

## **Environmental Sustainability Considerations in the Framing of the Eddington Review/East West Link Needs Assessment Recommendations**

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### **ABSTRACT**

The recently released Victorian Transport Plan constitutes a significant departure from previous Victorian transport strategies in the integrated approach taken to the development of the public transport system, road network enhancement and upgrade of cycling and pedestrian facilities, combined with measures to reduce transport impacts on both the environment and communities. A key influence of this progressive approach was the Eddington Review, released in 2008 and the associated East West Needs Assessment, conducted for Sir Rod Eddington by the Department of Transport (DoT) and its consultants.

This paper describes the environmental and sustainability study conducted for the East West Needs Assessment by consultants Sinclair Knight Merz, in association with Maunsell. The principal role of the study was to provide a strategic evaluation of environmental issues associated with the range of options under consideration to enhance east-west transport linkages in Melbourne. The study also provided input to the DoT study team on sustainability factors to be considered in the formulation of options and developed a sustainability assessment framework that was applied to the assessment and short-listing of identified road network development and public transport system initiatives.

The paper focusses on the sustainability aspects of the study. Strategic sustainability factors explored early in the study process meant that climate change and greenhouse issues were comprehensively assessed and considered in the formulation of the East West Needs Assessment recommendations. A sustainability assessment framework also assisted in the analysis of options from a triple bottom line perspective.

The study recommendations comprised a balanced set of transport initiatives, featuring significant rail infrastructure development proposals, a road tunnel proposal to reduce Melbourne's reliance on the Westgate Bridge and to improve access to the Port of Melbourne, measures to enhance the efficiency of the existing rail, tram, bus and road networks and measures to reduce the impacts of freight movements in residential areas. The recommendations also highlighted the need to reduce GHG emissions from transport, including adoption of more stringent vehicle emission standards and examination of ways to ensure that sustainable transport modes of travel (such as trams, cycles and pedestrians) benefit from the additional capacity provided by recommended road projects.

### **INTRODUCTION**

In June 2007, Sinclair Knight Merz, in association with Maunsell, was commissioned by the Department of Transport to advise on environment and sustainability factors for the Sir Rod Eddington-lead East West Link Needs Assessment (EWLNA). EWLNA was an independent investigation into the best transport solutions for connecting Melbourne's eastern and western suburbs. At study commencement, there was a perception in some quarters that the study would focus on a freeway connection between the Eastern Freeway, CityLink and Melbourne's western suburbs, following earlier debate about the need for such a road to close a gap in Melbourne's freeway network.

The primary purpose of the Environment and Sustainability study was to carry out a strategic evaluation of environmental issues associated with the range of options under consideration by Eddington and the DoT study team. The environmental team also provided input to the DoT team on environmental sustainability drivers to be considered and a recommended approach to the assessment of options by way of a sustainability assessment framework.

The SKM/Maunsell team focused on environment and sustainability. Other consultants investigated economic, social, transport planning, modelling and design issues, with coordination and integration undertaken by the DoT study team. The study was completed over a nine month period between June 2007 and February 2008, with the public release of the Eddington Report (*Investing in Transport – East West Link Needs Assessment*) in March 2008.

The paper is arranged to firstly describe the approach taken to the three phase study and the study outcomes (Section 2), with subsequent sections focussing on the sustainability aspects of the study and the way that sustainability factors were considered in the framing of the final study recommendations. Specific aspects covered in these sections include:

- Sustainability drivers that were explored (Section 3)
- Transport/GHG emission links and abatement opportunities (Section 4)
- The sustainability framework and its application (Section 5).

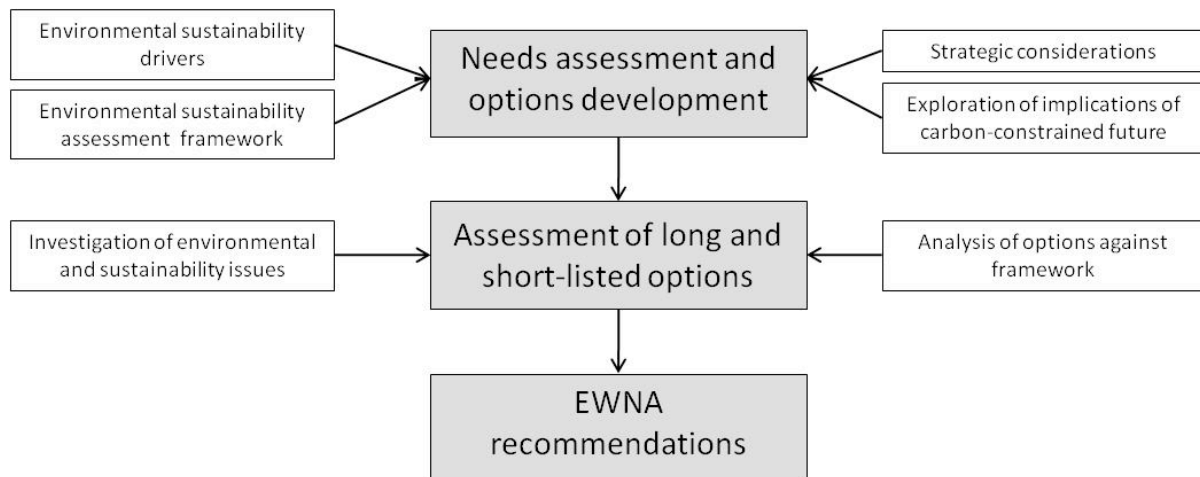
Section 6 draws together the main conclusions.

