

Northern Central City Corridor Study
Transport and urban solutions for the inner north

Scenario Appraisal Report

August 2003

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Executive Summary

The Northern Central City Corridor (NCCC) Study has investigated transport and land use issues in Melbourne's inner northern suburbs and has developed a draft integrated strategy that will:

- improve public transport;
- manage arterial road traffic and freight;
- improve walking and cycling;
- reduce car dependency; and
- enhance urban amenity.

This report is a precursor to the *Northern Central City Corridor Strategy (NCCC Strategy)* report, and presents the results of an appraisal of strategy options for transport and land use to cover the area's needs over the next 20-30 years. These results were used to develop the draft strategy detailed and assessed in the *NCCC Strategy* report. These two reports prepared by the Department of Infrastructure together with the supporting technical assessments by the study specialists are presented for consideration and comment.

The **core area of study** (referred to as the 'inner north') extends east-west from the Yarra River and Merri Creek to CityLink (the southern end of the Tullamarine Freeway), and north-south from the northern part of Melbourne city centre near Victoria Parade to the vicinity of Brunswick Road.

The overall study objective is to produce **“An integrated transport and land use strategy to improve the amenity and sustainability of the inner north whilst meeting the travel needs of people and goods.”**

The *NCCC Strategy* will support wider policies and **strategic frameworks** for Victoria and Melbourne. These have been expressed in a number of documents including the Bracks Government vision for Victoria and Melbourne as expressed in *Growing Victoria Together* and *Melbourne 2030*. These visionary strategies recognise the need for significant changes in the way Melburnians plan and live in order to maintain Melbourne as a great city and enhance the future for all communities in the broader region. One of the key directions of Melbourne 2030 is to reduce the dependence on private vehicle use and to raise the proportion of trips by public transport to 20% of the total by 2020. A range of ways to respond to this are examined in the study.

The strategy will also respond to the strategic plans of the Cities of Melbourne and Yarra and the strong desires of the local communities to create a more liveable environment and a significant reduction in car dependency (see Section 2.2 of this report for more discussion).

Table S-1 lists the **goals for a successful strategy** encompassing the policy directions of state and local government and the aspirations of the community (see Section 2.3).

Present and future land use and transport conditions in the area are discussed in the *Issues and Trends* report (DOI 2001b), released in September 2001. The main findings from that report are:

- there is a particularly high demand for travel to, from and through the area (much more than for travel wholly within the area);
- demand will continue to grow as activity and population in the area and surroundings (especially the CBD to the south) continue to grow;
- road traffic and its impacts are the main areas of concern and dissatisfaction, including air and noise pollution, congestion;
- there is a strong desire to preserve and enhance the special qualities of the inner north, especially the historic buildings and precincts, the parks and open spaces, the residential areas and the cultural and recreational activities; and
- improving other modes and reducing car use are the main solutions offered by the community and stakeholders.

Table S-1 NCCC strategy goals

Primary Category	Goals
Social	Improve amenity and liveability of the inner north by:
	<ul style="list-style-type: none"> • Significantly reducing the impacts of noise and air pollution from transport • Improving safety – reducing fatalities/casualties to or beyond stated targets • Significantly enhancing urban landscape and heritage values in key areas • Minimising through traffic on local streets • Improving access and travel choices for residents, visitors and workers, including disadvantaged groups • Providing facilities for people with mobility disadvantages
Environmental	Protect and enhance environmental sustainability in the inner north by:
	<ul style="list-style-type: none"> • Ensuring a contribution to overall reductions in greenhouse gas emissions • Reducing anticipated car use for travel through, to/from and within the inner north • Substantially increasing public transport mode share • Increasing the use of walking and cycling • Protecting and enhancing biodiversity
Economic	Support growth in economic activity, especially in and around Melbourne's CBD, by:
	<ul style="list-style-type: none"> • Enhancing access for commercial activities including tourism and recreation • Catering for increased residential population in the inner north and surrounding areas • Providing for commercial travel movements, including safe, efficient primary routes for freight • Efficiently serving travel needs through, to/from and within the inner north • Maximising the economic return on investment in transport and land use initiatives

If nothing substantial is done to 2021 beyond current commitments (and excluding many of the major, Melbourne-wide initiatives foreshadowed by *Melbourne 2030*), travel demand will continue to grow and the present situation will worsen significantly. When compared with the present, possible future conditions in the inner north in 2021 are likely to be as follows:

- Car travel will increase by 17% from 2001 with resulting significant increases in congestion and extension of peak conditions over more of the day;
- Trips by public transport will increase by 33% from 2001 but tram and bus services will be further impeded by increased congestion on the road network;
- Walking and cycling trips will increase by 14% from 2001;
- Increased traffic will cause substantial negative impacts on noise levels and the overall amenity of the area, crash risks will increase and there will be minor increases in pollutants (offset by changes in vehicle design rules and the partial replacement of the vehicle fleet);
- Access to businesses and the movement of freight will be impeded by increasing congestion on the road network with significant impact on regional economic activity;
- Even without *Melbourne 2030* in place, it is expected that there will be significant additional population and jobs within the inner north. This will require additional housing stock and will increase redevelopment pressures in the area, it would also increase pressure on parking resources and on the transport network.

Potential strategy elements have been developed to respond to the Melbourne 2030 direction to provide greater travel choice and reduce dependency on private car travel, and to address the problems identified above (for more detail of the elements see Chapter 4 following). These elements tested include the following:

- People movement
 - Network-wide improvements (eg. coverage, frequency, journey time, reliability, safety) to bus, tram and rail routes/services through the inner north, targeted at increasing patronage in key corridors.
 - A re-design of public transport services for the eastern suburbs (including potential high-speed mass transit in the Eastern Freeway corridor).
 - Measures to reduce low occupancy car use such as parking availability and controls, road pricing and behavioural initiatives such as TravelSMART.
 - Improvements to bicycle and pedestrian networks and encouragement measures to ensure greater use of cycling and walking.
- Goods movement
 - Measures to improve efficiency of goods movement.
 - Options within inner north to improve the efficiency of the arterial road network – this would include improvements to the east-west route (Eastern Freeway-Elliott Avenue), and between the Eastern Freeway and the CBD.

- Land use and local amenity
 - Land use-related measures to accommodate expected growth and, where possible, to reduce or minimise the need for travel.
 - Measures to remove traffic from local streets and reduce community severance effects.

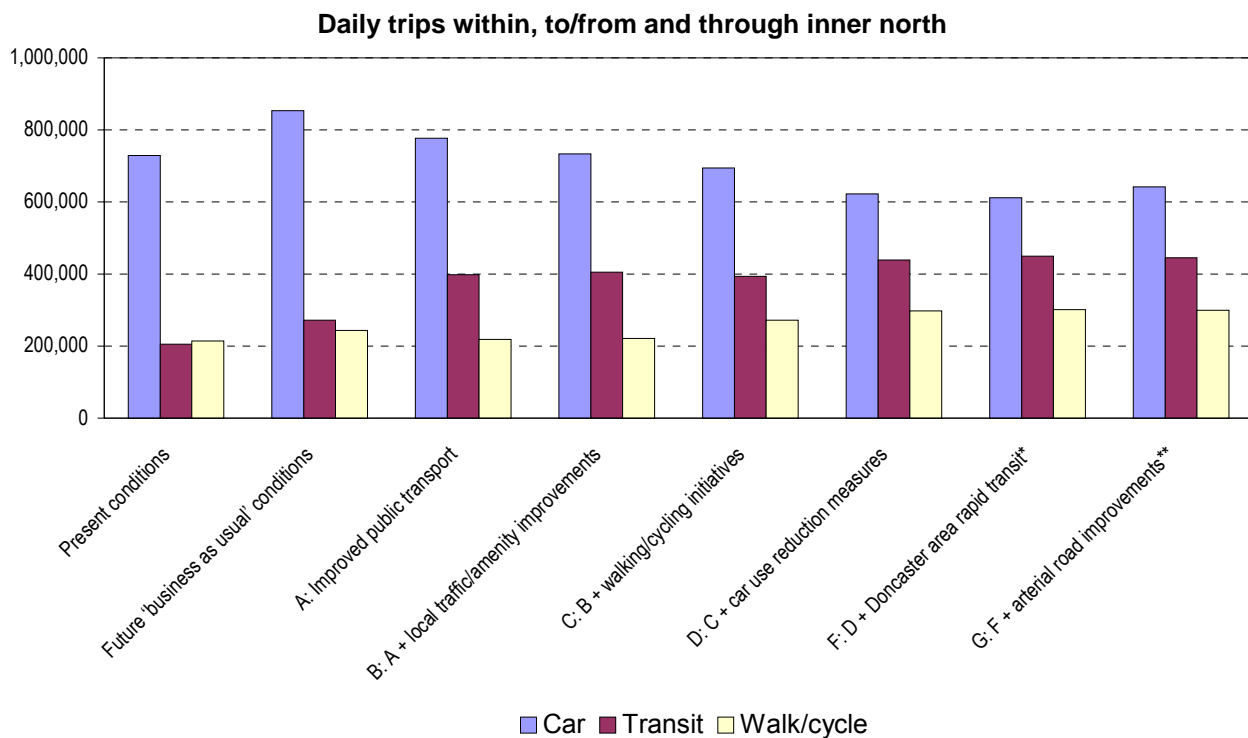
These initiatives are listed in Table S-2, grouped into possible strategy elements for appraisal. Scenarios A-G are then formed by adding each strategy element to the preceding ones, so their effects can be assessed incrementally. This gives an emphasis to the early implementation of public transport support measures in line with the strategies put forward in *Melbourne 2030*.

Table S-2 Strategy elements for appraisal

Strategy elements	Scenarios for testing						
	A	B	C	D	E	F	G
Significant improvements on a regional scale to bus, tram and rail routes/services	✓	✓	✓	✓	✓	✓	✓
Measures to remove traffic from local streets and improve amenity		✓	✓	✓	✓	✓	✓
Improvements to bicycle and pedestrian networks, encouragement of cycling and walking			✓	✓	✓	✓	✓
Measures to reduce car use such as parking, pricing, policy and behavioural initiatives				✓	✓	✓	✓
Land use-related measures to accommodate growth and reduce or minimise the need for travel					✓	✓	✓
Eastern Freeway corridor rapid transit system						✓	✓
Options within the inner north to improve the efficiency of the arterial network							✓

The **travel outcomes** of the scenarios tested in the appraisal are shown graphically in Figure S-1. This shows how the scenario elements contribute towards mode share targets and their impact on the travel task as a whole. Note that these packages are cumulative, that is, the results for each strategy include the travel changes resulting from the previous.

Figure S-1 Effect of scenarios on inner north trips



* Scenario F shown includes light rail Doncaster Area Rapid Transit (DART) option.

** Scenario G shown includes east-west tunnel with intermediate ramps

The **impact of the strategy elements on the transport task** within, to/from and through the inner north is discussed in Section 5.2 of this report and is summarised as follows:

- If a ‘business as usual’ Base Case is followed, total travel would increase by about 19% between now and 2021. Public transport mode share would increase slightly from today’s levels to 62% car, 20% public transport and 18% walk/cycle.
- If public transport services through and in the Inner North are substantially improved, the public transport share of inner north trips would increase from 29%. Car use would increase to 7% above today’s level.
- Addition of traffic management measures on local streets would increase congestion on arterial roads, which would in turn encourage more use of public transport, walking and cycling. Public transport would carry 30% of inner north travel and car use would reduce slightly in comparison to today. Whilst local areas should be protected from through traffic, it is also important to maintain an adequate arterial road network for through traffic, especially trucks.
- The walking and cycling initiatives assessed have the potential to further increase walking and cycling, to 20% of inner north travel. Although most of this increase would come from car use, there would be a small reduction in public transport use as well.
- Adding measures to reduce low occupancy car use could increase public transport mode share to 32%, walking and cycling to 22%, and reduce car use to 46% of inner north travel. Demand for car travel in the inner north is forecast to be below present day levels if all the preceding initiatives were in place.

The measures assessed above support the Melbourne 2030 objectives of reducing private car dependency. The following major infrastructure projects were also examined to assess their potential impact on the transport task:

- A light rail rapid transit system to Doncaster would attract nearly 70,000 boardings a day, and would increase inner north public transport mode share to 33%, with the preceding elements in place. The system would carry over 30,000 trips per day on the Eastern Freeway west of Hoddle Street.
- A tunnel linking the Eastern and Tullamarine Freeways, with ramp connections to/from Hoddle Street, Nicholson/Brunswick Streets, Royal Parade and Flemington/Racecourse Roads would carry about 95,000 vehicles per day (vpd) between the Eastern Freeway and Nicholson Street and 80,000 under Royal Park. It would divert up to 60,000 vpd from Alexandra Parade and a total of about 35,000 vpd from parallel routes such as Victoria Parade, Brunswick Road, Bell Street and City Link, outside the inner north. This would increase inner north car travel by 30,000 vpd and would slightly reduce public transport mode share, but not significantly impact on numbers using public transport.
- At present, 63% of morning peak traffic on the Eastern Freeway east of Hoddle Street is city-bound, and 37% is outbound. In comparison, about 54% of traffic in an east-west tunnel would be westbound and 46% eastbound. These figures confirm that radial traffic movements (i.e. in and out of central Melbourne) are more ‘tidal’ than circumferential (cross-town) movements, and that the east-west tunnel would primarily serve the latter.
- A tunnel between the Eastern Freeway and the CBD would cater mainly for radial traffic to/from the CBD and would, as a result, compete with public transport services to the CBD, with detriment to the public transport mode share. It would make little difference to traffic levels on roads in the inner north, except for reductions on Hoddle Street, Wellington Street and Smith Street. Morning peak traffic trying to access CBD streets would cause extensive queuing in the tunnel unless some form of ‘metering’ system was used to regulate traffic entering the tunnel from the Eastern Freeway.

The **transport economic evaluation** of the strategic options is discussed in Section 5.3 of this report. In keeping with the *Melbourne 2030* strategy goal of achieving 20% of motorised travel by public transport by 2020, improved public transport services through and within the Inner North were used as a ‘backdrop’ for the transport economic assessment of subsequent strategic elements. The results of the assessment are summarised as follows:

- The addition of local area traffic management, walking and cycling improvements:
 - Public transport operating costs would increase slightly because of small reductions in running times on some routes;

- Car use would fall due to the increased travel costs on motorists imposed by the area wide traffic managements;
- the incremental benefit-cost ratio (BCR) would be negative.
- Car use reduction measures in addition to local area traffic management and walking and cycling:
 - costs would be slightly lower due to somewhat improved PT running times and hence lower PT rolling stock requirement;
 - benefits would fall if parking charges were introduced;
 - the incremental BCR would be positive if TravelSMART benefits and costs are included.
- Light rail rapid transit from Doncaster Hill in addition to car use reduction measures:
 - public transport costs would be higher but these are outweighed by extra benefits to PT and road users, giving a BCR of about 1.1.
- Heavy rail from Doncaster Hill in addition to car use reduction measures:
 - due to the higher infrastructure and operating costs of the addition of the heavy rail scheme to Doncaster Hill the resulting incremental BCR would be 0.7.
- Road tunnel options in addition to rapid transit in the Doncaster corridor:
 - East-west tunnel with intermediate interchanges: high capital costs are offset by increased travel benefits for cross town traffic resulting in a BCR of about 1.0
 - East-west tunnels without the Nicholson Street/Brunswick Road and Royal Parade ramps would improve the incremental BCR to 1.2 due to its lower cost
 - Eastern Freeway to CBD tunnel: increased congestion in/around the CBD access roads would result in higher congestion costs resulting in an incremental BCR of 0.7.

The social, environmental and broadly based economic impacts were all examined. The findings of each are discussed in Sections 5.4, 5.5 and 5.6 of the report and are summarised as follows:

The key **social** findings are:

- The negative social impacts or implications of the Base Case are a key factor in the justification to move ahead with transport improvements in the inner north; to do nothing is not a justifiable outcome;
- The implementation of selected improvements to the public transport system, local area and arterial road management measures, walking and cycling measures and other measures to reduce car usage (eg TravelSMART) when taken together provide clearly identifiable local social benefits when compared to the Base Case (by reducing overall car use and by diverting through traffic from local streets).
- It is possible to improve the noise levels in the inner north further by reducing road traffic due to improved public transport .
- Diverting road traffic via an east-west tunnel would also reduce noise levels,
- The implementation of DART would improve choice and accessibility to the study area, while local area traffic management and the addition of walking and cycling initiatives would add most to the sense of neighbourhood ambience.
- The east-west tunnel would make a significant contribution to cross region car accessibility.

The key **environmental** findings are:

- While transport greenhouse emissions are expected to stabilise due to more stringent vehicle design rules, emissions will be further reduced by improved public transport and other initiatives to reduce car use;
- The east-west tunnel will have little impact on total emissions but will improve local air quality;
- Measures to increase public transport use, walking and cycling and reduce car use will make a significant contribution to improving the environment in general;
- To be most successful, improved public transport and walking/cycling initiatives should go forward together with the TravelSMART program as they would complement each other; and
- Complementary programs of native and exotic planting (and, if necessary, tree transplanting) should be part of any initiative requiring new works or the changing of the status of a road to local street.

The key findings in support of **economic development** are:

- The Base Case would be a significant impediment to the development of economic activity because of rising and spreading road system congestion;
- Better managing and increasing the cost of inner area and CBD parking would assist in promoting public transport use but these initiatives will need to be planned and implemented carefully so as not to have a marked impact on ‘doing business’ ;
- Improving public transport (including DART) or the construction of the E-W tunnel would enhance access for freight and business activity and private travel efficiency in the inner north and surrounding areas; and
- Additional parking charges or tolls would increase public transport mode share and may also provide the opportunity for additional revenue that could be used to fund public transport improvements, but such measures are not essential to the success of the *NCCC Strategy*.

Section 5.7 of the report draws a number of **key conclusions** from the appraisal. These are:

1. To remain at the Base Case over the next twenty years would cause major social, environmental and economic consequences unacceptable to the local and wider community.
2. The following range of initiatives would support the strategic goals set out in Melbourne 2030 and for the inner north by providing wide ranging social, environmental and economic benefits and should be considered further:
 - implement selected improvements to the public transport system which support region-wide public transport priorities;
 - implement local area and arterial road traffic management measures (eg kerb-side parking controls and turn bans) as part of an overall road hierarchy that improves local amenity and provides for the efficient movement of through traffic, public transport and freight on the arterial road network;
 - review land use controls in the area to accommodate the anticipated increases in residents and jobs while maintaining heritage values;
 - implement selected walking and cycling network improvements and encouragement measures; and
 - implement measures to reduce car usage (for example, TravelSMART) and changes to parking policies.
3. A comparison of **DART** and the **road tunnel options** indicates based on preliminary cost estimates:
 - **DART** would involve an implementation capital cost of \$130M for a bus-way, \$230M for light rail or \$610M for a heavy rail solution, whereas the east-west **road tunnel** would cost \$810M to construct. Both present ‘break-even’ results from transport economic assessment (ie DART has a BCR of 1.1 and the east-west road tunnel a BCR of 1.0).
 - A **road tunnel between the Eastern Freeway and the CBD** would have a cost of \$410M with a BCR of only 0.7 due to high levels of traffic congestion around its CBD terminal. It would also compete for radial public transport trips, to the detriment of mode **share**.
 - **DART** would be supportive of **social** and **economic development** objectives and has positive **environmental** benefits. However, due to its low overall benefits, it is considered to have a lower priority than the initiatives outlined in conclusion 2.
 - The east-west road tunnel would be supportive of meeting social and economic development criteria, and has positive local environmental benefits. However, due to its lower overall benefits and high cost it is considered to have a lower priority than the initiatives outlined in conclusion 2.
 - **DART** is more directly aligned than the E-W tunnel to the Government’s *Melbourne 2030* strategy of supporting public transport.
4. It is concluded that:
 - (a) the measures described in 2. above, together with **DART**, should be further assessed as the components of the draft strategy for the inner north. **DART** requires further work to establish the scope and extent of a preferred option and to ensure the route is protected.

(b) no further investigation should take place on the **road tunnel options**.

These conclusions are considered in the development of the draft strategy in the *NCCC Strategy* report.

1 Introduction

1.1 Background

The Northern Central City Corridor (NCCC) Study was established to investigate transport and land-use issues in Melbourne's inner north, covering:

- Abbotsford
- Carlton
- Carlton North
- Clifton Hill
- Collingwood
- Fitzroy
- Fitzroy North
- North Melbourne
- Parkville
- Princes Hill

The study has developed an integrated strategy with proposals for improving transport in these areas, including facilities and services for walking, cycling, public transport, freight and private car use into the future. It also proposes initiatives to address land use, urban design and heritage conservation issues.

The study used triple bottom line¹ appraisal techniques to assess options and develop a sustainable, integrated strategy, covering the following emerging themes:

- Improving public transport
- Managing arterial road traffic and freight
- Improving walking and cycling conditions
- Reducing car dependency
- Enhancing urban amenity

The strategy covers the area's needs over the next 20-30 years and will anticipate and guide the type of development and activity growth that will occur in this time frame, to provide a more sustainable future.

1.2 This report

This report has been prepared by the Department of Infrastructure and is a precursor to the *NCCC Strategy* report. It provides information on the work done to develop and appraise a range of possible strategic directions for transport and land use in the inner north, to identify the most effective elements for a strategy to cover the area's needs over the next 20-30 years. These results were used to develop the draft strategy detailed and assessed in the companion *NCCC Strategy* report. These two reports prepared by the Department of Infrastructure together with the supporting technical assessments by the study specialists are presented for consideration and comment.

1.3 Sustainability and the triple bottom line

The study is applying the principles of sustainability and seeks triple bottom line benefits, in line with the State Government's aims.

The following discussion on sustainability is adapted from material provided by Green Innovations Inc. (<http://www.green-innovations.asn.au>).

Sustainability and sustainable development are increasingly being discussed in the community. At its core, "sustainability" is **the ability to maintain something over time**. This concept can be applied to many different things. People often speak of 'ecological sustainability', 'social sustainability', 'economic sustainability' or 'organisational sustainability' or, when combined, 'holistic or triple bottom line sustainability'.

The terms 'sustainability' and 'sustainable development' are often used interchangeably, but they are not the same. Sustainable development is a compound concept that combines concerns for continuity (sustainability)

¹ 'Triple bottom line' refers to the combination of social, environmental and economic outcomes

with concerns for change (development). So ‘sustainable development’ is the change process in society and the economy that enables the achievement of sustainability and the effective pursuit of genuine progress.

A society or environment that claimed to be sustainable would have to have achieved:

- social health & security - if it was socially sustainable;
- ecological health & security - if it was ecologically sustainable; and
- economic health & security - if it was economically sustainable.

The inner northern suburbs of Melbourne cannot be considered in isolation from the areas that surround them. Like all cities, a fully-sustainable condition is somewhat remote for Melbourne, although the community and Government are working towards it more and more. The concept of ‘greater sustainability’ or a ‘more sustainable’ state is therefore a more realistic goal in the time frames under consideration. However it is also important to ensure that there is a path towards full sustainability in the longer term.

