5 Project alternatives

Tables

Figures

5.1 OVERVIEW

The scoping requirements for the Environment Effects Statement (EES) require Major Road Projects Authority (MRPA) to document "consideration of relevant alternatives and include an explanation of how specific alternatives were shortlisted for evaluation within the EES". It is required that the EES provides details of alternatives investigated for the project, their selection process including their likely environmental effects and where these may offer potential to achieve beneficial environmental outcomes and meet the objectives of the project. An outline of the process followed by MRPA during development of the reference design assessed in this EES is shown in Figure 5.1. The key steps discussed in this chapter are the identification and assessment of strategic interventions, the identification and assessment of alternative road designs for the preferred strategic response, and the refinement of the road design during development of the reference design assessed in this EES.

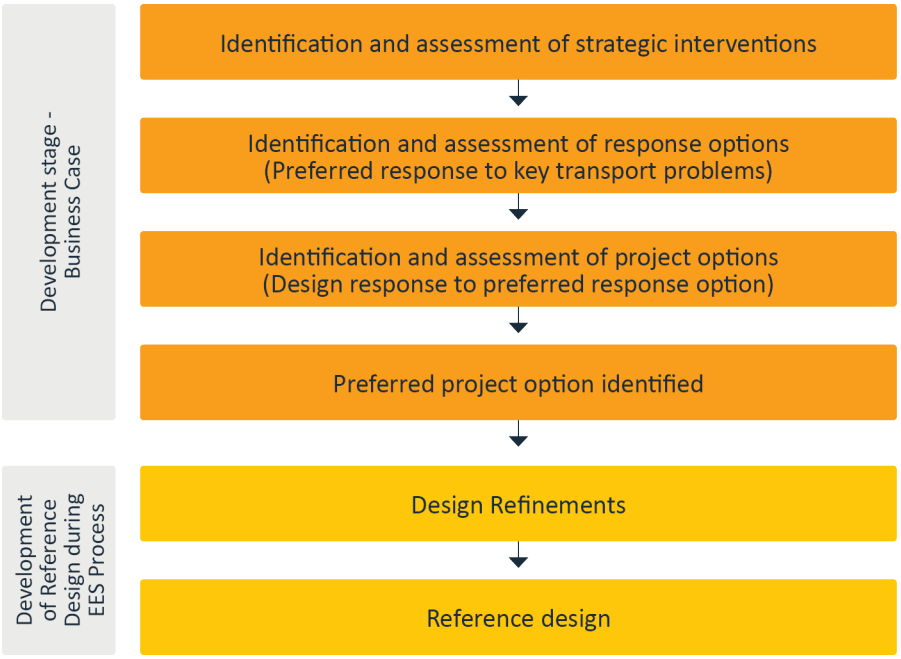

Figure 5.1 Mordialloc Bypass (Freeway) planning and development process

5.2 STRATEGIC INTERVENTIONS

A workshop was facilitated by VicRoads to discuss the problems facing the road network in Melbourne's southern movement corridor, specifically those around Mordialloc, Braeside, and Dingley Village. It included key stakeholders from Public Transport Victoria (PTV), Department of Economic Development, Jobs, Transport and Resources (DEDJTR) and the Cities of Greater Dandenong and Kingston.

With input from the multiple organisations, the workshop identified strategic interventions with the potential to address, to varying levels, the problems of congestion and traffic accidents in the area. These strategic interventions were identified through logic mapping exercises to address the problems and deliver benefits.

Seven strategic interventions were identified and considered based on the following three broad intervention approaches:

- manage demand
- improve productivity
- increase supply.

The seven strategic interventions are described in Table 5.1.