## **STUDY APPROACH AND OUTCOMES**

The three phases of the study are shown in the central column of Figure 1, with the inputs of the environment and sustainability team shown on either side. A key feature of the approach was the way that environmental and sustainability factors were considered progressively during each phase of the study.

The following investigations in *Phase 1 – Needs Assessment and Options Development*, guided the generation of an initial long list of options:

- Environmental sustainability drivers – key influencing factors were identified as climate change and the need to reduce transport-related greenhouse gas (GHG) emissions, maintenance of biological diversity and preservation of heritage values;
- Strategic considerations – strategic factors analysed for the Needs Assessment included the likely implications of Melbourne's strong economic and population growth on travel demand (including freight volumes), the change in travel patterns due to the shift to a services economy, the link between a connected transport network that supports business and commercial travel and economic prosperity, the importance of a well-connected Melbourne CBD to Victoria's prosperity and the need for transport initiatives to support the strong population growth occurring in Melbourne's west.
- Environmental Sustainability assessment framework – an analysis of sustainability and strategic drivers informed the development of an assessment framework based on sustainability principles and comprising a hierarchy of goals, objectives, criteria and influencing factors.
- Exploration of implications of a future year Basecase and an alternative carbon-constrained future – as well as analysing a 2031 Basecase based on a continuation of current trends, the study also modelled an alternative scenario that incorporated the possible results of the introduction of an emissions trading scheme in Australia. This was done to check the sensitivity of the Basecase projections to this changed context.



**Figure 1- Scope of the environment and sustainability study**

A key finding of the Phase 1 work was that the 2031 Basecase (based on continuation of current trends) was predicted to result in a significant increase in private vehicle travel and associated GHG emissions, at a time when Governments are striving to contain or reduce economy-wide GHG emissions. This prompted additional analysis of contributing factors to the projected increase and identification of potential abatement initiatives for the Eddington Review to consider.

The Environmental Sustainability assessment framework was then applied in *Phase 2 – Assessment of Long and Short-listed Options*, in conjunction with investigation of environmental and sustainability factors relevant to the options under consideration. The process involved initial mapping of environmental constraints and opportunities over the corridor, generation of an initial long list of options taking into account identified constraints and the Phase 1 Needs Assessment, a rapid assessment of long listed options via a team workshop, followed by further analysis and reporting of the impacts of short-listed options.

Outcomes of Phases 1 and 2 were then considered by Eddington and the DoT team (Phase 3) in the framing of the recommendations included in *Investing in Transport*. Study team activities in this phase comprised responding to DoT queries and documenting the final report. The outcome was a set of twenty recommendations, comprising:

- Enhanced public transport infrastructure, including a Metro rail tunnel, bringing forward of the Regional Rail project, enhanced capacity of the existing rail network through electrification of the Sunbury line, introduction of an upgraded DART bus service to Doncaster, escalated implementation of tram and bus priority measures and development of park and ride facilities
- Staged construction of a new cross city road connection to provide an alternative to the Westgate Bridge for east west traffic and improved freight access to the Port of Melbourne
- Implementation of a Truck Action Plan to remove truck traffic from local streets in the inner west and the introduction of high productivity freight vehicles on designated routes
- Improved cross city cycle connections
- Initiatives to increase rail's share of freight
- A recommended 'corridor' approach to planning and delivering the projects and re-evaluation of current road tolling policy to ensure that opportunities to capture the benefits of new road capacity (eg on-road public transport, cycling and pedestrians) can be realised

- Recommendations to bring Australia into line with European CO<sub>2</sub> emissions standards for motor vehicles and development of a strategy for increasing the proportion of low emission, efficient vehicles operating in Melbourne.

