



PART 1 INTRODUCTORY CHAPTERS

3 Project Development

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3.1 Introduction

Once the need for the Project was established, as discussed in Chapter 2 *Project Rationale*, further work was undertaken to develop the Project to the design presented in this EES. This chapter describes the different project options and design alternatives that were considered during design development, and how the design of the Project has been developed, evaluated and refined.

At all stages, the project development process has focused on addressing the identified challenges currently facing the relevant section of Yan Yean Road, including congestion, safety issues, high traffic volume and lack of appropriate infrastructure to support active users (e.g. pedestrians and cyclists) and public transport. The protection and enhancement of natural and cultural resources and the environment has been a core value throughout the process, while meeting the project objectives.

Options were developed in consultation with different stakeholders and the community. Many of these options, and further refinements to them, were developed to avoid and minimise impacts to the environment.

3.2 Project options

During the initial stages of the Project, MRPV identified, reviewed and assessed three options for the Project to establish a credible range of possibilities for upgrading Yan Yean Road.

In developing the three project options, a number of considerations were taken into account. These included:

- The challenges described in Chapter 2 *Project Rationale* such as the congested and complex road environment
- Design variations for each project option (e.g. intersection upgrades)
- Relevant Victorian Government objectives and commitments including wider transport portfolio projects and relevant strategies and policies, such as the Department of Transport's Movement and Place Framework
- Existing traffic modelling of current situations and forecast situations factoring in future land use, relevant planning schemes and technical consideration of feasible upgrades.

3.2.1 Evaluation approach

Evaluation criteria were developed to assess the project options and included:

- An assessment of traffic modelling results for each option
- The ability of the design to respond to government objectives including responding to a requirement to move traffic at an appropriate level that responds to the existing and future traffic demand, as well as options for active transport
- Social impacts, including impacts to vulnerable communities (e.g. low income households), access disruption during construction due to potential limited access to Yan Yean Road (e.g. access to local amenities) and potential for applying further restriction on existing networks or constraining opportunities to improve and expand pedestrian and cyclist connectivity
- Environmental impacts on local flora and fauna, landscape, contamination, air quality, surface water, groundwater, traffic noise and Aboriginal cultural heritage
- Economic benefits including travel time savings, vehicle operating costs, public transport benefits, crash cost savings and reduction in air pollution.

3.2.2 Options

Following discussions with the Department of Transport (which at the time was VicRoads and Transport for Victoria), three options were developed for the Project: business as usual, full upgrade from Kurrak Road to Jorgensen Avenue and full upgrade from Kurrak Road to Bridge Inn Road.

Option 1 – Business as usual

This option represented the minimum level of intervention.

The carriageways, intersections, pedestrian and cycling facilities would remain as they are. Minor safety improvements, such as the installation of guard rails and wire rope safety barriers, would be implemented. To improve access, minor upgrades to improve access to properties along the road and use of signage, were included.

Option 2 – Full upgrade from Kurrak Road to Jorgensen Avenue

This option included adding a lane in each direction on Yan Yean Road between Kurrak Road and Jorgensen Avenue. Intersection upgrades were part of this option including a roundabout at Heard and Jorgensen Avenues, traffic lights at North Oatlands Road, Ironbark Road and Bannons Lane, and access improvements using turn lanes at intersections with Yan Yean Road.

Wire rope safety barriers in the median would be installed where there is no concrete median and guard fence along the roadside at certain locations. A walking and cycling path (western side) and a pedestrian only footpath (eastern side) would be installed along the entire length of the upgrade. Access to all properties along Yan Yean Road would be left in, left out. A service lane would be constructed for properties along Yan Yean Road from Vista Court to near Ashley Road.

Option 3 – Full upgrade from Kurrak Road to Bridge Inn Road

This option incorporated the design of Option 2 and extended it further to Bridge Inn Road. It included adding a lane in each direction on Yan Yean Road along the entire length between Jorgensen Avenue and Bridge Inn Road. Upgrades to Orchard Road and Bridge Inn Road by replacing the roundabouts with traffic lights were also part of this option.