A positive triple bottom line outcome is one that achieves benefits in all three areas – social, environmental and economic. Achieving a positive triple bottom line is one way in which a move towards greater sustainability can be achieved. The State Government has adopted this concept, and triple bottom line appraisals are recommended for all major policy or investment initiatives.

In the NCCC Study, the move towards greater sustainability is enshrined in the study goals and the way in which strategy options or elements are evaluated against them; namely, the appraisal framework (see Chapter 2).

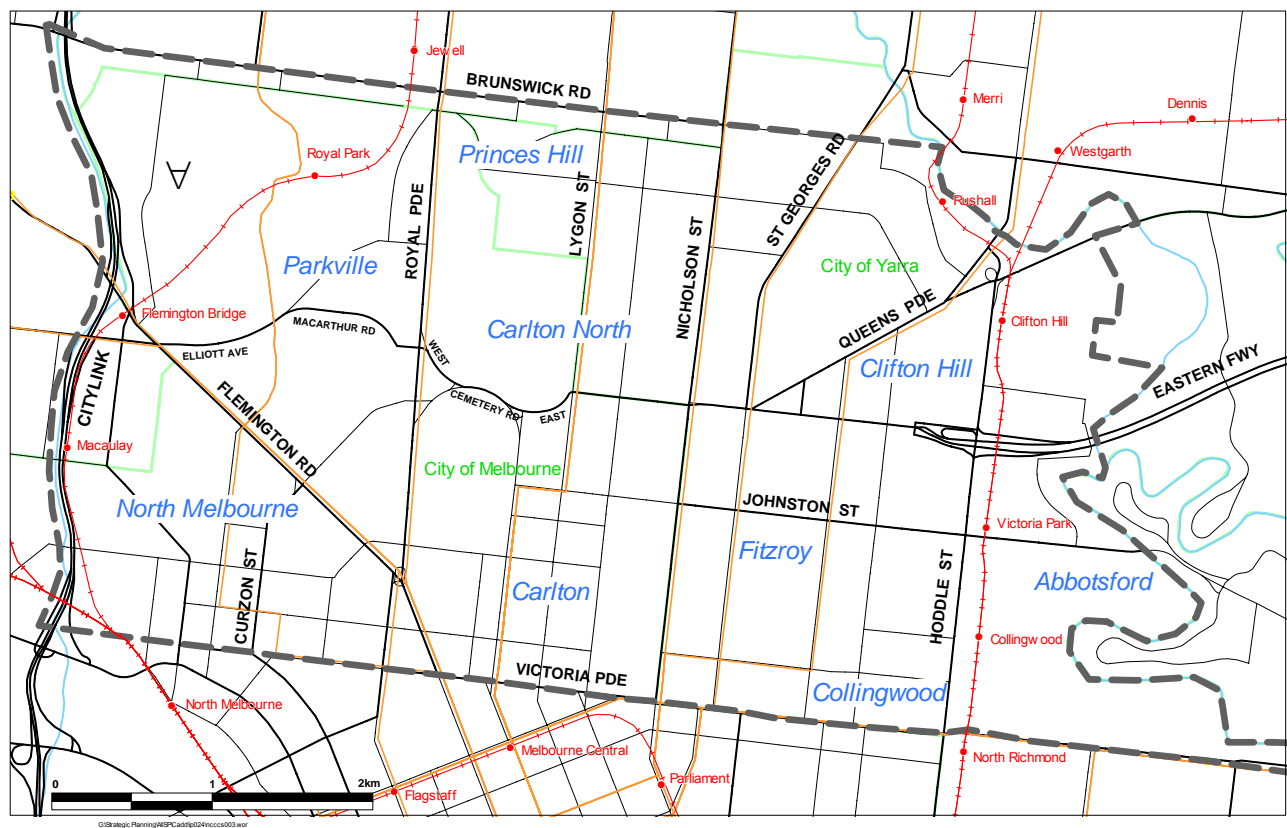
1.4 The inner north

The core area of study (referred to as the ‘inner north’, as illustrated in Figure 1-1) extends east-west from the Yarra River and Merri Creek to CityLink (southern end of Tullamarine Freeway), and north-south from the northern part of the city centre near Victoria Parade to the vicinity of Brunswick Road.

The study area was chosen because it is the primary area of influence of a possible road tunnel link between the Eastern and Tullamarine Freeways, which had been suggested as a solution to the area’s road congestion. The Bracks Government decided to look at the broader picture of transport and land use in the area, before making any decisions about new transport infrastructure.

Many transport issues in the inner north are caused by travel generated outside. Because of this, the study considers initiatives outside the inner north, in a sphere of influence that includes the CBD to the south and the northern and eastern suburbs in particular, since these areas generate a large proportion of the travel that affects the inner north.

Figure 1-1 The inner north



2 Study goals and appraisal framework

2.1 Study objective

The study objective was, to quote from the Minister’s initial (November 2000) press release, to produce “...an integrated strategy for the area (*ie. the inner north*) to meet road and public transport needs and to identify urban design and land use opportunities.” It was suggested by the Community Reference Group and the Technical Steering Committee that the words “to meet road and public transport needs” in the above should be replaced with “to meet the travel needs of people and goods”.

After consideration, the overall objective was amended and is now to produce:

“An integrated transport and land use strategy to improve the amenity and sustainability of the inner north whilst meeting the travel needs of people and goods.”

2.2 Strategic context

The *NCCC Strategy* will need to support the wider policy and strategy framework for Victoria and Melbourne, as contained in a range of sources summarised below.

Growing Victoria Together

The Bracks Government’s vision for Victoria is summarised in *Growing Victoria Together*, which addresses the following eleven strategic issues:

- Valuing and investing in lifelong education
- High quality, accessible health and community services
- Sound financial management
- Safe streets, homes and workplaces
- Growing and linking all of Victoria
- Promoting sustainable development
- More jobs and thriving, innovative industries across Victoria
- Building cohesive communities and reducing inequalities
- Protecting the environment for future generations
- Promoting rights and respecting diversity
- Government that listens and leads

Many of these issues have relevance for the *NCCC Strategy*. One of the most important is the stated target (under ‘growing and linking all of Victoria’) of increasing travel taken on public transport in Melbourne from 9% to 20% by the year 2020.

Melbourne 2030

Melbourne 2030 is a key government strategy, which provides a bold vision for retaining and enhancing Melbourne’s liveability over the next 30 years.

On current trends, the metropolitan region faces major challenges in the next 30 years because of:

- growth resulting in an additional population of 920,000 (and 620,000 households) by 2030
- an ageing population with the percentage of people aged over 60 to rise from 16% to 23% by 2031
- smaller households, fewer home-owners and increased demand for rental properties
- a strain on water supplies, rising patterns of car use, increased greenhouse gas emissions and a doubling of truck traffic.

Melbourne 2030 responds to these issues and challenges. It provides a framework for local and State Government to implement policies and plans that are responsive to the social, economic and environmental needs and challenges facing metropolitan region over the next three decades.

The substance of *Melbourne 2030* is contained in nine ‘directions’ that embody the Government’s aims of sustainability and of providing a better future for all. They are:

- a more compact city
- better management of metropolitan growth
- networks with the regional cities
- a more prosperous city
- a great place to be
- a fairer city
- a greener city
- better transport links
- better planning decisions, careful management.

Each of these directions is supported by specific policies that will be incorporated into the planning system. The policies will be implemented through a range of initiatives undertaken through joint action by local government, the Government and the wider community.

The NCCC Strategy will be highly dependent on the implementation of *Melbourne 2030* and its associated transport plans, which are presently under development.

Melbourne and Yarra City Plans

The Cities of Melbourne and Yarra both have strategic plans in place. Such plans are constantly evolving, and provide a framework for more detailed planning and decision making. The most directly relevant goals from these plans are as follows:

- Competitive transport infrastructure supporting the economy
- Efficient use and reuse of resources
- Fairly/equitably managed parking
- Growth of business and retail, and relevant industry
- Improved access to services and facilities for residents, visitors and workers
- Improved air and water quality
- Improved, more attractive public transport
- Increased residential population
- Increased tourism
- Integration of road upgrades with other civic facilities
- Maintained social and cultural diversity
- Protected and enhanced biodiversity
- Protected and enhanced physical character
- Reduced greenhouse gas emissions
- Safe and comfortable shopping and cultural areas
- Sustainable and integrated transport system

2.3 Community goals

Community consultation for this study has included discussion in workshops about suitable goals and aspirations for the inner north. These goals are echoed strongly in inputs received from the community at large as well. There is a strong emphasis on creating a more liveable environment and on reducing car dependency. In summary, the main community goals are:

- Healthier, less stressed community
- Improved cycling and walking conditions
- Improved public transport
- Improved safety
- Improved sense of place/community
- Increased public open space
- Less freight on inappropriate roads
- Less through traffic on local streets

- More sustainable living conditions
- More sustainable transport
- Reduced air and noise pollution
- Reduced car dependence
- Preservation/enhancement of heritage
- Reduced traffic congestion

2.4 Goals for a successful strategy

Table 2-1 lists the goals that a successful strategy will aim to achieve. The goals encompass current and emerging policy directions at state and local government levels as well as the views and aspirations expressed by the community, as outlined above.

It is recognised that some of the goals may conflict with one another, whilst others contribute to each other. A successful strategy will be one that achieves tangible benefits for all three components of the triple bottom line – a ‘win-win’ solution is therefore required that achieves a positive outcome for all of the goals.

Table 2-1 NCCC strategy goals

Primary Category*	Goals
Social	Improve amenity and liveability of the inner north by: <ul style="list-style-type: none"> • Significantly reducing the impacts of noise and air pollution from transport • Improving safety – reducing fatalities/casualties to or beyond stated targets • Significantly enhancing urban landscape and heritage values in key areas • Minimising through traffic on local streets • Improving access and travel choices for residents, visitors and workers, including disadvantaged groups • Providing facilities for people with mobility disadvantages
Environmental	Protect and enhance environmental sustainability in the inner north by: <ul style="list-style-type: none"> • Ensuring a contribution to overall reductions in greenhouse gas emissions • Reducing anticipated car use for travel through, to/from and within the inner north • Substantially increasing public transport mode share • Increasing the use of walking and cycling • Protecting and enhancing biodiversity
Economic	Support growth in economic activity, especially in and around Melbourne's CBD, by: <ul style="list-style-type: none"> • Enhancing access for commercial activities including tourism and recreation • Catering for increased residential population in the inner north and surrounding areas • Providing for commercial travel movements, including safe, efficient primary routes for freight • Efficiently serving travel needs through, to/from and within the inner north • Maximising the economic return on investment in transport and land use initiatives

* Most goals have implications for all three ‘triple bottom line’ categories (social, environment, economic); they are shown here in their primary categories.

2.5 Assessing strategy elements

Approach

Different strategy elements have been compared by assessing how they will perform against the goals shown in Table 2.1 above. To do this, a selection of indicators has been developed for each of the goals, and the expected outcomes of each strategy element have been estimated for each indicator.

Present conditions (2001)

Present conditions have been largely assessed already as summarised in *Issues and Trends* (DOI 2001b), with the exception of the modelled travel and transport patterns; the transport model (called ‘Zenith’) was calibrated after *Issues and Trends* was completed. The appraisal framework was completed for present conditions (see Chapter 3) to illustrate the scale of issues as they are now.

Future ‘Base Case’

The future ‘Base Case’ scenario represents the forward projection of expected travel and land use trends, with currently-committed or highly likely (but uncommitted) transport infrastructure included. The transport implications of this scenario have been estimated using the ‘Zenith’ model (both for Melbourne-wide travel effects and for travel affecting the inner north). The transport and other specialists have used a range of

appraisal techniques to appraise more detailed, localised or specialised impacts. The future Base Case was assessed and the likely conditions have been assessed (see Chapter 3) to indicate changes from the present if nothing significant is done over the next twenty years. This scenario is used as the common base against which the likely outcomes a range of possible action plans or scenarios are measured.

Future strategic scenarios

Future strategy elements were formulated to provide a suitable range of possibilities for appraisal. The strategies were developed to reflect the range of initiatives raised in consultations during the study, and are described in Chapter 4.

The appraisal of future strategy scenarios was undertaken by the specialists and the study team. The results are presented in Appendix B: Scenario Appraisal Results, and in the following chapters of this report. The appraisal presented compared the performance of each of strategy scenario against the future ‘Base Case’. A draft transport and land use strategy for the inner north has been developed from this appraisal and is presented and reviewed in the companion report ‘*NCCC Strategy*’.

2.6 The appraisal framework

The goals in Table 2-1 have been used to create an appraisal framework for the study (Table 2-2), by identifying appropriate performance indicators for each goal. This has been created to guide the appraisal of strategy scenarios, and takes account of what is measurable and achievable using the available modelling, forecasting and appraisal procedures.

The appraisal framework was applied at a strategic level to help identify a preferred strategy.

Table 2-2 Study appraisal framework

Goal	Indicators
Social: Improve amenity and liveability of the inner north by:	
Significantly reducing the impacts of noise and air pollution from transport	Extent of noise-sensitive land uses (especially residential) exposed to changes in noise exposure. Concentration of air pollutants at relevant sites according to adopted standards
Improving safety – reducing fatalities/casualties to or beyond state targets	Casualty accidents Safety/security risk appraisal at key locations related to travel routes and/or interchanges, and sensitive land uses
Significantly enhancing urban landscape and heritage values in key areas	Effect on parklands Effect on other public areas, streetscapes Effect on heritage protection/interpretation Effect on urban settings
Minimising through traffic on local streets	Car/truck traffic levels on local/collector streets
Improving access and travel choices for residents, visitors and workers, including disadvantaged groups	Transport accessibility to homes, jobs and services Sense of place/neighbourhood
Providing facilities for people with mobility disadvantages	Contribution to Disability Discrimination Act (DDA) compliance levels
Environmental: Protect and enhance environmental sustainability in the inner north by:	
Ensuring a contribution to overall reductions in greenhouse gas emissions	Estimated total greenhouse gas emissions
Reducing car use for travel through, to/from and within the inner north	Effect on car travel Car mode share
Substantially increasing public transport mode share	Public transport travel Public transport mode share
Increasing the use of walking and cycling	Cycling/walking travel Cycling/walking mode share Amount of cycling and walking infrastructure provision
Protecting and enhancing biodiversity	Effect on natural habitats Effect on exotic habitats Effect on water quality Effect on ground contamination
Economic: Support growth in economic activity, especially in and around Melbourne's CBD, by:	
Enhancing access for commercial activities including tourism and recreation	Accessibility to recreational, cultural and commercial areas in and around CBD and in the inner north
Catering for increased residential population in the inner north and surrounding areas	Existing or potential residential land affected Changes of land use (eg from commercial to residential) Accessibility to/from residential areas
Providing for commercial travel movements, including safe, efficient primary routes for freight	Effect on goods vehicle travel within, to/from and through the inner north
Efficiently serving travel needs through, to/from and within the inner north	Effect on business/private travel
Maximising the economic return on investment in transport and land use initiatives	Capital and operating costs Economic benefits, private/public sector provider impacts, other Government impacts Regional economic effects (effect on businesses etc)

3 Issues and trends

Present and future land use and transport conditions in the area are discussed in the *Issues and Trends* report (DOI 2001b), released in September 2001. The main findings from that report are summarised briefly as follows:

- there is a particularly high demand for travel to, from and through the area (much more than for travel wholly within the area);
- demand will continue to grow as activity and population in the area and surroundings (especially the CBD to the south) continue to grow;
- road traffic and its impacts are the main areas of concern and dissatisfaction, including air and noise pollution, congestion;
- there is a strong desire to preserve and enhance the special qualities of the inner north, especially the historic buildings and precincts, the parks and open spaces, the residential areas and the cultural and recreational activities; and
- improving other modes and reducing car use are the main solutions offered by the community and stakeholders.

In a broader sense, the present transport issues in the inner north are common to many areas of Melbourne and are a result of much greater levels of investment in roads and freeways than in public transport infrastructure over the last 30-40 years, throughout the metropolitan area.

The *Issues and Trends* report is available through the study web site (<http://www.doi.vic.gov.au/innernorth>) or by contacting the study team on (03) 9655 8770.

3.1 Present conditions

Tables 5.3A, 5.3B and 5.3C (fold-outs located at page 24) summarise present conditions in the inner north using the appraisal framework detailed in Table 2-2. These tables also contain the appraisals of the future Base Case and the full range of scenarios assessed.

Present day conditions are spelt out in detail in the *Northern Central City Corridor Study – Issues and Trends Report (DoI 2001b)* released in September 2001..

Figure 5-1 and Table 5-1 (see Chapter 5 of this report) show that there are about 1.2 million trips per weekday through (39%), into or out of (44%), or totally within (17%) the inner north². Of these trips, 64% are by car, 18% by public transport and 19% are by cycling or walking.

About 70,000 vehicles per weekday enter the inner north from the Eastern Freeway (140,000 vehicles a day two-way). Of this traffic, 34% is destined to the inner north, 17% to the CBD, 12% to the north and north-west, 15% to the west, 9% to Richmond and the south and 13% to South Melbourne and Port Melbourne.

The Eastern Freeway east of Hoddle Street carries about 5,000 trucks a day (two-way) or about 3.7% of the total traffic.

Traffic along the east-west route across the inner north varies along its length; 70,000 vehicles a day on Alexandra Parade west of Hoddle Street, 90,000 vehicles a day between Brunswick and Nicholson Streets, 46,000 vehicles a day on Princes Street east of Lygon Street, 29,000 vehicles a day on Macarthur Road west of Royal Parade and 31,000 vehicles a day (including 8.5% or about 2,600 trucks) on Elliot Avenue.

The movement of trucks in the area is generally based on the arterial road system (except where local access is required). The heaviest volumes are on the Eastern Freeway at Hoddle Street (4,900 trucks a day) and along the Alexandra Parade-Macarthur Road route (2,600 trucks a day west of Royal Parade, increasing to 4,900 west of Nicholson Street). While this is high for the area, other key routes in Melbourne (eg. Monash

² All travel through, to/from and within the inner north is referred to as 'inner north travel' throughout this report.

Freeway, Western Ring Road, Tullamarine Freeway) carry significantly higher volumes of trucks than the Eastern Freeway. Other routes in the inner north carry significantly fewer trucks than the Alexandra Parade route.

Of the trips by public transport, about 9% are by bus, 75% by tram and 16% by train. North-south routes account for nearly 90% of total public transport patronage, with east-west routes (Victoria Street tram, Eastern Freeway bus and Johnston Street bus) accounting for the remaining 11%. The tram interchange on Swanston Street at the University of Melbourne has the most boardings (9,500 passengers per weekday), followed by Clifton Hill rail station (5,000 passengers per weekday) and the Swanston/Grattan Street tram stop (3,600 passengers per weekday).

The *Issues and Trends Report* also summarises social, environmental, heritage and engineering appraisals of the present based on reports prepared by the specialist consultants (see Appendix A for a list of references).

The initial phase of the study also involved consultation with the community, especially through the study's Community Reference Group (CRG). Input from the CRG was via workshops which explored current problems and issues, desired future conditions and initiatives to achieve the desired future. This input formed the basis of the NCCCS strategic goals (see Table 2-1) and the study appraisal framework (see Table 2-2). The wide range of suggested initiatives also contributed to the range of strategic elements developed by the Study Team for appraisal (see Chapter 4). The CRG's suggestions were reinforced by the results of a questionnaire survey based on voluntary responses to a mail-back survey form (over 1,100 responses were received).

3.2 Projected future conditions

If nothing substantial is done beyond current commitments (and excluding many of the major, Melbourne-wide initiatives foreshadowed by *Melbourne 2030*), the transport modelling work suggests that travel demand will continue to grow and the present situation will worsen significantly. Tables 5.3A, B and C summarise possible future conditions in 2021. When compared with the present:

- Inner north car travel will increase by 17% overall from 2001 (but it will decrease from 64% to 62% of total trips in 2021), with resulting significant increases in congestion and extensions of peak conditions over more hours of the day. Truck traffic will probably increase at a somewhat greater rate.
- Trips by public transport will increase by 33% from 2001 (and increase from 18% to 20% of all inner north trips). Tram and bus services will be further impeded by the increasing congestion on the road network.
- Walking and cycling trips will increase by 14% from 2001 (but the share will decrease from 19% to 18% of inner north trips).
- Noise levels and crash risks will increase, increased traffic levels will cause substantial negative impacts on the overall ambience of the area and there will be increases in pollutants (offset by changes in vehicle design rules and the partial replacement of the vehicle fleet);
- Access to businesses and the movement of freight will be impeded by increasing congestion on the road network with significant impact on regional economic activity;
- *Melbourne 2030* envisages significant additional population and jobs in the inner north. Population projections indicate the need to accommodate an extra 10,000 residents and 8,000 jobs within the inner north by 2021. This will require additional housing stock and work locations, whilst still protecting the strong heritage values of the area. It will also increase pressure on parking resources and transport systems, in addition to the externally-generated demand levels.

4 Potential strategy elements for appraisal

In this section of the report, a range of possible future strategic elements are developed for testing. These elements are a rationalised response to suggestions made by the full range of interest groups and stakeholders ie the community through suggestions by individuals or via the Community Reference Group, councils, transport users, stakeholder and interest groups and agencies. They have been assessed (see Chapter 5 of this report) and several have been adapted or modified to become part of the draft package (see the companion *NCCC Strategy* report).

4.1 Key considerations

In developing a range of possible strategy elements to be assessed, some of the key issues to be understood, over a 20-30 year planning horizon, are:

- To what extent can service improvements, new services and behavioural initiatives increase public transport mode share?
- What is required to maximise the amount of travel accommodated by non-motorised modes?
- How much can the overall demand for travel be influenced by land use and policy initiatives?
- What will be the resulting effect of the above on car use? Are there other actions (such as parking, pricing, policy and behavioural initiatives) that will further reduce the amount of car use (or slow/arrest its growth)?
- Will this result in better opportunities to relocate inappropriate traffic from local areas onto the arterial road network in the inner north, or should this be a primary imperative?
- How can freight traffic be provided for efficiently whilst reducing its adverse effects on the community?
- Will the resulting transport system support projected growth in population and economic activity, or are other major transport infrastructure initiatives required?
- What is the cost-effectiveness of these strategic options?
- What opportunities do all these measures provide for urban design and heritage enhancements, to improve the amenity of the inner north?

These issues are linked to the goals in Table 2-1 earlier in this report. They essentially ask what can be done to **attract** people onto public transport and non-motorised modes, to **induce** them to travel and/or use cars less, and whether, after all this is done, **major infrastructure initiatives** are still needed to achieve the desired changes in transport, land use and amenity while improving overall accessibility.

In order to examine these issues and develop a suitable strategy, a range of potential strategy elements has been appraised. They have been assessed against a set of expected outcomes from the 'Base Case' scenario over the next 20-30 years.