These recommendations were considered by the Victorian Government in the development of the *Victorian Transport Plan*, released in December 2008. The Plan incorporates all significant Eddington recommendations in a \$38B package of public transport system development, road network enhancement and upgrades of cycling and pedestrian facilities.

## ENVIRONMENTAL SUSTAINABILITY DRIVERS

As part of the Needs Assessment (Phase 1), the environmental team considered how the terms *Sustainable Development* and *Sustainable Transport* could be applied to this study. In particular, the range of transport initiatives requiring consideration and how those initiatives should be assessed from a sustainable development perspective.

### Sustainable Development

The study team examined various definitions of sustainable development, as outlined below.

The concept of sustainable development was originally defined in 1987 by The World Commission on Environment and Development as '*development that meets the needs of others without compromising the ability of future generations to meet its own needs*'.

Within Australia, the Federal Government defined the concept of sustainability in 1992 through three core objectives contained within the National Strategy for Ecologically Sustainable Development. The objectives related to enhancing well-being through economic development, providing equity within and between generations and protecting biological diversity and maintaining essential ecological processes.

A systems-based approach to sustainability focusses on:

- Sustaining (maintaining) valued aspects of the economy, society or natural environment
- Achieving genuine progress by improving the quality of life, locally and globally
- Ensuring that there are no major tradeoffs across the triple bottom line
- Achieving win-win outcomes.

For EWLNA, compatibility of options with sustainable development principles was determined by combining the triple bottom line and systems approaches into a framework that comprised a hierarchy of performance-based goals, objectives and criteria.

### Sustainable Transport

Following the 1992 Rio Conference, there have been numerous attempts to incorporate the core principles of sustainable development in conceptualisations of sustainable transport, also referred to as sustainable mobility. These various approaches to defining sustainable transport were examined to provide guidance to the DoT study team.

A common approach to defining sustainable transport is provided by the New Zealand Ministry for the Environment. The Ministry's definition focusses on finding ways to move people, goods and information that reduce impacts on the environment. Examples cited include:

- Improving transport choice through enhanced public transport and cycling facilities
- Improving the efficiency of car use, such as using more fuel efficient vehicles
- Using cleaner fuels and technologies
- Using telecommunications to reduce or replace physical travel.

While definitions such as this are useful in identifying specific initiatives that individually could lead to more sustainable outcomes, they do not address the efficiency of the overall transport system from a true triple bottom line perspective, including consideration of the economic

efficiency of business and freight travel around a city and social equity implications. The common premises are that investment in public transport will automatically lead to a more sustainable system and that road network development is not consistent with sustainable transport. This tends to perpetuate the '*road versus public transport*' debate that frequently appears in the media.

For EWLNA, a '*road versus public transport*' approach was avoided. The study looked to identify the combination of modes that were best suited to meeting Melbourne's east-west transport needs over the next 30 years, while taking environmental, community and economic implications into account. Therefore the approach encompassed analysis of the full suite of transport needs (peak hour/off peak travel, business travel/ private travel, freight movements etc), with consideration of the triple bottom line (economic, environmental and social) implications.

This approach is consistent with that articulated by the Massachusetts Institute of Technology, where sustainable transport is defined using the TBL approach of environment, economy and equity/society/employment.

## **TRANSPORT/ GHG EMISSION LINKAGES AND ABATEMENT OPPORTUNITIES**

### **Transport/ GHG Linkages**

#### **Literature Review**

The analysis of sustainability drivers, and emerging Government GHG targets, prompted the team to further analyse the linkages between transport and GHG emissions. This involved reviewing available literature and examining how GHG emissions from transport in Melbourne could change under current Government policy and trends. The aim of this analysis was to identify opportunities for the EWLNA study recommendations to contribute to moderation of projected GHG emissions from transport within the study area.

Key findings of the literature review were:

- In 2005 transport generated 17% of total Victorian GHG emissions, with road transport contributing 90% of transport emissions
- GHG emissions from the transport sector in Australia grew by 28% between 1990 and 2004 and it is estimated that the growth of GHG emissions from transport from 1990 to 2020 will be 60.5% (AGO, 2006b) – road freight vehicles and air transport are predicted to be increasingly significant contributors to this predicted rise in emissions.

#### **Analysis of 2031 Basecase**

Following this literature review, the study team analysed a 2031 Basecase. The Basecase comprised the existing transport system and committed transport projects, as detailed in *Meeting Our Transport Challenges (MOTC)*, set in the context of land use, employment and economic forecast patterns that had been developed by government agencies reflecting current Government policy. The Basecase also made 'continuation of current trends' assumptions regarding travel behaviour, vehicle efficiency and technology enhancement etc.