Table 5.1 Summary of strategic interventions

Strategic intervention type	Strategic intervention	Description
1. Manage demand	Network optimisation approach: Limit access to key congested traffic routes	Introduce Intelligent Transport Systems traffic and management measures (e.g. truck curfews, traffic controls, etc.) to appropriately prioritise traffic in accordance with the designated road function and to align vehicle throughput with the capacity of the existing network.
	Land use approach: Promote land use change and local area amenity	Use planning controls to reduce travel demand to education and economic precincts, and actively promote and encourage jobs and services development closer to where people live.
	Alternative transport approach: Encourage mode shift away from car	Increase availability and uptake of other modes such as taking public transport, walking, and cycling.
2. Improve productivity	Network optimisation approach: Optimise the performance of the existing network	Introduce measures to improve the existing network's efficiency by implementing the latest technologies and network management systems (e.g. intelligent transport systems such as dynamic speed signs, traffic CCTV etc.).
3. Increase supply	Network upgrade approach: Minor upgrade of the existing network to improve capacity	Ease the existing network's most immediate pressure points through small-scale upgrades and investment (e.g. improve signalling, realign junctions, etc.) to provide extra carrying capacity and improve network speed.
	Network upgrade approach: Major upgrade of the network to provide additional capacity	Invest significantly in road infrastructure to improve network carrying capacity, by widening roads and/or upgrading intersections on existing arterial roads.
	Infrastructure approach: Establish a new major road connection	Invest significantly in establishing a new arterial road or freeway to operate as a priority corridor.

An analysis was undertaken which identified the strategic interventions (in order of preference) as:

- infrastructure approach
- network upgrade approach
- network optimisation approach
- land use approach
- alternative transport approach.

The infrastructure approach was identified as the preferred option as it provides the highest number of benefits – improvements to transport network efficiency and amenity, and attractiveness of the area for business and industry – and provides the best long-term solution to the problems identified. Providing an entirely new road connection would give direct access to employment centres and discourage trucks from using secondary arterial roads and local roads in the area.

Although the network upgrade approach provided reasonable benefits, the population and employment growth in the south-east made this solution potentially unsustainable in the long-term. It also entails significant risks, including the potential for protracted and expensive land acquisition processes and a lack of community support for the solution, that threaten cost certainty and benefit delivery. This option also creates greater amenity and network disruption impacts during construction than the infrastructure approach.

Network optimisation was found to provide minimal short-term relief to the transport capacity problem and could not address the corridor's travel demand growth. New technology and network management systems can often be costly and provide only short-term relief unless accompanied by road capacity improvements. While there is no consistent national policy on intelligent transport systems, implementation would be a challenge.

The land use approach did not add capacity to the road network and it required significant long-term land-use and travel-behaviour change. Planning policies often take a long time to implement and can be costly as gaining approvals involves extensive stakeholder consultation and management. This option also depended on third party participation and market forces. In addition, planning policy change would likely be difficult to achieve without private sector and industry support or government incentives.

The alternative transport approach also requires significant long-term changes to travel behaviour. Without significant improvements to the greater and local road network capacity, new and existing bus services are likely to suffer delays as they compete for road space with other on-road vehicles. This option will involve significant disruption to the road network, property access, utility services and involve significant land acquisition.

5.3 ALIGNMENT OPTIONS

Following on from the identification of an entirely new road connection as the preferred strategic intervention, identification of an alignment was required. A bypass of Mordialloc has been proposed for decades with development excluded from the road reserve. Land has been acquired by VicRoads and a public acquisition overlay (PAO) for road purposes has been applied over sections of the proposed alignment. This reserve was provided for the intended purpose of constructing a road to improve the north-south movement of people and goods.

Option analysis identified the proposed alignment as the preferred alignment for the project. At the southern end of the alignment, where the project connects to the Mornington Peninsula Freeway, is a fixed location. At the northern end of the alignment, there is limited scope to connect the project to the Dingley Bypass in any location other than where proposed.

These factors, combined with the presence of the existing road reservation along this alignment and the extent of existing development and/or environmental values on adjoining and nearby land, mean that the proposed alignment is preferred.