4.2 Strategy elements for appraisal

Strategy elements have been identified that address the questions posed in section 4.1 above. The range of initiatives evaluated can be expressed as follows:

- People movement
 - Network-wide improvements (eg. coverage, frequency, journey time, reliability, safety) to bus, tram and rail routes/services through the inner north, targeted at increasing patronage in key corridors.
 - A re-design of public transport services for the eastern suburbs (centred on high-speed mass transit in the Eastern Freeway corridor).
 - Measures to reduce car use such as parking availability and controls, road pricing and behavioural initiatives such as TravelSMART.
 - Improvements to bicycle and pedestrian networks and encouragement measures to ensure greater use of cycling and walking.
- Goods movement
 - Measures to improve efficiency of goods movement.

- Options within inner north to improve the efficiency of the arterial road network – this could include improvements to the east-west route (Eastern Freeway-Elliott Avenue), and between the Eastern Freeway and the CBD.
- Land use and local amenity
 - Land use-related measures to accommodate expected growth and, where possible, to reduce or minimise the need for travel to meet the expectations of *Melbourne 2030*.
 - Measures to remove traffic from local streets and reduce community severance effects.

These initiatives are listed in Table 4-1, grouped into possible strategy elements. Scenarios A-G were then formed for appraisal by adding each strategy element to the preceding ones, so their effects can be assessed incrementally. This gives an emphasis to the early implementation of public transport support measures, in line with the strategies put forward in *Melbourne 2030*.

Table 4-1 Strategy elements for appraisal

Strategy elements	Scenarios for testing						
	A	B	C	D	E	F	G
Significant improvements on a regional scale to bus, tram and rail routes/services	✓	✓	✓	✓	✓	✓	✓
Measures to remove traffic from local streets and improve amenity		✓	✓	✓	✓	✓	✓
Improvements to bicycle and pedestrian networks, encouragement of cycling and walking			✓	✓	✓	✓	✓
Measures to reduce car use such as parking, pricing, policy and behavioural initiatives				✓	✓	✓	✓
Land use-related measures to accommodate growth and reduce or minimise the need for travel					✓	✓	✓
Eastern Freeway corridor rapid transit system						✓	✓
Options within the inner north to improve the efficiency of the arterial network							✓

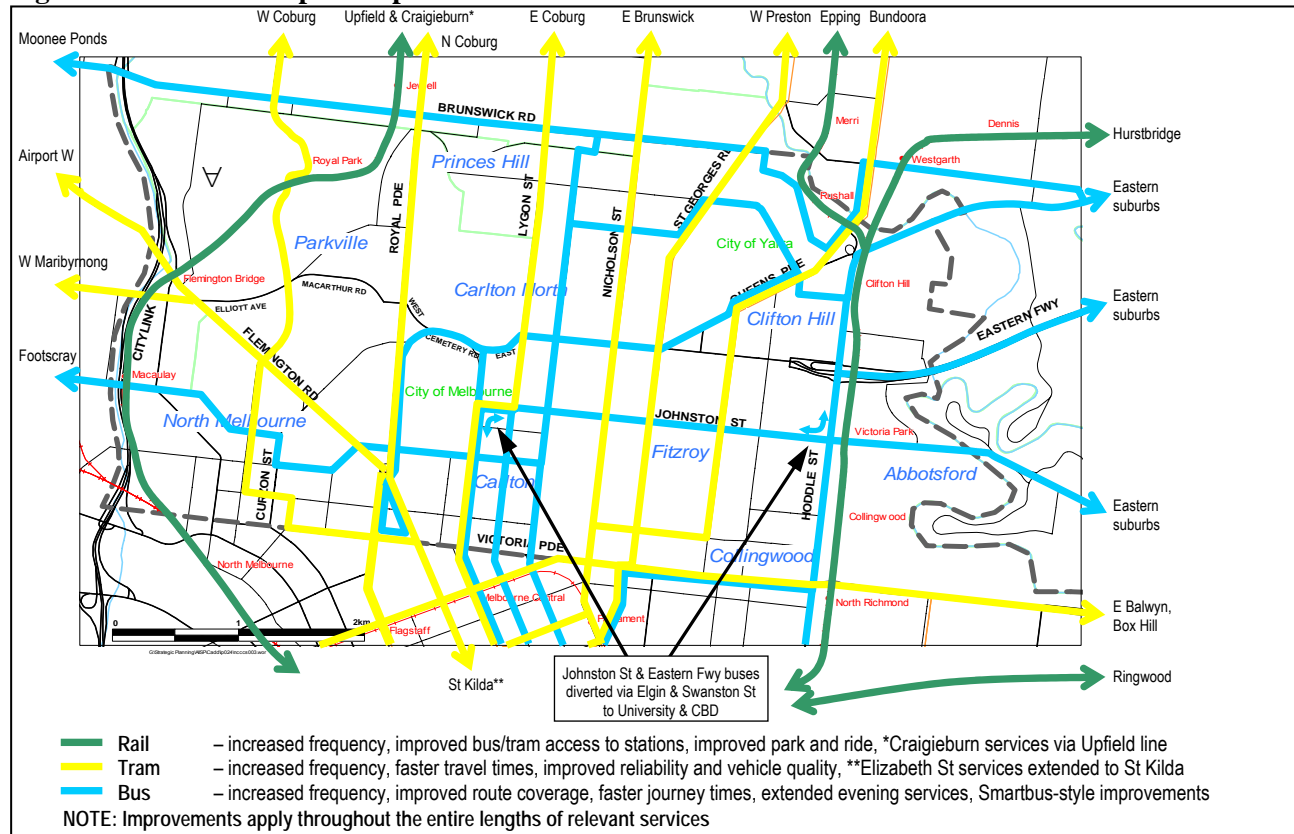
4.3 Details of the strategy elements

The strategy elements described below are representative examples of the type of initiatives that were developed for appraisal.

Possible public transport improvements

Potential improvements to public transport have been identified for regional routes and corridors that affect travel in, to/from and through the inner north, as summarised in Figure 4-1. The improvements follow the strategic directions proposed in *Melbourne 2030*, and represent very substantial changes to levels of service across rail, tram and most bus services through the inner north. They also seek to improve the distribution of public transport in the inner north, especially providing more east-west services, and services to the University of Melbourne via Swanston Street.

From the candidate projects shown in Figure 4-1, it is possible to identify the routes where initial improvements would provide the highest level of benefits and therefore make the most significant contributions to achieving the complementary goals of the *NCCC Strategy* and *Melbourne 2030*.

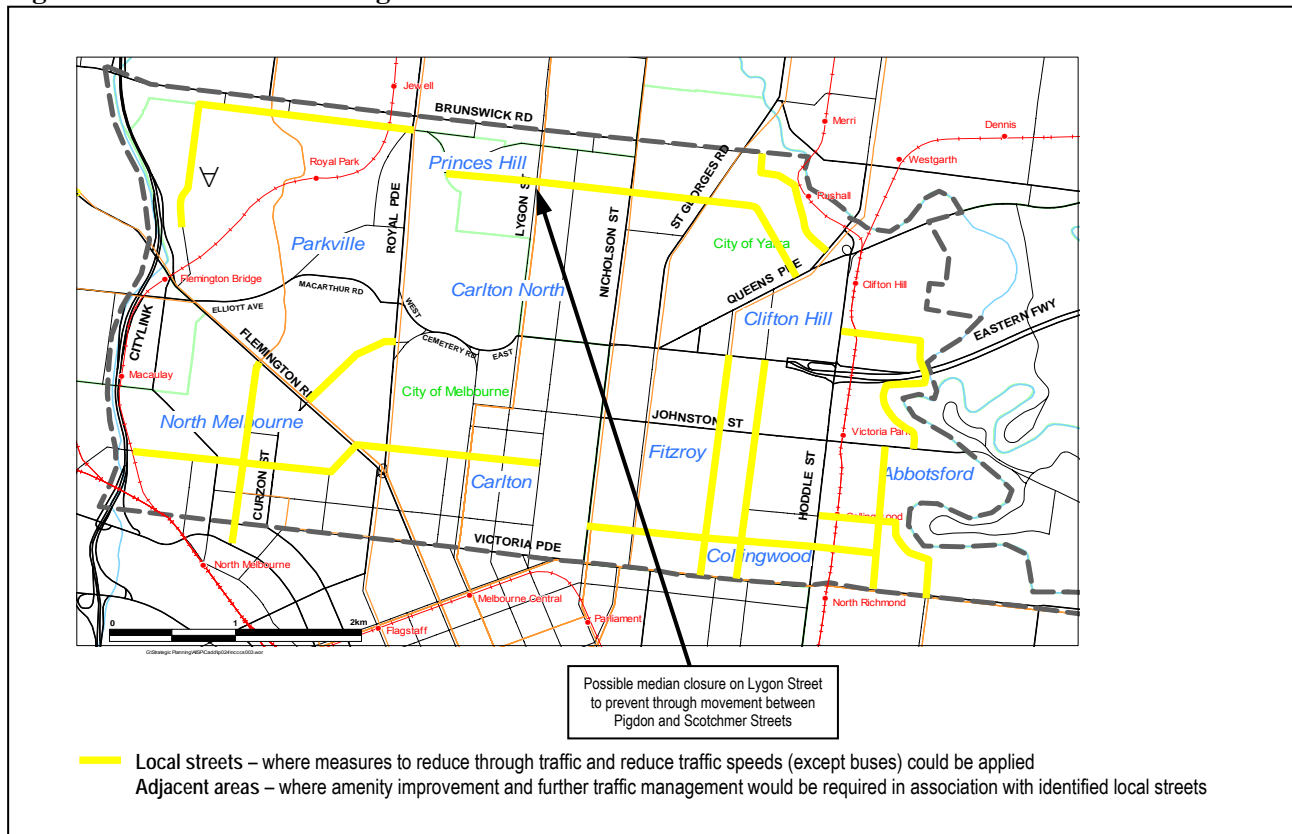
Figure 4-1 Public transport improvements considered

Local traffic management measures

Much of the inner north has already been treated with traffic management measures to discourage through traffic from local streets. However there are still some problem areas, and through traffic will increasingly seek out longer ‘rat runs’ as the level of congestion on main arterials continues to grow with time.

In order to test the implications of further measures to discourage through traffic on collector and local streets while maintaining a reasonable level of access, the capability of a number of candidate streets to carry through traffic was examined (see Figure 4-2). Figure 4-2 also shows the areas adjacent to these streets where additional management measures may be required, to ensure local amenity is not compromised. Techniques examined included a reduction in traffic signal priority, peak hour turn bans, restricted movements across arterial roads, left turn entry/exit only and roundabouts. Further downgrades involving techniques such as the introduction of pavement narrowing and chicanes could also be contemplated.

The initial analysis indicated that in order to achieve a balance between local area amenity and the reasonable operation of the arterial road network, the key streets requiring attention were identified as Pigdon/Scotchmer/Michael Streets, Gatehouse Street at Royal Parade and Harker Street at Flemington Road. The detailed nature of changes on these and other local streets is best determined at the local level following the development of an agreed road hierarchy (as discussed in the draft *NCCC Strategy* report).

Figure 4-2 Local traffic management measures considered

Cycling and walking initiatives

Cycling and walking conditions in the inner north have been improved in recent years but there is still much that can be done. If substantial increases in walking and cycling are to be realised, the conditions must be further improved and the benefits of cycling and walking need to be ‘sold’ more strongly to the community.

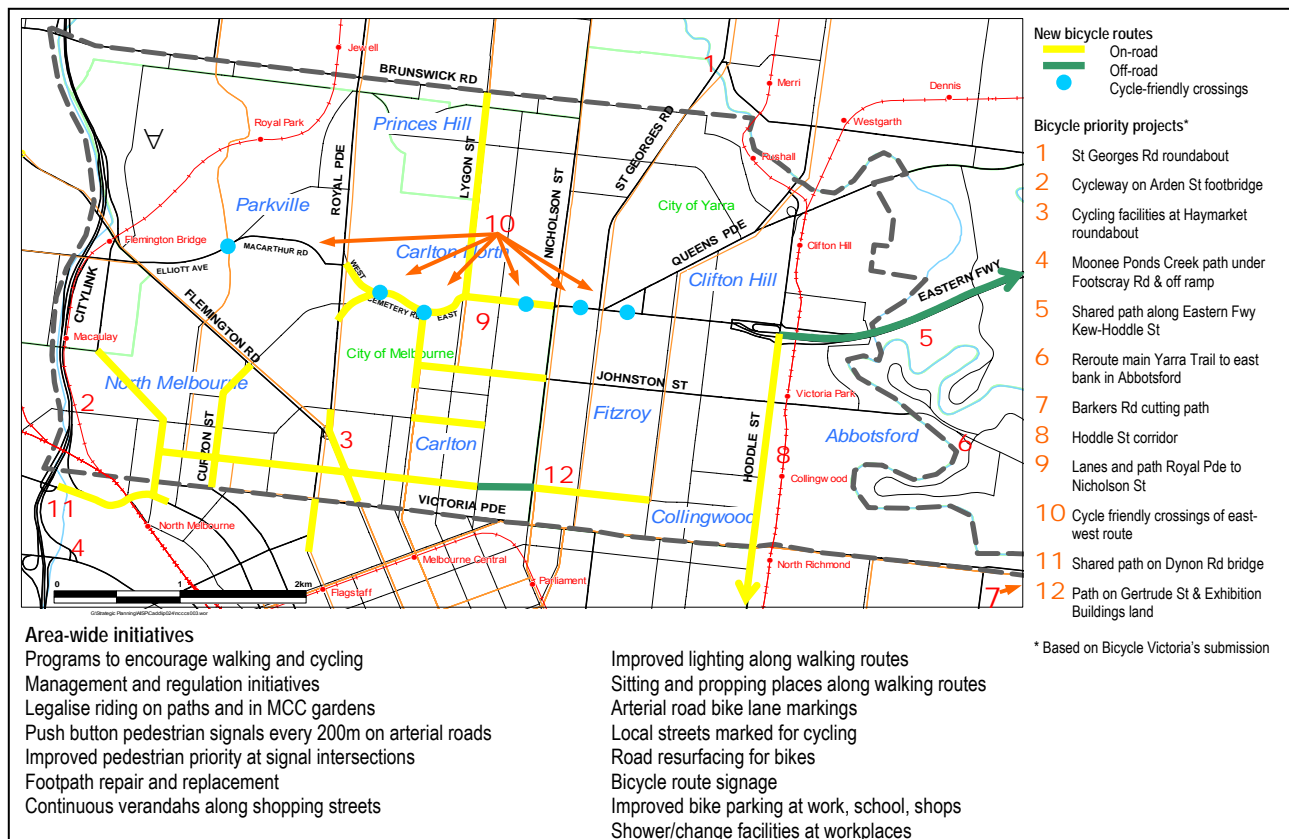
A comprehensive range of walking and cycling network initiatives were considered, including:

- On and off-road paths and lanes to provide new bicycle routes
- Additional pedestrian crossings and improved response/crossing time for pedestrians at traffic signals
- Footpath repair and replacement
- Verandahs and improved lighting, sitting and propping places
- Fine-grained network of bicycle lanes/markings on local streets

A number of supporting initiatives are proposed such as:

- Programs to encourage walking and cycling
- Management and regulation initiatives
- Improved bicycle parking and end-of-trip facilities at schools and shops and especially workplaces (showers, change rooms, lockers)

The proposals considered in the appraisal are illustrated in Figure 4-3.

Figure 4-3 Cycling and walking initiatives considered

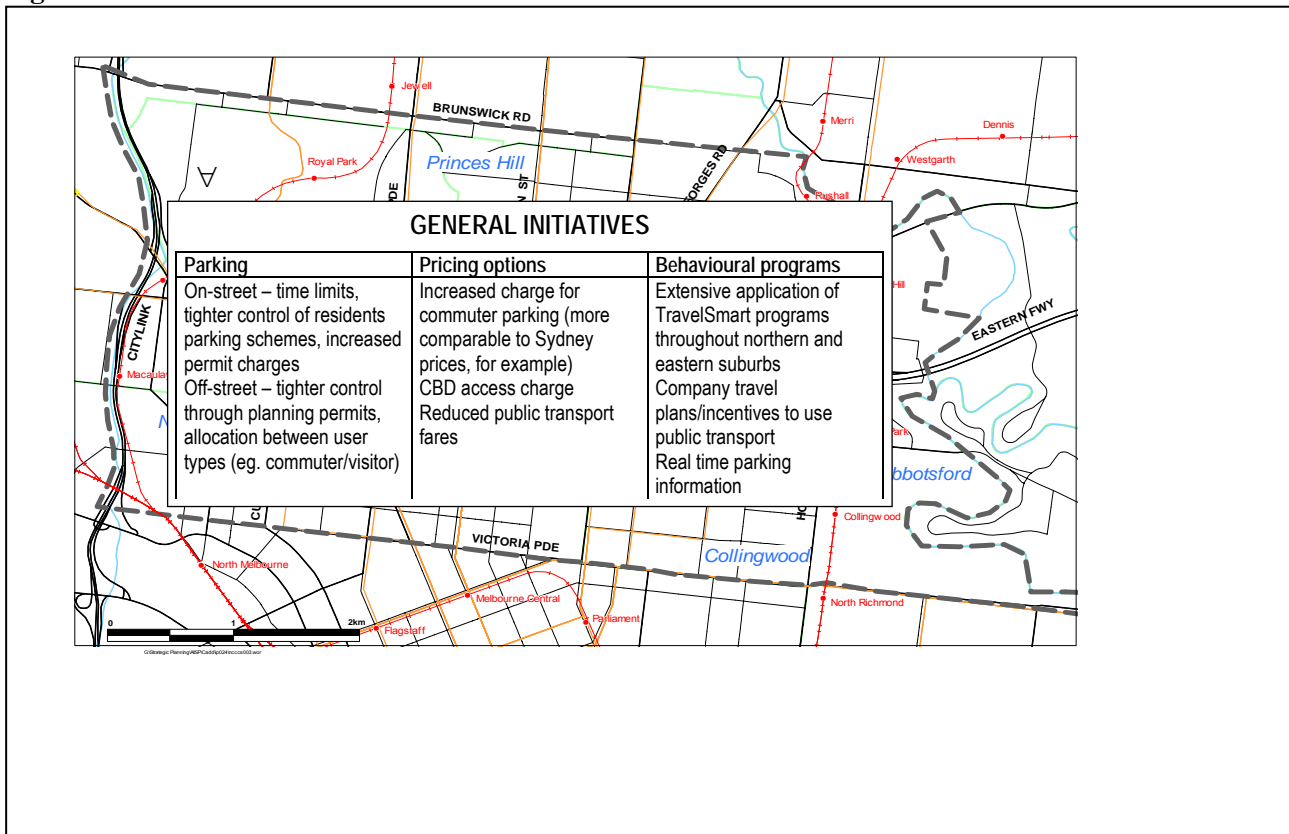
Car use reduction strategies

The preceding strategy elements are primarily measures to improve or encourage alternatives to car travel, formulated to assess what degree of mode shift would occur. Longer term initiatives to actively discourage car use in certain areas and/or times have also been suggested and examined. The range of possible initiatives are listed in Figure 4-4. The appraisal in Chapter 5 reviews these and suggests which should be carried forward as part of the draft strategy.

Key issues are the availability and price of parking (especially for commuters), relative pricing of private and public transport, and behavioural programs such as TravelSMART, which can establish significant and lasting shifts to public transport, cycling and walking through concerted and individualised marketing campaigns. Initiatives suggested for review include:

- On-street parking – time limits, tighter control of residents parking schemes, increased permit charges;
- Off-street parking – tighter control through planning permits, allocation between user types (eg. commuter/visitor);
- Pricing – increased charge for commuter parking (more comparable to Sydney prices, for example), CBD access charge, reduced public transport fares; and
- Behavioural programs – extensive application of TravelSMART programs throughout northern and eastern suburbs, company travel plans/incentives to use public transport, real time parking information, parking plus free public transport ‘packages’.

The possibility of moving transport costs from predominantly fixed to predominantly variable over an extended period was also suggested and is considered in the following appraisal. This would ensure that transport users experience more of the true cost of their travel choices (for further information refer to the National Transport Secretariat document ‘*Lowering Emissions from Urban Traffic: An Integrated National Strategy*’).

Figure 4-4 Car use reduction initiatives considered

Land use initiatives

Initiatives are required to ensure that ongoing growth in the area is accommodated successfully and sustainably. This will require changes in planning schemes and guidelines (eg parking provision for new developments), promotion of transit-oriented development principles and other innovative ways to improve the sustainability and liveability of the inner north.

The key land use related issues were identified as:

- Policies which raise car parking prices for residents may adversely affect residential property in the inner north;
- There are significant issues associated with the need to raise the intensity of residential development and employment opportunities –there may be considerable impacts at the local level on built form, amenity and heritage values; and
- Land will need to be more efficiently used if the anticipated population and jobs are to be accommodated.

Doncaster area rapid transit

Public transport serving the north-eastern suburbs (Doncaster, Templestowe and Warrandyte) is the only broad-scale bus based system in Melbourne. Radial travel on this system is via the Eastern Freeway/Hoddle Street or Kew Junction/Johnston Street and as such, its reliability is impacted by congestion on the arterial road system particularly during peak hours. To address this to a limited degree, Scenario A includes improved frequencies and speeds to the present bus-based system in the Eastern Freeway corridor. However, appraisal of Scenario A shows that this is not enough to achieve the mode shifts required to avoid further traffic growth on the Eastern Freeway, or to reduce it in the longer term (Scenario A reduces future traffic on the Eastern Freeway by about 10,000 vehicles a day or 6% compared to the Base Case, and increases patronage on Eastern Freeway and Johnston Street bus routes by about 10,000 passengers per day or 100%).

In addition to this, options were developed to significantly upgrade public transport in the Doncaster corridor to provide a high speed rapid transit system from Doncaster Shoppingtown to Melbourne CBD, possibly via the University and Carlton (Figure 4-5). This system (DART for Doncaster Area Rapid Transit) could be either bus, rapid tram or train-based, and could have a limited number of major interchanges in the inner north (at Hoddle Street, University of Melbourne and Melbourne Central). It could utilise exclusive protected lanes along Doncaster Road, the Eastern Freeway, Alexandra Parade and tram fairways along Nicholson, Elgin and Swanston Streets where possible. Alternative routes to the CBD include Hoddle Street/Victoria Parade or Nicholson Street. A heavy rail option would link into the existing Clifton Hill railway line from the Eastern Freeway median north of Victoria Park Station.