The Basecase did not consider the effect that such factors as peak oil, emissions trading and heightened community awareness of the threat posed by climate change may have on changes to travel behaviour, travel demand management and accelerated introduction of substantially more efficient vehicles. These factors were considered in a 'carbon-constrained' scenario detailed in Section 4.1.3.

Under the Basecase assumptions noted above, the number of daily trips in Melbourne are predicted to increase from 13.5 million to around 19 million trips (representing a 34% increase) between 2005 and 2031, with an additional 3 million car trips every day. With the public transport enhancements included in MOTC, over 90% of the total travel task in

Melbourne is predicted to continue to be taken by cars. The Basecase analysis also predicted a 50% increase of freight trips by 2031.

These changes are predicted to result in an increase of transport-related GHG emissions in Melbourne by 39% between 2005 and 2031. Contributing factors were identified as:

- Strong anticipated growth in population and economic activity
- More widely dispersed jobs throughout the suburbs
- Continued strong growth in corridors on Melbourne's fringe under Melbourne 2030
- Reduced car occupancy rates arising from decreasing average household size
- Growing car ownership
- Increased demand for just-in-time and door-to-door freight services.

This scale of predicted GHG emissions is predicted to occur in many developed and developing countries, as examined in the '*Mobility 2030: Meeting the Challenges to Sustainability*' report (World Business Council for Sustainable Development, 2004). The Mobility 2030 report concluded that the way people and goods are transported today is not sustainable if the present trends continue. The study proposed seven goals that, if achieved, would improve the prospects for sustainable mobility, including:

- Application of vehicle technologies and transport fuels to be building blocks of sustainable mobility, including hybrid-electric propulsion systems, fuel cells, biofuels, hydrogen, lightweight vehicles and intelligent transport system technologies
- Measures to reduce the total volume of transport activity performed
- Enhancement of the portion of the transport task taken by public transport through adoption of integrated transport and land-use strategies.

The inconsistency between projected transport-related GHG emissions under the Basecase and emerging GHG reduction targets was highlighted. Further analysis was then undertaken of available GHG abatement initiatives, as reported in Section 4.2.

### **Implications of a Carbon-Constrained Future**

Future travel patterns in Melbourne in a '*carbon constrained*' world were modelled in order to understand what changes a carbon price may have on travel behaviour, compared with the Basecase situation. This was done to evaluate whether the introduction of the planned emissions trading system (ETS) in Australia would avoid the need for other measures to be introduced to reduce GHG emissions from transport.

Assumptions incorporated into the '*carbon constrained*' scenario included doubling of the cost of private travel relative to other household expenditure items, a 25% decrease in the cost of public transport and significant increase in city density.

Modelling of this scenario, and comparison with the 2031 Basecase, revealed:

- 6% moderation in the growth predicted for private vehicle trips
- 6% increase in public transport mode share
- 19% reduction in kilometres of travel by increasing city density.

However, the overall number of car trips taking place each day in Melbourne in 2031 would still be nearly 2 million more than today (compared with the 3 million additional car trips per day predicted under the Basecase) largely due to projected population growth. Under this scenario, only a relatively small moderation of projected GHG emissions would be achieved indicating that the introduction of a carbon price in the transport sector is unlikely to be sufficient by itself to result in reductions consistent with emerging GHG targets. This led to further analysis of other complementary GHG abatement measures.

### **Identification of GHG Abatement Opportunities**

Work undertaken by SKM and the Nous Group for Victoria's Office of Climate Change (SKM, 2008) identified that the initiative likely to have the greatest influence on moderating the

predicted short to medium term increases in transport-related GHG emissions is improved fuel and vehicle efficiency. Other important initiatives identified were:

- Travel demand management
- Increased vehicle occupancy
- Mode shift to public transport.

The likely effectiveness of each of these initiatives was then analysed to inform the EWLNA recommendations.

#### *Improved fuel and vehicle efficiency*

Improving fuel efficiency was identified as by far the most effective way to reduce emissions from transport, provided that current barriers to increased market penetration of fuel efficient vehicles are overcome eg behaviour changes, FBT and tariff arrangements.

A 30% improvement in fuel efficiency between 2010 and 2022, increasing to 60% through to 2034, would lead to a 10% saving in Victoria's projected 2050 GHG emissions. The quantity of GHG abatement achieved with these efficiency improvements is indicated in the wedge depicted in Figure 2.