Given that this EES has demonstrated that the proposed alignment is capable of achieving the project objectives and that the project will not result in unacceptable environment impacts that cannot be mitigated to acceptable levels, alternative alignment corridors were not subject to detailed assessment as part of this EES process.

5.4 ROAD DESIGNS OPTIONS ASSESSMENT

Within the existing road reserve, there were opportunities to consider various road designs, ranging from arterial roads to freeways. An arterial road is a high traffic capacity road with traffic lights at major intersection junctions and limits to traffic interaction across the roadway. Arterial roads are designed to transfer traffic from minor roads to urban centres and to freeways.

A freeway is separated from arterial roads through the use of bridges and on and off ramps. Freeways generally have a higher capacity and are more free flowing than arterial roads, catering for increased traffic demand.

5.4.1 Road configuration options

Four project options for the Mordialloc Bypass (Freeway) were identified and evaluated:

- Project option 1 – a four-lane arterial road
- Project option 2 – a four-lane freeway (Springvale Road to Lower Dandenong Road)/arterial road (Lower Dandenong Road to Dingley Bypass)
- Project option 3 – a four-lane freeway
- Project option 4 – a six-lane freeway.

Table 5.2 provides a summary of the details of each project option considered.

Table 5.2 Scope of road configuration options considered for the project

Project option	Project scope assessed
Project option 1 – Four-lane arterial road	The four-lane arterial option comprised the following key elements: • four-lane arterial road with two lanes in each direction and a divided centre median • 3.5m wide lanes • 80km/hr posted speed • at-grade signalised intersections at Dingley Bypass, Centre Dandenong Road, Lower Dandenong Road and Governor Road • redirection of Woodlands Drive to Lower Dandenong Road via Tarnard Drive and Bell Grove • a full diamond grade separated interchange at Springvale Road • truncation (cutting off) of Old Dandenong Road either side of the Mordialloc Bypass (Freeway) • an elevated structure over the Mordialloc Creek Wetlands and Bowen Parkway, between the Waterways Estate and Aspendale Gardens • a shared use path along the entire length of the Mordialloc Bypass (Freeway) to provide connection from Springvale Road to Dingley Bypass.
Project option 2 – Four-lane freeway/arterial	The four-lane freeway/arterial option comprised the following key elements: • as per option 1, with an additional grade-separated interchange at Governor Road • 100km/hr between Springvale Road and Lower Dandenong Road • 80km/hr between Lower Dandenong Road and Dingley Bypass.
Project option 3 – Four-lane freeway	The four-lane freeway option comprised the following key elements: • four-lane freeway with two lanes in each direction and a divided centre median • lane width of 3.5m • 100km/hr posted speed • full grade-separated interchanges at Springvale Road, Governor Road, and Lower Dandenong Road • south-facing single-point urban interchange at Centre Dandenong Road (south facing ramps only) • redirection of Woodlands Drive to Lower Dandenong Road via Tarnard Drive and Bell Grove • an at-grade signalised intersection at Dingley Bypass • elevated structures over the Mordialloc Creek Wetlands and Bowen Parkway, between the Waterways Estate and Aspendale Gardens • freeway continuation over Old Dandenong Road, without providing access • a shared-use path along the entire length of the Mordialloc Bypass (Freeway) to provide connection from Springvale Road to Dingley Bypass.
Project option 4 – Six-lane freeway	The six-lane freeway option comprises the following key elements: • as per option 3, except a six-lane freeway with three lanes in each direction.

The above options all include the addition of north-facing ramps at Thames Promenade.

5.4.2 Options assessment

In 2010, VicRoads commissioned a strategic transport assessment and feasibility study to investigate the associated benefits, impacts and feasibility of constructing a bypass within the alignment. The study found that there was not enough demand to invest in a freeway; however, it also found there was enough future demand to support a business case for an arterial road within the road reserve, due to the level of demand and cost benefits.