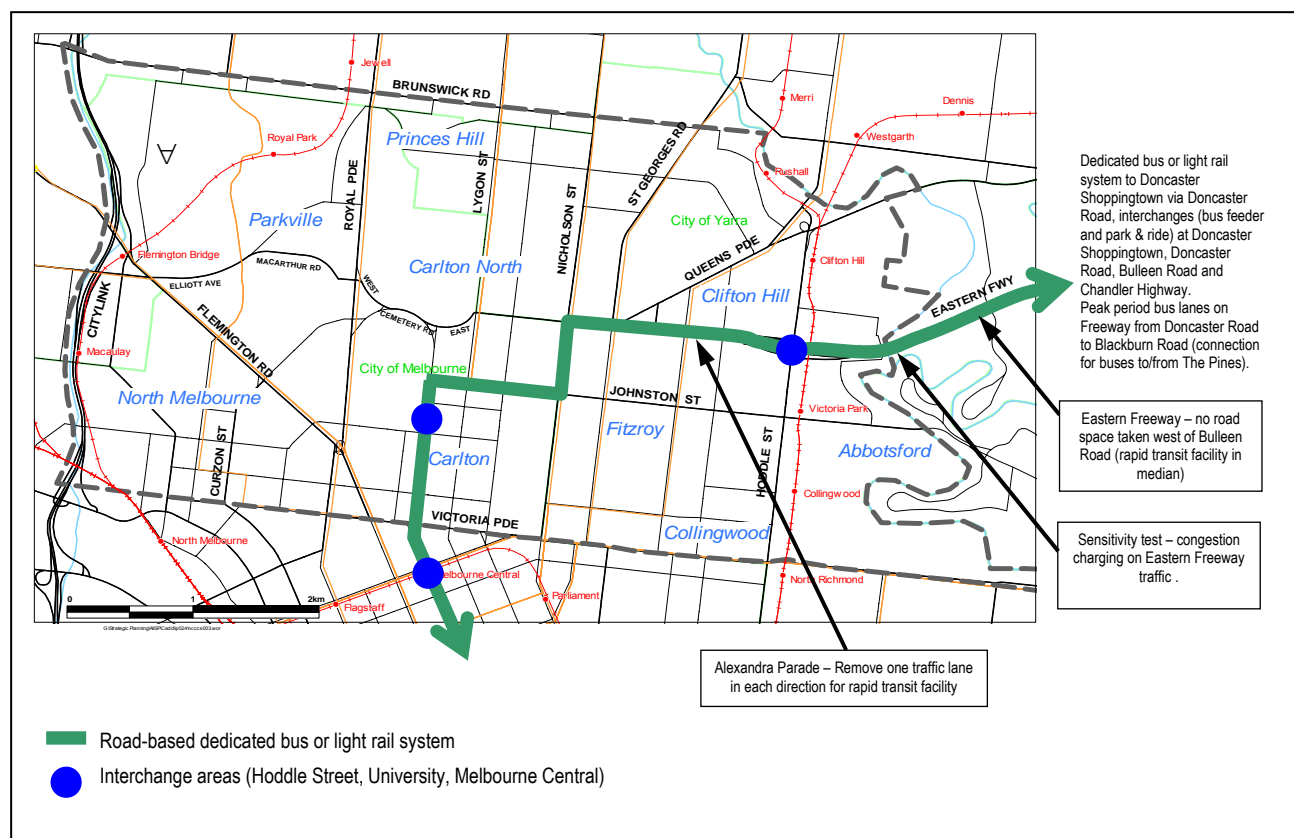
Along the Eastern Freeway the system could have its own right of way in the median from Hoddle Street to the west of Bulleen Road. East of Bulleen Road, some widening and freeway reconstruction may be required to accommodate the system. Traffic capacity of the freeway would not be affected. Stops or interchanges could be included at Doncaster Road, Bulleen Road and Chandler Highway, with bus access and park-and-ride facilities.

In the longer term, it may be desirable to put the rapid transit system underground from Nicholson Street and along Swanston Street, as part of a north-south spine to provide more public transport system capacity in the CBD, if required.

A heavy rail option from Doncaster Hill to join the City Loop at Clifton Hill would be underground from Doncaster Hill to join the freeway median west of Bulleen Road.

As a sensitivity test, a congestion charge on Eastern Freeway traffic was examined for its effect in increasing patronage on DART and reducing car traffic on the freeway.

Figure 4-5 Doncaster Area Rapid Transit (DART) system



Arterial road improvements

Finally, the issue of improvements to arterial roads in the inner north was examined. A pair of two-lane road tunnels between the Eastern Freeway east of Hoddle Street to Racecourse Road, was considered to provide access between the Eastern Freeway and the western suburbs, Tullamarine Freeway and the western leg of City Link.

One option includes interchange ramps at Hoddle Street (similar to existing), all directions at Brunswick/Nicholson Streets and east-only ramps at Royal Parade (see Figure 4-6). The tunnel would attract east-west traffic from the surface road system in the inner north, resulting in a substantial reduction to traffic on the Alexandra Parade/Princes Street/College Crescent/ Cemetery Road/Macarthur Road/Elliot Avenue route.

With the tunnel in place, the residential areas of Parkville could be protected by closing Cemetery Road West (and using it for ramp portals), closing the western separator along Royal Parade for some distance to reduce the western carriageway to a service road and limiting access to/from Gatehouse Street and Macarthur Road at Royal Parade to left turn in and left turn out movements. The western north bound service road would continue to provide a good level of access to Parkville and into Royal Park but would effectively prohibit through traffic from using Gatehouse Street, Macarthur Road and Elliot Avenue. Alexandra Parade and Princes Street could also be reduced to two through traffic lanes in each direction.

These local street measures could not be considered as stand-alone initiatives, because without the tunnel, Macarthur Road/Elliot Avenue would need to remain as the east-west connector serving both park access traffic and through traffic along the Eastern Freeway/Alexandra Parade/Racecourse Road corridor.

It should also be noted that an east-west road tunnel between the Eastern Freeway and the western leg of City Link/Tullamarine Freeway would provide for the through truck traffic currently using the surface road link through the inner north. Without the tunnel, the capability of the main arterial road network would need to be maintained to ensure it was able to cope efficiently with the movement of road freight.

Other versions of the road tunnel were considered but rejected early in the study. An east/west tunnel option without intermediate interchanges was examined but rejected as a less practical solution as it provided less relief to the Alexandra Parade-Elliot Avenue east-west route. The east-west route not only carries through traffic between the Eastern Freeway and City Link/Tullamarine Freeway but it also provides for a range of movements into and out of the inner north, for example between the Eastern Freeway and areas such as Carlton and the University/hospital precinct, and to or from Queens Parade/Heidelberg Road. The tunnel with intermediate interchanges provides for many of these additional movements.

Another tunnel option considered would provide a direct link between the Eastern Freeway and the north-east corner of the CBD connecting to Victoria, Latrobe and Lonsdale Streets. While this option would provide some relief to inner north roads (particularly Hoddle and Nicholson Streets), it would introduce major traffic problems in the north-east part of the CBD and would detract from the central area as the focus of the public transport system by competing for the radial movement of people. It would provide only minor relief to the east-west route west of Nicholson Street.

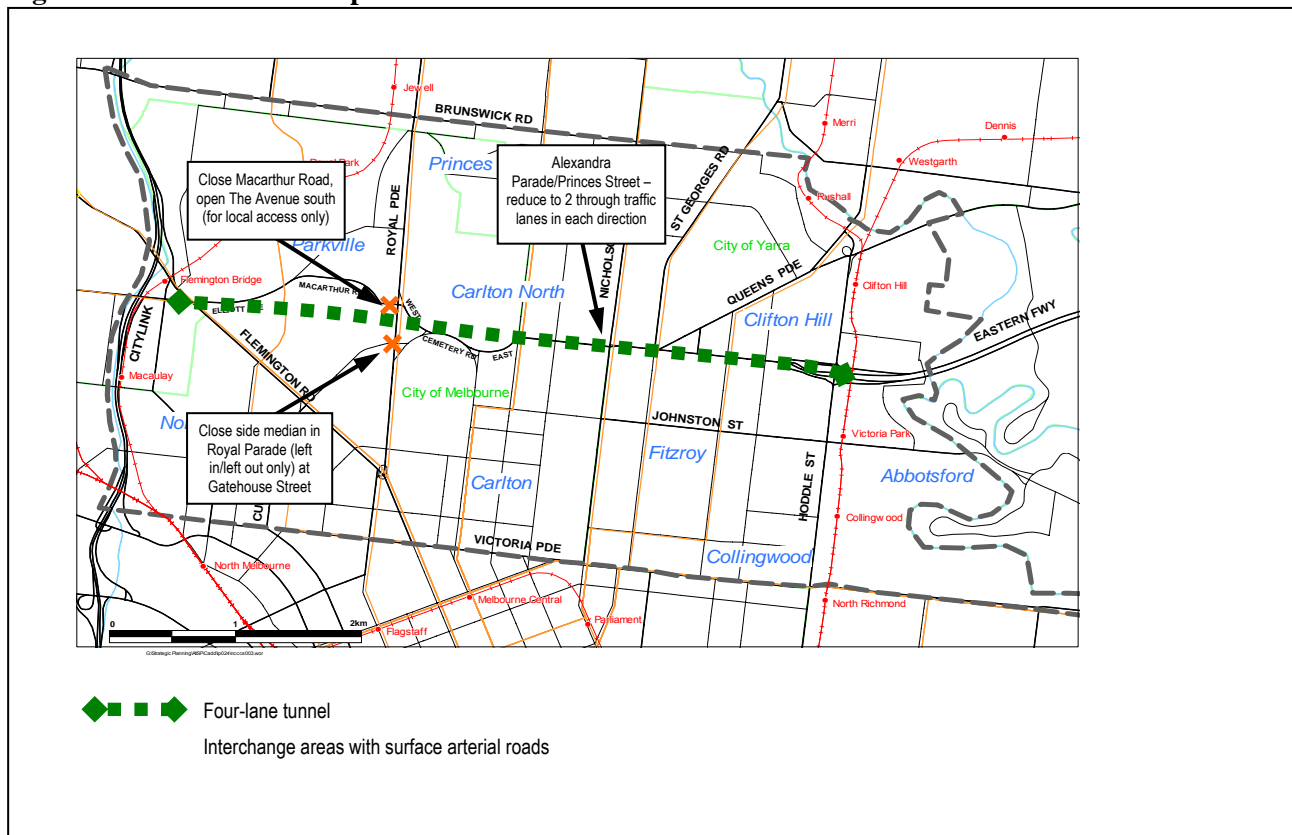
A single tunnel between the Eastern Freeway and the western leg of City Link was also considered. This was proposed to carry one-way traffic from the east during the morning peak and from the west in the evening peak. Day and night-time directions would require further study. The premise upon which this proposal was based was the possibility of a high degree of ‘tidal’ flow in the peak periods. Traffic analysis (see the *NCCCS Transport Component* specialist report) shows that the western end of the Eastern Freeway would be expected to carry about 160,000 vehicles a weekday in 2021 (Base Case). During the morning peak about 63% of freeway traffic is inbound, with a strong inner city focus (i.e. it has a 63/37 directional split). City-bound freeway traffic uses Hoddle Street (or other north-south streets). If a two-way east-west tunnel was built, traffic analysis shows 54% of the traffic using it would be westbound in the morning peak period and 46% eastbound. The volume in each direction is therefore of a similar magnitude, requiring major changes during the day on the surface road system to handle the reverse direction if a single, reversible, tunnel was built. A tidal flow (single direction) tunnel arrangement would leave high levels of congestion remaining on

the arterial system in the ‘reverse’ peak direction. There would also need to be intricate and difficult arrangements to change the direction of the tunnels at some point during the day. It was concluded that a single two lane reversible tunnel was not an appropriate solution at this inner urban location.

Possible grade separations at key intersections were also considered. Those suggested included Victoria Parade/Hoddle Street, Hoddle Street/Johnston Street and Victoria Parade/Nicholson Street. While simple grade separations could fit into the existing rights of way, the provision of ramps to cater for the high volumes of turning movements at these key intersections would cause major traffic operation difficulties and would require significant property acquisition and local impacts. If turning movements were not catered for, there would be high increases of traffic on local streets as road users sought alternative routes. This option was rejected as unworkable.

The tunnel options were assessed without tolls. Although the east-west tunnel would maximise the traffic relief effect on surface roads, the economic evaluation (see Chapter 5) indicates that it is not justified.

Figure 4-6 Arterial road improvements



5 Appraisal results

5.1 Appraisal presentation

The basic appraisals of each of the Scenarios were carried out by the study specialists (see Appendix A for a list of their reports). Their appraisals are summarised in the detailed appraisal tables for each scenario, contained in Appendix B. Whilst undertaking their appraisals, the specialists each met with the Community Reference Group and presented and discussed their basic appraisal results. The Community Reference Group's feedback was taken into account in their appraisals as now presented.

The following sections summarise and compare the scenarios against the indicators for each of the three basic goals of the framework (see Table 2-1 for a full listing of goals and Table 2-2 for the appraisal indicators):

- **Social:** *Improve amenity and liveability of the Inner North;*
- **Environmental:** *Protect and enhance environmental sustainability of the Inner North; and*
- **Economic:** *Support growth in economic activity, especially in and around Melbourne's CBD.*

Tables 5-3A, B and C summarise the key results from each of the specialists (from the tables in Appendix B) against each of the second level of goals and indicators. Symbols are used to indicate whether the impacts are positive or negative and to what degree (significant, low or near neutral).

In this Chapter, sections 5.2 and 5.3 present the travel demand outcomes and economic evaluation of scenarios, and sections 5.4, 5.5 and 5.6 discuss the social, environmental and economic appraisals respectively, identifying the key findings. Section 5.7 draws these findings together to reach conclusions against the basic 'triple bottom line' framework. These conclusions are then used in Chapter 6 to establish a set of principles to guide the development of the draft strategy.

It should be noted that the strategic scenarios tested have been ordered in such a manner that (generally) it is anticipated that significant parts of the earlier scenarios (e.g. Scenario A, network-wide public transport improvements) will be introduced before those that follow (e.g. B, C, etc). As a result, Tables 5-3A, B and C and Table 5-4 should be read in the following context:

- The strategy elements are added sequentially to create the scenarios, so that the overall impact of (say) Scenario D also includes the positive and negative impacts of the elements of Scenarios A, B, and C compared with the Base Case;
- The tables generally show incremental changes; for example, what will the implementation of Scenario D add to the impacts of Scenario C (or, by inference, the combined impacts of Scenarios A, B and C)?
- In some cases, the results highlight the complementary nature of the incremental ordering of the strategies (for example, the addition of DART in Scenario F might be significantly less effective without the TravelSMART program in Scenario D already in place);
- For the major new infrastructure options Scenarios F and G, the appraisals for most indicators show the direct implications of introducing each;
- In the appraisal of Scenario F, some of the indicators reflect the fact that DART in Scenario F is a replacement for the improved express bus service along the Eastern Freeway in Scenario A. If DART was implemented at the outset, all the benefits accruing to public transport along the Eastern Freeway corridor would be attributed to DART (this is discussed further later in the report).

5.2 Travel outcomes

It should be noted that the transport modelling components of the appraisal use results of the 'Zenith' computer transport model of Melbourne (property of and operated by Veitch Lister Consulting Pty Ltd as instructed by the transport specialist Sinclair Knight Merz). The land use estimates used in modelling future years were preliminary figures prepared by the Department of Infrastructure in response to *Melbourne 2030*. It should be noted that more recent land use estimates were used to evaluate the draft *NCCC Strategy*. The difference in these figures was insignificant in terms of their impact on the overall analysis of data for the inner north.

The travel outcomes of the scenarios tested in this appraisal are presented in Table 5-1 and shown graphically in Figure 5-1. This shows how the scenario elements contribute towards mode share targets and their impact on the travel task as a whole.

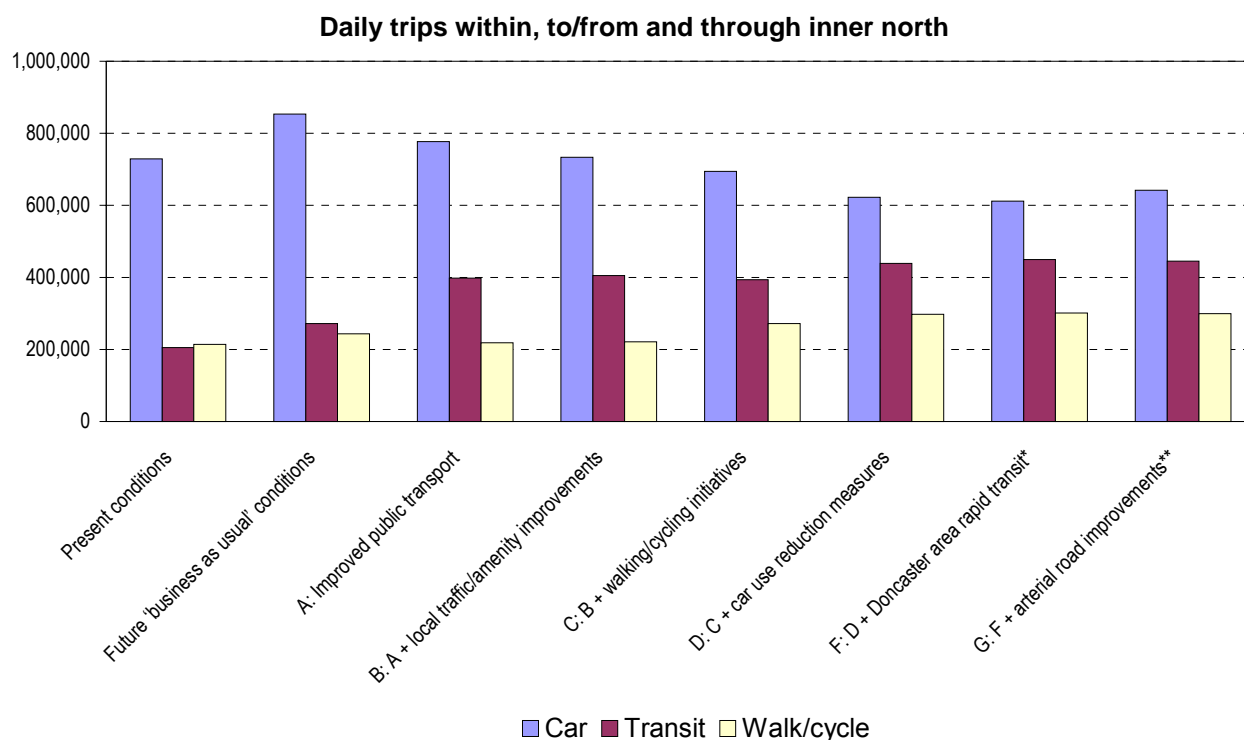
Table 5-1 Travel outcomes of strategy elements

Scenario	Thousand trips/day (%) of inner north travel				Growth from present day			
	Car	Public transport	Walk & cycle	Total	Car	Public transport	Walk & cycle	Total
Present conditions	729 (64%)	205 (18%)	214 (19%)	1,148	1.00	1.00	1.00	1.00
Future 'business as usual' conditions	853 (62%)	272 (20%)	244 (18%)	1,369	1.17	1.33	1.14	1.19
A: Improved public transport	777 (56%)	398 (29%)	219 (16%)	1,394	1.07	1.94	1.02	1.21
B: A + local traffic/amenity improvements	733 (54%)	405 (30%)	221 (16%)	1,359	1.01	1.98	1.03	1.18
C: B + walking/cycling initiatives	694 (51%)	394 (29%)	272 (20%)	1,360	0.95	1.92	1.27	1.18
D: C + car use reduction measures	622 (46%)	439 (32%)	298 (22%)	1,359	0.85	2.14	1.39	1.18
E: D + land use/development initiatives	618 (45%)	441 (32%)	301 (22%)	1,360	0.85	2.15	1.41	1.18
F: E + Doncaster area rapid transit*	612 (45%)	450 (33%)	301 (22%)	1,363	0.84	2.20	1.41	1.19
G: F + arterial road improvements**	642 (46%)	445 (32%)	300 (22%)	1,387	0.88	2.17	1.40	1.21

* Scenario F shown includes light rail DART option

** Scenario G shown includes east-west tunnel with intermediate ramps

Figure 5-1 Effect of the scenarios on inner north travel



* Scenario F shown includes light rail DART option.

** Scenario G shown includes east-west tunnel with intermediate ramps

The impact of the strategy elements on the transport task within, to/from and through the inner north is summarised as follows:

- If a 'business as usual' Base Case is followed, travel would increase by about 19% between now and 2021. Public transport mode share would increase slightly from today's levels to 62% car, 20% public transport and 18% walk/cycle³.
- If public transport is improved along the lines indicated in Scenario A, the mode share of public transport would increase from 18% to 29%. Car use would increase to 7% above today's level.

³ Note that walk/cycle here refers to trips undertaken using walking or cycling only – public transport trips also involve a significant proportion of walking, for access and egress to the public transport system.

- Extensive management of traffic and amenity on local streets (added in Scenario B) would increase congestion on arterial roads, which would in turn encourage more use of public transport, walking and cycling. Public transport would carry 30% of travel, and car use would reduce slightly compared with Scenario A.
- There is therefore the need to carefully manage the road system to ensure local areas are protected from through traffic while maintaining an adequate arterial road network for through traffic, especially trucks.
- Walking and cycling initiatives (added in Scenario C) would have the potential to increase walking and cycling to 20% of total travel. Although most of this would come from road traffic, there would be a small reduction in public transport use as well.
- Adding measures to reduce car use (Scenario D) would increase public transport mode share to 32% and walking and cycling to 22%, and reduce car use to 46% of travel.

The measures assessed above meet the *Melbourne 2030* objective of a substantial increase in public transport mode share, and result in a potential reduction of car travel demand in the inner north, compared to today's levels.

The following major infrastructure projects were also examined to assess their potential impact on the transport task:

- A light rail rapid transit system to Doncaster (added in Scenario F) would attract 69,000 trips a day and increases inner north public transport mode share to 33%. The highest loading on any one section (just east of the interchange at Hoddle Street) is expected to be 33,000 trips per day.
- Scenarios D and F are complementary; the significant reduction in car usage would require not only the TravelSMART measures of Scenario D but the additional capacity and service improvements offered by Strategy F to make public transport more attractive.
- An east-west tunnel with intermediate interchanges (Figure 4-6), added in Scenario G, would carry about 95,000 vehicles a day between the Eastern Freeway and Nicholson Street and 80,000 beneath Royal Park. This includes diversion of up to 60,000 vehicles a day from Alexandra Parade and a total of about 35,000 vehicles a day from parallel routes such as Brunswick Road, Victoria Parade, Bell Street and City Link, outside the inner north. This would result in an overall increase in inner north car travel by 30,000 trips a day and a minor reduction in public transport mode share to 32% compared with Scenario F (33%).
- At present, 63% of morning peak traffic on the Eastern Freeway east of Hoddle Street is city-bound, and 37% is outbound. About 54% of traffic in an east-west tunnel would be westbound and 46% eastbound. These figures confirm that radial traffic movements (i.e. in and out of central Melbourne) are more 'tidal' than circumferential movements, and that the east-west tunnel would primarily serve the latter.
- A tunnel between the Eastern Freeway and the CBD would cater mainly for radial traffic to/from the CBD and would, as a result, compete with public transport services to the CBD, to the detriment of mode share. It would make comparatively little difference to traffic levels on roads in the inner north, except for reductions on Hoddle Street, Wellington Street and Smith Street. Inbound morning peak traffic would cause extensive queuing through the tunnel unless some form of 'metering' system was used to regulate traffic entering the tunnel from the Eastern Freeway.
- With an east-west tunnel with interchanges in place, significant traffic reductions would occur on the surface road system in the inner north (See specialist study report '*Transport Component*', SKM, 2002 & 2003) and would include:
 - Alexandra Parade east of Smith Street, down from 70,000 vehicles a day in 2001 to 24,000 vehicles a day in 2021 (a 65% reduction);
 - Princes Street west of Lygon Street, down from 46,000 vehicles a day in 2001 to 29,000 vehicles a day in 2021 (a 38% reduction);
 - Macarthur Road closed to through traffic under Scenario G, with traffic reduced from 29,000 vehicles a day in 2001 to around 2,000 vehicles a day (local access traffic only) in 2021;
 - Elliott Avenue east of Flemington Road, down from 31,000 vehicles a day in 2001 to 5,000 vehicles a day (park access traffic only) at 2021.