#### *Travel demand management*

Current demand for travel is estimated at about 3.7 trips per head of population per weekday. Reducing this to about 3.2 through behaviour change programs (eg Travel Smart), awareness/education programs and increased transport pricing could achieve a 10% reduction in private vehicle use over the next 10 years, leading to a saving a 2% of Victoria's GHG emissions by 2050. Longer term savings could be achieved through higher density development and action to promote a more compact Melbourne.

#### *Increased vehicle occupancy*

Car occupancy has been declining due to such factors as dispersed origins and destinations, reduced household sizes and rising vehicle ownership levels. The opportunity exists to reverse this trend through Travel Smart programs to promote car pooling. Initiatives include introduction of transit lanes and information/education. A 10% reduction in private vehicle use would translate into a 1.4 Mt reduction by 2050 (1% of Victoria's GHG emissions).

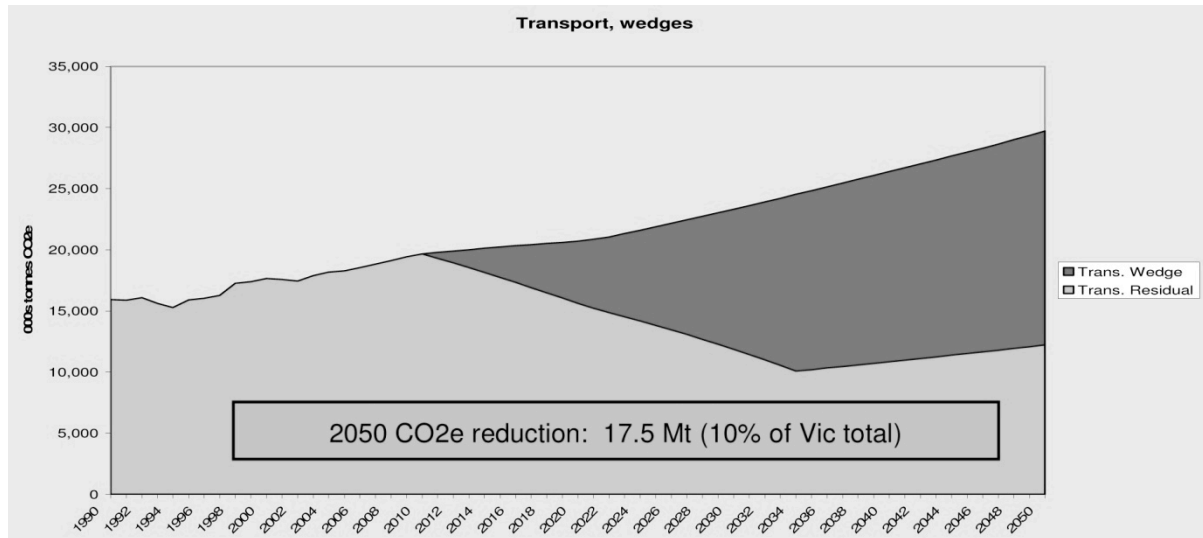
#### *Mode shift to public transport*

On a daily basis in Melbourne, around 78% of trips are by car, 7% by public transport (train, tram or bus) and 15 % by walking or cycling. A 10% shift of private passenger transport to public transport, accompanied by a 1% shift in road freight to rail, is estimated to achieve a 1.5 Mt saving, representing a 1% reduction in Victoria's GHG emissions by 2050.

While this shift would have substantial economic benefits through reduced congestion, the result highlights the further changes required for mode shift to public transport to contribute significantly to moderated GHG emissions from transport. A very significant enhancement of public transport services is required, accompanied by a concerted education program to drive behavioural change in Melbourne, well beyond the business as usual assumptions, in order to achieve the Government's target of 20% public transport mode share by 2020.

The key conclusion from this analysis was that implementation of the suite of initiatives is required to achieve a substantial moderation of projected Basecase GHG emission increases. In assessing the transport options proposed, their consistency with these initiatives was incorporated into the sustainability assessment framework and analysed. While improved fuel and vehicle efficiency is independent of the options, travel demand management, increased vehicle occupancy and mode shift to public transport could all be influenced (to varying degrees) by the options. The way these factors were incorporated into the assessment framework is explained in Section 5.

The fuel and vehicle efficiency initiative provides the most significant short to medium term abatement opportunity and was an important recommendation of the Eddington Report.