More recently, VicRoads conducted a multi criteria analysis and benefit-cost analysis of the identified road configuration options in 2018. The project options analysis was informed by multiple studies, plans, traffic modelling, and designs from the 2014 feasibility study through to investigations completed by VicRoads in 2017. Each project option was examined in detail across a range of issues, including:

- a qualitative assessment of:
  - how each option aligns with the overall project objectives
  - the benefits realised by each project option
  - the major risks associated with each project option
- an analysis of likely social, environmental and economic impacts to determine the nature and extent of both positive and negative project option impacts
- a benefit-cost analysis, incorporating project costs and monetised impacts of project options
- an analysis of the project option's incremental cash flow to compare the likely financial impact of each option.

When assessing the project options, consideration was also given to:

- Government commitment
- community feedback
- likely planning and environmental approval requirements.

The outcomes of the options analysis indicated that the preferred option is 3A – a four-lane freeway with north facing ramps at Thames Promenade. Appendix A: *Transport impact assessment* provides detailed analysis of the impacts and benefits of a four-lane arterial road (alternative) and the four-lane freeway (project) options.

A freeway was found to be preferable to an arterial road because:

- it provides more congestion relief on adjacent roads such as Nepean Highway, White Street, and Springvale Road
- it reduces travel times by about 20 percent
- it provides greater throughput capacity with a lower impact on intersecting roads, thereby extending the period before any further upgrades are required
- the freeway reduces the likelihood of incidents, making it safer than the arterial road option. This is achieved by reducing congestion in surrounding roads, and providing less interaction at traffic lights, where accidents are more likely to occur
- the community has a very strong preference for a freeway option, as evidenced by feedback received (including via a web-based social pin-point survey; refer to Chapter 7: *Consultation and stakeholder engagement*)
- it provides the highest returns on investment with a Benefit Cost Ratio (BCR) of 4.0
- it is expected to generate stronger economic returns by providing companies with faster access to employees and reducing transit times for goods and services
- the arterial options would be significantly more expensive to upgrade to freeway in the future compared with today's cost differential.

BENEFIT COST RATIO

The economic appraisal has been undertaken using a benefit cost ratio (BCR) approach to assess the economic merits of the project. A BCR provides a single, dollar-value summary of the welfare benefits of each project option, quantifying both market and non-market social and environmental benefits. In simple terms, a BCR is the ratio of benefits of a project, expressed in monetary terms, relative to its costs, also expressed in monetary terms.

The environmental impacts of an arterial road and a freeway were found to be largely similar. The key differentiators between the two options were:

- Landscape and visual impacts of a freeway are likely to be increased due to bridge structures over roads. However, community responses (via the social pin-point survey) indicate people are more concerned with connectivity and decreasing the traffic congestion in the area, which is better achieved with a freeway.
- The increased footprint of a freeway including on- and off-ramps will result in greater loss of vegetation. However, the main areas of vegetation clearing would be toward the centre of the roadway, which is the same for both the arterial and freeway options. As such effects to matters of national environmental significance (MNES) are considered comparable for both options.

Although the preferred option selected is the four-lane freeway, MRPA has incorporated sufficient room on the inside of the road design for the future upgrade of the road to a six-lane freeway. In addition, all bridge structures will have enough space for an additional lane to be added when traffic numbers and congestion increase.

This inclusion is proposed to reduce future disruption to the freeway and surrounding roadways and reduce environmental impact as bridge construction will only be undertaken on one occasion. It is also expected to decrease future costs associated with the development of the six-lane option.

