
VicRoads

# Western Highway Project – Section 2: Beaufort to Ararat

## Economic Impact Assessment Report

August

*This Economic Impact Assessment Report ("Report"):*

1. *Has been prepared by GHD Pty Ltd ("GHD") for VicRoads;*
2. *May only be used for the purpose of informing the Environment Effects Statement and Planning Scheme Amendment for the Western Highway Project (and must not be used for any other purpose); and*
3. *May be provided to the Department of Planning and Community Development for the purpose of public exhibition as part of the Environmental Effects Statement and Planning Scheme Amendment for the Western Highway Project.*

*The services undertaken by GHD in connection with preparing this Report were limited to those specifically detailed in Section '4. Methodology' of this Report.*

*The opinions, conclusions and any recommendations in this Report are based on assumptions made by GHD when undertaking services and preparing the Report ("Assumptions"), as specific in Section '4. Methodology' and throughout this Report.*

*The opinions, conclusions and any recommendations in this Report are based on assumptions made by GHD when undertaking services and preparing the Report ("Assumptions"), as specified in Section '4. Methodology' and throughout this Report.*

*GHD excludes liability for errors in, or omissions from, this Report arising from or in connection with any of the assumptions being incorrect.*

*Subject to the paragraphs in this section of the Report, the opinions, conclusions and any recommendations in this Report are based on conditions encountered and information reviewed at the time of preparation. GHD has not, and accepts no responsibility or obligation to update this Report to account for events or changes occurring subsequent to the date that the Report was signed.*

# Contents

## Table Index

## Figure Index

# Executive Summary

VicRoads is progressively upgrading the Western Highway as a four-lane divided highway between Ballarat and Stawell (Western Highway Project). The Western Highway Project consists of three sections, to be constructed in stages. Section 2 (Beaufort to Ararat) of the Western Highway Project (the Project) is the subject of this report.

On 27 October 2012, the Victorian Minister for Planning advised that an Environment Effects Statement (EES) would be required to identify the anticipated environmental effects of the Project. GHD has been commissioned by VicRoads to undertake an economic impact assessment for the Project as part of the EES.

Following a multi-criteria assessment of numerous potential alignment options, VicRoads selected three proposed road alignments for the Project (Alignments or Alignment Options) which were subject to the risk and impact assessment presented in this report. The Alignment Options are outlined in Section 6 of this report.

This report, together with other technical reports prepared by GHD and other consultants as part of the EES, will inform VicRoads' selection of the preferred and alternate alignment for the Project from the three Alignment Options. VicRoads' preferred and alternate alignment for the Project will be documented in the EES.

This report has considered the economic impacts across three options associated with the ultimate upgrade of the existing highway to a freeway, as well as the construction impacts associated with the interim upgrade to a duplicated highway. The Economic Impact Assessment forms part of the EES.

The EES scoping requirements for the economic impact assessment of the Project are detailed in Section 2 of this report. In summary they require:

- Identification of the potential economic effects of the proposed works and relevant alternatives during construction and operation at the local and regional level in relation to employment, income distribution and existing land uses in the area, (especially key infrastructure or services, agriculture, business and tourism); and
- An overall analysis of the costs and benefits of the proposed works and relevant alternatives, including the “no project” scenario.

The impact assessment undertaken by GHD involved identification of  baseline of existing conditions pertinent to the study and then considered the impacts arising from execution of the Project on a number of industry sectors, including the agricultural sector, local non-agricultural businesses, employment and tourism. The Project was also considered from an economic benefit cost assessment standpoint.

The impact assessment indicated potential for a moderate impact in the agricultural sector through the loss of agricultural facilities and infrastructure (estimated at a loss of revenues in the region of $3.5 million), plus the loss of agricultural land and severance of properties. The risk assessment also uncovered potential impacts to businesses through the loss of passing trade and for access disruptions during construction.

The findings indicate that, subject to the implementation of management controls, these impacts could be mitigated substantially through appropriate interventions. The mitigation of some business impacts would also positively impact the local tourism industry.

There would be an additional impact to employment as a result of the Project, with the creation of up to 2,200 direct full time equivalent (FTE) jobs over the construction profile of the Project, plus up to 4,090 indirect FTE jobs, depending on the alignment option.

The study found that the likely costs and benefits associated with the Project resulted in a Benefit Cost Ratio (BCR) of 0.6 for Option 2, which is slightly higher than that estimated for Option 1 (0.5). Such BCRs are common for rural highway upgrades because of the high cost involved for long corridors.

Option 2 was found to have the least severance impact from an agricultural perspective. The impact differential from the perspective of non-agricultural businesses was found to be broadly similar across all three options and the BCR value is slightly higher for Option 2. Therefore, the preferred option from an overall Economic Impact Assessment stance is Option 2.

# 1. Introduction

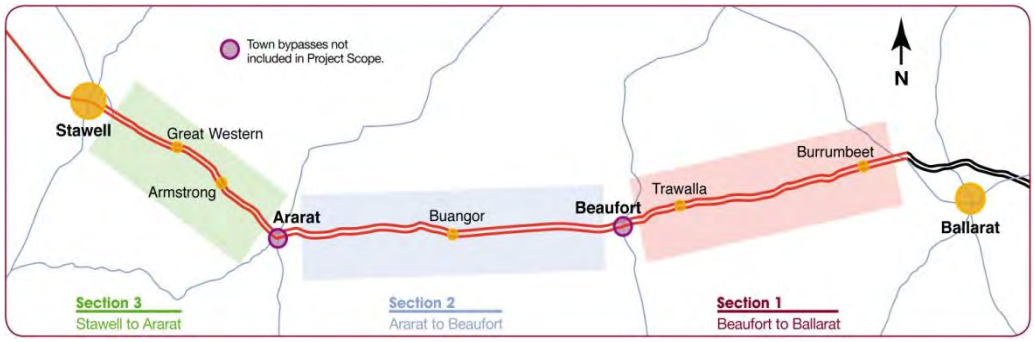
## 1.1 Background & Project Description

The Western Highway (A8) is being progressively upgraded as a four-lane divided highway for approximately 110 kilometres (km) between Ballarat and Stawell. As the principal road link between Melbourne and Adelaide, the Western Highway serves interstate trade between Victoria and South Australia and is the key transport corridor through Victoria's west, supporting farming, grain production, regional tourism and a range of manufacturing and service activities. Currently, more than 5500 vehicles travel the highway west of Ballarat each day, including 1500 trucks.

The Western Highway Project (here within referred to as 'the Project') consists of three stages:

- Section 1: Ballarat to Beaufort;
- Section 2: Beaufort to Ararat; and
- Section 3: Ararat to Stawell.

**Figure 1 The Western Highway Project**




Source: VicRoads

Works on an initial 8 km section between Ballarat and Burrumbeet (Section 1A) commenced in April 2010 and will be completed in 2012. Construction for Section 1B (Burrumbeet to Beaufort) commenced in early 2012 and is expected to be completed by 2014. Separate Environment Effects Statements (EESs) and Planning Scheme Amendments (PSAs) must be prepared for both Sections 2 and 3. It is expected that Sections 2 and 3 would be completed and opened in stages through to 2016, subject to future funding.

**Section 2** of the Project commences immediately west of the railway crossing (near Old Shirley Road) west of the Beaufort township and extends for a distance of approximately 38 km to Heath Street, Ararat.

**Section 3** commences at Pollards Lane, Ararat and extends for approximately 24 km to Gilchrist Road, Stawell.

The EES will focus on assessment of the proposed ultimate upgrade of the Western Highway between Beaufort and Stawell to a duplicated highway standard complying with the road category 1 (freeway) of VicRoads Access Management Policy (AMP1). The project includes a duplicated road to allow for two lanes in each direction separated by a central median.

The EES has also considered a proposed interim upgrade of the Western Highway to a highway standard complying with the VicRoads Access Management Policy AMP3. When required, the final stage of the project is proposed to be an upgrade to freeway standard complying with AMP1.

The proposed interim stage of the Project (AMP3) would provide upgraded dual carriageways with wide median treatments at key intersections. Ultimately the Western Highway is proposed to be a freeway (AMP1) where key intersections would be grade separated, service roads constructed and there would be no direct access to the highway.

To date $505 million has been committed for the Western Highway upgrade by the Victorian Government and the Australian Government as part of the Nation Building Program.

Highway improvements for the three sections between Ballarat and Stawell will involve:

- Constructing two new traffic lanes adjacent to the existing highway, separated by a central median.
- Constructing sections of new four-lane divided highway on a new alignment.

In addition to separating the traffic lanes, highway safety would be improved with sealed road shoulders, safety barriers, protected turning lanes, intersection improvements, and service lanes for local access at some locations.

Town bypasses of Beaufort and Ararat are not included in the current proposals. Beyond Stawell to the Victorian border, ongoing Western Highway improvements would continue with shoulder sealing works, new passing lanes and road surface improvements.

The aims/objectives of this Project are to:

- Provide safer conditions for all road users by:
  - Reducing the incidence of head-on and run-off road crashes;
  - Improving safety at intersections; and
  - Improving safety of access to adjoining properties.
- Improve efficiency of freight by designing for High Productivity Freight Vehicles
- Provide adequate and improved rest areas.
- Locate alignment to allow for possible future bypasses of Beaufort and Ararat.