3.2.3 Preferred option for the Project

A number of assessments were undertaken to select the preferred option for the Project. Of importance, environmental studies, including of ecological impacts, concluded that Options 2 and 3 would not result in considerable impacts to the environment. Option 1 was deemed to have the least impact to the environment due to the limited changes that it proposed. Option 3 - Full upgrade from Kurrak Road to Bridge Inn Road was selected as the preferred option for the Project having regard to the following criteria:

Network efficiency

- Traffic modelling showed that Option 3 would most effectively address the future traffic demand on Yan Yean Road. It would also improve wider network efficiency and provide the greatest travel time savings when compared to Option 1 (business as usual) and Option 2 (full upgrade from Kurrak Road to Jorgensen Avenue). For example, vehicle trips were found to provide a 44 percent increase in travel time savings when compared to the current travel time of Option 1
- Stopping the upgrade at Jorgensen Avenue (Option 2) would create a bottleneck at Jorgensen Avenue that would result in congestion at the Bridge Inn Road intersection (which is a key east-west route). Bridge Inn Road is currently identified as a key bottleneck for northbound travel in the afternoon peak period, with observed queues extending as far back as Orchard Road (over 800 metres to the south)
- The duplication of Yan Yean Road between Kurrak Road and Bridge Inn Road and the upgrade of the Yan Yean Road and Bridge Inn Road intersection was identified as two of the City of Whittlesea's highest road network priorities. Option 3 is the only option that addresses both of these priorities.

Active transport

Option 3 would increase active transport opportunities including a walking and cycling path along Yan Yean Road, particularly between Jorgensen Avenue and Bridge Inn Road, which is part of the Principal Bicycle Network in the Victorian Cycling Strategy 2018-2028. Yan Yean Road currently lacks walking and cycling facilities.

Safety

- The roundabout at Bridge Inn Road has been the site of four recorded crashes. Upgrade of the intersection at this location would only occur under Option 3
- Option 3 would address safety issues alongside Yan Yean Road, in particular at the intersection of Jorgensen Avenue which had a fatal collision in 2014
- Option 3 would address the strong likelihood of 'rat-running' through the residential area to the south-west of the Bridge Inn Road intersection and its associated potential safety and amenity impacts. This section of Yan Yean Road was not included in Option 2 (full upgrade from Kurrak Road to Jorgensen Avenue).

Social connectedness

Option 3 would effectively increase social connectedness through the proposed walking and cycling path, particularly to the Mernda Town Centre and Mernda Station compared to the other two options.

State and Commonwealth commitments

- Option 3 best met the Department of Transport's Movement and Place Framework objectives for Yan Yean Road by increasing capacity and improving road safety
- Option 3 is in line with the Victorian Cycling Strategy 2018-2028, as discussed above under 'Active transport'
- Upgrade of the intersection of Jorgensen Avenue and Yan Yean Road was included in Option 3 (full upgrade of Yan Yean Road from Kurrak Road to Bridge Inn Road) which qualified for upgrade funding under the Federal Black Spot Program in 2015-2016.

3.3 Design development

This section outlines key areas where the Project's design has been refined to avoid and minimise environmental impacts, while still meeting the project objectives.

Development and refinement of the project design is a continuing process. As design develops, the Project is continually seeking refinements that would contribute to avoiding and minimising impacts to native vegetation, the preferred foraging trees for the critically endangered *Lathamus discolor* (Swift Parrot) and trees of ecological and cultural value.

3.3.1 Key design developments

Typical cross-section

The cross-section of a road is the width of the road with the position and number of traffic lanes, bicycle lanes, medians, walking and cycling paths and footpaths. The width of the cross-section of the road has the greatest physical impact on the footprint of the Project. Variables that can be reviewed as part of refining the cross-section design include:

- Total width of cross-section that directly impacts the project footprint and its associated environmental impacts
- Walking and cycling path and footpath provision that contribute to customer (road users) experience
- Roundabouts versus traffic lights that relate to the improvement to road safety as well as the efficiency of the road network
- Posted speed that affects the traffic flow and travel time across the road network.

A number of cross-sections were developed conceptually and assessed by the project team. These options ranged from relatively minor road improvements (no duplication and a smaller construction footprint) to a standard arrangement (duplication with wide medians and a larger construction footprint).

The preferred cross-section provides a balance that achieves the project objectives while minimising the footprint and therefore impact to the environment. The key features of the typical cross-section approaching intersections or roundabouts include:

- Design speed of 70 kilometres per hour
- 2.2 metre centre median with wire rope safety barrier
- Walking and cycling path on the western side and footpath on the eastern side of Yan Yean Road
- Flexible guard fence between the traffic lanes and the walking and cycling path to promote safety and avoid vehicle run-off
- A total cross-section width of 24.2 metres.