**Figure 2: Abatement Wedge – Improved Fuel and Vehicle Efficiency**

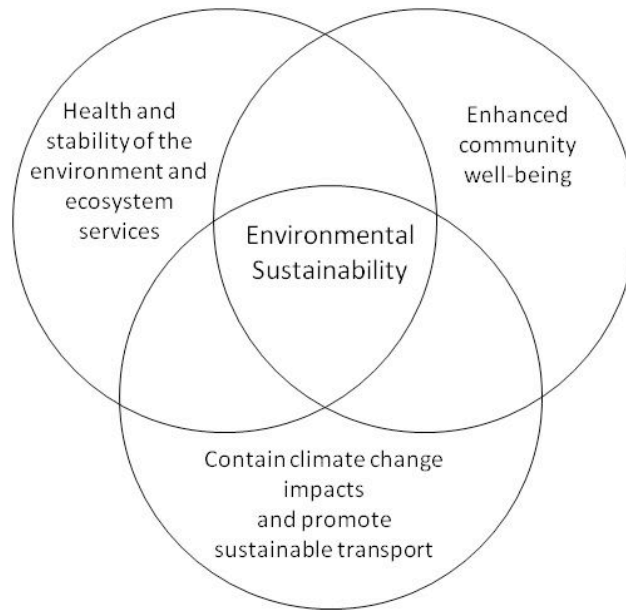
## SUSTAINABILITY ASSESSMENT OF OPTIONS

### Assessment Framework

From the consideration of sustainable development drivers and the Basecase analysis, an evaluation method was proposed that comprised a triple bottom line framework of goals, objectives across economic, environmental and social sectors.

The goal of *'Contribute to the target of containing climate change impacts and promoting sustainable transport'* was identified as one of three over-arching environmental sustainability goals, as indicated in Figure 3. These environmental sustainability goals were combined with goals identified by the Economics and Social teams to provide an overall assessment framework.

With the sustainability focus of this paper, only the *'Contain climate change impacts and promote sustainable transport'* goal is reported here. The objectives and criteria identified for the climate change goal are shown in the table below.



**Figure 3: Environmental Sustainability principles**

Influencing factors in achieving the environmental sustainability goals were identified as:

- Enhanced transport system efficiency – the extent to which the option contributes to improved connectivity (road, public transport, cycling and pedestrians) and reduced congested/stop-start conditions
- Mode shift to public transport, walking and cycling – opportunities provided by the option to improve transport choice by increasing the quality of public transport, cycling and walking facilities and the service they offer
- Consistency with travel demand management initiatives – the extent to which the option is complementary to existing and proposed travel demand management programs.

Compliance with the above criteria would be expected to result in reduced consumption of fossil fuels and reduced greenhouse gas emissions from transport over the affected area. The consistency of the option under consideration was scored on a ratings system between +3 (high consistency) and -3 (low consistency). The initial unweighted scores were then weighted, taking into account the relative importance of the various goals and objectives, as determined by a combined study team/DoT workshop.

Results of the *climate change* objective were combined with the outcomes of similar assessments undertaken for the *health and stability of the environment and ecosystem services* and *enhanced community well-being* objectives to give an *environmental and sustainability* score for each option. These scores were then combined by the DoT study team with outcomes of similar assessments by the Economics and Social and Community teams and fed into the identification of recommended initiatives.

Contribute to target of containing climate change impacts and promoting sustainable transport	Efficient Use of Resources	<ul style="list-style-type: none"> <li>▪ Enhanced transport system efficiency</li> <li>▪ Increased mode shift to public transport, walking and cycling</li> <li>▪ Consistency with travel demand management initiatives</li> </ul>
	Reduce energy use and greenhouse gas emissions	<ul style="list-style-type: none"> <li>▪ Reduced consumption of fossil fuels</li> <li>▪ Reduced CO2 emissions of transport over the study area</li> </ul>

## Options Considered

Four alternative transport packages were assessed, with each package comprising a different degree of road network development to accompany a common set of public transport initiatives. The common public transport initiatives featured:

- CBD metro rail tunnel from Tottenham to Caulfield station, linking Melbourne's western and south-eastern suburbs
- An enhanced Doncaster Area Rapid Transport (DART) bus service featuring bus priority measures into the CBD
- Tarneit Rail line from west of Weribee to Deer Park (Regional Rail).

Option A combined these public transport initiatives with an East West road connection from Eastern Freeway to West Gate Freeway (featuring improved road access to Port of Melbourne) and a package of freight network connectivity enhancements (including measures to reduce freight traffic impacts in Footscray).

Option B combined the common public transport initiatives and freight initiatives with an East West road connection from Eastern Freeway to Western Ring Road, while the road network development in Option C was limited to an upgrade of the existing road system, largely through widening of existing roads. Option D focussed on the public transport and freight enhancements of Options A and B, without any upgrading of the road network.