## 1.2 Project and Study Areas

### 1.2.1 Project Area

The project area was defined for the purposes of characterising the existing conditions for the Project, and to consider alignment alternatives. The project area encompasses a corridor extending up to 1500 metres (m) either side (north and south) of the edge of the road reserve (encompassing the extent of new alignment possibilities).

### 1.2.2 Study Area

***Local Study Area***

The study area for the economic assessment is defined as commencing at the railway crossing near Old Shirley Road, west of the Beaufort township and extending for a distance of approximately 38 kilometres (km) to Heath Street, Ararat.

The local study area is the same as the project area and extends approximately 1500 metres (m) from either side of the road reserves of the existing Western Highway. Buangor is the only town in the study area.

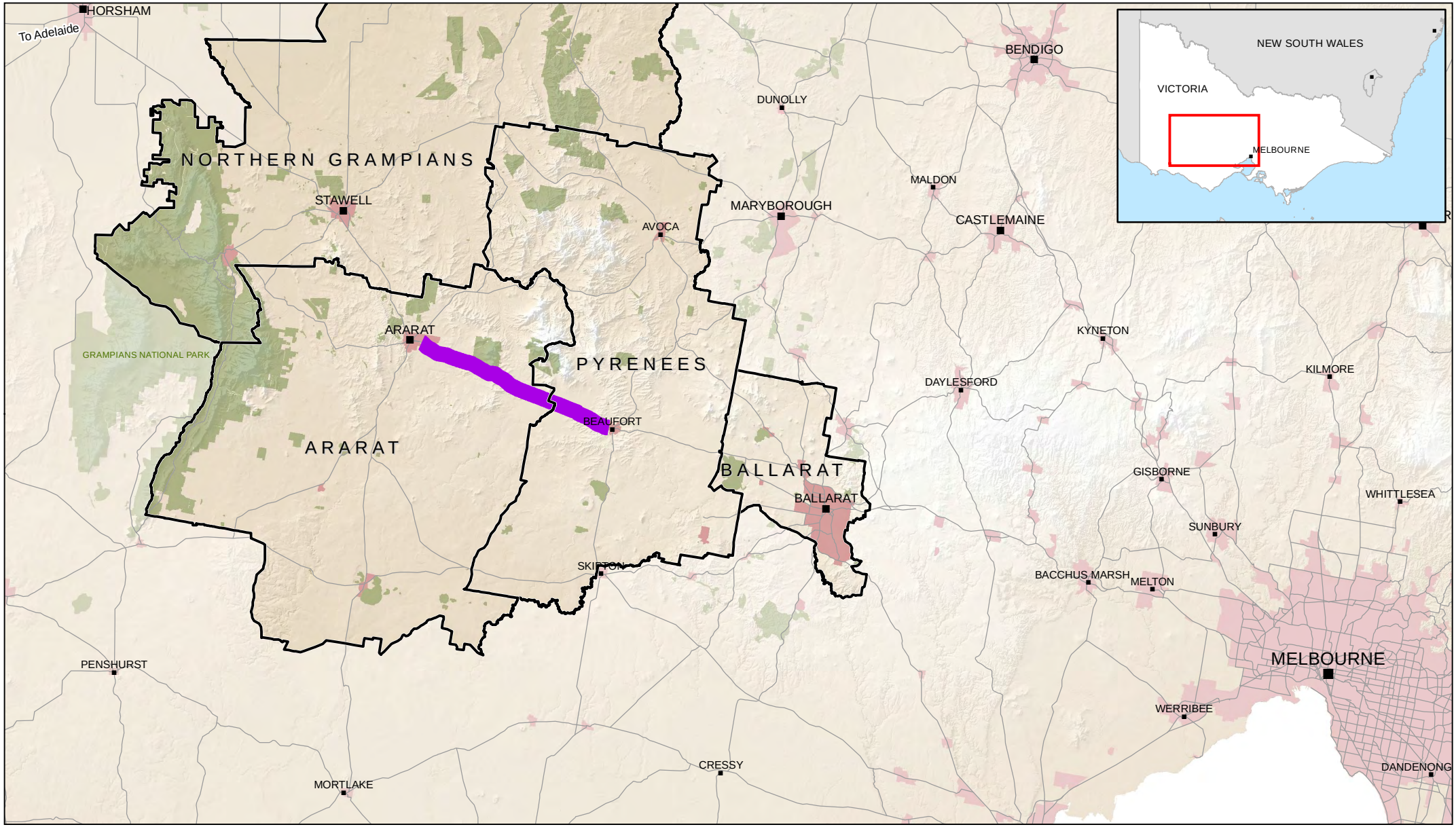
***Regional Study Area***

For the purposes of the economic assessment, a regional study area has also been defined (see Figure 2) as all area and road infrastructure incorporated into the local government areas of:

- Ballarat City
- Pyrenees Shire
- Ararat Rural City
- Northern Grampians Shire.

## 1.3 Proposed Alignment

A multi-criteria assessment of alignment options was conducted based on information from the existing conditions assessments. The outcome was the selection of three proposed alignments to take forward to the risk and impact assessment presented in this report. These three alignments are described in Section 6. This report informs the selection of a preferred and alternate alignment from these three alignments for the EES for Section 2. The assessment and selection of the proposed alignments are documented in Chapter 5 of the EES for Section 2, and in the Options Assessment Paper (Technical Appendix to the EES).




Paper Size A4

0 5 10 20 30

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

N

LEGEND

Study Area

GHD CLIENTS | PEOPLE | PERFORMANCE

vicroads

VicRoads
Western Highway Project

Job Number 31-27558
Revision B
Date 22 Aug 2012

Regional Context

Figure 2

G:\31\27558\GIS\Maps\Deliverables\Stage 2\RISK AND IMPACT ASSESSMENT\11_ECONOMICS\3127558_S2_002_RegionalContext_A4L.mxd

180 Lonsdale Street Melbourne VIC 3000 Australia T 61 3 8687 8000 F 61 3 8687 8111 E melmail@ghd.com W www.ghd.com



Data source: DSE, VicMap, 2012; VicRoads, 2012. Created by: cillingworth

# 2. EES Scoping Requirements

## 2.1 EES Objectives

For the Economic Impact Assessment aspects of the EES for the Western Highway Project, the relevant draft evaluation objectives outlined in the EES Scoping Requirements are:

- *To provide net economic benefits for the State, having regard to road user benefits, direct costs, and indirect costs including with respect to other land uses and economic activities; and*
- *To avoid or minimise disruption and other adverse effects on infrastructure, land use (including agriculture) and households, as well as road users resulting from the construction and operation of the highway duplication.*

## 2.2 EES Scoping Requirements

The EES Scoping Requirements for the Economic Impact Assessment are as follows:

- *Identify the potential economic effects of the proposed works and relevant alternatives during construction and operation at the local and regional level in relation to employment, income distribution and existing land uses in the area, (especially key infrastructure or services, agriculture, business and tourism); and*
- *Provide an overall analysis of the costs and benefits of the proposed works and relevant alternatives, including the "no project" scenario.*

# 3. Legislation, Policy and Guidelines

This section details the legislation, guidelines and policies relevant to the economic conditions in the local and regional study areas or to the economics of the project.

## 3.1 Commonwealth

### 3.1.1 Nation Building Program

To date, $505 million has been committed for the Project by the Victorian Government and Australian Government as part of the Nation Building Program.

### 3.1.2 National Land Freight Strategy – Discussion Paper 2011

The Western Highway is part of the indicative national land freight network.

The goals on page 55 of the strategy include:

- High productivity/performance based standard network for 'national' highways – Goulburn Valley – Newell, Hume – Pacific – Bruce etc. (identification of operating impediments to high productivity vehicle access, including local housing/traffic and traffic lights etc.).
- Town bypasses and grade easing on national highways.
- Improved safety outcomes embedded in each of the initiatives.

## 3.2 State and Regional

### 3.2.1 Transport Integration Act 2010

Part 2, Division 2 of the *Transport Integration Act 2010* outlines the objectives of the Act; many of which are relevant to this economic assessment. The relevant objectives are listed in Table 1.

**Table 1 Transport Integration Act Transport System Objectives of Relevance to the Socio-Economic Impact Study**

| Social and economic inclusion |
|---|
| The transport system should provide a means by which persons can access social and economic opportunities to support individual and community wellbeing including by—<br>(a) minimising barriers to access so that so far as is possible the transport system is available to as many persons as wish to use it;<br>(b) providing tailored infrastructure, services and support for persons who find it difficult to use the transport system. |
| **Economic prosperity** |
| The transport system should facilitate economic prosperity by—<br>(a) enabling efficient and effective access for persons and goods to places of employment, markets and services;<br>(b) increasing efficiency through reducing costs and improving timeliness;<br>(c) fostering competition by providing access to markets;<br>(d) facilitating investment in Victoria; and<br>(e) supporting financial sustainability. |
| **Efficiency, coordination and reliability** |
| (1) The transport system should facilitate network-wide efficient, coordinated and reliable movements of persons and goods at all times.<br>(2) Without limiting the generality of subsection (1), the transport system should—<br>(a) balance efficiency across the network so as to optimise the network capacity of all modes of transport and reduce journey times;<br>(b) maximise the efficient use of resources including infrastructure, land, services and energy;<br>(c) facilitate integrated and seamless travel within and between different modes of transport;<br>(d) provide predictable and reliable services and journey times and minimise any inconvenience caused by disruptions to the transport system. |

### 3.2.2 Planning and Environment Act 1987

The *Planning and Environment Act 1987* (P&E Act) establishes a framework for planning the use, development and protection of land in Victoria in the present and long-term interest of all Victorians. The Act sets out the legislative basis to ensure that planning provisions are prepared and approved throughout Victoria.