Bridge Inn Road intersection

As part of design development at the Bridge Inn Road / Yan Yean Road / Doctors Gully Road intersection, significant ecological, social and cultural values were identified including the Doreen River Red Gums, the General Store / former post office, the Doreen Recreation Reserve, the Doreen Business Precinct, and residential and rural living areas.

Initial community consultation completed in April 2018 indicated strong community sentiment to save the Doreen River Red Gums (refer to Chapter 6 *Communications and Engagement*). Subsequently, several intersection designs were developed (Options A-E) and subject to further community consultation in May 2020. In response, Option B was selected as the preferred design and is presented in this EES as it achieves the project objectives to improve road safety, capacity and walking and cycling links; retains the Doreen River Red Gums; and retains the General Store / former post office.

The selection of Option B followed an iterative design development process where:

- Five intersection design options (Options A-E) were developed in response to the project objectives and existing conditions at Bridge Inn Road including effects on transport capacity and connectivity, biodiversity such as the Doreen River Red Gums, social and cultural values, and land use planning such as land acquisition requirements
- Intersection design Options A-E were then subject to stakeholder engagement, with Options D and E not progressed due to safety concerns and challenges associated with intersection configuration and traffic flow
- Intersection design Options A, B and C were subject to further stakeholder engagement and community consultation in May 2020:
 - Option A: Duplication on the existing alignment (refer to Figure 3.1)
 - Option B: Shifting intersection north east to retain two Doreen River Red Gums (refer to Figure 3.2)
 - Option C: Split intersection north to retain two Doreen River Red Gums (refer to Figure 3.3)
- Following from the stakeholder and community engagement, Option B was selected as the preferred design and was refined in response to additional arboriculture advice on the Doreen River Red Gums (refer to Technical Report C – *Arboriculture Assessment*).

Option B was selected because it would retain the Doreen River Red Gums and retain the General Store / former post office, whilst Option A would remove them. Option B would also have a significant improvement in traffic performance, whilst the future traffic performance of Option C would be impacted due to the potential for queuing between the staggered intersections.

Relative to Option A, which would require the full acquisition of one land parcel (resulting in the loss of two businesses), Option B would require only partial land acquisition. In addition, Option B would provide a dedicated service road to the Doreen Business Precinct, with potential for landscaping between Yan Yean Road and the service road. Refer to Table 3.1 for a comparison of Options A, B and C.

Generally, the differences in the impacts among the different design options of intersection were predicted to be minor or negligible for all key aspects of the physical environment including noise and vibration, groundwater, contaminated soil, surface water and air quality.