5.3 Economic evaluation

Table 5-2 summarises the results of the economic evaluation of scenarios, reported in the *NCCCS Scenario Appraisal – Transport Component* by Sinclair Knight Merz 2002.

Table 5-2 Summary of economic evaluation results

Scenario	Incremental costs and benefits				
	Undiscounted Capital costs (\$M)	Undiscounted Total costs (\$M)	Discounted Total costs (\$M)	Discounted Economic benefits (\$M)	Benefit- cost ratio
A: Public transport improvements	620	6,670	3,590	14,910	4.2
B/C: A + Traffic management, walk/cycle measures	20	60	40	-670	n/a
D: B/C + Increased CBD parking charge	10	-30	-20	-740	n/a
F: D + DART (light rail)	180	50	110	120	1.1
F2: D + DART (heavy rail)	190	800	530	340	0.7
G: F + E-W tunnel (with ramps)	260	840	660	650	1.0
G1: F + E-W tunnel (no ramps)	810	710	550	640	1.2
G2: F + CBD tunnel	660	450	340	240	0.7

Notes: 1. Scenario A (public transport improvements) is used as a base for comparison of the economic implications of the other scenario elements.

2. Capital and total costs are undiscounted and cover the evaluation period of 30 years.

3. Scenario D evaluation did not include TravelSMART, which would potentially provide substantial benefits relative to its cost.

4. Incremental costs and benefits are discounted, and indicate the economic effects of the additional elements in each successive scenario.

5. The incremental benefit-cost ratio illustrates the economic performance of each additional element in turn.

The incremental benefit cost ratio (BCR) is of the incremental costs and benefits of each scenario above the costs and benefits of the previous scenario.

The costs and benefits of Scenario A (wide-ranging public transport improvements) are substantial; the analysis suggests an overall benefit-cost ratio of 4.2 for the package of works modelled. The public transport improvements involve \$620 million in capital cost and over \$6 billion in total costs over 30 years (reflecting increased costs of operating the substantially-increased levels of service on train, tram and bus), and generate potential benefits of nearly \$15 billion, mostly through user time savings and reduced traffic congestion because of mode shift effects.

The results of the assessment for subsequent scenarios are summarised as follows:

- Addition of local area traffic management, walking and cycling improvements:
 - Public transport operating costs would increase slightly because of small reductions in running times on some routes;
 - Car users would fall due to the increased travel costs on motorists imposed by the area wide traffic managements;
 - the incremental BCR would be negative.
- Car use reduction measures in addition to local area traffic management and walking and cycling:
 - costs would be slightly lower due to somewhat improved PT running times and hence lower PT rolling stock requirement;
 - benefits would fall if parking charges were introduced;
 - the incremental BCR would be positive if TravelSMART benefits and costs are included.
- Light rail rapid transit from Doncaster Hill in addition to car use reduction measures:
 - public transport costs would be higher but these are outweighed by extra benefits to PT and road users, giving a BCR of about 1.1.
- Heavy rail from Doncaster Hill in addition to car use reduction measures:
 - due to the higher infrastructure and operating costs of the addition of the heavy rail scheme to Doncaster Hill the resulting incremental BCR would be 0.7.
- Road tunnel options in addition to rapid transit in the Doncaster corridor:
 - East-west tunnel with intermediate interchanges: high capital costs are offset by increased travel benefits resulting in a BCR of about 1.0
 - East-west tunnels without the Nicholson Street/Brunswick Road and Royal Parade ramps would improve the incremental BCR to 1.2 due to its lower cost
 - Eastern Freeway to CBD tunnel: increased congestion in/around the CBD would result in higher congestion costs offsetting lower construction costs resulting in an incremental BCR of 0.7.

Table 5-3 A, B, C

5.4 Social implications

Table 5-3A presents a summary of the appraisal of the social implications of the basic scenarios being assessed. The main sources of information used as a basis for this summary appraisal are the tables showing the specialists' appraisals in Appendix B and the specialist reports, in this case:

- Helen Lardner Conservation and Design, 2002, *NCCCS Appraisal Report – Heritage, Landscape and Urban Design Component* (including work by EDGe Environmental Design, Dr Carlotta Kellaway and Isabel Ellender); and
- Sinclair Knight Merz, 2002, *NCCCS Appraisal Report – Social Appraisal Component*

The table clearly indicates the major negative social impacts of the 2021 Base Case – the 'business as usual' scenario (containing nothing significant beyond present transport commitments). These negative impacts are due in the main to very significant increases in road system congestion levels with very little area-wide improvement to the public transport network.

The main social impacts of the Base Case as documented by the specialists are:

- Substantial increases in traffic noise levels and the number of properties adversely effected;
- Significant increase in road crashes and perceived insecurity on the public transport system;
- High traffic levels and on-street parking demands would increase impacts on public areas, streetscapes, heritage areas and urban settings; and
- Substantial growth of traffic intruding into local areas to avoid congested arterials and a subsequent decrease in local accessibility.

Scenario E contains land use initiatives in the inner north, in response to the *Melbourne 2030* growth directions. By 2021, it is anticipated that there will be a significant increase in both the population (up by 8,400 or 15%) and jobs (up by 8,000 or 11%) in the inner north. Many of the jobs will be taken up by new residents, reducing the need for long-distance commuting. However, increases in residents and jobs will also create other trips to/from the area (by residents, workers or visitors) and increased parking demands and may, as such, require changes to the transport systems in order to avoid the further deterioration of the amenity of the area and the capability/efficiency of the transport system. The changes in the indicators as a result of the increases in population and jobs add to the Base Case implications. Most of the social indicators in the table will show further negative impacts as travel demands and the resulting traffic congestion and intrusion into local areas grow.

The goal of '*significantly reducing the impacts of noise and air pollution from transport*' would be addressed in two parts:

- Significant noise level reductions would be achieved by the rerouting of some through traffic from local streets (as in Scenario B – see Figure 4-1), which may result in a reduction in the number of properties affected to 22% below the Base Case, and by the introduction of the east-west road tunnel (in Scenario G) which may reduce the number of affected properties by a further 15% (or by 42% if all strategies are in place);
- While the amount of road travel would increase by 25% above the present day to the Base Case, there would only be a small increase in motor vehicle pollutants due to fleet replacement and compliance with more stringent design rules. The introduction of major improvements to public transport in and around the inner north (present in Scenarios B and F), would provide further reductions in pollutants with related social benefits. The east-west road tunnel (Scenario G) would provide minor improvements due to smoother traffic flow and the removal of through traffic from surface streets in the inner north.

The goal of '*improved safety*' would be met as follows:

- Road crash savings would improve as road traffic decreases, with some savings due to improved public transport (Scenarios A and F), but with more significant savings due to measures to reduce car usage (Scenario D) and improved ease of traffic flow resulting from the east-west tunnel (Scenario G);
- Improved security would be best met by the upgrading of public transport services Scenarios A and F which provide more frequent services, improved stops and more surveillance.

The goal of *'significantly enhancing urban landscape and heritage values'* would be best met by the walking and cycling initiatives in Scenario C and the reduced car usage initiatives in Scenario D. These initiatives both contribute to reductions in car use and add to the opportunities to enjoy local areas at a personal level. Enhanced public transport (Scenarios A and F) would also assist in achieving this goal but care must be taken that new services and updated tram and bus stops do not intrude into or detract from local character. The east-west road tunnel (Scenario G) has the potential to cause impacts in this regard, which would need to be alleviated by careful design, construction and traffic management. It should be noted no significant private property acquisition would be required for Scenarios A to D and it is unlikely that DART options (Scenario F) would require significant private property. Scenario G (the east-west road tunnel) may require a small number of properties near the Flemington Road portal but the extent (if any) would depend upon the form of the portal and interchange in this area.

Each scenario (except possibly the land use initiatives in Scenario E) would have a positive effect on the goal to *'minimise through traffic on local streets'*. While the public transport initiatives in Scenario A would reduce car usage, its advantages are offset to some degree by the potential reduction in arterial road capacity caused by the additional road space required for public transport, which could increase pressure on local streets (although the reduction in car demand will mitigate this effect). Scenario B specifically addresses this issue by reducing the capacity of selected local streets, while cycling and walking initiatives, car use reduction measures and DART (in Scenarios C, D and F respectively) further reduce car use. The east-west road tunnel in Scenario G would increase the capacity of the arterial road system, and could relieve local streets, although the increased capacity would also induce more car traffic. Minimisation of through traffic in local and collector streets provides substantial social benefits in terms of improved neighbourhood road safety, reduced neighbourhood severance due to traffic and improved ambience and amenity.

While reducing car usage by increasing CBD parking charges does not necessarily meet the objective of *'improving access and travel choices for residents, visitors, and workers including disadvantaged groups'*, the other scenarios would provide a positive contribution to this. The level of transport accessibility would increase the most through Scenarios A, F and G, while a *'sense of place/neighbourhood'* would be enhanced mainly by local traffic management, cycling and walking initiatives (in Scenarios B and C).

Most scenarios make a positive contribution to *'providing facilities for people with mobility disadvantages'*. The public transport initiatives (in Scenarios A and F) perform best against this objective while the local traffic management, cycling, walking and car use reduction initiatives (in Scenarios B, C and D) also perform well. The east-west road tunnel (Scenario G) has the potential to reduce traffic congestion and local street traffic and thus makes a small indirect contribution.

In summary, the **key social findings** are:

- The negative social impacts or implications of the Base Case are a key factor in the justification to move ahead with transport improvements in the inner north; to do nothing is not a justifiable outcome.
- While the implementation of substantial improvements to the public transport system, local area and arterial road management measures, walking and cycling measures and other measures to reduce car usage (eg TravelSMART) together provide clearly identifiable social benefits when compared to the Base Case (by reducing overall car use and by diverting through traffic from local streets), DART and/or the east-west road tunnel would further enhance local social benefits.
- It is possible to improve the noise ambience of the inner north by reducing road traffic (due to improved public transport including DART) and diverting road traffic (via the east-west road tunnel). This is a key social factor in determining the outcomes from this study; and
- Improved travel accessibility and mode choice is a key social indicator to determine the outcome of this study. The implementation of DART or the east-west road tunnel would make the main contribution to accessibility while local area traffic management and the addition of walking and cycling initiatives would add most to the sense of neighbourhood ambience.

5.5 Environmental implications

Table 5-3B presents a summary of the appraisal of environmental implications of the strategy scenarios. The main sources of information for Table 5-3B and this appraisal are the tables showing the specialists' appraisals in Appendix B and the specialist reports, in this case:

- Maunsell McIntyre, 2002, *NCCCS Appraisal Report, Environment Component* (including work by Marshall Day Acoustics Pty Ltd and Environmental Resources Management Australia Pty Ltd).

As Table 5-3B indicates, the main factor impacting on environmental issues is the relative level of car usage. While the 2021 Base Case maintains car mode share at about 67% of inner north trips, the actual number of car trips will rise by about 25%. Trips by public transport will be maintained at 17% of the total, but overall trip numbers will rise by 25% and walk/cycle trips will decline marginally, mainly due to increased congestion and associated hazards on the arterial road system. Although greenhouse emissions are expected to stabilise by 2021 due to changes in vehicle design rules and the turnover in the vehicle fleet, these improvements would be compromised by additional emissions due to increased congestion.

Other environmental issues have been included in the discussion on social issues (changes to the noise and air quality environments). As shown in Table 5-3A and discussed in section 5.4 above, there would be a substantial increase in traffic noise levels for the Base Case. While the air environment may stabilise, further reductions would be beneficial.

While the potential impacts of the Base Case on the key environmental measures of improving sustainability at the broad-scale level and maintaining biodiversity are not very different from today, the Base Case precludes the opportunity to implement significant positive changes.

Increased residents and jobs will result in increased densities which will, in turn, result in minor reductions in the rate of car use per household and increases in public transport usage and walk/cycle trips. This will result in minor positive changes to the environment, but requires additional actions to promote further mode changes and more marked changes in environmental parameters.

The goal of '*ensuring a contribution to overall reductions in greenhouse gas emissions*' will be met to a degree over the next 20 years due to changes in vehicle design rules and the gradual replacement of the vehicle fleet. These changes should result in a gradual reduction in the growth of emissions (currently 2% per annum) but this is seen by many as a minor improvement to a still unacceptable situation. More significant changes will occur as vehicle use is reduced through changes in travel habits (in Scenario D) and the increases in public transport and walking/cycle use (supported by the initiatives in Scenarios A, C and F). While the east-west road tunnel (in Scenario G) will induce a small increase in traffic (and a minor decrease in public transport use), the largely unimpeded travel conditions for cars and trucks in the tunnel will result in fuel efficiencies and reduced greenhouse emissions for those trips. In overall terms, the east-west road tunnel is assessed as neutral with respect to greenhouse emissions.

The goal of '*reducing car use for travel through, to/from and within the inner north*' is successfully met by the proposed major increases in public transport services in Scenarios A and F combined with increased walk and cycle trips in Scenario C, all strengthened by behavioural changes through TravelSMART or similar. Together, these programs will create a reduction in car mode share from 64% (Base Case) to about 45%, and will decrease inner north car trips by 16% from today's levels (and 39% from projected Base Case 2021 levels). It should be noted that while the introduction of the east-west road tunnel in Scenario G will see a minor increase in car travel (up 1% to 46%), there will be a significant further reduction in car travel on some parts of the arterial road network (eg Alexandra Parade/Princes Street would reduce by 38 to 64% to a volume ranging between 24,000 and 55,000 vehicles a day, depending on location). This will result in traffic reductions of 46,000 to 17,000 vehicles a day along this route (refer to the discussion in section 5.2 of this report).

The converse (to the previous paragraph) applies to the goal of '*Substantially increasing public transport mode share*'. The introduction of network-wide public transport improvements, including DART, and the complementary introduction of car use reduction measures (including TravelSMART) will increase inner

north public transport mode share from 18% today (and 20% for the 2021 Base Case) to 33%. Public transport trips in the inner north will increase by 120% compared with today's levels. The walking and cycling initiatives (Scenario C) and the east-west road tunnel (Scenario G) will cause small decreases in future public transport use.

The cycling and walking initiatives (Scenario C), together with behavioural programs (Scenario D) will have a positive impact on the objective of '*increasing the use of walking and cycling*'. It is anticipated that travel by these modes will increase by 39% from today's levels, but with only a minor improvement in the mode share from 19% of all inner north trips at present to about 22% by 2021 (mainly because of the effect of public transport improvements in increasing public transport mode share).

None of the scenarios would have a major impact on the objective of '*protecting and enhancing biodiversity*'. Scenarios A-D would all have a low positive impacts by reducing traffic, particularly at the local level, thus providing an opportunity for increased plantings and a higher level of appreciation. The major infrastructure initiatives (DART and the road tunnels, in Scenarios F and G) would all require construction works which may have some impacts, especially on established trees and urban streetscapes, and good design and project management processes would be necessary to minimise these.

In summary, the **key environmental findings** are:

- While transport greenhouse emissions are expected to stabilise due to more stringent vehicle design rules, emissions will either be further reduced (by improved public transport and other initiatives to reduce car use) or about neutral (for the east-west road tunnel);
- Measures to increase public transport, walking and cycling and reduce car usage will make a significant contribution to improving the environment in general;
- To be most successful, improved public transport and walking/cycling initiatives should go forward **together** with behavioural initiatives like TravelSMART as they will complement each other; and
- Complementary programs of native and exotic planting (and, if necessary, tree transplanting) should be part of any initiative requiring new works or the changing of the status of a road to local street.

5.6 Economic development implications

Table 5-3C presents a summary of the appraisal of the economic implications of the basic scenarios being assessed. The appraisal has been developed from the tables showing the specialists' appraisals in Appendix B and the specialist reports, in this case:

- Sinclair Knight Merz, 2002, *NCCCS Appraisal Report – Transport Component* (including work by Booz Allen & Hamilton Ltd and Veitch Lister Consulting Pty Ltd);
- Maunsell McIntyre, 2002, *NCCCS Appraisal Report – Land use and Macroeconomics Component* (including work by Essential Economics Pty Ltd); and
- Sinclair Knight Merz, 2002, *NCCCS Appraisal Report – Engineering Component*.

The economic analysis summarised and discussed in section 5.3 and Table 5-2 of this report was also a key input to the appraisal.

Table 5.3C indicates that in the 2021 Base Case, growth in economic activity in and around the inner and central areas will be contained at best, or constrained or curtailed because development initiatives would locate in areas with better access. Additional traffic (above 2001) will result in increased conflicts and inefficiencies and worsening congestion, adding significantly to the cost of the movement of goods and to the cost of business and private travel (increased travel time). Accessibility to the full range of inner area activities (including recreational, cultural and commercial) will be reduced resulting either in increased costs or lost opportunities or both.

Inherent in the Base Case are the increased population and jobs in the inner north envisaged by the directions of *Melbourne 2030*. While there are some synergies to be gained by more people residing in the area and more local jobs (more people would work locally and walk or cycle to work), increased densities may lead to the possible implementation of stricter parking controls, more vigorous competition for parking spaces and

higher parking charges. This would be detrimental to many inner area businesses which require the movement of workers and clients into/out of the area during business hours.

The goal of *‘enhancing access for commercial activities including tourism and recreation’* is best met by improving public transport (as in Scenarios A and F), walking and cycling (Scenario C) and improving road capacities (especially the east-west road tunnel in Scenario G). Reductions in car use by CBD cordon or higher parking charges and reduced parking opportunities would have minor negative implications for this objective.

Improved public transport (Scenarios A and F) and the east-west road tunnel (Scenario G) would best address the objective of *‘catering for increased residential population in the inner north and surrounding areas’*. Improved public transport would provide increased travel opportunities to service residents and workers while the east-west road tunnel would provide significant decreases in surface traffic, improving the flow public transport and local traffic. The combination of a new rapid transit system along Alexandra Parade and the removal of through traffic to a tunnel would transform the Alexandra Parade corridor by providing improved accessibility for public transport and improved amenity by the removal of through traffic including a proportion of freight traffic. This would promote redevelopment opportunities along the corridor, with conversions and new residential and office developments in support of the goals and long term outcomes envisaged in *Melbourne 2030*.

The objective of *‘providing for commercial travel movements including safe, efficient primary routes for freight’* is best met by a combination of upgraded public transport (Scenarios A and F) to reduce traffic on the arterial road system (and, as a consequence, improve traffic flows for trucks etc) and the east-west road tunnel (in Scenario G), which will provide relief to parts of the surface road system and significant travel time savings for traffic using the tunnel. For example, Alexandra Parade between the Eastern Freeway and Smith Street currently carries about 70,000 vehicles a day. The 2021 Base Case indicates a likely increase to 86,000 vehicles a day, but with Scenarios A to F (including DART as a light rail system) in place, this figure would reduce to 64,000 vehicles a day. The east-west road tunnel would further reduce this to 24,000 vehicles a day.

While freight vehicles are a relatively small proportion (3.5%) of daily traffic along the Eastern Freeway when compared with other major routes, the volume on the east-west route is nevertheless significant (4,900 trucks a day east of Hoddle Street, and 2,600 trucks a day on Macarthur Road), with major impacts on the social environment and ambience at a number of locations along the corridor. A combination of improved public transport and the east-west road tunnel would provide significant economic benefits to the movement of freight as well as social and environmental benefits to the local community.

The objective of *‘efficiently serving travel needs to/from and within the inner north’* will benefit significantly from the combination of improved public transport (Scenarios A and F) which would provide wider mode choice, faster, more efficient and relevant public transport; and the east-west road tunnel (Scenario G) which would provide improved travel conditions, travel time savings and accessibility plus relief to the surface road system.

The results of the economic evaluation illustrate how the objective of *‘maximising the economic return on investment in transport and land use initiatives’* is met. This is discussed in section 5.3 of this report.

In summary, the **key findings in support of economic development** are:

- The Base Case would be a significant impediment to the development of economic activity because of rising and spreading road system congestion;
- The restriction and increased cost of inner area and CBD parking will assist in promoting public transport use but these initiatives may have an impact on ‘doing business’ unless carefully planned and implemented; and
- The major improvement of the public transport system (including DART) or the construction of the E-W tunnel would enhance access for freight and business activity and private travel efficiency in the inner north and surrounding areas; and

- Additional parking charges or tolls would increase public transport mode share and may also provide the opportunity for additional revenue that could be used to fund public transport improvements but such a measure is not necessarily essential to the success of the *NCCC Strategy*.

5.7 The triple bottom line appraisal

Table 5-4 highlights the key deciding factors from the more detailed Tables 5.3A, B and C by focusing on the high negative and high positive impacts. The table suggests an overall rating based on the extent to which the objectives of each of the three basic appraisal areas (social, environmental, economic) are supported.

Table 5-4 Summary appraisal of scenarios

Goals	Base Case	A	B	C	D	E	F	G
Social: Improve amenity and liveability of the inner north by:								
• Significantly reducing the impacts of noise and air pollution from transport	X	X	✓				✓	✓
• Improving safety – reducing fatalities/casualties to or beyond state targets	X							✓
• Significantly enhancing urban landscape and heritage values in key areas	X			✓	✓			
• Minimising through traffic on local streets	X		✓	✓	✓		✓	✓
• Improving access and travel choices for residents, visitors and workers, including disadvantaged groups	X	✓	✓	✓			✓	✓
• Providing facilities for people with mobility disadvantages		✓					✓	
Overall rating								
Environmental: Protect and enhance environmental sustainability in the inner north by:								
• Ensuring a contribution to overall reductions in greenhouse gas emissions								
• Reducing car use for travel through, to/from and within the inner north	X	✓		✓			✓	✓
• Substantially increasing public transport mode share	X	✓		✓			✓	
• Increasing the use of walking and cycling				✓				
• Protecting and enhancing biodiversity		✓	✓	✓	✓			
Overall rating								
Economic: Support growth in economic activity, especially in and around Melbourne's CBD by:								
• Enhancing access for commercial activities including tourism and recreation							✓	✓
• Catering for increased residential population in the inner north and surrounding areas	X	✓	✓	✓			✓	✓
• Providing for commercial travel movements, including safe, efficient primary routes for freight	X							✓
• Efficiently serving travel needs through, to/from and within the inner north	X	✓					✓	✓
• Maximising the economic return on investment in transport and land use initiatives	X	✓					✓	
Overall rating								



The low negative impacts in Tables 5.3A, B and C could generally be improved by careful design and management; for example the design of stops or stations along the DART system, if built, would need to be in keeping with the character of each locality, to protect or improve local ambience. The low positive impacts in Tables 5.3A, B and C could be regarded as opportunities to further enhance the benefits of the adopted strategy.