The P&E Act provides for a single instrument of planning control, the planning scheme, which sets out the way land may be used or developed. A planning scheme is a statutory document

which sets out objectives, policies and provisions relating to the use, development, protection and conservation of land in the area to which it applies, usually a municipality. A planning scheme regulates the use and development of land through planning provisions designed to achieve those objectives and policies.

### 3.2.3 State Planning Policy Framework

Every Victorian planning scheme includes the State Planning Policy Framework (SPPF). The SPPF consists of general principles for land use and development in Victoria as well as specific objectives and strategies applying to the whole State or to areas of State significance.

The following clauses from the SPPF are of particular relevance to this study.

Clause 11.05 relates to regional development and sub-clause 11.05-1, which relates to regional settlement networks, contains the following relevant strategies:

"*Direct urban growth into the major regional cities of Geelong, Ballarat, Bendigo and the Moe, Morwell and Traralgon cluster.*

*Support sustainable development of the regional cities and centres of Ararat … Horsham …*

*Promote transport and communications and economic linkages between the various settlements through the identification of servicing priorities in regional land use plans*."

Sub-clause 11.05-4, which relates to regional planning strategies and principles, contains a strategy to support a network of integrated and prosperous regional settlements by, amongst other things:

- "*Strengthening networks of settlements by maintaining and improving transport links, spatial patterns of service delivery, and promoting commercial relationships and community activities*."

Clause 18 relates to transport and has the overall objective that:

"*Planning should ensure an integrated and sustainable transport system that provides access to social and economic opportunities, facilitates economic prosperity, contributes to environmental sustainability, coordinates reliable movements of people and goods, and is safe*."

Sub-clause 18.02-4 relates to management of the road system and contains the following relevant strategies:

"*Selectively expand and upgrade the road network to provide for:*

- *High-quality connections between Metropolitan Melbourne and regional cities, and between regional cities.*
- *Upgrading of key freight routes.*

*…*"

Improve the management of key freight routes to make freight operations more efficient while reducing their external impacts."

### 3.2.4 10 Year Tourism and Events Strategy

The guiding strategy for tourism and events development in Victoria is the 10 Year Tourism and Events Strategy which was released in 2006, followed by a progress report in 2010.

Four key focus areas are set out in this Strategy. These focus areas are:

1. Build upon existing strengths
2. Develop new strengths
   - Assist with investment attraction and facilitation to leverage new major tourism investment in Victoria
3. Focus on long term growth opportunities
   - Focus on business events acquisition with the finalisation of a business case for developing business events in regional Victoria and the implementation of a new strategy to attract and leverage these
   - Focus on regional destination development and marketing programs, particularly the regions beyond Melbourne surrounds that have the greatest growth potential in the next 5 – 10 years. Focus on attracting entrepreneurs to invest in iconic tourism product in regional Victoria.
4. Strengthen the partnership between government and industry

A number of strategies have been developed that specify the implementation of the framework in the 10 Year Strategy. These are:

- *Three Year Business Plan 2008-2011*
- *Regional Tourism Action Plan 2009 – 2012*; and
- Specific Market Segment Plans, of which the following are relevant for the Project due to the tourism product located in the wider region –
  - Backpacker Tourism Action Plan 2009-13
  - Victoria's Aboriginal Tourism Development Plan 2006-2009
  - Victoria's Food and Wine Tourism Action Plan (a new version is currently under development)
  - Victoria's Nature-Based Tourism Strategy 2008-2012, and
  - Victorian Trails Strategy 2005-2010.
- *Regional Marketing and Development Plan 2011-2012 – Grampians,* which covers the Grampians Tourism Region[1] and implements the various State level strategies and plans at a regional level.

Relevant objectives and actions of these plans are shown in Table 2 below.

[1] Grampians Tourism Region incorporates the municipalities of Ararat, Northern Grampians, Southern Grampians, Horsham, West Wimmera, Hindmarsh, Yarriambiack, Buloke and Mildura. Note that Pyrenees shire is part of the Goldfields Tourism Region.

**Table 2 Relevant Regional Tourism Strategies and Actions**

| Strategy/Plan | Objective/Action | Relevance |
|---|---|---|
| Backpacker | Increase backpacker visitation to regional Victoria | Grampians identified as a high-opportunity destination for leisure backpackers. |
| Aboriginal Plan/ Nature-Based | Actively support market-ready Aboriginal attractions to ensure they develop and maintain a high profile in appropriate markets. | Visitation to Brambuk National Park and Cultural Centre in Grampians |
| Trails Strategy/Nature-Based | Investigate development of a 3-4 day long distance trails using existing trails in the Grampians National Park. Facilitate investment in cabins for overnight accommodation on the trail. | As a flagship trail, this would target interstate and international visitors. |
| Nature-Based/Food and Wine/Aboriginal | Improving the supply and quality of tourism experiences/ Assist with investment in quality accommodation and infrastructure. | Grampians is included in Phase 1. |
| Regional Tourism Action Plan/Grampians Region | Increasing consumer demand for regional tourism experience. | Marketing of Halls Gap under the Villages of Victoria program to the interstate and intrastate markets. |
| Grampians Region | Priority events: Marketing of Grampians Grape Escape | Targeting the Melbourne market – reduced travel time to destinations in the Grampians Region has the potential to increase demand by tourists from the Melbourne area as it will also be a daytrip option for these visitors. |

The Project is relevant for these tourism development efforts because safe and convenient access to the destination is an important aspect of the tourism experience. The Project would reduce the travel time from major markets in Melbourne and Adelaide to destinations in the region. Apart from access, the other key needs and demands for a tourism 'product' are attractions, activities, accommodation and amenities, according to Tourism Victoria.

### 3.2.5 Central Highlands Regional Strategic Plan, 2010

Eight local government areas form the Central Highlands Region, namely Ararat Rural City, City of Ballarat, Central Goldfields, Golden Plains, Hepburn, Moorabool, Northern Grampians and Pyrenees. These councils collaborate through the Central Highlands Mayors & CEO forum. To further regional strategic planning, Regional Development Victoria has coordinated and supported the development of regional plans, including a plan for the Central Highlands region. In 2010, the Central Highlands Regional Strategic Plan was endorsed by the eight collaborating municipalities and it provides a clearly articulated framework designed to best position the region to 2030 and beyond.

Figure 3 illustrates the key comparative advantages and drivers, issues and challenges facing the region.

**Figure 3 Comparative advantages of and drivers, issues and challenges facing the Central Highlands Region**


Source: Central Highlands Regional Strategic Plan Overview, 2010

The Project is identified as a project that would add to the competitive advantages of the region. The Central Highlands Regional Strategic Plan builds on this competitive advantage and encourages more investment in transport infrastructure and services as evidenced in the below listed strategic directions and actions included in the plan.

The existing villages with heritage structures are also listed as a strength for the region; there will be focus on such villages to support population growth and settlement in existing urban areas. Bypassing of smaller towns along the existing highway would increase urban amenity in the bypassed towns and should support this objective.

The strategic directions and actions included in the plan are the following:

- Central Highlands regional settlement network and hierarchy;
- Settlement Development and Managed Land Use in the Melbourne Peri Urban areas – A Regional Land Use and Development Plan ;

- Managed Land Use and Regional Scale Assets, Horticulture, Securing Water and Energy and providing for Planned Rural Living;
- Investment in Transport Infrastructure and Services;
- Positioning the Region's Heritage at the National level;
- Expanded and Better Health Services, IT Development, Broadband Provision and Access;
- Housing Options, Ballarat CBD Revitalisation and, Education and Training Facilities; and
- Leadership, Capacity Building and Regional Planning – Implementation and Governance.

## 3.3 Municipal

The components of the Local Legislative and Policy Context that affect the route most directly are the Municipal Strategic Statement (MSS) and Local Planning Policy Framework (LPPF) of the relevant Planning Schemes. Although two municipalities are involved, namely Pyrenees and Ararat, a commonality exists in the legislative framework required.

### 3.3.1 Municipal Strategic Statement

The MSS outlines the key strategic planning, land use and development objectives specific to the municipality and provides strategies and actions for achieving those objectives.

The relevant strategy specific to this clause is:

"*Protect high quality agricultural land for agricultural use*".

This strategy implies giving special consideration to high quality agricultural land that is likely to be affected by any of the route options.

### 3.3.2 Local Planning Policy Framework

The LPPF identifies long term directions for land use and development within each Municipality and provides rationale for zone overlay requirements and particular provisions of Planning Schemes.

The zone provision that implements the relevant agricultural strategies in the LPPF is Clause 35.07 Farming Zone (FZ) which includes the following purposes:

- "*To ensure that non-agricultural uses, particularly dwellings, do not adversely affect the use of land to agriculture;*
- *To encourage use and development of land based on comprehensive and sustainable land management practices and infrastructure provision;*
- *To protect and enhance natural resources and the biodiversity of the area*".

The major agricultural impacts that highway or freeway development tends to have are the direct loss of land, infrastructure loss, severance of land holdings and rehabilitation to previous condition following road construction. It is with the knowledge of these impacts that the strategies above need to be considered.

