomes and to present them in this way in the subsequent evaluation process.

Examples of typical assessment criteria that may arise out of such consultation are shown in Table 2.1.
## Table 2.1: Project assessment criteria

<table>
<thead>
<tr>
<th>Economic</th>
<th>Project cost</th>
<th>PV (present value) of project capital cost</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>PV of whole of project life cost</td>
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<tr>
<td>Benefit cost analysis</td>
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<td>PV of project benefits</td>
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<td></td>
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<td>Travel time savings</td>
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<td>VOC savings</td>
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<td></td>
<td></td>
<td>Crash cost savings</td>
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<td></td>
<td></td>
<td>Benefit cost ratio (BCR)</td>
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<td></td>
<td></td>
<td>Net present value (NPV)</td>
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<tr>
<td>Economic impacts</td>
<td></td>
<td>Agricultural property severance</td>
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<tr>
<td></td>
<td></td>
<td>Direct construction jobs created</td>
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<tr>
<td></td>
<td></td>
<td>Flow-on jobs created</td>
</tr>
<tr>
<td>Social</td>
<td>Community impacts</td>
<td>Community severance and aesthetics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Equity effects e.g. accessibility to services</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Severance of community facilities</td>
</tr>
<tr>
<td>Environmental</td>
<td>Flora</td>
<td>Impacts on indigenous species</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Impacts on grasslands</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trees removed</td>
</tr>
<tr>
<td>Fauna</td>
<td></td>
<td>Severance of indigenous species populations</td>
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<tr>
<td></td>
<td></td>
<td>Removal of habitat</td>
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<tr>
<td>Cultural heritage</td>
<td></td>
<td>Impact on Aboriginal cultural sites</td>
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<td></td>
<td></td>
<td>Impact on RAMSAR wetland</td>
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<tr>
<td>Landscape</td>
<td></td>
<td>Scenic character – ridgelines</td>
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<tr>
<td></td>
<td></td>
<td>Impact on town character</td>
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<tr>
<td>Pollution</td>
<td></td>
<td>Residences affected by noise</td>
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<tr>
<td></td>
<td></td>
<td>Impact on air quality</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Disturbance of salinity affected land</td>
</tr>
</tbody>
</table>

### 2.3 Transport Network Considerations

For transport infrastructure projects, an assessment needs to be undertaken to identify possible impacts at the network, corridor and link levels. For example, projects at the link level must consider how changes made at that level may affect the wider network.

### 2.4 Developing Possible Solutions

It is important to think broadly and creatively in developing solutions to the particular transport problem being addressed. Alternative solutions to provision of new road infrastructure might include better utilisation of the existing network by smarter traffic management or priority systems, changes to the adjoining road hierarchy, facilities to encourage or advantage different modes, or possible changes to future land use.

Potential solutions must focus on the specific problems being addressed as expressed by the project purpose. If there are other deficiencies that could be addressed concurrently, the additional facilities required should be assessed on their merits in terms of ‘incremental’ costs and benefits. Without this discipline an effective solution to the specific project purpose may result in a less efficient investment because of scope creep.
2.5 Staged Evaluation Process

A three stage assessment process is often used to ensure that (i) the investment proposals are consistent with policy and strategy, (ii) they address the project purpose/objectives and assessment criteria, and (iii) the evaluation of benefits and costs is transparent and rigorous. This three stage process is consistent with the approach used in the ATC National Guidelines (http://www.atcouncil.gov.au/documents/NGTSM.aspx). Typically, these stages are as follows:

- **Strategic alignment.** In this stage of the process alternative solutions are assessed against the project purpose and alignment with broader strategies, policies and plans. Alternatives that do not align are rejected.

- **Rapid assessment of alternative solutions.** In this stage alternatives are subjected to a 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.

- **Detailed business case.** The preferred options(s) are subject to detailed modelling and evaluation based on risk adjusted benefits and costs and detailed assessment of other potential project impacts. The results are presented in a business case for the recommended solution\(^1\).

The business case presents the necessary information required to make a decision on whether to proceed with a project. The business case should provide justification on why a project should proceed based on a range of considerations from testing for strategic fit to a thorough evaluation process. The business case may also identify the consequences of not proceeding with the project. Information that would generally be included in a business case is presented in Table 2.2.