The Base Case

Table 5-4 demonstrates that it is clearly unacceptable to remain at the Base Case (i.e. 'business as usual' over the next twenty years). To do so would have substantial social and economic consequences and a worsening environmental situation, all of which would be unacceptable to the local (and wider metropolitan) community. The basic reason for this result is the increase in traffic across the total network, with 25% more trips by car within or passing through the inner north than today. This increase will result in unacceptable levels of traffic congestion on the arterial road network and increased intrusion of through traffic into local residential areas, which will adversely impact on the amenity and ambience of the area.

Conclusion 1: To remain at the Base Case over the next twenty years would cause major social, environmental and economic consequences unacceptable to the local and wider community.

Issues for further consideration

The appraisal also shows that, generally, any of the scenarios will result in an improvement over the Base Case, and that the combined effects of multiple strategy elements are mainly complementary. However, the appraisal brings to light a number of issues that need further consideration through the development of an overall strategy. These are:

- The need for a clearly defined road hierarchy that provides a basis for the efficient movement of through traffic and freight, adequate access to local areas and protection of neighbourhoods from the impact of through traffic;
- The problems associated with accommodating additional residents and jobs, which could conflict with heritage values and increase pressures on local transport infrastructure; and
- The implications, to businesses in particular, of measures to reduce car usage such as reduced parking availability, increased parking charges or a move towards transport users paying more of the true cost of their travel choices.

A clearly defined road hierarchy is required to resolve major issues in the inner north resulting from conflicts between road route functions and abutting land uses. It is recognised that while elements of the road system must be ‘fit for purpose’ in that their function is related to the status of the road (or the task it must perform), the potential impact of this function on abutting land uses must be taken into account. To address this, it is possible to define the ‘beneficial function’ for a range of road and street types that would lead to the classification of each road and street within the network as arterial road, collector street or local street. Examples of ‘beneficial function’ are the use of a high capacity route as a primary arterial to carry through traffic, especially trucks, and, at the other end of the spectrum, the exclusive use of a low capacity local street for local access and neighbourhood activity. While these goals are desirable, the reality of the situation is that there will be some residential development along arterial roads and an element of through traffic on many collector streets. The challenge is to achieve a suitable **balance** to arrive at the best overall result for all segments of the community. A road hierarchy that has simple but relevant definitions of ‘beneficial functions’ will be an important step in resolving local road use conflicts within the inner north. However, to be successful, its implementation will need to include specific measures to discourage through traffic on local streets, and at the other end of the spectrum, measures to maximise the efficiency of arterials through, for example, extended use of clearways and full integration of traffic signals along arterials and public transport routes to promote efficient flow of large movements of people and goods.

The second of these issues, namely the changes needed to accommodate additional residents and jobs, must be viewed in the context that some changes are required to land use zonings in the area. Particular attention is required to this in the inner north due to existing mixed use zones, heritage overlays and other planning controls which may limit opportunities to achieve the desired outcome. These constraints must be recognised and attention given to revise the provisions of some zones or to introduce new zones to provide the capacity required without prejudice to the character or amenity of the area.

The inner north is well located with respect to public transport services and highly accessible as both a residential area and a workplace. Given the key land-use/transport integration goals of *Melbourne 2030*, the inner north is therefore well positioned to cater for increases in residential population and jobs provided adequate and complementary actions are taken to address the zoning issues and to improve the transport systems serving the area. As the increased populations and jobs are included in the Base Case and all other scenarios, the outcomes of the study will anticipate these increases.

The third issue listed above indicates the need for a balanced approach to catering for the variety of often conflicting parking demands and travel costs. Limited on-street parking opportunities are ‘claimed’ by residents (as a ‘right’ to the spot(s) outside their house), by businesses operating in the area and by visitors (for personal or business reasons). Any perceived loss of on-street parking by any of these groups is seen as an amenity or economic loss, requiring a parking policy to meet all needs. As this is not possible without major expenditure and/or disruption, there are some negative impacts attributable to this issue which can only be alleviated to a degree by actions to reduce private vehicle usage.

Issues such as increased parking charges in the CBD and a move towards more direct payment of the cost of travel may have some impacts on business trips into the CBD, with consequential location changes to fringe areas, which could put more pressure on the limited parking facilities of the inner north if it were to occur in an unplanned way.

The possible introduction, over the next two decades or so, of a system where transport users pay more directly for each trip made will have some impact on mode choice, particularly if introduced as an integral part of a package that includes substantial upgrading of public transport and other incentives to reduce car usage while maintaining levels of mobility and accessibility. However, while such actions would assist in reducing private car use, they are not an essential ingredient of the draft *NCCC Strategy*.

Conclusion 2: The following range of initiatives would support the strategic goals set out in Melbourne 2030 and for the inner north by providing wide ranging social, environmental and economic benefits, and should be considered further:

- ***implement selected improvements to the public transport system which support region-wide public transport priorities;***
- ***implement local area and arterial road traffic management measures (eg kerb-side parking controls and turn bans) as part of an overall road hierarchy that improves local amenity and provides for the efficient movement of through traffic, public transport and freight on the arterial road network;***
- ***review land use controls in the area to accommodate the anticipated increases in residents and jobs while maintaining heritage values;***
- ***implement selected walking and cycling network improvements and encouragement measures; and***
- ***implement measures to reduce car usage (for example, TravelSMART) and changes to parking policies.***

Major public transport initiatives

Transport modelling analysis suggests that the initiatives listed in conclusion 2 above will increase public transport's share of inner north travel to 27% (compared to 17% today), and public transport use will increase by 92% over today's levels. This will reduce the proportion of travel by car to 49% (compared to 67% today), and car use could decrease by 8% from today's levels.

The DART concept would further increase public transport's share of inner north travel to 30%, (inner north public transport use will increase by nearly 120% from today's levels), with an attendant decrease in car use to 45% of inner north travel (85% of today's level).

As previously discussed (in section 5.1), the analysis presents the incremental effect of DART over preceding scenarios, including improved express buses on the Eastern Freeway as part of Scenario A. If DART was implemented without prior improvements to other public transport, it could generate more benefits, including:

- further reductions in arterial and local street traffic;
- additional improvements in accessibility, particularly along the Alexandra Parade corridor; and
- benefits to higher density populations along the Alexandra Parade corridor and positive economic returns to the community.

DART is a relatively high cost project (ranging from \$130 million for a dedicated busway to \$230 million for a high speed light rail system or \$610 million for a heavy rail system), and it would have to compete for funding with a wide range of other potential public transport improvements across Melbourne. However, as indicated in Table 5-4, it has substantial social, economic and environmental benefits.

The east-west road tunnel

The east-west road tunnel between the Eastern Freeway and City Link would increase the number of trips by car in the inner north, but a high proportion of these would be trips attracted into the area to use the tunnel, with consequential benefits to parallel routes outside the area, such as Bell Street. Significant car and truck trips would also be diverted to the tunnel from the surface road system in the inner north. As discussed in

section 5.2, reductions range from up to 65% on Alexandra Parade to 38% on Princes Street. The east-west tunnel also provides an opportunity to close Macarthur Road west of Royal Parade to through traffic, leaving Macarthur Road and Elliot Avenue as local roads for access into Royal Park. Traffic would reduce from 31,000 vehicles a day on Elliot Avenue today to about 5,000 vehicles a day in 2021.

The east-west tunnel would further enhance the benefits provided by preceding strategy elements by:

- maximising the reduction of traffic on arterial and local streets; and
- further improving accessibility along the Alexandra Parade corridor.

The high cost of the east-west tunnel (\$810 million) results in an economic benefit cost ratio of about 1.0, making this a marginal project within the somewhat narrow definitions of the transport economic appraisal.

Other tunnel options have also been considered (see section 4.3) including an east-west tunnel with no intermediate interchanges, a tunnel linking the Eastern Freeway to the north-east corner of the CBD, and a single, two-lane reversible east-west tunnel. These were not considered to the same level of detail as the full east-west tunnel scheme because:

- a tunnel without intermediate interchanges would provide less relief to the Alexandra Parade-Elliot Avenue east-west route
- an Eastern Freeway-CBD tunnel would increase congestion in the north-east part of the CBD and would compete for radial public transport patronage; and
- a single, two-lane (reversible) east-west tunnel would not alleviate congestion significantly in the reverse direction of travel at any given time.

Although the modelling results indicate that the east-west tunnel would provide traffic relief to the Alexandra Parade to Elliot Avenue route, there is a risk that any spare capacity thus created would be used by additional generated or re-routed traffic, unless the relieved road space were used for other purposes. Appropriate protection measures such as lane reductions, exclusive public transport lanes and/or resetting of traffic signals to favour north-south public transport and traffic would be necessary to achieve this.

The east-west road tunnel would require little, if any, private property acquisition, except possibly in the vicinity of the Flemington terminal for the Western City Link and Tullamarine Freeway connections. Other potential problems such as the need for and location of ventilation stacks would need to be assessed during detailed design, were the project to proceed further.

Although Table 5-4 demonstrates that the east-west road tunnel could deliver social and broad-scale economic benefits and generally positive environmental benefits, its high implementation cost and relatively low transport benefit-cost ratio are key factors to take into account when assessing the priority for funding relative to competing projects. The relatively low benefit-cost also decreases the likelihood that the project would attract private sector investment, for example as a build/own/operate/transfer project.

Conclusion 3: A comparison of DART and the road tunnel options indicates:

- ***DART would involve an implementation capital cost of \$130M for a bus-way, \$230M for light rail or \$610M for a heavy rail solution, whereas the east-west road tunnel would cost \$810M to construct. Both present ‘break-even’ results from transport economic assessment (ie DART has a BCR of 1.1 and the east-west road tunnel a BCR of 1.0).***
- ***A road tunnel between the Eastern Freeway and the CBD would have a cost of \$410M with a BCR of only 0.7 due to high levels of traffic congestion around its CBD terminal. It would also compete for radial public transport trips, to the detriment of mode share.***
- ***Both DART and the east-west road tunnel would be supportive of meeting social and economic development criteria, and both have positive environmental benefits. However, due to their lower overall benefits, they are considered to have a lower priority than the initiatives outlined in conclusion 2.***
- ***DART is more directly aligned to the government’s Melbourne 2030 strategy.***

Conclusion 4: It is concluded that the measures described in 2. above together with DART should be further assessed as the components of the draft strategy for the inner north. DART requires further work to establish the scope and extent of a preferred option and to ensure the route is protected whereas no further investigation should take place on the road tunnel options.

These conclusions are considered in the development of the draft strategy in the *NCCC Strategy* report.

6 Towards a draft strategy for the inner north

From the foregoing appraisal it is clear that no single strategy will provide the solution to transport and land use issues in the inner north. What is needed is an integrated strategy which will best achieve the stated goals. Such a strategy will only bring the desired results if it is implemented completely; it will not be as effective if only certain elements are pursued.

A successful strategy will also need to have a plan of implementation, with full support from those involved, especially the relevant State departments and local councils. The implementation plan should include monitoring of results and review of the strategy at regular intervals to keep it on track (or to change direction if needed) to ensure consistency with more broadly based strategies and policies (eg *Melbourne 2030*).

Finally the strategy will need to be financially viable, with funding and revenue streams that ensure it can be achieved in the required time frame. Priorities for implementation need to be established to ensure maximum benefits are achieved in the event that funding is limited.

The appraisal discussed in Chapter 5 demonstrates that most of the positive and negative impacts of the various scenarios flow from their ability to reduce dependency on private car use and hence reduce traffic flows, without compromising the need for and the necessary opportunities to travel. It is therefore necessary to develop and test a recommended strategy that contains the elements outlined in Conclusions 2 and 3 in Chapter 5, to determine likely traffic flows and public transport loadings across the network. The implications of the changed traffic patterns on the full range of appraisal objectives can then be compared to the results in Tables 5-3A, B and C to ensure the draft strategy achieves the best possible outcomes across all elements of the triple bottom line.

The development of the draft strategy and its expected outcomes are reported in the *NCCC Strategy* report.

Appendix A – Supporting reports

Booz.Allen Hamilton, 2001. Northern Central City Corridor, Existing Conditions Public Transport, 2001.

Booz.Allen Hamilton, 2002. Appraisal of Transit Strategy Results 2002.

Department of Infrastructure, 2001a. Northern Central City Corridor Study – Draft Study Process, 2001.

Department of Infrastructure, 2001b. Northern Central City Corridor Study – Issues and Trends, April 2001.

Department of Infrastructure, 2003. *Northern Central City Corridor Study Scenario Appraisal Report*, Department of Infrastructure, August 2003.

Helen Lardner Conservation and Design, 2001. Northern Central City Corridor Study Existing Conditions Report – Heritage, Landscape and Urban Design Component, August 2001.

Helen Lardner Conservation and Design, 2002. Northern Central City Corridor Study Scenario Appraisal Report – Heritage, Landscape and Urban Design Component, 2002.

Maunsell McIntyre, 2001a. Northern Central City Corridor Study Existing Conditions Report – Land Use and Macroeconomics Component, 2001.

Maunsell McIntyre, 2001b. Northern Central City Corridor Study Existing Conditions Report – Environment Component, 2001.

Maunsell McIntyre, 2002a. Northern Central City Corridor Study Scenario Appraisal Report – Land Use and Macroeconomics Component, 2002.

Maunsell McIntyre, 2002b. Northern Central City Corridor Study Scenario Appraisal Report – Environment Component, 2002.

Sinclair Knight Merz, 2001a. Northern Central City Corridor Study Existing Conditions Report – Engineering, August 2001.

Sinclair Knight Merz, 2001b. Northern Central City Corridor Study Existing Conditions Report – Social Appraisal Component, August 2001.

Sinclair Knight Merz, 2001c. Northern Central City Corridor Study Existing Conditions Report – Transport, August 2001.

Sinclair Knight Merz, 2002a. Northern Central City Corridor Study Scenario Appraisal Report – Engineering, Implications and Strategy Costs, 2002.

Sinclair Knight Merz, 2002b. Northern Central City Corridor Study Scenario Appraisal Report – Engineering, Strategy Elements Cost Estimate Validation, 2002.

Sinclair Knight Merz, 2002c. Northern Central City Corridor Study Scenario Appraisal Report – Social Appraisal Component, 2002.

Sinclair Knight Merz, 2002. Northern Central City Corridor Study Economic Appraisal Report – Transport.

Sinclair Knight Merz, 2003. Northern Central City Corridor Initial Appraisal Report - Transport.

VicRoads and Department of Infrastructure, 1999. Northern City Corridor Study Interim Report, October 1999 (work of a previous study, released at the start of the NCCCS in 2001).

Appendix B – Scenario appraisal results

Tables B1 to B7 are an amalgamation of the summary tables from the specialists for each of the strategy scenarios tested (Scenarios A to G). Each specialist's conclusions are listed in the column headed 'possible outcome'.

Table B-1 Scenario A – Public transport improvements

Goal	Indicator	Possible outcome
Social: Improve amenity and liveability of the inner north by:		
Significantly reducing the impacts of noise and air pollution from transport	Extent of noise-sensitive land uses (especially residential) exposed to changes in noise exposure.	Environment: 5% 'significant improvement' in noise environment compared with 2021 Base Case. Social: Positive outcome due to lower exposure to traffic noise overall. Transport: Has more impact than any other single strategy in reducing private road travel and associated noise effects. This will be slightly balanced by increased tram and bus vehicles through NCCC
	Concentration of air pollutants at relevant sites according to adopted standards	Environment: Small decrease in NOx, CO and VOC, and increase in particle emissions, compared with 2021 Base Case. Social: Positive outcome if fewer pollutants Transport: Due to the considerable impact in reducing private vehicle movements this has a strong positive impact on pollutants.
Improving safety – reducing fatalities/casualties to or beyond state targets	Casualty accidents	Transport: Should have a positive impact due to reduction in more accident generating travel modes. Social: Positive outcome if fewer car trips in area. Reducing accidents or fear of accidents has major social benefits.
	Safety/security risk appraisal at key locations related to travel routes and/or interchanges, and sensitive land uses	Transport: Increased patronage and service levels in evening/weekends should have a strong positive impact Social: Positive outcome if fewer car trips in area. Community severance potentially reduced. Access to key destinations enhanced.
Significantly enhancing urban landscape and heritage values in key areas	Effect on parklands	Heritage: No likely changes Social: Social values enhanced if less car traffic and less parking. Greater enjoyment amenity in public places.
	Effect on other public areas, streetscapes	Heritage: Substantial changes to existing buildings (eg railway stations, tram shelters) and infrastructure (eg stops, overhead services) must be carefully managed to avoid negative impacts on public areas and streetscapes. Possible opportunities for improvement of public areas (eg around stations). Social: Social values enhanced if less car traffic and less parking
	Effect on heritage protection/interpretation	Heritage: Substantial change to existing buildings (eg railway stations, tram shelters) and infrastructure (eg stops, overhead services) must be carefully managed to avoid negative impacts on the cultural heritage significance of places or settings. Changes must be tested against Burra Charter requirements and in relation to the degree of heritage significance reflected in the statutory controls. Opportunity to incorporate improved interpretation. Social: Social values enhanced if less car traffic and less parking
	Effect on urban settings	Heritage: Changes to urban infrastructure (such as paving, street furniture, street trees, lighting, access for elderly/disabled people) should respond to the local setting, especially with route 109 style upgrades. Social: Social values enhanced if less car traffic and less parking
Minimising through traffic on local streets	Car/truck traffic levels on local/collector streets	Transport: Almost half increased transit use is from reduced NCCC through traffic Social: Some increases to local traffic due to increases in congestion on arterial network (space for cars taken by public transport), resulting in some negative deterioration of local amenity.
Improving access and travel choices for residents, visitors and workers, including disadvantaged groups	Transport accessibility to homes, jobs and services	Transport: Substantially increases the number of travel options available to all members of the community but particularly assists disadvantaged groups Social: Improved mode choice and improved public transport services (both time & destination) will benefit those without access to a car - elderly, poor and young in particular.
	Sense of place/neighbourhood	Social: Fewer cars in the area will enhance sense of place / neighbouring Heritage: Qualitative appraisal of neighbourhood and sense of place effects is required and enhancement opportunities exist.
Providing facilities for people with mobility disadvantages	Contribution to Disability Discrimination Act (DDA) compliance levels	Social: Direct contribution to principles of DDA especially if public transport vehicles are upgraded.

Goal	Indicator	Possible outcome
Environmental: Protect and enhance environmental sustainability in the inner north by:		
Ensuring a contribution to overall reductions in greenhouse gas emissions	Estimated effect on greenhouse gas emissions	Transport: Strong positive impacts Environment: No change in emissions as compared with 2021 Base Case. Social: Positive outcome if less car travel in area including fewer short journeys
Reducing car use for travel through, to/from and within the inner north	Effect on car travel	Transport: Strong positive impacts Social: Positive outcomes if fewer car trips, leading to enhanced local amenity.
	Car mode share	Transport: Strong positive impacts
Substantially increasing public transport mode share	Public transport travel	Transport: Strong positive impacts Social: Significant social benefits for those who depend on public transport or without access to a car.
	Public transport mode share	Transport: Strong positive impacts
Increasing the use of walking and cycling	Cycling/walking travel	Transport: Walk/cycle trips decline and are encouraged onto transit Social: May reduce walking if public transport availability significantly enhanced. Positive in terms of choices, possible negative health outcomes
	Cycling/walking mode share	Transport: Walk/cycle trips decline and are encouraged onto transit Social: May reduce walking if public transport availability significantly enhanced. Positive in terms of choices, possible negative health outcomes
	Amount of cycling and walking infrastructure provision	Transport: Neutral Social: May be less space on arterial roads for cycling/walking infrastructure
	Effect on natural habitats	Environment: Low risk of impact. Potential for enhancement.
Protecting and enhancing biodiversity	Effect on exotic habitats	No comment provided.
	Effect on water quality	Environment: Low risk of impact. Potential for enhancement.
	Effect on ground contamination	Environment: Low risk of impact. Potential for enhancement.
Economic: Support growth in economic activity, especially in and around Melbourne's CBD, by:		
Enhancing access for commercial activities including tourism and recreation	Accessibility to recreational, cultural and commercial areas in and around CBD and in the inner north	Transport: Strong positive impacts Land Use: Adverse impact for centres which rely on good car access to the extent that measures favouring public transport inhibit good access by private vehicle. Improved access for centres which have catchments that are well-served by public transport Economic stimulus at premium stations located outside the inner north Heritage: Qualitative appraisal relating to specific sites and precincts is required but opportunity for enhancement. Social: Local benefits if better public transport, may improve access to the area for visitors.
Catering for increased residential population in the inner north and surrounding areas	Area of existing or potential residential land affected	Heritage: Appraisal of sites affected (quantitative and qualitative) is required. No loss of residential stock in Heritage Overlays should be permitted. Social: Better public transport will contribute to social amenity.
	Changes of land use (eg from commercial to residential)	No comment provided
	Accessibility to/from residential areas	Land Use: Improved amenity due to improved PT services has positive effect on property market. Social: Potentially major social benefit.
Providing for commercial travel movements, including safe, efficient primary routes for freight	Effect on goods vehicle travel within, to/from and through the inner north	Transport: Reduced private road travel should reduce traffic congestion making commercial vehicle movements marginally easier
Efficiently serving travel needs through, to/from and within the inner north	Effect on business/private travel	Transport: Reduced private road travel should reduce traffic congestion making vehicle movements marginally easier Social: Benefits for people without a car outside the area wishing to access services within area and vice versa.
Maximising the economic return on investment in transport and land use initiatives	Capital and operating costs	Engineering: see specialist report for cost details
	Economic benefits, private/public sector provider impacts, other Government impacts	See details in economic evaluation report attached to transport Specialist report.
	Regional economic effects (effect on businesses etc)	Land Use: Some adverse impacts for centres which particularly rely on car access (see above), but positive effects where amenity improvements and improved services reflect the characteristics of the centre