### 3.3.3 Council strategies

Apart from the MSSs, the two Councils along the route (Pyrenees Shire and Ararat Rural City) have articulated relevant strategies for growth and development in the wider region.

The key focus for economic development as set out in the *Ararat Economic Development Strategy 2009-2012* is to grow the local economy through growing the city's population base. The strategy contains actions which focus on attracting new residents as well as on educating and retaining the existing labour force to be able to provide workers for new projects and expansion of existing businesses. Employment in the city is mainly in retail, manufacturing, agriculture, trades and services and there are strategies to support and strengthen these sectors. In the Economic Development Strategy, the Ararat Prison is identified as a large and important employer and a case study demonstrates the employment impacts of the currently ongoing expansion of the prison. The strategy includes actions to increase industrial land usage and identifies 'proposed wind farm developments' and the Ararat Renewable Energy Park as current projects that will increase the future demand for labour.

The Economic Development Strategy makes no specific mention of the existing highway. However, in terms of economic development, the role of the highway is clearly important as it is a major transport route to the prison, the Ararat Renewable Energy Park and the retail precinct in the town centre.

The strategies for Pyrenees Shire specifically identify the existing highway and the Project as being important to the Shire's growth and development.

In the *Pyrenees Shire Growth and Development Strategy 2010-2014,* transport links are identified as important to the support and development of large export driven businesses in particular. The Project is specifically identified as transport infrastructure that would improve safety and efficiency of road freight on the Melbourne to Adelaide route and is supported by Council as a positive contribution to growth and development (refer Strategy p8).

In the *Beaufort and Avoca Industrial Land Strategy, 2002* and *Supplementary Review, 2005*, Beaufort is identified as one of two important strategic locations for industrial land in the Shire. It notes that one of Beaufort's key strengths is its strategic location on the existing highway between Melbourne and Adelaide (Strategy p25) with tourism potential as a highway service town and serviced industrial land available at a reasonable price. The Project would augment these attributes and therefore be a contributing factor to growth and development of Pyrenees Shire.

In terms of tourism, both Councils recognise the importance of this industry to their economic prosperity. As mentioned in the Pyrenees Shire Growth and Development Strategy 2010 – 2014, the Shire has plans to grow tourism. However, they do not have a tourism strategy, and the development of one is listed as an action in the Growth and Development Strategy. This is also the case for Ararat. They do not have a tourism strategy but this is listed as an action in the Ararat Rural City Council Plan 2009-13. While the two Councils' strategies recognise the importance of tourism to the region, Tourism Victoria's Regional Marketing and Development Plan 2011-2012 - Grampians is the strategic document that articulates the priorities for the region. How access to the identified tourism destination towns and their amenity is affected is therefore an important criteria for the evaluation of the Project route options.

# 4. Methodology

## 4.1 Existing Conditions

In order to understand the local and regional existing economic conditions, the regional economic context of the Project has been detailed in the next section.

The section on existing conditions quantifies the regional geography and economy in terms of factors such as:

- Existing employment and major industries of employment by local government area;
- Land transport infrastructure other than the existing highway;
- Wind farm infrastructure in the region;
- Agricultural conditions and farming systems;
- Manufacturing and industrial land supply; and
- Tourism and other industries.

As agriculture is the predominant land use in the study area, this sector is described to a higher level of detail, and includes discussion of the following agricultural conditions:

- The characteristics of the farming environment including climate, soils, landform, vegetation patterns and land capability;
- The type of farming activity being conducted and its significance to the regional economy;
- The pattern of land ownership and the type and degree of land management impacts being anticipated through constructing the Project.

Establishing the existing conditions involved desktop analysis (including internet searches), field work, consultation with existing land owners, facility directors and those who would be adversely impacted as well as consultation with Council representatives.

Major information sources are either; acknowledged in the report, included as foot notes or detailed in Chapter 9 (References).

## 4.2 Impact and Risk Assessment

The following impact assessment methodology was used to determine the economic impact pathways and risk ratings for the Project:

1. Determine the impact pathway (how the Project impacts on a given economic value or issue).
2. Describe the consequences of the impact pathway.
3. Determine the maximum credible ‘consequence level’ associated with the impact. Table 3 provides guidance criteria for assigning the level of consequence. The method used for defining these criteria is described in Section 4.2.1.
4. Determine the likelihood of the consequence occurring to the level assigned in step 3. Likelihood descriptors are provided in Table 4.
5. Using the Consequence Level and Likelihood in the Risk Matrix in Table 5 to determine the risk rating.

**Table 3 Impacts Consequence Table**

| Insignificant | Minor | Moderate | Major | Catastrophic |
|---|---|---|---|---|
| Minimal impact at locality.<br>Recovery time potential within range of natural variability. | Impact at local level<br>Isolated exceedance of standard<br>Recovery time detectable. | Severe impact at locality, or of significance at regional level. | Severe disbenefit to the region. | Very high magnitude event, affecting a State-wide area.<br>Requiring over a decade to reach functional recovery.<br>Examples: Major disruption to activities, total loss of operating capability, damage exceeding $5M. |

**Table 4 Likelihood Guide**

| Descriptor | Explanation |
|---|---|
| Almost Certain | The event is expected to occur in most circumstances |
| Likely | The event will probably occur in most circumstances |
| Possible | The event could occur |
| Unlikely | The event could occur but not expected |
| Rare | The event may occur only in exceptional circumstances |

**Table 5 Risk Matrix**

| Likelihood | Consequence Level | | | | |
|---|---|---|---|---|---|
| | Insignificant | Minor | Moderate | Major | Catastrophic |
| Almost Certain | Low | Medium | High | Extreme | Extreme |
| Likely | Low | Medium | High | High | Extreme |
| Possible | Negligible | Low | Medium | High | High |
| Unlikely | Negligible | Low | Medium | Medium | High |
| Rare | Negligible | Negligible | Low | Medium | Medium |

### 4.2.1 Consequence Criteria

Consequence criteria range on a scale of magnitude from “insignificant” to “catastrophic”. Magnitude was considered a function of the size of the impact and the spatial area affected. Consequence criteria descriptions indicating a minimal impact over a local area, and with a recovery time potential within the range of normal variability were considered to be at the insignificant end of the scale. Conversely, catastrophic consequence criteria describe scenarios involving a very high magnitude event, affecting a State-wide area, or requiring over a decade to reach functional recovery.

The consequence criteria used for describing the economic impact assessment was the economic impact on businesses and the associated loss of annual revenue. These consequence criteria are based on the Impacts Consequence Table set out in Table 3, where an 'Insignificant' consequence has 'minimal impact on a local area' and 'Catastrophic' consequence is a 'Very high magnitude event, affecting a State-wide area.' The consequence level thresholds are identical to thresholds that have been used for other road project impact evaluation, including for the Peninsula Link project near Frankston. The impact is measured over the whole length of Section 2 of the Project and distinguishes between short term impacts during construction and ongoing impacts at completion of the project. Levels of impact have been assigned as per Table 6 below.

**Table 6 Economic Impacts Consequence Table**

| | Consequence Level | | | | |
|---|---|---|---|---|---|
| Aspect | Insignificant | Minor | Moderate | Major | Catastrophic |
| Economic impacts on businesses including agricultural enterprises | Loss of annual revenue less than $100,000 | Loss of annual revenue less than $1M but greater than $100,000 | Loss of revenues less than $10M but greater than $1M | Loss of revenues less than $100M but greater than $10M | Loss of revenues less than $1B but greater than $100M |

## 4.3 Impact Assessment Methodology

In order to understand the economic effects of the Project on the Study Area and region, the method described below has been used:

- The existing conditions of the Project, Study Area and region were described. This is the base case against which potential effects are measured. It is noted that:
- Aside from agricultural, no other businesses are operating on land which would be required for construction of the highway duplication; and
- The potential economic effects were assessed and where possible, these effects were quantified, otherwise they are described qualitatively.

The economic effects that have been quantified are outlined in Table 7.

**Table 7 Quantified Economic Effects**

| Effect | Measure |
|---|---|
| Change in travel time and travel costs for business travel, personal travel and freight transport | Savings in travel times and savings in vehicle operating costs |
| Costings in terms of construction and maintenance | Construction and operation costs |
| Displacement (wholly or partially) of businesses and farm operations that operate on land which would be required for the project | Loss of annual revenue as an indicator for loss of employment due to changes in productivity of agricultural land and business conditions for other businesses. |
| Infrastructure loss (e.g. farm sheds, stock yards, dams) of some landholdings along the project route | Estimated through required investment in new infrastructure |

### 4.3.1 Benefit Cost Assessment

Benefit Cost Assessment (BCA) is the tool adopted for assessing the direct benefits and costs of the Project. It involves identification and analysis of the benefits and costs associated with the Project with investigation of the direct economic, social and environmental impacts. It aims to express, in monetary terms, all the direct gains and losses (benefits and costs) created by the Project to all members of society, and to combine the gains and losses into a single measure. The overarching assumptions and estimates are listed in Table 8.

The benefits that are covered in the BCA for this Project are:

- Travel time savings – increases in average speeds as a result of the Project improve overall travel time resulting in a positive economic benefit;
- Vehicle operating costs savings – increases in average speed typically lead to a decrease in vehicle operating costs per kilometre leading to an overall reduction in transport costs and a positive benefit;
- Road crash cost savings – improvements in safety would reduce the expected level of crashes overall and therefore reduce the cost incurred as a result of crash costs; and
- Externality savings – improvements to greenhouse gases, air and noise pollution arising from the Project (compared to the no-project scenario).