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\(^1\) In the ATC National Guidelines these stages are discussed using the following terminology:

- strategic alignment — ‘strategic merit’ or ‘strategic fit’
- rapid assessment of alternative solutions — ‘rapid project appraisal’ (broad-brush quantitative assessment aimed at eliminating proposals that are unlikely to succeed in a detailed appraisal), ‘rapid benefit–cost analysis’ (a BCA that includes only the main benefits and costs estimated with less accuracy than would be expected for a detailed BCA), ‘options analysis’ (identification and assessment of alternative projects/solutions and variants of projects/solutions that promote the same set of objectives or address the same set of problems)
- detailed business case — ‘business case’ (a self-standing document that brings together the results of all assessments and analyses undertaken and presents in one place all the information needed to make a decision about whether or not to proceed with the proposal).
Table 2.2: Information to be included in the business case

<table>
<thead>
<tr>
<th>Topic</th>
<th>Required information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project need</td>
<td>Background and purpose</td>
</tr>
<tr>
<td></td>
<td>Alignment with government policy and strategy</td>
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<tr>
<td></td>
<td>Extent of government commitment</td>
</tr>
<tr>
<td>Performance requirements</td>
<td>Project purpose</td>
</tr>
<tr>
<td></td>
<td>Evaluation criteria</td>
</tr>
<tr>
<td>Planning process</td>
<td>Statutory process requirements</td>
</tr>
<tr>
<td></td>
<td>Consultation arrangements</td>
</tr>
<tr>
<td>Option development</td>
<td>Options appraisal and prioritisation</td>
</tr>
<tr>
<td>Scope of preferred option</td>
<td>Limit of works (or scope of service improvements)</td>
</tr>
<tr>
<td></td>
<td>Performance standards</td>
</tr>
<tr>
<td>Project evaluation</td>
<td>Risk adjusted benefit and cost</td>
</tr>
<tr>
<td></td>
<td>Economic analysis</td>
</tr>
<tr>
<td></td>
<td>Social impacts</td>
</tr>
<tr>
<td></td>
<td>Environmental impacts</td>
</tr>
<tr>
<td>Financing/funding</td>
<td>Public private partnership assessment</td>
</tr>
<tr>
<td></td>
<td>Budget funding</td>
</tr>
<tr>
<td></td>
<td>Other (developer contributions)</td>
</tr>
<tr>
<td>Project delivery</td>
<td>Current status</td>
</tr>
<tr>
<td></td>
<td>Delivery risk assessment</td>
</tr>
<tr>
<td></td>
<td>Delivery timetable</td>
</tr>
<tr>
<td>Post delivery evaluation</td>
<td>Post-completion evaluation criteria and requirements</td>
</tr>
</tbody>
</table>

An important component of the business case is the specification of requirements for any post-implementation review. The business case section on performance requirements, which sets out the objectives of the project and the project evaluation criteria, should also detail effectiveness criteria by which the project will be deemed successful in a post-completion evaluation. Further information about post-completion evaluations can be found in Part 7 of this guide.
# 3 PROJECT EVALUATION PROCESS AND THE GUIDE

The broad correspondence between the project evaluation process described in Part 1 and the structure of the *Guide to Project Evaluation* is illustrated in the Figure 3.1. The eight parts of the guide briefly introduced in Section 3 are designed to address the logic of this project evaluation process. The guidance, tools and procedures provided assist practitioners to select projects providing solutions to transport problems and to quantify and value the economic benefits and costs of these projects or programs over a multi-year timeframe. This discipline in the assessment and evaluation of projects allows agencies to target resources to maximise benefits to the public and to account for their decisions.

## PROJECT EVALUATION PROCESS FLOW

- Understand project context, undertake strategic fit, investigate and analyse options
- Undertake economic evaluation
- If required, undertake evaluation of impact on national and regional economies.
- Undertake evaluation of distributional (equity) effects
- Present evaluation results
- Implement project
- Conduct post completion evaluation

## RELEVANT PART OF GUIDE

- **Part 1: Introduction to Project Evaluation**
- **Part 2: Project Evaluation Methodology (including Risk Analysis)**
- **Part 3: Models and Procedures**
- **Part 4: Project Evaluation Data**
- **Part 8: Examples**
- **Part 5: Impact on National and Regional Economies**
- **Part 6: Distributional (Equity) Effects**
- **Part 7: Post-completion Evaluation**

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![Figure 3.1: Project evaluation process and the relevant part of the guide](image)
4 NAVIGATING THROUGH THE REST OF THE GUIDE TO PROJECT EVALUATION

4.1 Part 2: Project Evaluation Methodology

Part 2 provides guidelines for conducting benefit–cost analysis (BCA) and multi-criteria analysis (MCA) on transport infrastructure projects, policies and programs.

Its aim is to foster good practice, consistency and transparency in the evaluation of transport projects. It does so by setting out a comprehensive set of procedures and assumptions to be incorporated in all evaluations, and by recommending an accessible and standardised format for the presentation of results.