The following options were those assessed:

a. Option 0: Do Nothing.
    - This option was ranked last as it did nothing to improve the existing problems identified as needing to be addressed by the proposed project.

b. Option 1: Four-Lane Arterial Road
    - This option was assessed as returning $2.30 for every $1 invested on the project mainly through improved travel time performance.
    - This option also was assessed as only moderately well addressing the transport needs, road safety needs and stakeholder expectations of the project.

c. Option 2: Four-Lane Freeway/Arterial (Freeway from Springvale Road to past Governor Road)
    - This option was assessed as returning $3.50 for every $1 invested on the project mainly through improved travel time performance.
    - This option also was assessed as only moderately well addressing the transport needs, road safety needs and stakeholder expectations of the project.

d. Option 3: Four-Lane Freeway
    - This option was assessed as returning $3.90 for every $1 invested on the project mainly through improved travel time performance.
    - This option also was assessed as addressing the transport needs, road safety needs and stakeholder expectations of the project well.

e. Option 3A: Four-Lane Freeway including additional ramps at Thames Promenade
    - This option was assessed as returning $4.00 for every $1 invested on the project mainly through improved, and more efficient, travel time performance.
    - This option also was assessed as addressing the transport needs, road safety needs and stakeholder expectations of the project well.

f. Option 4: Six-Lane Freeway
    - This option was assessed as returning $3.50 for every $1 invested on the project mainly through improved travel time performance.
    - This option also was assessed as addressing the transport needs, road safety needs and stakeholder expectations of the project well.

5.5 PROJECT BENEFITS

Mordialloc Bypass will result in a number of benefits for road users and communities in the southern subregion, including:

- improved transport network efficiency
- improved amenity and attractiveness of the area as places to live and work
- increased business and industry attractiveness.

Improving east-west and north-south connectivity and capacity will reduce delays, and improve accessibility between employment and residential areas. The project is expected to divert thousands of vehicles from nearby arterial roads and will deliver travel time savings of up to 10 minutes in each direction.

For commuters, a reduction in travel time variability and delays will reduce time spent on travel and allow more time to be spent at home with family. For the freight and logistics sectors, it will improve productivity by reducing vehicle operating costs and unexpected delays that result in lost efficiency.

Reduced reliance on local and low capacity arterial roads will boost amenity in the middle south-eastern suburbs by reducing traffic through residential areas. It will also make the South East area more appealing, making it easier for commuters to access employment areas.

Benefits for residents and businesses will include improved environment, safer and less congested arterial roads, improving the attractiveness of the area as a place to live and work and improved access to economic and activity centres where they can access education institutions, health and community facilities, amenities and shopping needs.

An improved southern movement corridor characterised by faster, less congested and more reliable travel across the city will alleviate infrastructure bottlenecks that slow the development of employment areas. It will also reduce barriers to investment in key employment areas and industrial nodes and reduce travel-related business costs for the freight industry.

More information about the project benefits can be found in Chapter 2: *Project rationale and benefits*.

5.6 DESIGN REFINEMENTS

During development of the reference design for the four-lane freeway, design refinements were considered based on specialist studies and stakeholder and community engagement. The reference design details are provided in Chapter 6: *Project description*. Design alternatives and the mitigation strategies proposed by technical specialists are detailed in Chapters 8 to 20 of this EES. Table 5.3 summarises the alternatives considered during development of the EES.

Table 5.3 Design refinements

Area	Refinements	Reason for refinements
Governor Road and Lower Dandenong Road	Grade-separated intersection at Governor Road and Lower Dandenong Road in addition to Springvale Road	Constructing the project as an arterial road provides corridor traffic with a capacity alternative. However, modelling suggests that unless grade-separated interchanges are provided to Governor Road and Lower Dandenong Road as well as Springvale Road, traffic would continue to access Nepean Highway via local roads such as White Street, which is an unsatisfactory result. Removal of all at-grade intersections would significantly reduce the likelihood of run-off-road, head-on and intersection crashes, and would reduce the number of high-speed crossing points accessible to pedestrians and cyclists.