The costs covered in the BCA are:

- Capital costs involved in construction of the Project; and
- Maintenance costs required for the Project's upkeep.

**Table 8 Overarching benefit cost assumptions and estimates**

| Description | | Source |
|---|---|---|
| Discount rate (the rate that future benefits and costs are discounted to determine present values) | 4.4% real | VicRoads |
| Project life for economic assessment | 30 years | VicRoads |
| Construction cost estimate in current dollars | $344 - $347 million | GHD estimate |
| Construction period | 3 years elapsed time | GHD estimate |
| Construction begins | 2012/13 | GHD estimate |
| Construction ends | 2015/16 | GHD estimate |

The construction period is dependent on securing further funding for the Section between Buangor and Ararat.

### 4.3.2 Construction Impacts

The Project would require inputs from a number of industries and result in flow-on effects to other economic activity and generate significant short term employment during the construction phase in the construction industry and in the wider economy. Economic impacts of the construction of the Project would be estimated based on the number of jobs the expenditure in the construction industry generates. These values are obtained from input-output tables for 2007-08 (latest available) produced by the Australian Bureau of Statistics and a detailed analysis of the construction industry's linkages as provided in the ABS Year Book Australia 2002, Cat № 1301.0.

### 4.3.3 Economic impact on agricultural businesses

The construction of the Project would have an effect on businesses currently operating on land which would be required for construction of the highway duplication.

The farming activity within the study area comprises a mixed farming system of livestock grazing and dryland cropping.

In order to estimate the effect on economic activity from the potential loss of land, production values have been assigned to different types of economic activities. These production values were developed with reference to other agricultural impact assessments in Victoria, ABS statistics and regional survey data. Table 9 provides a measure of economic activity based on gross margin analysis (gross income level less variable costs) drawn from the Livestock Farm Monitor Project, (DPI 2006-07 to 2010-11).

**Table 9 Gross Margin values per hectare**

| Economic Activity | $/ha | Source |
|---|---|---|
| Wool | $300 | DPI |
| Prime lamb | $350 | DPI |
| Crop | $400 | DPI |

Where allotments were predicted to lose land as a result of the Project it was possible to estimate the size in hectares of land loss (relative to the size of the allotment) as well as whether there would be any impacts on infrastructure (sheds, stock yards, storage facilities etc.) associated with the production on the allotment.

The extent of severance of allotments and situations where the potential land loss to the Project would be particularly valuable to an allotment's level of economic activity was also identified from consultation with existing landowners that would be impacted by the Project.

The following features of allotments zoned Farming Zone along and within the project area were identified in terms of:

- Total size of the allotment;
- Total area of the allotment estimated to be required for the Project;
- Type(s) of production activity being undertaken on the allotment;
- Whether the project would require relocation or removal of any infrastructure related to the production activity on the allotment; and
- Whether the Project would cause severance to the allotment or where the potential land lost to the Project would be particularly valuable to an allotment's level of economic activity.

The economic impact from estimated loss of land for each allotment area affected was then calculated as follows:

- The total estimated area lost was multiplied by the appropriate production value to give a base loss of productivity from land loss per annum;
- The total size of the allotment was multiplied by the appropriate production value in the cases of significant severance or potential loss of highly productive land to give an additional loss of productivity from land loss per annum;
- These productivity losses were summed to reach a total productivity loss;
- A present value of the whole of life loss of productivity was determined using a 4.4% (real) discount rate over the project life (30 years) in the benefit cost assessment. (The discount rate is the rate that future benefits and costs are discounted at to determine present values);
- For each parcel of land affected by loss of infrastructure, a one-off replacement cost was estimated for the replacement or relocation of affected infrastructure; and
- A total loss of productivity over the life of the Project, to include infrastructure replacement, was calculated.

In addition to direct land loss, severance and facilities damage, vehicle movement and transport of stock are all important considerations to alignment performance.

# 5. Existing Conditions

This section provides an overview of the economic context of the Study Area and region in order to understand the local and regional existing economic conditions. The regional geography and economy is quantified in terms of the following factors:

- Existing employment and major industries of employment by local government area;
- Land transport infrastructure other than the existing highway;
- Wind farm infrastructure in the region;
- Agricultural conditions and farming systems;
- Manufacturing and industrial land supply; and
- Tourism and other industries.

## 5.1 Existing Employment

Table 10 provides a breakdown of the latest (2006) Census information on fields of employment for the population of the regional area by Local Government Area (LGA). It indicates the importance of the agricultural sector (all industry and business activity involved in agriculture) across the region as well as the services sector (an industry made up of companies that primarily earn revenue through providing intangible products and services). The tourism sector (an industry made up of companies that provide products and services pertinent to tourism) and manufacturing sector (the agglomeration of industries engaged in chemical, mechanical or physical transformation of materials, substances etc.) are also of importance to the regional area and discussed further in this section.

**Table 10 Top industries of employment by municipality (2006)**

| LGA | Industry | Number of People Employed | Proportion of Total LGA Employment |
|---|---|---|---|
| Ararat | Sheep, Beef Cattle and Grain Farming | 763 | 16.20% |
| | School Education | 252 | 5.40% |
| | Hospitals | 244 | 5.20% |
| | **Total LGA Employment** | **4,706** | |
| Ballarat | Hospitals | 2,372 | 6.30% |
| | School Education | 2,221 | 5.90% |
| | Cafes, Restaurants and Takeaway Food Services | 1,587 | 4.20% |
| | **Total LGA Employment** | **37,537** | |
| Pyrenees | Sheep, Beef Cattle and Grain Farming | 509 | 19% |

| LGA | Industry | Number of People Employed | Proportion of Total LGA Employment |
|---|---|---|---|
| | Hospitals | 117 | 13% |
| | School Education | 101 | 10% |
| | **Total LGA Employment** | **2,540** | |
| Northern Grampians | Sheep, Beef Cattle and Grain Farming | 580 | 11.30% |
| | School Education | 259 | 5.00% |
| | Hospitals | 255 | 5.00% |
| | **Total LGA Employment** | **5,149** | |

Source: Census Quickstats, 2006

## 5.2 Other land transport infrastructure

The Ballarat-Ararat rail line interacts with the study area between Beaufort and Ararat, which is single track and of broad gauge alignment. The rail line supports the movement of V/Line passenger rail traffic passing through the study area terminating at Ararat.

There are 3 services per day on weekdays and 2 services per day during the weekend that serve Beaufort and Ararat from Melbourne via Ballarat. There are also the same number of services connecting Beaufort and Ararat to Melbourne. (V/Line, 2011).

There are no scheduled interstate or intrastate freight movements on this rail line in Section 2.

## 5.3 Wind Energy Facilities in the Region

The Challicum Hills Wind Farm is located near the Study Area. It consists of 35 turbines and has a 52.5MW capacity. Completed in 2003, the wind farm is operated by Pacific Hydro and supplies electricity to Origin Energy. According to Pacific Hydro, the wind farm has a 25-year lifespan and provides sufficient energy to supply 26,000 homes with their annual electricity needs.

The Ararat Wind Farm is a planned wind farm to be located off Warruk Road and Pyrenees Highway between 9 and 17kms northeast of Ararat. The planned wind farm comprises 75 turbines with total capacity of 247.5MW. The proponent is RES Energy. According to RES Energy, the Project would generate enough electricity to power between 83,000 and 137,000 homes per annum depending on the final turbine type selected.

Wind farms generate significant economic activity in the region during the construction phase, and also cause some transport issues due to transport of components from port of entry to the wind farm site.

Ongoing economic benefits of wind farms include landowner rentals, employment of specialized technicians for turbine maintenance and repair, and demand for other services. The wider region is recognised as having good wind conditions for wind farms and a relatively low population density outside of urban areas, enabling the development of wind farms with minimum amenity impacts on the region's existing residents.

## 5.4 Agricultural Conditions

Land use characteristics for the regional study area were derived from Australian Bureau of Statistics (ABS) data. Table 11 indicates the broad land use patterns on an individual municipality and total region basis, recorded in 2006. There are a number of observations:

- Cropping represents about 30% of land use overall with a greater orientation in the Ararat and the Northern Grampians municipalities;
- Grazing is the most dominant land use in both area and value;
- Forestry is a minor enterprise over all municipalities; and
- Agricultural establishment number is similar between the more rural municipalities (i.e. apart from Ballarat).

**Table 11 Regional Study Area Agriculture: Land Use**

| | | Ballarat | Pyrenees | Ararat | Northern Grampians | Total |
|---|---|---|---|---|---|---|
| Area of holding | ha | 38023 | 235951 | 320228 | 357576 | 951778 |
| All crops | ha | 6648 | 55768 | 97392 | 117507 | 277315 |
| Grazing | ha | 29132 | 161509 | 201203 | 210887 | 602731 |
| Forestry | ha | 198 | 3176 | 3152 | 156 | 6682 |
| Other | ha | 2045 | 15498 | 18481 | 29026 | 65050 |
| Establishment number | No | 224 | 503 | 525 | 496 | 1748 |

Source: ABS Small Area Data 2005-06

The major crop types are cereals (wheat, barley, oats, triticale) and oilseeds (canola) grown on a rotation basis. Other lesser but significant crop types include potato production (Ballarat) and grapes, particularly in the Great Western locality. Table 12 illustrates the proportions of the two broad acre crops.