Part 2 also provides guidance on risk assessment and analysis in project evaluation. These guidelines assist the user to incorporate risk into the evaluation of investment proposals. A tool (Risk Explorer™ software) used for identifying, assessing and analysing risks related to uncertain factors impacting on project benefits and costs is included to help the practitioner perform a risk assessment and analysis.

Part 2 is applicable to most projects requiring evaluation, but excludes the following classes of project that raise methodological problems that should be left to specialists: (1) very large projects with complex impacts; and (2) public-private partnerships type projects that require a kind of accounting-based analysis known as financial analysis.

Worked examples illustrating the procedures contained in Part 2 are provided in Part 8.
4.2 Part 3: Models and Procedures

Part 3 provides guidance on models and procedures used for economic evaluation. It presents a summary account of activity in the area of project evaluation tools and presents a guide to major sources of information from recent research and development work.

The distinction is drawn between rural project evaluation procedures and urban (network) procedures, given that different applications have been developed to deal with these contexts.

4.3 Part 4: Project Evaluation Data

Part 4 presents a range of Austroads information relating to project evaluation inputs. This part provides a source of information on unit costs, and other inputs/parameters which can be used in road project evaluation activities. A wide range of unit values is needed to evaluate all benefits and costs in project evaluation applications, as described in Part 2.

4.4 Part 5: Impact on National and Regional Economies

Part 5 provides a guide to the conditions under which the use of economy-wide models in project evaluation is appropriate and how they can be applied.

Major transport infrastructure projects often significantly alter the economies of regions in which they are located and, if large enough, the national economy as well. These effects may not be fully captured by standard benefit-cost analysis evaluations. One method of estimating economic impacts of large transport infrastructure projects is the use of economy-wide type models. A class of model known as 'computable general equilibrium' (CGE) has been extensively used to analyse economy wide impacts.

4.5 Part 6: Distributional (Equity) Effects

Part 6 helps the practitioner to evaluate the distributional (equity) impacts of transport projects, i.e. the winners and losers of projects, and how these impacts can be traded with efficiency gains.

The procedures/processes provided help the decision-maker to consider distributional effects of projects as part of the project evaluation process by comparing sets of efficiency outcomes of projects with desired social (equity) outcomes.

An Equity Explorer™ software tool is provided as an integral component of Part 6.

4.6 Part 7: Post-completion Evaluation

Part 7 provides guidelines for carrying out evaluation of completed transport projects to assess actual performance against stated objectives.

A post-completion evaluation is the final step in project evaluation, and provides feedback on evaluation methodologies, efficiency of implementation and how effectively the project met its objectives.

4.7 Part 8: Examples

Part 8 consists of worked examples illustrating the types of projects and analytical problems that practitioners are likely to encounter. Each worked example is presented in a standardised format broadly replicating the structure of the project evaluation guidelines contained in Part 2.
These examples are characterised in terms of dummy (default) numbers, and their performance is calculated on the basis of those numbers. Each worked example is accompanied by an interactive spreadsheet showing how the computations are conducted. This means that the practitioner can replace the default values of a particular example with his/her project data to obtain a quick view of their example results.
BIBLIOGRAPHY


Austroads 2001a, *Australian and New Zealand Road System and Road Authorities National Performance Indicators*, AP-43/01, Austroads, Sydney, NSW.


COMMENTARY 1 TRIPLE BOTTOM LINE

In setting assessment criteria for project evaluation it is useful to consider the criteria under three categories, i.e., economic (financial), social and environmental. ‘Triple bottom line’ has become a commonly used phrase to describe these categories (Tsolakis, Rockliffe and Patrick, 2003).

Triple bottom line (TBL) as a concept emerged from the private sector where public awareness and interest in social and environmental issues, demand for transparency, ethical investment funds and more rigorous legislation have had an impact on the way companies operate. In the private sector the three bottom line dimensions typically refer to financial, social and environmental implications. The terminology is different in the public sector with the ‘financial bottom line’ replaced by the ‘economic bottom line’. This can cause some confusion in the public sector because economic evaluations may include some environmental and social aspects. For example, increased public safety may be considered both an economic and a social outcome.

A well designed economic evaluation should consider all key quantitative and qualitative impacts of projects. BCA is the technique most commonly used to undertake economic evaluation. MCA is also used where project performance is not measured in single monetary values but on the basis of performance against multiple assessment criteria. These criteria may include qualitative measures of social or environmental impacts. Transport agencies are also required to complete social impact assessments and environmental impact assessments under legislative requirements. These evaluations will often complement BCA and MCA evaluations of projects.