## Sustainability Assessment

For the goal of '*Contain climate change impacts and promote sustainable transport*', each package was assessed against the following objectives:

### *Enhanced transport system connectivity*

Options with significant public transport system initiatives (rail and bus) and enhanced road network connectivity were rated highly for this objective. The CBD rail tunnel (all options) is the critical foundation infrastructure for further rail network improvements, including enhanced rail services from Melbourne's western suburbs. The Tarneit Rail Link from Werribee to Deer Park also rated highly, as did the Doncaster Rapid Transport.

Projected Basecase traffic congestion would be alleviated by the enhanced road network connectivity of Options A and B in particular, and to a lesser extent, the road network upgrades associated with Option C:

- Option A provides the most enhanced road network connectivity by linking of three existing freeways – Eastern Freeway/City Link/Westgate Freeway, as well as Improved access for freight vehicles to the Port of Melbourne
- Option B also enhances road network connectivity, linking the Eastern Freeway/City Link/ Sunshine Road/Western Ring Road, and enhanced access to the Port of Melbourne
- Option C comprises an upgrading of the existing road network that is expected to alleviate some Basecase traffic congestion, without the gains in connectivity of either Options A or B.

Option D traffic congestion would be very similar to the Basecase and road network connectivity would not change.

### *Increased use of Public Transport, Walking and Cycling*

Factors considered in assessing consistency with this objective included:

- Encouragement of public transport use due to public transport enhancements – the CBD metro rail tunnel project rated highly due to its significance as a critical foundation infrastructure for further rail network improvements, including enhanced rail services from Melbourne's western suburbs

- Opportunities to capture 'freed up' road space for enhanced on-road public transport, cycling and pedestrian facilities were analysed – road network initiatives that diverted high traffic volumes (private vehicles and freight) into tunnels rated highly in this category
- The extent to which local benefits to public transport, pedestrians and cyclists would be offset by the effect that the road network development initiatives would have in making driving more competitive against both public transport and cycling, particularly for longer, peak hour commuter journeys
- The assessment recognised that this effect could be minimised by the immediate introduction of public transport, cycling and high occupancy vehicle initiatives that capture the 'freed up' road space
- The assessment also considered how options that did not relieve road congestion would maximise the comparative advantage provided by public transport enhancements, but could disadvantage on-road public transport, pedestrian and cycling conditions eg the no build options.

Options A and B provide significant opportunities to enhance local public transport (eg trams), as well as improved pedestrian and cycling facilities and linkages in areas where high traffic volumes would be diverted into tunnels. This applies, for example, in areas adjacent to Alexandra Parade, where a proportion of projected traffic would be diverted into a tunnel, with flow-on benefits for both Alexandra Parade and adjoining local roads, providing the opportunity for enhancement of pedestrian and cycling facilities, as well as reduced travel times for north- south tram services. The upgrade of Ballarat Road in Option A also provides an opportunity to enhance this road as a cycle link.

Local benefits to public transport, pedestrians and cyclists provided by Options A and B have the potential to be offset by the effect that the road network development initiatives would have in making driving more competitive against both public transport and cycling, particularly for longer, peak hour commuter journeys. This potential effect would be minimised by additional measures to capture the opportunity presented by 'freed up' road space by introducing further public transport, cycling and high occupancy vehicle initiatives.

The absence of significant new road infrastructure in Options C and D means that predicted Basecase traffic congestion levels will remain, maximising the comparative advantage provided by the public transport enhancements (particularly the rail initiatives). However, on-road/local public transport, pedestrian and cycling conditions would be disadvantaged by congestion levels similar to the Basecase, without the prospect of reduced traffic volumes.

#### *Consistency with travel demand initiatives*

Assessment in this category considered the extent to which road and public transport network development initiatives could result in increased overall travel, particularly discretionary trips. Factors potentially contributing to increased travel include:

- Route shift – motorists may change the route of their journey to take advantage of the improved travel conditions offered by the new facility. This can lead to increased vehicle kilometres of travel
- Transport mode shift – travellers may shift from public transport to private vehicle travel
- Change of destination choice – this may lead to an increase in vehicle kilometres of travel
- Newly generated trips – this category comprises trips taken that were previously considered not to be worthwhile (first order effect) and trips generated by changes to land use patterns (second order, longer term effect).

While Options A and B represent a balanced approach to transport system development, the significant road network development initiatives (and to a lesser extent the public transport initiatives) of both options has the potential to increase overall travel, particularly

discretionary trips. Potential increases in travel demand would be moderated by effective implementation of travel behaviour change programs. It is anticipated that Option C would only have a minor effect on travel demands, while travel demand for Option D would be as for the Basecase.