**Table 12 Regional Study Area Agriculture: Crop Type**

| | | Ballarat | Pyrenees | Ararat | Northern Grampians | Total |
|---|---|---|---|---|---|---|
| All crops | ha | 6648 | 55768 | 97392 | 117507 | 277315 |
| Cereals | ha | 4243 | 38130 | 62118 | 90064 | 194555 |
| Oilseeds | ha | 888 | 8429 | 20608 | 8519 | 38444 |
| Other including fallow | ha | 1517 | 9209 | 14666 | 18924 | 44316 |

Source: ABS Small Area Data 2005-06

Table 13 shows the livestock numbers across the regional study area. Sheep are dominant and represent over 80% of livestock equivalents[2] followed by beef (less than 20%).

**Table 13 Livestock type and numbers**

| | | Ballarat | Pyrenees | Ararat | Northern Grampians | Total |
|---|---|---|---|---|---|---|
| Sheep & lambs | No | 113476 | 911788 | 1185722 | 733551 | 2944537 |
| Milk cattle | No | 429 | 3 | 163 | 8 | 603 |
| Meat cattle | No | 11773 | 25425 | 34679 | 10222 | 82099 |
| Stocking rate | dse/ha | 9.1 | 8.9 | 9.4 | 5 | 7.7 |

Source: ABS Small Area Data 2005-06

The sheep enterprises are principally wool production but with prime lamb production a significant and growing proportion. Merinos remain the dominant breed for wool production while first cross ewes are favoured for prime lamb production.

Table 14 shows commodity values across the municipalities with livestock being dominant, a reflection of numbers rather than earning rates per hectare. Cropping generally has a gross margin[3] 25%-50% greater than livestock on a per hectare basis but is more demanding in terms of soil suitability and seasonal conditions.

**Table 14 Commodity value**

| | | Ballarat | Pyrenees | Ararat | Northern Grampians | Total |
|---|---|---|---|---|---|---|
| Crop value | $m | 13.9 | 38.4 | 59.2 | 59.1 | 170.6 |
| Livestock | $m | 24.9 | 63.1 | 80.4 | 84.1 | 252.5 |
| All | $m | 38.8 | 101.5 | 139.6 | 143.2 | 423.1 |

Source: ABS Small Area Data 2005-06

### 5.4.1 The Farming Environment

To judge local agricultural conditions, the area considered is a 3 km strip of land, stretching 1.5 km to the south of the Study Area and 1.5 km to the north. This area embraces all the farms directly or indirectly impacted by the project.

The farming environment within the area is cropping and grazing based due to the combination of landform, climate and soil type characteristics. There is considerable physiographic change along the route through the interaction of these natural features.

[2] Livestock equivalents are usually measured as dry sheep equivalents. A dry sheep equivalent is that amount of dry matter required by one mature wether per annum.

[3] Gross margin is gross income less variable costs such as seed, fertiliser, sprays, harvest and transport expressed on a per ha basis.

Table 15 provides a summary of the different land units[4] and their natural features that occur along the Beaufort-Ararat route. The key features to be noted from this table are:

- Annual rainfall is in the range of 550-600 mm with an autumn, winter and spring distribution pattern. The plant growing season commences with the autumn break, normally mid to late April, continues over winter with a cessation in growth during July through low temperatures, increases during spring and dries off from mid to late November. These conditions suit pasture and crop production.
- Landform is rolling low hills to undulating plains, mostly arable.
- The soils are a mixture of sandstone, basalt and alluvium in their origin. Profiles vary in their texture, level of bleaching and depth to subsoil. The A horizon(s) is typically dark brown sandy loam, bleaching with depth and overlying yellow-brown medium clay subsoils. Soil fertility is moderate and responsive to nutrient inputs.
- Land use is crop and stock.

**Table 15 Beaufort to Ararat Land Units**

| Feature | Beaufort Non-Marine Sandstone | Basalt plains | Ararat alluvial / colluvium |
|---|---|---|---|
| Annual rainfall | 550-580 mm | 550-600 mm | 550-600 mm |
| Landform | Undulating rises to rolling low hills | Undulating plain | Slopes to alluvial plain |
| Soil | Brown sandy loam, bleached and mottled | Clay loam becoming bleached overlying clay | Sandy loam to loamy sand over clay |
| Hazard | Waterlogging in drainage depressions | Low permeability, some waterlogging | Some dispersion |

Source: A Land Resource Assessment of the Glenelg-Hopkins region, 2005

### 5.4.2 Farming Systems

The farming systems practiced include both crop and stock. Crop rotations are usually based on some combination of oilseeds (canola) and cereals (wheat, barley, oats) with a rotation length of three years, after which the land returns to pasture. Expected crop yields are in the range of 1.5-2.2 t/ha for canola and 2.5-4.0 t/ha for cereals.

Gross margins for wheat, canola and oats are shown in Table 16. They have been extracted from the South West Farm Monitor Project, 2008/09 annual survey conducted across the Western District and as such, are indicative rather than being an accurate representation of district performance.

[4] Land unit is where climate, parent material, topography, soil and vegetation are uniform within the limits significant for a particular land use. It is a mapping unit used by the Soil Conservation Authority.

**Table 16 Gross margins crop**

| | | Wheat | Canola | Oats |
|---|---|---|---|---|
| Yield | t/ha | 3.1 | 1.7 | 2.9 |
| Price | $/t | 256 | 538 | 181 |
| Variable costs | $/ha | 409 | 463 | 276 |
| Gross margin | $/ha | 433 | 449 | 302 |

Source: South West Farm Monitor Project 2008-09

The pasture phase supports livestock enterprises including merino wool production, prime lamb and beef cattle. The relative proportion of sheep to beef is 80:20.

The average stocking rate is estimated at 9 dry sheep equivalents per hectare (dse/ha) but with the range 7-15 dse/ha depending on land quality and management capability. Livestock gross margins shown in Table 17.

**Table 17 Gross margins stock**

| | Measure | Wool | Lamb | Beef |
|---|---|---|---|---|
| Stocking rate | dse/ha | 15.6 | 16.1 | 15 |
| Wool cut (greasy) | kg/head | 4.77 | 4.7 | |
| Wool price (clean) | $/kg | 9.37 | | |
| Lamb price-carcass weight | $/kg | | 3.69 | |
| Beef Price-liveweight | $/kg | | | 1.71 |
| Gross margin | $/dse | 12 | 18 | 20 |
| Gross margin | $/ha | 179 | 271 | 312 |

Source: South West Farm Monitor Project, 2008-09

### 5.4.3 Land Ownership

From route commencement near Old Shirley Road, Beaufort, tenements are small, (in the range 10-30 hectares (ha)), through the combined influences of location to Beaufort and low land quality. However, by the 3 km mark, tenements become larger, generally over 40 ha and often substantially greater as rural activity becomes commercial. Blue gum plantations commence and extend to near Buangor. The township of Buangor has a large number of small allotments but most are undeveloped and their influence is minor.

Beyond Buangor, tenements continue to be large, the only exception being where road patterns have resulted in land severance, for example at the intersection of Hillside Road and the existing highway.

West of the Langi Ghiran Picnic Ground Road the allotment pattern becomes smaller and more regular, although this does not appear to be reflected in tenement patterns which remain large.

The overall impression is that rural activity is the dominant commercial use, both for cropping and grazing, and smaller holdings only occur on the outskirts of Beaufort and Ararat.

## 5.5 Manufacturing and Industrial Land Supply

While not generating the highest employment within the local study area, when measured in terms of output, manufacturing is an important industry in the region. The contribution of manufacturing to LGA output is shown in Table 18.

**Table 18 Manufacturing Output**

| LGA | Output $m |
|---|---|
| Pyrenees Shire[1] | $112m |
| Ararat Rural City[2] | $438m |

Source: (1) Pyrenees Shire Growth & Development Strategy – 2011—14 based on 2009 REMPLAN data
(2) Ararat Rural City Economic Development Strategy, based on Dec 2008 REMPLAN data

The close link between agricultural output and manufacturing employment is demonstrated in the Pyrenees Shire, where wine and spirit manufacturing accounts for $83m or 73% of output from the manufacturing industry. As a large proportion of this industry's output is exported, transport links to capital cities and major ports are important to the future competitiveness of the region's manufacturing industry, and in turn to the agricultural industry.

The study area's manufacturing industry benefits from the strategic location of towns such as Beaufort, Stawell and Ararat on the existing highway, the main transport route between Melbourne and Adelaide and the provision of affordable industrial land. In the Beaufort and Avoca Industrial Land Strategy Review (2005), a parcel of land of 5.4 ha in Beaufort south of the existing highway is recommended for rezoning from Public Use 2 to Industrial 1 to meet demand for industrial land. Further west, Ararat Rural City Council has recently rezoned a 30 hectare site in Ararat for the development of the Ararat Renewable Energy Park, which includes 17 lots varying in size from 3,000 $m^2$ up to 8 ha. This Energy Park is located within the study area. To date, no sites in the Energy Park have been developed, but the estate is part of Council's long term planning for provision of industrial land and Council is keen to retain the estate.