Area	Refinements	Reason for refinements
Alignment adjustment at Braeside Park	Alignment adjusted to maintain heritage listed Parks Victoria Office	Initial design showed the roadway passing within the road reservation over the Parks Victoria office. The alignment has been adjusted to avoid this impact, and mitigated to limit impacts on work space amenity. Consultation with Parks Victoria and stakeholders helped refine the design to achieve an acceptable outcome for all.
Maintain local access at Old Dandenong Road	Provide bridge structure at Old Dandenong Road	Public consultation indicated a preference to maintain local access at Old Dandenong Road. This has been achieved by maintaining an elevated road between Centre Dandenong Road and Old Dandenong Road.
Centre Dandenong Road	Alignment adjustment	Adjusting the road alignment at the intersection with Centre Dandenong Road minimises the impact on privately owned land, which limits the amount of land needing to be acquired for the project and the number of businesses displaced.
Intersection design at Woodlands Drive and Lower Dandenong Road	Diversion of Woodlands Drive to Tarnard Drive	Due to its proximity to the Mordialloc Bypass (Freeway), the intersection of Woodlands Drive and Lower Dandenong Road would need to be relocated. Three main design options were proposed: • divert the off-ramp onto Woodlands Drive, and maintain the current intersection location • divert Woodlands Drive onto the freeway off-ramp • divert Woodlands Drive to Tarnard Drive and realign Bell Grove and Redwood Drive intersections. Detailed traffic analysis showed that diverting Woodlands Drive onto Tarnard Drive is the safest and most efficient intersection arrangement.
Slope of batter fill	Increase of batter slope from 1:6 to 1:2	The angle of the built up road was increased from 1m drop every 6m horizontal distance to 1m drop every 2m horizontal distance. The initial driver for the change was to reduce the roadway footprint through ecologically sensitive vegetation near the Waterways Wetlands (refer to Chapter 10: *Biodiversity* and Appendix C: *Flora and fauna impact assessment*). Reducing the batter slope and overall project footprint also leads to a reduced need for imported fill and reduces associated costs.
Braeside Park	Additional fauna culverts	Surface water culverts are proposed to manage overland flow and flooding impacts on the Braeside Park area. The culvert designs would incorporate a fauna passageway using elevated 'dry' structures. Extra culverts would be installed to provide additional fauna connectivity where none currently exists.
Waterways Bridge	Double bridge structure	A double bridge structure over the Waterways wetlands is incorporated in the reference design to create fauna connectivity at the waterways, and a lightwell is provided beneath the bridge. A single bridge structure would increase dark space or under-bridge shadow, reducing the waterway's appeal.

Area	Refinements	Reason for refinements
Waterways Bridge	Decrease in height and vertical alignment of bridge	The visual impact of the Waterways wetlands is a key issue for consideration. MRPA is committed to working with Melbourne Water to minimise the bridge height over the Waterways wetlands. The EES considered a bridge approximately 1.5m above the southern levee bank (compared with 6m originally proposed). The bridge apex is above Bowen Parkway, which has a minimum clearance of 4.8m. The roadway decreases in height to the levee bank to provide the most amenable bridge shape.
Shared use path	Adjusted to avoid trees and connect to Braeside Park	The shared use path was adjusted in several locations to limit the impact on trees and native vegetation and to provide links to Braeside Park.
Parkway Drive to Braeside Park connection	Pedestrian underpass	A pedestrian underpass was included in the reference design between Parkway Drive and Braeside Park. Pedestrians currently use an informal pathway, which would be affected by the project. The underpass is proposed as a 3.6m culvert with daytime lighting and vegetated 'open' design entrances.

5.7 CONCLUSION

Traffic congestion and road safety concerns in this area have increased the need for a new road within this reserve. During development of the project, MRPA explored a range of strategic interventions and road design options. The initial preferred option was a new arterial road. However, as studies progressed and community feedback was received, analysis of the options showed that a four-lane freeway was a superior option over an arterial road, mainly due to the better traffic flow outcomes and associated BCR. The EES process has resulted in further design refinements of the four-lane freeway solution, which have created additional social and economic benefits for the project, with similar levels of environmental impacts.

Chapter 6: *Project description* describes the reference design for the project that has been assessed in the following technical chapters of this EES (Chapters 8 to 20).