Table B–2 Scenario B – Scenario A + local street/amenity improvements

Goal	Indicator	Possible outcome
Social: Improve amenity and liveability of the inner north by:		
Significantly reducing the impacts of noise and air pollution from transport	Extent of noise-sensitive land uses (especially residential) exposed to changes in noise exposure.	<p>Environment: 22% 'significant improvement' in noise environment compared with 2021 Base Case.</p> <p>Social: Redistribution of impacts from local streets to major roads requires testing of social consequences (severance, safety) and acceptability to the community</p> <p>Transport: Shift in traffic from low volume streets to high volume streets.</p>
	Concentration of air pollutants at relevant sites according to adopted standards	<p>Environment: Small decrease in NO_x, CO and VOC compared with Scenario A.</p> <p>Social: If air pollution along main roads increases there will be corresponding health impacts for users of these roads.</p>
Improving safety – reducing fatalities/casualties to or beyond state targets	Casualty accidents	<p>Transport: While there will be risk reductions on local streets, there will be increased accident risk on other streets with conflicting land uses – the net result is likely to be a small reduction in accidents.</p> <p>Social: People on local streets will feel safer, leading to less social severance effects.</p> <p>Perceived safety on major roads may decrease.</p>
	Safety/security risk appraisal at key locations related to travel routes and/or interchanges, and sensitive land uses	Social: If traffic shifts to major roads with sensitive land uses, perceptions of safety will be further reduced on these roads.
Significantly enhancing urban landscape and heritage values in key areas	Effect on parklands	<p>Heritage: Increased traffic on main arterial routes may detract from the quality of parklands and create severance by making roads an increased barrier to movement. Traffic calming measures on local streets must avoid the loss of established tree cover and/or detrimental effects on parkland. Less traffic on local streets may create opportunities for planting, creating linkages and improving access and should be compatible with master plans or strategies developed in consultation with local residents.</p> <p>Social: Changed traffic patterns throughout the inner north will have social benefits in some areas however if parklands about more heavily trafficked roads negative effects will occur.</p>
	Effect on other public areas, streetscapes	<p>Heritage: Increased traffic on main arterial routes may detract from the quality of public areas or streetscapes and create severance by making roads an increased barrier to movement. Traffic calming measures on local streets must avoid the loss of established street trees and/or detrimental effects on public areas or streetscapes. Less traffic on local streets may create opportunities for planting and other improvements, including creating linkages and improving access. They should be compatible with master plans or strategies developed in consultation with local residents.</p> <p>Transport: Improvement in selected local streets.</p> <p>Social: Main roads may incur reduced amenity affects.</p>
	Effect on heritage protection/interpretation	Heritage: Increased traffic on main arterial routes may detract from the cultural heritage significance of places or settings. Less traffic on local streets may create opportunities for improved presentation of heritage assets and their interpretation.
	Effect on urban settings	<p>Heritage: Increased traffic on main arterial routes may detract from the quality of urban settings and create severance by making roads an increased barrier to movement. Traffic calming measures on local streets must be developed in consultation with local residents and not overwhelm the local setting. They may create opportunities for enhancement of urban infrastructure such as pathways, street furniture, street trees, lighting and access for elderly/disabled people.</p> <p>Social: Redistribution of benefits across the area.</p>
Minimising through traffic on local streets	Car/truck traffic levels on local/collector streets	<p>Transport: Substantial reductions on the streets to which the improvements are applied.</p> <p>Social: Social benefits in treated streets likely to be significant – increased opportunities for social contact and reduced severance.</p>
Improving access and travel choices for residents, visitors and workers, including disadvantaged groups	Transport accessibility to homes, jobs and services	<p>Transport: Reduced accessibility due the consequent increases in journey times on the unimproved network (on average a speed reduction of almost 2km/h; for one in ten links a reduction greater than 5km/h).</p> <p>Social: Accessibility may be reduced on more heavily trafficked roads. Disadvantaged groups using / living on main roads negatively affected.</p>

Goal	Indicator	Possible outcome
	Sense of place/neighbourhood	<p>Transport: Increased for local streets – decreased for other streets.</p> <p>Social: Neighbouring significantly enhanced on local streets and in local precincts / neighbourhoods.</p> <p>Main roads may be less attractive for informal social contacts.</p> <p>Heritage: Increased traffic on main arterial routes may create severance by making roads an increased barrier to movement, increasing isolation. Traffic calming measures on local streets offer opportunities for enhancements of neighbourhoods and increasing the sense of place.</p>
Providing facilities for people with mobility disadvantages	Contribution to Disability Discrimination Act (DDA) compliance levels	Transport: no change.
Environmental: Protect and enhance environmental sustainability in the inner north by:		
Ensuring a contribution to overall reductions in greenhouse gas emissions	Estimated effect on greenhouse gas emissions	<p>Transport: Neutral-but more stop start driving</p> <p>Environment: Very slight decrease compared with Scenario A.</p> <p>Social: Increased congestion on main roads may have negative consequences. Decreased traffic on local streets equals positive consequences</p>
Reducing car use for travel through, to/from and within the inner north	Effect on car travel	<p>Transport: Neutral</p> <p>Social: Congestion along certain roads may have adverse social effects.</p>
	Car mode share	Transport: Neutral
Substantially increasing public transport mode share	Public transport travel	<p>Transport: Increased delays to buses and trams could impact negatively on public transport patronage.</p> <p>Social: If public transport movement affected on main roads due to traffic displaced from local streets may have negative social outcomes.</p>
	Public transport mode share	No comment provided
Increasing the use of walking and cycling	Cycling/walking travel	<p>Transport: Neutral</p> <p>Social: May be more attractive to walk/cycle on local streets leading to local, social and health benefits. However, main roads may be negatively affected, and may be less attractive for these users.</p>
	Cycling/walking mode share	<p>Transport: Neutral</p> <p>Social: Peak hour trips on local streets may benefit.</p>
	Amount of cycling and walking infrastructure provision	<p>Transport: Neutral – positive on streets freed of through traffic.</p> <p>Social: Increased opportunities to provide for cyclists / pedestrians on local roads. Reduced opportunities on Main roads subjected to displaced traffic.</p>
Protecting and enhancing biodiversity	Effect on natural habitats	Environment: Low risk of impact. Potential for enhancement.
	Effect on exotic habitats	No comment provided.
	Effect on water quality	Environment: Low risk of impact. Potential for enhancement.
	Effect on ground contamination	Environment: Low risks of impact. Potential for enhancement.
Economic: Support growth in economic activity, especially in and around Melbourne's CBD, by:		
Enhancing access for commercial activities including tourism and recreation	Accessibility to recreational, cultural and commercial areas in and around CBD and in the inner north	<p>Transport: Reduced accessibility due the consequent increases in journey times on the unimproved network (on average a speed reduction of almost 2km/h; for one in ten links a reduction greater than 5km/h)</p> <p>Land Use: Generally adverse impact on access to centres and other activities, etc due to increased congestion on main roads and restricted access via local roads. Potential positive effects for local shops which serve a walk-in catchment, associated with amenity improvements. Potential positive impacts for some recreational activities associated with amenity improvements (subject to access).</p> <p>Heritage: Qualitative appraisal relating to specific sites and precincts is required but opportunity for enhancement.</p> <p>Social: Negative effect if economic activities on main roads disrupted by additional traffic / congestion.</p>
Catering for increased residential population in the inner north and surrounding areas	Area of existing or potential residential land affected	<p>Heritage: Appraisal of sites affected (quantitative and qualitative) is required. No loss of residential stock in Heritage Overlays should be permitted.</p> <p>Social: If population increases may become more socially unacceptable to redistribute traffic from local to main roads, but protecting local neighbourhoods may become more important.</p>
	Changes of land use (eg from commercial to residential)	No comment provided
	Accessibility to/from residential areas	<p>Land Use: Improvements in amenity for residential areas; improved accessibility for residents</p> <p>Social: Local areas benefit.</p>
Providing for commercial travel movements, including safe, efficient primary routes for freight	Effect on goods vehicle travel within, to/from and through the inner north	<p>Transport: Increased commercial travel costs due the consequent increases in journey times on the main road network (on average a speed reduction of almost 2km/h; for one in ten links a reduction greater than 5km/h)</p> <p>Social: May negatively affect commercial traffic on main roads and hence business viability.</p>

Goal	Indicator	Possible outcome
Efficiently serving travel needs through, to/from and within the inner north	Effect on business/private travel	<p>Transport: No travel is suppressed, but there are increased costs due the consequent increases in journey times on the main road network (on average a speed reduction of almost 2km/h; for one in ten links a reduction greater than 5km/h)</p> <p>Social: May make the area a less attractive destination for out of area traffic with both positive and negative social consequences.</p>
Maximising the economic return on investment in transport and land use initiatives	Capital and operating costs	Engineering: see Engineering specialist report for cost estimates
	Economic benefits, private/public sector provider impacts, other Government impacts	Transport: See details in Transport Economics Report attached to the Transport Specialist Report
	Regional economic effects (effect on businesses etc)	Land Use: Adverse impacts on local business and other economic activities that rely on good accessibility by private vehicle.

Table B-3 Scenario C – Scenario B + walking and cycling initiatives

Goal	Indicator	Possible outcome
Social: Improve amenity and liveability of the inner north by:		
Significantly reducing the impacts of noise and air pollution from transport	Extent of noise-sensitive land uses (especially residential) exposed to changes in noise exposure.	<p>Environment: Changes in noise environment unlikely to be noticeable.</p> <p>Social: Positive social outcome if some diversion away from car to walking and/or cycling- however some localities may experience more noise from braking if increased pedestrian crossings</p> <p>Transport: Positive but small effects.</p>
	Concentration of air pollutants at relevant sites according to adopted standards	<p>Environment: Reduction in emissions expected compared with Scenario B.</p> <p>Social: Positive benefits if fewer short car journeys</p> <p>Transport: Positive but small effects.</p>
Improving safety – reducing fatalities/casualties to or beyond state targets	Casualty accidents	<p>Transport: Unclear: while any reduced car use will effect accidents, the increased exposure/conflict of pedestrians and cyclists with motor vehicles brings increased risks. Health benefits likely to outweigh accidents.</p> <p>Social: Health benefits of greater walking/cycling. Safer neighbourhoods created for walking / cycling. Minor negative impact due to cyclist exposure to traffic.</p>
	Safety/security risk appraisal at key locations related to travel routes and/or interchanges, and sensitive land uses	Social: Enhanced perceptions of safety may increase feelings of community well-being and reduce severance.
Significantly enhancing urban landscape and heritage values in key areas	Effect on parklands	<p>Heritage: Initiatives to promote walking will have a positive benefit on the quality of open space and the creation of linkages and access. Most infrastructure to promote cycling will not have a significant impact on parklands but some such as road surface treatments, racks, shelters and barriers will require careful design. They should not result in the loss of established tree cover which provides shade and should be compatible with master plans or strategies. Legalising cycling in Melbourne City Council gardens (eg Carlton Gardens and the Fitzroy Gardens) is a significant departure from the established and historic use of these parks and is not supported.</p> <p>Social: Social benefits of enhanced accessibility to valued places especially for recreational walking / cycling. Some people may resist cyclists using local parks.</p> <p>Transport: Some positive, some negative. Legalising riding in MCC Gardens may be slightly negative. The completion of the Capital City Trail would significantly increase access to the Darebin Creek valley, the Yarra River and other points of local interest.</p>
	Effect on other public areas, streetscapes	<p>Heritage: Initiatives to promote walking will have a positive benefit on the quality of public areas and streetscapes and the creation of linkages and access. Most infrastructure to promote cycling will not have a significant impact on public areas or streetscapes but some such as road surface treatments, racks, shelters and barriers will require careful design. They should not result in the loss of established street tree cover and should be compatible with master plans or strategies.</p> <p>Social: Social benefits of more walking and cycling in public areas – more surveillance etc.</p> <p>Transport: Some positive, some negative</p>
	Effect on heritage protection/interpretation	<p>Heritage: The cultural heritage significance of places or settings should be retained and both cycling and walking offer opportunities for improved interpretation.</p> <p>Social: It will be important to ensure protection of heritage areas from overuse</p> <p>Transport: Some positive, some negative</p>
	Effect on urban settings	<p>Heritage: Initiatives to promote walking and cycling will have a positive effect on urban infrastructure such as pathways, street furniture, street trees, lighting, access for elderly/disabled people as long as they reflect the established settings. Some cycling infrastructure such as road surface treatments, racks, shelters and barriers will require careful design so that existing settings are not overwhelmed.</p> <p>Social: Urban areas generally more pleasant, if more local activity, more vitality.</p> <p>Transport: Some positive, some negative</p>
Minimising through traffic on local streets	Car/truck traffic levels on local/collector streets	<p>Transport: Neutral.</p> <p>Social: Increased opportunities from walking / cycling may have some benefits in reducing local street traffic.</p>
Improving access and travel choices for residents, visitors and workers, including disadvantaged groups	Transport accessibility to homes, jobs and services	<p>Transport: Enlarges travel choice, improves accessibility by walk and bike. Additional traffic signals would reduce accessibility by car.</p> <p>Social: Social benefits of greater choice of destination. Benefits to a number of different social groups, in terms of more opportunities to cross roads, meet people, social networks etc.</p>

Goal	Indicator	Possible outcome
	Sense of place/neighbourhood	Transport: Slightly positive Social: Valued places more accessible on foot / bicycle, more pleasant to be in etc. / more opportunities for informal social contact. Heritage: Initiatives to promote walking and cycling will promote neighbourhoods and the sense of place and offer enhancement opportunities.
Providing facilities for people with mobility disadvantages	Contribution to Disability Discrimination Act (DDA) compliance levels	Transport: Strongly positive Social: Major local contribution. Disabled people will be able to move around more easily if pedestrian facilities improved.
Environmental: Protect and enhance environmental sustainability in the inner north by:		
Ensuring a contribution to overall reductions in greenhouse gas emissions	Estimated effect on greenhouse gas emissions	Transport: Positive but small effects. Environment: Reduction in emissions expected compared with 2021 Base Case. Social: Positive if less car travel especially short trips
Reducing car use for travel through, to/from and within the inner north	Effect on car travel	Transport: Positive but small effects. Social: If car use reduced major social benefit
	Car mode share	Transport: Positive but small effects.
Substantially increasing public transport mode share	Public transport travel	Transport: Probably neutral. Social: Benefits if more walking to/from Public Transport Services
	Public transport mode share	Transport: Probably neutral.
Increasing the use of walking and cycling	Cycling/walking travel	Transport: Positive effects. Social: Social benefits of increased safety, less severance, more opportunities for social contact, access to valued places
	Cycling/walking mode share	Transport: Positive effects. Social: Benefits if contributes to peak hour car travel reduction.
	Amount of cycling and walking infrastructure provision	Transport: Much greater provision. Social: Local, social benefits for a range of walker and cyclists Type of infrastructure will determine who benefits.
Protecting and enhancing biodiversity	Effect on natural habitats	Environment: Low risk of impact. Potential for enhancement. Social: Less car travel and more cycling will have environmental benefits. Transport: Neutral
	Effect on exotic habitats	No comment provided.
	Effect on water quality	Environment: Low risk of impact. Potential for enhancement. Transport: Neutral
	Effect on ground contamination	Environment: Low risk of impact. Potential for enhancement. Transport: Neutral
Economic: Support growth in economic activity, especially in and around Melbourne's CBD, by:		
Enhancing access for commercial activities including tourism and recreation	Accessibility to recreational, cultural and commercial areas in and around CBD and in the inner north	Transport: Provision of greater access choice will particularly benefit tourism and recreation, particularly the off road bike paths. Additional traffic signals would reduce accessibility by car. Land Use: New bicycle paths may add to tourism product. Heritage: Initiatives to promote walking and cycling can enhance access to specific sites and precincts. Social: Area more attractive to walk around, more attractive for visitors and locals.
Catering for increased residential population in the inner north and surrounding areas	Area of existing or potential residential land affected	Heritage: Unlikely to effect existing residential stock in Heritage Overlays. Social: Increased population will benefit from enhanced walking, cycling, opportunities leading to greater opportunities for social contact, less social isolation.
	Changes of land use (eg from commercial to residential)	Social: Emphasises the need for improved pedestrian and cycling facilities.
	Accessibility to/from residential areas	Transport: Wider choice of travel mode Land Use: Pedestrian-friendly measures improve amenity and access and support the residential property market Social: Disadvantaged groups will benefit in particular.
Providing for commercial travel movements, including safe, efficient primary routes for freight	Effect on goods vehicle travel within, to/from and through the inner north	Transport: Neutral. Social: No effect.
Efficiently serving travel needs through, to/from and within the inner north	Effect on business/private travel	Transport: By enlarging travel choice the strategy will increase efficiency. Additional traffic signals would reduce accessibility by car. Social: Greater choices of modes and destinations, for a wider range of community groups.
Maximising the economic return on investment in transport and land use initiatives	Capital and operating costs	Engineering: See cost estimates in engineering Specialist Report.
	Economic benefits, private/public sector provider impacts, other Government impacts	Transport: The benefits of cycling and walking projects external beyond the transport sector to include health and recreations.
	Regional economic effects (effect on businesses etc)	Land Use: Improved infrastructure associated with weather protection. Need to ensure that street activity is promoted, not restricted

Table B-4 Scenario D – Scenario C + measures to reduce car use

Goal	Indicator	Possible outcome
Social: Improve amenity and liveability of the inner north by:		
Significantly reducing the impacts of noise and air pollution from transport	Extent of noise-sensitive land uses (especially residential) exposed to changes in noise exposure.	Environment: 3% 'significant improvement' in noise environment compared with Scenario B. Social: Positive social outcome if less on street parking, less car travel through area. Benefits from a small improvement in the noise environment overall
	Concentration of air pollutants at relevant sites according to adopted standards	Environment: Small decrease in NO _x , CO, VOC, SO ₂ and particle emissions compared with Scenario B. Social: Minimal effect.
Improving safety – reducing fatalities/casualties to or beyond state targets	Casualty accidents	Transport: CBD Parking: small reduction. Road Pricing: potentially large reduction. Behavioural: potential reduction. Social: Positive social outcome if fewer conflicts between cars and other road users.
	Safety/security risk appraisal at key locations related to travel routes and/or interchanges, and sensitive land uses	Social: Behavioural programs have educational benefits and social development spin-offs.
Significantly enhancing urban landscape and heritage values in key areas	Effect on parklands	Heritage: The reduction in car use may improve parklands and encourage the creation of linkages and access. Social: Less on street car parking will have social amenity benefits in local area – parklands / streetscapes valued / environments.
	Effect on other public areas, streetscapes	Heritage: Initiatives to reduce on-street parking and encourage rear of property vehicle access via existing laneways will improve public areas and streetscapes. It can create opportunities for improved pedestrian and public spaces and encourage appropriate landscape and urban design treatments. Social: Less on street car parking will have social amenity benefits in local area – parklands / streetscapes valued / environments.
	Effect on heritage protection/interpretation	Heritage: Initiatives to reduce on-street parking and encourage rear of property vehicle access via existing laneways will improve heritage assets and may offer increased opportunities for interpretation. Similar benefits would be gained from removing garages and carports from the street frontages of properties within most parts of the Heritage Overlays. Social: Opportunities to enhance heritage precincts / opportunities for interpretation if fewer cars.
	Effect on urban settings	Heritage: Encouraging the redevelopment of existing off-street public parking areas will improve local amenity values as will improving the design and presentation of off-street commercial parking with rear of property access from existing laneways. Car-park entries rarely retain a human scale in keeping with many Heritage Overlays in the Inner North.
Minimising through traffic on local streets	Car/truck traffic levels on local/collector streets	Transport: These policies do not specifically focus on local streets Social: If less external parking on local streets will have local amenity
Improving access and travel choices for residents, visitors and workers, including disadvantaged groups	Transport accessibility to homes, jobs and services	Transport: CBD Parking and Pricing: these measures reduce travel choices; accessibility is improved for continuing car users. Social: Access reduced so wider community wishing to visit inner north may be disadvantaged with flow on negative consequences to local businesses.
	Sense of place/neighbourhood	Social: Local disadvantaged groups may benefit. Greater sense of place for local community. Heritage: The reduction in car use may improve neighbourhoods and encourage the sense of place.
Providing facilities for people with mobility disadvantages	Contribution to Disability Discrimination Act (DDA) compliance levels	Social: No direct effect
Environmental: Protect and enhance environmental sustainability in the inner north by:		
Ensuring a contribution to overall reductions in greenhouse gas emissions	Estimated effect on greenhouse gas emissions	Environment: Reduction in emissions compared with Scenario B. Social: Positive effect if less local car travel
Reducing car use for travel through, to/from and within the inner north	Effect on car travel	Transport: CBD Parking: small reduction. Pricing: potentially large reduction. Behavioural: potential reduction. Social: Combination of programs should have local social benefits – improved amenity.
	Car mode share	Transport: CBD Parking: small reduction. Pricing: potentially large reduction. Behavioural: small reduction. Social: Behavioural programs also have community development values
Substantially increasing public transport mode share	Public transport travel	Transport: CBD Parking: small increase. Pricing: potentially large increase. Behavioural: potential increase. Social: Reducing public transport fares increases patronage. Benefits those who are public transport dependent and economically vulnerable

Goal	Indicator	Possible outcome
	Public transport mode share	Transport: CBD Parking: small increase. Pricing: potentially large increase. Behavioural: potential increase.
Increasing the use of walking and cycling	Cycling/walking travel	Transport: CBD Parking: potential increase. Pricing: potential increase. Behavioural: potentially significant increase. Social: Behavioural programs include these objectives with accompanying social benefits if walking / cycling more attractive
	Cycling/walking mode share	Transport: CBD Parking: potential increase. Pricing: potential increase. Behavioural: potentially significant increase Social: More walking /cycling at peak periods has positive social consequences
	Amount of cycling and walking infrastructure provision	Social: Significant benefits if it leads to improved infrastructure.
Protecting and enhancing biodiversity	Effect on natural habitats	Environment: Low risk of impact. Potential for enhancement.
	Effect on exotic habitats	No comment provided
	Effect on water quality	Environment: Low risk of impact. Potential for enhancement.
	Effect on ground contamination	Environment: Low risk of impact. Potential for enhancement.
Economic: Support growth in economic activity, especially in and around Melbourne's CBD, by:		
Enhancing access for commercial activities including tourism and recreation	Accessibility to recreational, cultural and commercial areas in and around CBD and in the inner north	Transport: Inner north parking: risk of negative impacts in options 2 and 3. CBD Parking: neutral. Pricing: potentially severely negative impact of higher prices. Behavioural: neutral. Land Use: Reduced access to shops, business and institutions in the inner north as a result of reduced availability of parking - these effects relate to shoppers/visitors as well as employees, and particularly where alternative parking options are unavailable. Potential adverse impact on CBD businesses where there is a reduction in availability of parking spaces. Cordon pricing for the CBD would reduce the relative attractiveness of the CBD as a shopping and entertainment destination. Heritage: Reducing car dependency may have both positive and negative effects on accessibility of specific sites and precincts. Social: Potential negative effects on CBD access; if inner north parking restricted, may affect businesses viability.
Catering for increased residential population in the inner north and surrounding areas	Area of existing or potential residential land affected	Heritage: Unlikely to effect existing residential stock in Heritage Overlays. Social: Behavioural programs may be suited to new (incoming) communities – opportunities to influence behaviour patterns of new population.
	Changes of land use (eg from commercial to residential)	Land Use: Restrictions on development that do not provide car spaces would tend to reduce the opportunities for residential development Social: Parking restrictions may be resisted by new / incoming community.
	Accessibility to/from residential areas	Land Use: Price increases for parking permits, or reduced availability, would adversely affect residents. This affect offset by amenity improvements, and also offset to the extent that behavioural programs are successful Social: Minimal effect, unless visitor parking is reduced, may be resisted by residents.
Providing for commercial travel movements, including safe, efficient primary routes for freight	Effect on goods vehicle travel within, to/from and through the inner north	Transport: Inner north parking: improved access to residential spaces CBD Parking: beneficial effects of reduced peak congestion. Pricing: reduced congestion offset to a degree by higher prices. Behavioural: potential improvement due to fewer other vehicle trips Social: If parking / access restricted for commercial vehicles, could have negative economic and hence social outcomes
Efficiently serving travel needs through, to/from and within the inner north	Effect on business/private travel	Transport: CBD Parking: negative: overall cost of travel is increased. Pricing: negative: overall cost of travel is substantially increased. Behavioural: neutral. Social: Road pricing has negative effects on accessibility. Cheaper public transport benefits certain groups, especially poorer and those dependent on public transport.
Maximising the economic return on investment in transport and land use initiatives	Capital and operating costs	Engineering: See cost estimates in Engineering Specialist Report.
	Economic benefits, private/public sector provider impacts, other Government impacts	Transport: See details in Transport Economics Report attached to the Transport Specialist Report.
	Regional economic effects (effect on businesses etc)	Land Use: Adverse impacts on businesses to the extent that car parking loss affects access to shops, businesses, etc. Potential adverse effect on major institutions which are not sufficiently served by off-street car parking