Ararat and Pyrenees Industrial Development Strategies: The Councils' development strategies focus on providing suitable industrial land with good access to the highway, and highway access to/from these identified industrial areas would therefore be an important criteria for assessment of route options and impacts.

## 5.6 Tourism and other industries

An important 'driver' for the upgrade of the existing highway is to maintain the important tourism industry in the region. Parts of Section 2 of the Project are located in the Grampians Tourism Region. Visitation to this region has declined over the 11 year period from 2000, and analysis of the visitation data shows that the Grampians Region is losing its comparative advantage compared with other regional destinations and compared to Melbourne. Table 19 and Table 20

provide tourism visitation data for the region.

**Table 19 Number of visitors to Grampians Region, 2000 and 2007-2011 ('000)**

| | 2000 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|
| Day trip visitors | 1373 | 753 | 580 | 741 | 733 | 822 |
| Domestic overnight | 772 | 630 | 625 | 593 | 529 | 652 |
| International overnight | 51.2 | 38.3 | 39.6 | 34.1 | 33.8 | 30.7 |
| Total Visitors | 2196.2 | 1421.3 | 1244.6 | 1368.1 | 1295.8 | 1504.7 |

Source: International Visitor Survey, national Visitor Survey, Year ending March 200, 2007-2011

**Table 20 Visitor nights to Grampians Region, 2000 and 2007-2011 ('000)**

| | 2000 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|
| Domestic visitor nights | 1819 | 2098 | 1457 | 1470 | 1532 | 1572 |
| Av. length of stay - nights | 2.4 | 3.3 | 2.3 | 2.5 | 2.9 | 2.4 |

Source: National Visitor Survey, Year ending March 200, 2007-2011

As detailed in the Grampians Market Profile, prepared by Tourism Victoria, domestic (as distinct from international) visitation accounts for 98% of visitation to the Grampians region, and is clearly the key market for the region. From Table 20, it can be seen that in 2011 the average length of stay for domestic overnight visitors is 2.4 nights. There have been some small variations over the last five years but the average length of stay is unchanged compared to the year 2000. Data for international visitor nights is not available due to the small number of international visitors, but some survey results provide an indication of their travel pattern. The majority of international visitors (79%) come to the Grampians Region for a short visit of 1 – 3 nights.

Tourism expenditure in the Grampians Tourism Region is estimated at approximately $204m, based on the following 2007 and 2008 data indexed to December 2011. This is a conservatively low estimate and excludes international visitors to the region. It is based on estimated expenditure per day trip visitor in 2008 of $74 per visitor, and per domestic overnight visitor in 2007 of $79 per night. (Tourism Research Australia, Regional Expenditure Tables). International visitor expenditure is not available by tourist region.

In 2005, tourism employment in the Grampians region was estimated at 1,840 or 4.4% of total employment (TTF Australia Victoria Tourism Employment Atlas 2005). This employment is measured using the tourism satellite account, as tourism is not an industry listed in the ANZSIC system. The tourism satellite account models 14 tourism-related sectors, the most important of these being:

- Travel agency and tour operator services, where tourism accounts for 97.1% of the industry employment;
- Accommodation, where tourism accounts for 90.1% of the employment;

- Air and Water Transport (67.1%);
- Cafés and restaurants (26.6%); and
- Clubs, Pubs, Bars and Taverns (19.1%).

It is also worth noting that tourism contributes 8.1% to employment in retail trade, and that in tourist destinations, this percentage is significantly higher.

The value of tourism to the region can also be measured by its contribution to Gross Value Added of other industries. Estimates by Tourism Victoria of the ratio of the tourism region's total tourism output to the region's total economic output, indicates that tourism represents 2.7% of the economy of the Grampians region in 2007/08 (refer Grampians Market Profile, Year Ending December 2010).

Tourism and retail operations in or partly within the Study Area include the following:

- Off the Beaten Track cellar door and art gallery in Buangor– south side of the existing Highway
- The Challicum Hills Wind Farm signage and viewing parking area
- Langi Ghiran State Park – on the north side of the existing highway between Buangor and Ararat
- Caltex Service Station – on the south side of the existing highway on the eastern outskirts of Ararat
- Ararat Racecourse – on the south side of the existing highway on the eastern outskirts of Ararat
- Green Hill Lake recreation area – on the eastern outskirts of Ararat.
- Caltex Service Station and Red Roo Roadhouse – immediately west of the railway crossing near Beaufort on the north side of the existing highway.

Another important facility partly within the Study Area is the Ararat Airport/ Aerodrome, which is located on the eastern perimeter of Ararat with access off the existing highway as part of the 'cluster' of facilities that include Green Hill Lake, Ararat Racecourse and the Caltex service station and roadhouse. The Grampians Soaring Club – a volunteer based club - operates from the Ararat Aerodrome. The airport is Council owned and operated and is also used for pilot training by regionally based trainers and for patient transport flights.

Outside the Study Area, but important nevertheless, is the Ararat prison. HM Ararat Prison provides accommodation for prisoners with low to medium security protection requirements, including a high proportion of sex offenders (50 per cent) and protection or special needs prisoners (50 per cent).This facility currently has operational capacity for 382 prisoners and construction is underway to expand the facility's capacity. The prison is an important employer in the region, providing approximately 150 ongoing jobs, but this is expected to double with the completion of the expansion.  Specialists, for example psychologists, attend the prison on a regular basis, as well as visiting relatives to prisoners. Anecdotally, two-thirds of traffic to the facility originates from the Ararat direction (northwest) and one-third from the Ballarat direction (southeast). Warrayatkin Road is one of the roads that is used to access the prison from the east including access by prisoner transport vehicles.

No tourism or retail related home-based businesses like bed and breakfast establishments have been identified within the Study Area.

The tourism and retail operations in or partly within the Study Area are shown in Table 21.

**Table 21 Tourist and Retail Operations in Section 2**

| Tourist and Retail Operations | Name and Location | Details |
|---|---|---|
|  | Off the Beaten Track Cellar Door and Art Gallery,<br>6669 Western Highway, Buangor | Off the Beaten Track is a combined cellar door, art gallery and reception centre. The facility also markets itself as a stop for drivers offering free coffee for the driver and for a gold coin donation to others. As of April 2012, the property is for sale listed with Hocking Stuart. |
|  <br>  | Challicum Hills Wind Farm viewing area<br>Buangor | Parking for the Wind Farm Viewing Area and associated Interpretative Signage is at Buangor adjacent to the Off the Beaten Track Cellar Door and Winery. Access is off the existing highway in Buangor, where there is a 90km/h speed limit in effect. |
|  | Langi Ghiran State Park, Approximately 3000ha, off the existing highway between Buangor and Ararat | Located on the northern side of the existing highway and access directly off the Highway via a level crossing. According to ParksVic visitation statistics from 2001, the park received approximately 5,400 visit days in 2000/2001. Accessed via Langi Ghiran Picnic Ground Road. Access would be maintained. |

| Tourist and Retail Operations | Name and Location | Details |
|---|---|---|
|  | Caltex Service Station and roadhouse,<br>Western Highway, Ararat | Located on the eastern perimeter of Ararat, this business has a high degree of visibility to existing highway passing traffic. On the south side of the Highway, access is directly off the highway and would be affected by duplication. |
|  | Ararat Racecourse<br>Geelong Road/Western Highway, Ararat | Ararat Turf Club holds 7 meetings per annum, mostly mid-week. The key event is Ararat Gold Cup which is held during the Victorian Spring Racing Carnival. |
|  <br>  | Green Hill Lake recreation area, Entrance off existing Highway, eastern outskirts of Ararat | This recreation area is accessed off the existing highway. There are boat ramps and it is frequented by power boats and water-skiers and also used by campers and as a rest stop for travellers and locals. Access for vehicles towing boats to and from the recreation area is important for its use by the community. Access from the Project would be maintained. |
|  | United Service Station and Red Roo roadhouse near Beaufort | Located on the western perimeter of Beaufort, this business has a high degree of visibility to existing highway passing traffic. On the north side of the Highway, access is directly off the highway. No physical works are planned for this section of the highway. |

# 6. Impact Assessment

The detailed impact assessment documented in this report addresses the potential impacts of the construction and operation of the proposed alignments of Section 2 of the Project. The alignments assessed are a culmination of progressive refinement of the design and consideration of potential impacts.

The Existing Conditions section of this report covers an area encompassing the long list of alignment options considered for the Project. Potential impacts of each option in the long list of alignments were considered in Phase 1 of the options assessment process, and were used to reduce the initial long list to a short list of alignment options.

The potential impacts of each option in the short list of alignment options were considered in more detail in Phase 2 of the option assessment process. The alignment options assessment process is described in the 'Western Highway Project Section 2 Options Assessment Report' (February 2012).

Three proposed alignments were selected for further detailed assessment in the EES. The impacts of the proposed alignment(s), together with potential mitigation measures, were considered in detail through the environmental risk assessment process. The outcomes of the risk assessment process were used to finalise the proposed alignments assessed in the EES.

The environmental risk assessment methodology and complete risk register for all specialist disciplines is presented in 'Western Highway Project Section 2 EES Environmental Risk Assessment' (February 2012) report.

Extracts from the environmental risk register are provide in this report and the identified impacts of the preferred proposed alignments are considered in detail in the following sections.