TBL is more of a philosophy that influences the planning stages of project evaluation rather than a new approach or methodology. As such the TBL concept is discussed in more detail in the Austroads Guide to Road Transport Planning. People attempting to develop triple bottom line evaluation frameworks (tools) should note the similarities to existing evaluation methods, in particular, multi-criteria analysis (MCA). However, TBL developments may be a catalyst for improving the practices of benefit cost analysis (BCA) and better relating BCA and associated MCA principles in project evaluation applications. TBL will help most by imposing consistency in the reporting of project performance.

An additional uncertainty created by the TBL concept relates to the definition(s) of the ‘social’ bottom line that commonly mixes the economic impacts of projects on the community with the distributional impacts of projects. While the former are part of a BCA or MCA process and have an objective of maximising the efficiency of project investments, the latter are concerned with equity impacts (winners and losers of projects). A different set of principles/procedures and tools would be required to simulate equity trade-offs of projects. As presented in Part 6 of the Guide these tools would help the decision maker to consider distributional effects of projects as part of the project evaluation process by comparing sets of efficiency outcomes of projects with social trade-offs.
COMMENTARY 2 TRANSPORT NETWORK CONSIDERATIONS

Inadequate consideration of broader network requirements and impacts is a common deficiency in project evaluation. It is important to consider more than just the effect a project may have on the immediate links and intersections. Attention should also be given to the interactions that produce a well functioning, integrated transport system as a whole. Transport infrastructure needs and deficiencies need to be explored at the network, corridor and link levels.

**Network level** – the transport network for major transport movements across a region or city, providing for freight movements, on-road public transport users and motorists travelling for business, shopping, social and other purposes.

**Corridor level** – corridors provide for movement between two major destinations. Corridors generally incorporate facilities for alternative modes of transport. An example is a corridor between two major urban centres. On-road vehicles (cars, freight, buses), trains, and cyclists/walkers all require links to get between the two major centres, as well as a network to facilitate east-west journeys to local areas or minor nodes in the corridor.

**Link level** – these are individual links within networks or a corridor. Links are often discussed in terms of what is required to make the network more efficient.

Planning at the link level must consider the needs of the wider transport network and how changes made on the link level affect the wider network. Equally, strategic network planning must consider the effects on smaller scale networks and corridors.

For example, consider issues such as:

- Are there any other planned projects that will have an effect on this project, or vice versa? Benefits from a road duplication project may be greatly diminished if another major arterial is to be upgraded within close proximity.

- Will changes at one location cause adverse effects at other locations (such as increased congestion)? Care must be taken not to shift problems to another part of the network.

- Changing the characteristics of a road may have a significant impact on neighbouring development and land-use. For example, building freeways may divert significant volumes of traffic away from arterial roads with abutting retail development thereby affecting exposure of traders whereas, increasing the capacity of a road with abutting retail areas may encourage higher speed travel through the area to the detriment of the retail sector.

- The development of one modal link in a corridor may affect the number of trips on another modal link. This effect may be positive or negative, but needs to be understood.

The inter-relationship between network, corridor, link and project levels and planning has been also discussed in greater detail in the *National Guidelines for Transport System Management in Australia* (http://www.atcouncil.gov.au/documents/NGTSM.aspx).
COMMENTARY 3 DEVELOPING POSSIBLE SOLUTIONS

It is important to consider non-infrastructure solutions to needs and deficiencies as well as solutions that improve infrastructure capacity. With limited options to improve capacity in developed urban areas demand may need to be managed by influencing travel mode and behaviour. A range of techniques for managing travel demand should often be considered in developing options.

Travel demand management (TDM) is a means of moderating road traffic growth and reducing traffic congestion, noise and vehicle emissions. TDM measures seek to broaden thinking to recognise and consider available choices and change present patterns of car use. For example, typical TDM methods include considering vehicle occupancy, technological change, parking limitations, or road pricing.

Some possible solutions for addressing identified needs and deficiencies in the transport system are outlined in Table C3 1. As shown, there is a range of solutions that have different costs and benefits over varying periods of time.

<table>
<thead>
<tr>
<th>Table C3 1: Possible solutions to address deficiencies in the transport system</th>
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<tbody>
<tr>
<td><strong>Manage land use</strong></td>
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<tr>
<td><strong>Influence travel demand</strong></td>
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<tr>
<td><strong>Manage operations on existing infrastructure</strong></td>
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<tr>
<td></td>
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<tr>
<td><strong>Provide necessary new infrastructure</strong></td>
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<td></td>
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<tr>
<td><strong>Consider different modes</strong></td>
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