Figure 3.1 Option A – Duplication on the existing alignment



Figure 3.2 Option B – Shifting intersection north-east

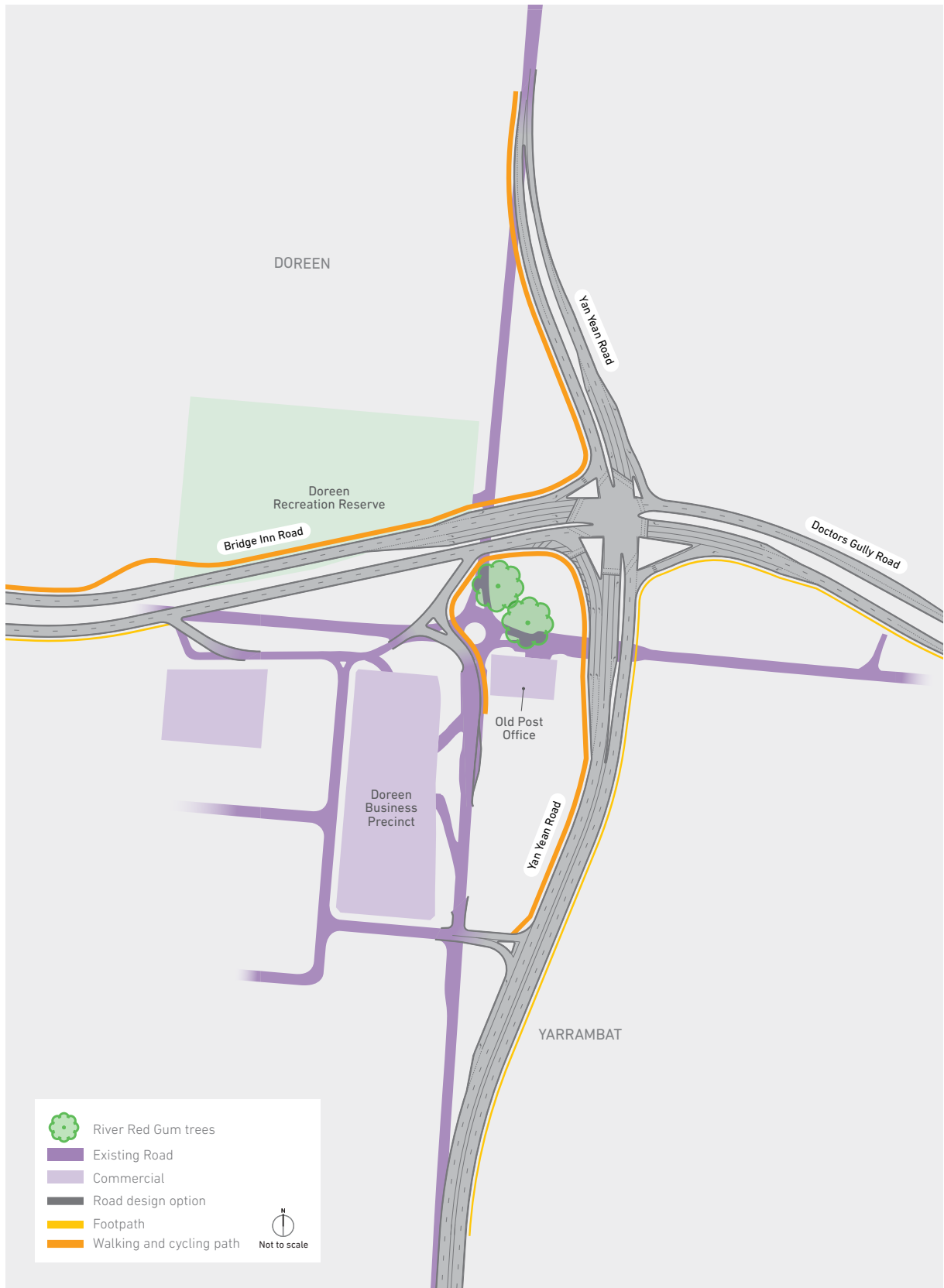


Figure 3.3 Option C – Split intersection north



Table 3.1 Assessment of Bridge Inn Road options against Evaluation Objectives

Evaluation Objective	Option A	Option B	Option C
Effects on transport capacity and connectivity	<ul style="list-style-type: none"> • Significant improvement in traffic performance and improved pedestrian amenity • Intersection configuration promotes smooth traffic flow and will cater to future growth. 	<ul style="list-style-type: none"> • Significant improvement in traffic performance and improved pedestrian amenity • Requires new access arrangement to the Doreen Business Precinct via a dedicated service road. 	<p>Redirects Doctors Gully Road to the north of Bridge Inn Road:</p> <ul style="list-style-type: none"> • The future traffic performance impacted due to the potential for queuing between the staggered intersections • Increased vehicle delay navigating through two intersections.
Effects on biodiversity	<ul style="list-style-type: none"> • Requires the removal of the two Doreen River Red Gums which have ecological value • Requires the largest amount of native vegetation removal compared to other options (0.48 hectares north of Coolong Terrace). 	<ul style="list-style-type: none"> • Retains the two Doreen River Red Gums • Requires the least amount of native vegetation removal compared to other options (0.41 hectares north of Coolong Terrace). 	<ul style="list-style-type: none"> • Retains the two Doreen River Red Gums • Requires 0.44 hectares of native vegetation removal (north of Coolong Terrace).
Effects on social and cultural values	<ul style="list-style-type: none"> • Requires the removal of the two Doreen River Red Gums, which have social, aesthetic, scientific and heritage value • Requires the removal of the General Store / former post office and the pet and stock supply store on the south-east corner of Yan Yean Road • Significant landscape and visual amenity impacts, with opportunity for landscaping in medians. 	<ul style="list-style-type: none"> • Retains the two Doreen River Red Gums • Retains the General Store / former post office and the pet and stock supply store on the south-east corner of Yan Yean Road, but requires significant change of access • Potential for landscaping between the service road and Yan Yean Road. 	<ul style="list-style-type: none"> • Retains the two Doreen River Red Gums • Retains the General Store / former post office on the south-east corner of Yan Yean Road, but requires change of access • Positive impact on the landscape and amenity through retention of the rural feel of the local area, with opportunity for landscaping in wider median.