Overall, all options recorded a small overall positive rating for the *climate change* goal, compared with the Basecase. This indicated that the packages assessed were found to result in a small, but beneficial, impact on GHG emissions, compared with the Basecase. When weightings were applied to the assessment criteria, environmental sustainability emerged as the most influential factor, consistent with the strategic purpose of the study. The weighting process placed a strong emphasis on potential long term/irreversible environmental implications as an important strategic consideration.

Application of the weightings meant that the environmental sustainability ratings accorded to Options C and D represented the highest positive, individual scores. The positive scores for Options C and D were due to the significant public transport initiatives they contain and the comparative advantage afforded to those initiatives over private vehicle travel through the absence of major new road infrastructure. The economic and social implications of the continuation of Basecase levels of road congestion were considered separately in the Economic and Social appraisals (conducted by other consultants).

### **'Investing in Transport' Recommendations**

As indicated in Section 2 of this paper, the final Eddington report recommended twenty initiatives, comprising:

- Six public transport initiatives, including two major new rail infrastructure projects
- Five initiatives associated with increasing rail's share of freight and reducing community impacts of road freight movements
- One cross city road connection that facilitates improved access to the Port of Melbourne
- One recommendation to improve cross city cycle connections
- One land use initiative
- Two recommendations for reducing emissions from vehicles
- A road tolling recommendation
- Three recommendations focusing on efficient implementation, including a corridor approach to planning of the recommended projects.

The final Eddington report doesn't explain the role of the assessment framework in the formulation of these recommendations. However, it is apparent that the progressive consideration of sustainability factors in each phase of the study resulted in a final report that thoroughly considered all relevant environmental, community and economic factors. Further, the recommendations reflect the longer term sustainability factors explored during the study, far removed from initial perceptions of the study as focussing on single mode (ie road) solutions.

## **CONCLUSIONS**

The Environment and Sustainability study played an important role in highlighting the key sustainability factors for the Eddington study team to consider in each phase of the study. An overarching outcome was that the study progressed from having a perceived single mode (ie road) focus to a comprehensive analysis of multi-modal approaches to enhancing Melbourne's east west transport connections.

The study recommendations comprised significant rail infrastructure development proposals, a road tunnel proposal to reduce Melbourne's reliance on the Westgate Bridge and to improve access to the Port of Melbourne, measures to enhance the efficiency of the existing rail, tram, bus and road networks, measures to reduce the impacts of freight movements in residential areas. Attention was also paid to reducing GHG emissions from transport, including the need to adopt more stringent vehicle emission standards and examining ways

to ensure that sustainable transport modes of travel (such as trams, cycles and pedestrians) benefit from the additional capacity provided by new road projects.

Contributions from the Environment and Sustainability team to achieving these progressive outcomes included:

- Consideration of sustainability drivers in Phase 1 of the study lead to the formulation of an assessment framework based on sustainability principles. The framework guided both the generation of initial options, their preliminary appraisal and short-listing and final assessment of the short-listed packages of public transport and road infrastructure projects
- Exploration of sustainable transport concepts lead to an approach where the overall efficiency of the transport system was considered from a genuine TBL perspective, including the implications for economic vitality and development and social equity. This approach also played close attention to transport/GHG linkages, including exploration of the potential effectiveness of the range of GHG abatement initiatives.
- This analysis found that GHG emissions from transport would continue to increase under current population and employment forecasts and under assumptions of continued trends in travel behaviour – highlighted the imperative of breaking away from current trends. The analysis found that introduction of a carbon price would not be sufficient to arrest the currently projected GHG increases and that a range of initiatives need to be pursued, including improved fuel and vehicle efficiency, travel demand management, increased vehicle efficiency and mode shift to public transport
- Evaluation of four alternative, integrated transport packages, comprising road network and public transport system initiatives, against the environmental sustainability assessment framework, considered enhanced system connectivity, increased use of public transport, walking and cycling and consistency with travel demand initiatives. The outcomes informed the development of the final set of recommendations included in the Eddington Review.

## ACKNOWLEDGEMENTS

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## BIOGRAPHY

### Philip Heath – Environmental Planner

Philip Heath is a Principal at Sinclair Knight Merz, and works within the company's Sustainable Systems team. He is an experienced leader of multi-disciplinary teams with expertise in environmental strategy development, infrastructure planning, impact

assessment, carbon reduction strategies and sustainability assessments. Philip was SKMs Project Manager for the Sir Rod Eddington-led East West Link Needs Assessment, for the Victorian Department of Transport.