Table B-5 Scenario E – Scenario D + land use initiatives

Goal	Indicator	Possible outcome
Social: Improve amenity and liveability of the inner north by:		
Significantly reducing the impacts of noise and air pollution from transport	Extent of noise-sensitive land uses (especially residential) exposed to changes in noise exposure.	Environment: Changes in noise environment unlikely to be noticeable. Social: Potentially negative consequences unless actions to curb car use are implemented
	Concentration of air pollutants at relevant sites according to adopted standards	Social: Potentially negative consequences unless actions to curb car use are implemented
Improving safety – reducing fatalities/casualties to or beyond state targets	Casualty accidents	Social: Increased population plus higher densities may reduce perceptions of safety.
	Safety/security risk appraisal at key locations related to travel routes and/or interchanges, and sensitive land uses	No comments made.
Significantly enhancing urban landscape and heritage values in key areas	Effect on parklands	Heritage: No loss of parklands or open space should be allowed in order to meet increased population expectations. A gain in quality and quantity is desirable as the parkland and open space needs to serve more people. Social: Strategies to protect valued places from land use changes may be needed – increased pressure on parkland etc.
	Effect on other public areas, streetscapes	Heritage: Building stock to accommodate increased population should not detract from the quality of public areas or streetscapes, or result in the severance of linkages and decreased access. It should not result in the loss of established tree cover and/or opportunities for planting. Social: New areas of parkland may be needed.
	Effect on heritage protection/interpretation	Heritage: Because of the extent of Heritage Overlays in the planning schemes, very limited opportunities for infill dwellings or development exist within established residential neighbourhoods. Current trends for the redevelopment of industrial and commercial land to residential may continue. Care must be taken to assess the heritage significance of the existing land use so that important heritage values within industrial complexes or railways land, for example, are not lost. The heritage significance of the Inner North encompasses a wider range of land use than just residential and there may be opportunities to interpret this in building fabric even if the historic use is lost. Social: Measures to protect heritage and urban values will be required.
	Effect on urban settings	Heritage: Existing urban settings should be retained. It may be undesirable for land outside of Heritage Overlays to be developed at very high densities, for example by high rise development, which can detract from the human scale of most of the Inner North. Social: Changes to urban character may be resisted by the local community.
Minimising through traffic on local streets	Car/truck traffic levels on local/collector streets	Social: Local area traffic plans to protect local neighbourhoods will become more important as densities increase.
Improving access and travel choices for residents, visitors and workers, including disadvantaged groups	Transport accessibility to homes, jobs and services	Social: Walking, cycling and behavioural programs to improve local access will be important if social amenity is to be protected.
	Sense of place/neighbourhood	Social: Specific actions will be needed to enhance the protection of disadvantaged groups and vulnerable groups through a process which may include major social change in the area. Heritage: A range of initiatives, such as traditional shop-top housing, home offices and mixed use areas may improve neighbourhoods and retain the sense of place.
Providing facilities for people with mobility disadvantages	Contribution to Disability Discrimination Act (DDA) compliance levels	Social: The disabled community will require particular attention. There is a danger that small groups will be overlooked when major changes occur in the area.
Environmental: Protect and enhance environmental sustainability in the inner north by:		
Ensuring a contribution to overall reductions in greenhouse gas emissions	Estimated effect on greenhouse gas emissions	Environment: Reduction in emissions expected compared with 2021 Base Case. Social: If more car travel, negative impacts
Reducing car use for travel through, to/from and within the inner north	Effect on car travel	Social: Programs to redirect travel away from cars will be important as densities increase.
	Car mode share	Social: Programs to redirect travel away from cars will be important as densities increase.
Substantially increasing public transport mode share	Public transport travel	Social: Greater population densities should increase viability of public transport
	Public transport mode share	Social: Greater population densities should increase viability of public transport
Increasing the use of walking and cycling	Cycling/walking travel	Social: Behavioural programs to promote walking and cycling should be more viable with new and denser communities and should be introduced at an early stage at both the residential and business level.
	Cycling/walking mode share	No comments made.

Goal	Indicator	Possible outcome
	Amount of cycling and walking infrastructure provision	Social: Walking / cycling infrastructure needs to be enhanced to maintain local access for disadvantaged groups.
Protecting and enhancing biodiversity	Effect on natural habitats	Environment: Low risk of impact. Potential for enhancement.
	Effect on exotic habitats	Environment: No comment provided. Although comment in section 6.3 in report.
	Effect on water quality	Environment: Low risk of impact. Potential for enhancement.
	Effect on ground contamination	Environment: Low risk of impact. Potential for enhancement.
Economic: Support growth in economic activity, especially in and around Melbourne's CBD, by:		
Enhancing access for commercial activities including tourism and recreation	Accessibility to recreational, cultural and commercial areas in and around CBD and in the inner north	Land Use: Competition for limited available space for car likely to adversely affect businesses and residents. Heritage: Increased population expectations may have negative effects on the accessibility of specific sites and precincts. Social: Greater population numbers will support local businesses but parking pressures may increase.
Catering for increased residential population in the inner north and surrounding areas	Area of existing or potential residential land affected	Land Use: Significant areas of land will be required in order to accommodate the increased population - requires development of available sites, redevelopment of remnant industrial land, conversion to mixed use, increased intensity of development (including increased height) Heritage: Current trends for the redevelopment of industrial and commercial land to residential may continue. It is unlikely that residential building stock will be lost but may be increased in density. Social: Important to protect interests of minority groups
	Changes of land use (eg from commercial to residential)	Land Use: Expected changes in land use to residential and mixed use Social: This may be hard to achieve on a wide scale in practice.
	Accessibility to/from residential areas	Land Use: Reduced access associated with competition for limited available car parking Social: Measures to ensure accessibility is maintained are important.
Providing for commercial travel movements, including safe, efficient primary routes for freight	Effect on goods vehicle travel within, to/from and through the inner north	No comment provided.
Efficiently serving travel needs through, to/from and within the inner north	Effect on business/private travel	Social: Greater population should enhance public transport viability
Maximising the economic return on investment in transport and land use initiatives	Capital and operating costs	Engineering: See cost estimates in Engineering Specialist Report.
	Economic benefits, private/public sector provider impacts, other Government impacts	Transport economic analysis not carried out for this Scenario.
	Regional economic effects (effect on businesses etc)	Land Use: Potential adverse impact on businesses associated with restrictions on car parking. Positive impacts associated with growth in the market for shopping, entertainment and other activities

Table B-6 Scenario F – Scenario E + Doncaster area rapid transit

Goal	Indicator	Possible outcome
Social: Improve amenity and liveability of the inner north by:		
Significantly reducing the impacts of noise and air pollution from transport	Extent of noise-sensitive land uses (especially residential) exposed to changes in noise exposure.	Environment: 3% 'significant improvement' in noise environment for DART with toll on the Eastern Freeway (F2) compared with Scenario D. Social: If through car travel is reduced this represents a social benefit to the area. Noise improvements in some localities however conditions worse in some locations
	Concentration of air pollutants at relevant sites according to adopted standards	Environment: Small decrease in NOx, CO, VOC, SO2 and particle emissions compared with Scenario D. Social: Small improvements overall has positive health outcomes
Improving safety – reducing fatalities/casualties to or beyond state targets	Casualty accidents	Social: Reducing through car travel may improve perceived safety and hence enhance social amenity.
	Safety/security risk appraisal at key locations related to travel routes and/or interchanges, and sensitive land uses	Social: Having a designated public transport route from the Eastern Suburbs may be perceived to increase safety and security.
Significantly enhancing urban landscape and heritage values in key areas	Effect on parklands	Heritage: DART should not result in the loss of any parkland or open space. Social: If car travel is reduced this will enhance local amenity of valued places and improved accessibility to these areas.
	Effect on other public areas, streetscapes	Heritage: Changes to existing buildings and infrastructure to accommodate DART must be carefully managed to avoid negative impacts on public areas and streetscapes. Possible opportunities for improvement of public areas (eg around premium stations). Social: If car travel is reduced this will enhance local amenity of valued places and improved accessibility to these areas.
	Effect on heritage protection/interpretation	Heritage: Substantial change to existing buildings and infrastructure must be carefully managed to avoid negative impacts on the cultural heritage significance of places or settings. Changes must be tested against Burra Charter requirements and in relation to the degree of heritage significance reflected in the statutory controls. Opportunity to incorporate improved interpretation. Social: If car travel is reduced this will enhance local amenity of valued places and improved accessibility to these areas.
	Effect on urban settings	Heritage: Changes to urban infrastructure (such as paving, street furniture, street trees, lighting, access for elderly/disabled people) should respond to the local setting, especially with route 109 style upgrades. Opportunities exist for gateway experiences into the Inner North and improvement of specific areas. Social: If car travel is reduced this will enhance local amenity of valued places and improved accessibility to these areas.
Minimising through traffic on local streets	Car/truck traffic levels on local/collector streets	Social: If public transport infrastructure causes cars to displace to local streets this will reduce local amenity.
Improving access and travel choices for residents, visitors and workers, including disadvantaged groups	Transport accessibility to homes, jobs and services	Social: This service will enhance transport choices to, through and from the NCCC
	Sense of place/neighbourhood	Social: Minimal effect. Heritage: Qualitative appraisal of neighbourhood and sense of place effects is required and enhancement opportunities exist.
Providing facilities for people with mobility disadvantages	Contribution to Disability Discrimination Act (DDA) compliance levels	Social: Service would need to be DDA Compliant, thereby enhancing public transport services for disabled people
Environmental: Protect and enhance environmental sustainability in the inner north by:		
Ensuring a contribution to overall reductions in greenhouse gas emissions	Estimated effect on greenhouse gas emissions	Environment: Reduction in emissions compared with Scenario D. Social: Reducing car travel has positive effects
Reducing car use for travel through, to/from and within the inner north	Effect on car travel	Social: Service makes a small positive contribution to reducing car trips with consequent local social benefits.
	Car mode share	No comment provided.
Substantially increasing public transport mode share	Public transport travel	Social: Has benefits in a particular corridor – especially from east to/from NCCC – thereby increasing opportunities for these social connections.
	Public transport mode share	Social: Likely to have benefits especially for peak travel.
Increasing the use of walking and cycling	Cycling/walking travel	Social: This Strategy has some positive spin-offs for walking
	Cycling/walking mode share	Social: This Strategy has positive spin-offs for walking
	Amount of cycling and walking infrastructure provision	Social: If road space consumed by Public Transport Infrastructure, this could impact on plans for pedestrian / cycle infrastructure.
Protecting and enhancing biodiversity	Effect on natural habitats	Environment:: Medium risk of impact. Potential for enhancement.
	Effect on exotic habitats	No comment provided.
	Effect on water quality	Environment: Medium risk of impact. Potential for enhancement.
	Effect on ground contamination	Environment: Low risk of impact. Potential for enhancement.

Goal	Indicator	Possible outcome
Economic: Support growth in economic activity, especially in and around Melbourne's CBD, by:		
Enhancing access for commercial activities including tourism and recreation	Accessibility to recreational, cultural and commercial areas in and around CBD and in the inner north	<p>Land Use: Improved access to the extent that congestion is reduced (mostly evident in the Zenith model). Potential adverse accessibility due to loss of car lane along Alexandra Parade.</p> <p>Heritage: Improved access should be provided to specific sites and precincts.</p> <p>Social: Greater mode choice available and greater choice of destinations.</p>
Catering for increased residential population in the inner north and surrounding areas	Area of existing or potential residential land affected	<p>Heritage: No loss of potential residential land should result from DART.</p> <p>Social: Should have benefits for larger population - especially those who wish to travel through and to/from the area (especially from the Eastern Freeway corridor).</p>
	Changes of land use (eg from commercial to residential)	Land Use: Expected changes in land use to residential and mixed use.
	Accessibility to/from residential areas	<p>Land Use: Improved access for local traffic due to reduced congestion along key routes (particularly Alexandra Parade).</p> <p>Social: Should have benefits for larger population - especially those who wish to travel through and to/from the area (especially from the Eastern Freeway corridor).</p>
Providing for commercial travel movements, including safe, efficient primary routes for freight	Effect on goods vehicle travel within, to/from and through the inner north	Social: If relieves roads, may improve conditions for commercial vehicles
Efficiently serving travel needs through, to/from and within the inner north	Effect on business/private travel	Social: Provides greater mode choice for travel to/from inner north.
Maximising the economic return on investment in transport and land use initiatives	Capital and operating costs	Engineering: See cost estimates in Engineering Specialist Report.
	Economic benefits, private/public sector provider impacts, other Government impacts	Transport: See details in Transport Economics Report attached to the Transport Specialist Report.
	Regional economic effects (effect on businesses etc)	<p>Land Use: Generally positive impact on business activity</p> <p>Positive opportunities associated with interchanges and park-and-ride stations</p>

Table B-7 Scenario G – Scenario F + arterial road improvements

Goal	Indicator	Possible outcome
Social: Improve amenity and liveability of the inner north by:		
Significantly reducing the impacts of noise and air pollution from transport	Extent of noise-sensitive land uses (especially residential) exposed to changes in noise exposure.	<p>Environment: 14% 'significant improvement' in noise environment compared with Scenario F.</p> <p>Transport: Decrease in traffic on many roads leads to general reduced impact.</p> <p>Social: Reduced traffic on surface roads has positive social consequences, less severance, improved amenity. Significant reductions in traffic (including trucks along Alexandra Parade/Princes Street/ Elliott Avenue route has benefits in turn of noise reduction and local air quality improvements along this route.</p>
	Concentration of air pollutants at relevant sites according to adopted standards	<p>Environment: Slight increase in NO_x, CO, VOC and particle emissions compared with Scenario F.</p> <p>Transport: Could be some localised negative impact at tunnel portals as a result of vent stacks. Need careful design and location of stacks to minimise or avoid local impacts. Positive impact due to less traffic on surface roads.</p> <p>Social: May have small concentrations of noise and pollution at portals which may lead to problems at these sites.</p>
Improving safety – reducing fatalities/casualties to or beyond state targets	Casualty accidents	<p>Transport: Small overall improvement - very slight increase in traffic is more than offset by higher quality (safer) route – about 10 causality accidents per year.</p> <p>Social: Traffic diverted from sensitive land uses in many cases → positive benefits. Increased perception of safety along these routes.</p>
	Safety/security risk appraisal at key locations related to travel routes and/or interchanges, and sensitive land uses	<p>Transport: The diversion of traffic away from surface routes will reduce its impact on sensitive land uses</p> <p>Social: Increased sense of personal safety along routes relieved of traffic.</p>
Significantly enhancing urban landscape and heritage values in key areas	Effect on parklands	<p>Heritage: A major traffic management review of the area is needed before its impacts on parklands and open spaces can be assessed. This strategy should not result in the loss of any parkland or open space. Any changes should be compatible with master plans or strategies.</p> <p>Social: Opportunity to take back some road space for landscaping. Construction impacts on parkland</p> <p>Transport: Greatly reduced surface traffic (and trucks) would provide significant positive impact. Potentially small negative impact on Royal Park in vicinity of western portal.</p>
	Effect on other public areas, streetscapes	<p>Heritage: A major traffic management review of the area is needed before its impacts on public areas and streetscapes can be assessed. The nominated tunnel would have a significant impact on public areas and streetscapes through the loss of significant features or as a dominant visual intrusion in areas such as: the central median strips along Alexandra Pde and Princes St; near Royal Parade and Cemetery Road West where the Elm tree canopy must be protected; and near Elliott Ave which has established Eucalyptus trees needing protection.</p> <p>Social: May be able to enhance surface roads where traffic reduced – social amenity benefits.</p> <p>Transport: Potential for streetscape improvement due to need for less road space on surface streets.</p>
	Effect on heritage protection/interpretation	<p>Heritage: A major traffic management review of the area is needed before its impacts on heritage protection and interpretation can be assessed. The nominated tunnel would have a significant impact on the heritage character of the area and its appreciation because many commuters would be removed from the historic context of the Inner North by the tunnel.</p> <p>Social: Potential to enhance heritage values where traffic reduced.</p> <p>Transport: Positive where traffic reduced – negative where the tunnels meet the surface.</p>
	Effect on urban settings	<p>Heritage: Major changes to the established setting would occur in the vicinity of the ventilation stacks near Hoddle St and Flemington Road tunnel end exits. The nominated tunnel would have a significant impact on urban settings through the loss of significant features or as a dominant visual intrusion in some places because of the portals, ramps and other infrastructure. It offers some opportunities for improvement to degraded landscapes. The extent of proposed changes from a human scale would need careful management to avoid negative impacts.</p> <p>Social: Potential local amenity improvements.</p> <p>Transport: Positive impact due to less traffic.</p>

Goal	Indicator	Possible outcome
Minimising through traffic on local streets	Car/truck traffic levels on local/collector streets	Transport: No further effect, this is already achieved by the Strategy B components. Social: May enable local area traffic planning thereby benefiting local neighbourhoods, and social interaction at neighbourhood level.
Improving access and travel choices for residents, visitors and workers, including disadvantaged groups	Transport accessibility to homes, jobs and services	Transport: Improves accessibility by road. Reduced traffic levels on most streets will have some small beneficial effects on bus and tram users, walkers and cyclists. Social: Greater choices, greater accessibility for cars. Potential benefits to other road users also.
	Sense of place/neighbourhood	Social: Safer surface access for vulnerable groups – children elderly etc.(except on roads where traffic increases) Heritage: The arterial road network improvements would need careful qualitative appraisal of community severance, loss of neighbourhood and sense of place effects and enhancement opportunities. The tunnel experience detracts from the appreciation of these qualities. Transport: Positive where traffic reduced – negative where the tunnels meet the surface.
Providing facilities for people with mobility disadvantages	Contribution to Disability Discrimination Act (DDA) compliance levels	Transport: No further effect, this is already achieved by other Strategies. Social: Disabled people may experience a safer more pleasant environment on some street9where traffic reduced)
Environmental: Protect and enhance environmental sustainability in the inner north by:		
Ensuring a contribution to overall reductions in greenhouse gas emissions	Estimated effect on greenhouse gas emissions	Environment: Slight increase in emissions compared with Scenario F. Transport: Small overall improvement, slight increase in overall traffic but more efficient travel. Social: Car travel is not discouraged, but is more efficient.
Reducing car use for travel through, to/from and within the inner north	Effect on car travel	Transport: Overall traffic is very slightly increased, but most perceptible impacts will be a marked reduction in traffic on surface streets. Social: Car use not discouraged, but up to 100,000/day via tunnel, rather than on surface roads.
	Car mode share	Transport: Neutral, no perceptible effects.
Substantially increasing public transport mode share	Public transport travel	Transport: Neutral. Model forecast is for a very slight reduction, but this does not allow for the effects of any improvements in bus/tram running times and greater reliability due to reduced congestion – particularly on the north-south tram routes. Social: Public transport operation on some roads may be improved with positive social spin-offs.
	Public transport mode share	Transport: Neutral. Model forecast is for a very slight reduction, but this does not allow for the effects of any improvements in bus/tram running times and greater reliability due to reduced congestion – particularly on the north-south tram routes. Social: Public transport operation on some roads may be improved with positive social spin-offs.
Increasing the use of walking and cycling	Cycling/walking travel	Transport:: Does not specifically cater for walking/cycling although reduced traffic levels on surface streets may marginally improve conditions for these modes. Social: Improved environment for walking and cycling on and across relieved roads is a social benefit.
	Cycling/walking mode share	Transport:: Does not specifically cater for walking/cycling although reduced traffic levels on surface streets may marginally improve conditions for these modes. Social: May enable 'freed' road space to be given back to community uses including bicycle lanes.
	Amount of cycling and walking infrastructure provision	Transport:: Does not specifically cater for walking/cycling although reduced traffic levels on surface streets may marginally improve conditions for these modes. Social: May enable 'freed' road space to be given back to community uses including bicycle lanes.
Protecting and enhancing biodiversity	Effect on natural habitats	Environment:: Medium risk of impact. Potential for enhancement.
	Effect on exotic habitats	Environment: No comment provided. Although comment under section 6.3 of report.
	Effect on water quality	Environment: Low risk of impact. Potential for enhancement. Transport: Treatment of ground water entering tunnel could be an issue.
	Effect on ground contamination	Environment: Medium risk of impact. Potential for enhancement.

Goal	Indicator	Possible outcome
Economic: Support growth in economic activity, especially in and around Melbourne's CBD, by:		
Enhancing access for commercial activities including tourism and recreation	Accessibility to recreational, cultural and commercial areas in and around CBD and in the inner north	<p>Transport: Directly improved by road. May be consequent minor improvements in bus and tram running times due to reduced traffic levels.</p> <p>Land Use: Improved access to the extent that congestion is reduced</p> <p>Heritage: Qualitative appraisal relating to specific sites and precincts would be required.</p> <p>Social: Access to and through the area enhanced. If traffic removed from tourist precincts this is a benefit.</p>
Catering for increased residential population in the inner north and surrounding areas	Area of existing or potential residential land affected	<p>Heritage: The arterial road network improvements and the tunnel would create both positive and negative effects on residential building stock in Heritage Overlays.</p> <p>Social: May encourage more car usage by local community – not necessarily a local, social benefit.</p> <p>Transport: Reduction in traffic volumes on surface roads means additional traffic as a result of increased residential development can be accommodated.</p>
	Changes of land use (eg from commercial to residential)	No comment provided
	Accessibility to/from residential areas	<p>Transport: Reduction in traffic volumes on surface roads means additional traffic as a result of increased residential development can be accommodated.</p> <p>Land Use: Improve access generally, although there would be specific local adverse impacts associated with ventilation stacks and other social effects</p> <p>Social: Accessibility potentially improved – less local congestion.</p>
Providing for commercial travel movements, including safe, efficient primary routes for freight	Effect on goods vehicle travel within, to/from and through the inner north	<p>Transport: Significant road journey time savings.</p> <p>Social: Significant improvements for this section of the community</p>
Efficiently serving travel needs through, to/from and within the inner north	Effect on business/private travel	<p>Transport: Significant road journey time savings.</p> <p>Social: Significant improvement for through vehicle travel, including trucks. Major disbenefit is that the amount of car travel is not reduced.</p>
Maximising the economic return on investment in transport and land use initiatives	Capital and operating costs	Engineering: See costs in Engineering Specialist Report.
	Economic benefits, private/public sector provider impacts, other Government impacts	Transport: See details in Transport Economics Report attached to Transport Specialist Report.
	Regional economic effects (effect on businesses etc)	Land Use: Positive impacts on businesses associated with improved access.