Evaluation Objective	Option A	Option B	Option C
Effects on land uses, businesses and social assets	<ul style="list-style-type: none"> Requires acquisition of two businesses (one parcel), resulting in the removal of the General Store / former post office and the pet and stockfeed store on the south-east corner of Yan Yean Road and Doctors Gully Road Partial acquisition along the frontage of the Doreen Recreation Reserve Minor loss of productive agricultural land from Homestead farm (25 Doctors Gully Road) on the north-east corner of Yan Yean Road and Doctors Gully Road. 	<ul style="list-style-type: none"> Retains the General Store / former post office on the south-east corner of Yan Yean Road, but requires significant change of access Provides dedicated service road to the Doreen Business Precinct, eliminating direct access from a busy intersection Significantly impacts Doreen Recreation Reserve including loss of existing car park and tennis courts Some loss of productive agricultural land from Homestead farm (25 Doctors Gully Road) on the north-east corner of Yan Yean Road and Doctors Gully Road, as well as loss of access by trucks. 	<ul style="list-style-type: none"> Retains the General Store / former post office on the south-east corner of Yan Yean Road, but requires change of access Likely decrease in business turnover for the General Store due to the increased separation with the Doreen Business Precinct Impacts existing facilities at Doreen Recreation Reserve (including loss of existing car park and tennis courts) Some loss of productive agricultural land from Homestead farm (25 Doctors Gully Road) on the north-east corner of Yan Yean Road and Doctors Gully Road.

Divided carriageway (boulevard design) between Bannons Lane and Jorgensen Avenue

An exception to the typical cross-section described above is the inclusion of a divided carriageway (boulevard design) between Bannons Lane and Jorgensen Avenue. Along this section of the Project, the width of the centre median increases from 2.2 metres to approximately 14 metres by re-aligning the northbound carriageway. A wider median at this location will provide for additional landscaping opportunities and potential avoidance of existing biodiversity values and large trees.

Golf course safety barrier

With the duplication of Yan Yean Road, the western carriageway would be brought closer to the Yarrambat Golf Course. To maintain safety requirements for road and active users a barrier between the golf course and Yan Yean Road is required to mitigate golf balls hitting cars, cyclists or pedestrians. Two options were considered by the Project:

- The construction of a 30-36 metre high fence
- Realigning up to four of the golf fairways to create a safe distance between the golf fairway and Yan Yean Road.

The fence has been included in the proposed design for the Project to enable assessment of the potential impacts of the fence in the EES. The impacts are discussed in Chapter 8 *Effects on Biodiversity* and Technical Report G – *Landscape Strategy*.

Jorgensen Avenue intersection

The initial design proposed a roundabout at the intersection of Jorgensen Avenue and Yan Yean Road. After further investigation by the project team, this was replaced with a signalised intersection. The signalised intersection has a smaller footprint than the roundabout and would avoid removing multiple trees on the east side of Yan Yean Road opposite Jorgensen Avenue.

Closing the northern driveway access at property 790 Yan Yean Road

There are two existing driveway access tracks to the property at 790 Yan Yean Road. By closing the northern access track and extending a retaining wall, impacts to additional Swift Parrot habitat trees are avoided.

Consolidating walking and cycling path and service road between Vista Court and Ashley Road

A service road is included in the project design between Vista Court and Ashley Road. By co-locating the walking and cycling path on the proposed service road, it enables existing trees to be retained at this location.

The walking and cycling path in Werther Park

Where the walking and cycling path passes through existing vegetation, such as at Werther Park, the project design has responded by curving the path through and around the existing vegetation to minimise tree impacts.

3.3.2 Refinements under investigation

Some areas of the project design are being investigated by the project team to identify further refinements to avoid and minimise impacts to environmental values, respond to community feedback and meet the project objectives. Examples of current areas of the project design that are under investigation are summarised below.

Youngs Road roundabout

The current roundabout design at Youngs Road directly impacts the Shire of Nillumbik's wetland located on the north east corner of the Youngs Road and Yan Yean Road intersection. The project team is currently investigating shifting the proposed roundabout at the Youngs Road intersection further west. This would minimise impacts to the existing wetland such as potential for impacting the water quality of this wetland.

Yarra Valley Water pump station

Relocation of the Yarra Valley Water pump station would result in impacts to existing vegetation. The project team is currently investigating alternatives to relocating the pump station, which could reduce impacts to vegetation.

Reducing auxiliary left turn length

The design of the left turn lane at the approach to Golf Links Drive would impact existing native trees and vegetation. As part of ongoing design works, further investigation (in consultation with the Department of Transport) will be undertaken to review the length of the left turn lane to avoid impacts to the existing trees.

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