## 6.1 Project Description

The Project provides two lanes in each direction and associated intersection upgrades to improve road safety, and facilitate the efficient movement of traffic. It commences at the railway overpass west of Old Shirley Road, Beaufort and extends for approximately 38 km to Heath Street, Ararat.

The initial upgrade (the interim solution) considered in this impact assessment would only be built to highway standard (AMP3). However, the Project intention is for an ultimate solution to upgrade to freeway standard (AMP1) at some point beyond the 30-year lifetime of the interim solution. There would be further impacts beyond those calculated in this report for further construction to AMP1 level.

For the first length from the railway overpass to approximately Ch. 800, near McKinnon Lane, there are no works proposed. Then from Ch. 800 to Warrayatkin Road on the outskirts of Ararat the ultimate upgrade would be to freeway standard (AMP1). For the final length from Warrayatkin Road to Heath Street the proposed upgrade would only be to highway standard (AMP3). Grade separated interchanges are proposed at Eurambeen-Streatham Road, Peacocks Road, Hillside Road, and Langi Ghiran Picnic Ground Road. At-grade intersections with a wide median treatments are initially proposed at Goulds Lane / Ferntree Gully Road, Hillside Road and Brady Road. These intersections would ultimately be upgraded to grade-

separated intersections when the highway is upgraded to a freeway standard (AMP1). Warrayatkin Road would have an at-grade intersection with a wide median treatment.

There are three proposed alignment options that are being assessed. These share a common alignment from Beaufort to near the Anderson Road intersection, east of Buangor (Ch. 16800), retaining the existing single carriageway footprint, and providing a duplicate carriageway located approximately 15 to 100 m to the north. Thereafter the options differ in their geometry, and whether a duplication or an entirely new dual carriageway is constructed. The alignment options are summarised in Table 22.

All alignment options bypass the small township of Buangor, which is currently accessed via the Western Highway. The Project proposes access to Buangor via an at-grade intersection with wide median treatment at Peacocks Road.

There are steep grades from Beaufort through to Fiery Creek, before the highway levels for 18 km. To the west of Buangor the topography undulates as the highway crosses the Ballarat to Ararat railway line, and passes to the south of Langi Ghiran State Park. The highway then levels once again from the west side of Langi Ghiran State Park through to Ararat. Apart from the State Park and small areas of remnant vegetation, the surrounding land use is predominately agricultural (grazing and cropping).

Other than the Ballarat to Ararat railway, which carries local passengers, no State significant infrastructure, such as major pipelines or powerlines, is located within the study area. The alignment options all involve a crossing of the railway, six major waterways and 21 minor waterways (tributaries, drainage lines and irrigation channels).

The key impacts assessed relate to agricultural impact, split between agricultural land lost, property severed and facilities loss. This also includes access to agricultural land which may be compromised as a result of the Project. The other key impact was on agricultural and other businesses, in terms of the access disruptions during and post construction. Additionally, there is an impact of the new alignment options on passing trade.

## Table 22 Alignment Option descriptions

| Option | Location and Chainage (m) East to West | Description |
|---|---|---|
| Common to all options | Box's Cutting to Warrayatkin Road (Ch. 840 to 34400) | **Duplication to AMP1 standard** |
| | Warrayatkin Road to Heath Street (Ch. 34400 to 39600) | **Duplication to AMP3 standard** |
| | Beaufort to the base of Box's Cutting (Ch. 840 - 3400) | **New dual carriageway** north of the existing highway (does not used the existing highway alignment)<br>No duplication works undertaken between Ch. 0-840 |
| | Box's Cutting to Waldrons Road (Ch. 3400 – 12000) | **Duplication** of existing highway on the northern side then transferring to the southern side at Fiery Creek (Ch. 5900), with a median treatment of approximately 15 m to 30 m depending on the extent of constraints..<br>Includes a new interchange at Eurambeen-Streatham Road / Eurambeen-Raglan Road |
| | Waldrons Road to east of Anderson Road (Ch. 12000 – 15700) | **Duplication** of the existing highway on the southern side, maintaining a median from approximately 15 m in the east to 40 m in the west. |
| Option 1 | Anderson Road to Pope Road (Ch. 16500 – 22400) | **New dual carriageway** to the north of Buangor, and meeting the existing highway west of Buangor-Ben Nevis Road.<br>Alignment common to Option 3 |
| | Pope Road to the eastern end of Hillside Road (Ch. 22400 – 24800) | **New dual carriageway**, extending southwest from the existing highway and crossing the rail line. |
| | Eastern end of Hillside Road to Heath Street, Ararat. (Ch. 24800 – 39600) | **New dual carriageway** located approximately 700 m south of the existing highway until Ch. 28400 where it converges over a 1.5 km distance. A **duplication** of the existing carriageway occurs from Ch. 28400 with the new carriageway to the south. The median width varies from 30 m in the east to a narrow 6 m treatment in the west. |
| Option 2 (chainages to be confirmed with final alignment) | Anderson Road to Pope Road (Ch. 16600 – 24600) | **New dual carriageway** that bypasses Buangor to the north, then extends south over the existing highway and rail line. |
| | Pope Road to the eastern end of Hillside Road (Ch. 22600 – 24200) | **New dual carriageway**, extending along the southern side of the railway line, meeting the existing highway. |
| | Eastern end of Hillside Road to Heath Street, Ararat. (Ch. 24200 – 39400) | **Duplication** of the existing highway on the southern side.<br>Alignment common to Option 3. |

| Option | Location and Chainage (m) East to West | Description |
|---|---|---|
| Option 3 | Anderson Road to Pope Road (Ch. 16500 – 22400) | Common alignment with Option 1<br>**New dual carriageway** to the north of Buangor, and meeting the existing highway alignment west of Buangor-Ben Nevis Road. |
| | Pope Road to the eastern end of Hillside Road (Ch. 22400 – 24800) | **New dual carriageway**, extending southwest across the rail line further than Option 2, then meeting the existing highway alignment in a similar location to Option 2. |
| | Eastern end of Hillside Road to Heath Street, Ararat. (Ch. 24800 – 39600) | Alignment common to Option 2.<br>**Duplication** of the existing highway on the southern side. |

## 6.2 Key Issues

### 6.2.1 Agricultural Impacts

The AustRoads Guide to Project Evaluation methodology and parameters do not include agricultural impacts, however these have been reported and are considered to be a valid economic impact.

The impact on agriculture is divided between agricultural land and agricultural facilities.

There is a degree of loss of agricultural land and severance of properties across the alignment. The economic impact on businesses for the loss of land and severance of properties is estimated in the range $2.2-$2.5 million.

There is also a loss to the level of agricultural facilities (including water supply, stock yards, sheds etc.). The cost for this impact is estimated at $1.3-1.5 million. These are broad impact estimates in terms of the loss of revenue to agriculture.

Using the methodology described in Section 4 and applying it to each alignment option, it was determined that there would be an annual productivity loss as a result of loss of productive land due to the Project in the region of $127,750-$130,550 per year in current dollars. The annual loss resulting from severance was estimated at between $8,610 and $22,260 and for total facilities loss between $1.3 - $1.5 million. (See Table 23).

**Table 23 Potential economic impact on business activities on land required for the Project**

| | Unit | Option 1 | Option 2 | Option 3 |
|---|---|---|---|---|
| Direct loss | ha | 365 | 373 | 345 |
| Gross margin | $/ha | 350 | 350 | 350 |
| Annual loss | $ | 127,750 | 130,550 | 120,750 |
| Severance | ha | 212 | 82 | 128 |
| Loss proportion | % | 30 | 30 | 30 |

| | Unit | Option 1 | Option 2 | Option 3 |
|---|---|---|---|---|
| Annual loss | $ | 22,260 | 8,610 | 13,440 |
| Total NPV | $m | 2.47 | 2.29 | 2.21 |
| Facilities loss | $m | 1.5 | 1.3 | 1.5 |
| Total Regional loss | $m | 3.97 | 3.59 | 3.71 |

The measurement was conducted on the basis of direct land loss, severance and facilities damage. It is based on the following assumptions:

- The productivity of direct land loss is estimated at an annual gross margin of $350/ha representing a weighted average between stock and crop. Annual productivity loss was then discounted to Net Present Value assuming a 30 year timeframe and a 4.4% discount rate.
- Severance is measured as a permanent loss in rural productivity brought about through the realignment. The affected area is measured as that part of a holding that has been isolated from the main block. Productivity loss is a function of a percentage annual loss in gross margin earning capacity discounted to Net Present Value over a 30 year timeframe;
- Facilities loss including structures and water supply according to replacement value of the items affected.

A Consultation Program was undertaken with a representative sample of existing landowners, to understand the scope and scale of the impact that could be incurred as a result of the Project for each of the options.

The consultation program was undertaken over a three day period, 23rd – 25th January 2012. In Section 2, a small number of landholders (9) were interviewed and their landholdings inspected for alignment impact. Properties were selected on the basis of route representation, range in size and severity of impact.

Numerous landholdings were already split by the current highway or had other landholdings that required highway usage to service.

A major outcome of the consultation program was to identify the concerns felt by landowners. These are summarised as follows:

- ***Severance of landholding***

Severance is being imposed on some properties either directly through the alignment's passage or by upgrading the highway to dual carriageway. A number of effects were identified:

  - The isolation of one section of the property requiring facilities duplication (water supply, stock yards, laneways, shearing shed);
  - Reduced flexibility in grazing management through not having all paddocks available to grazing stock;
  - An increase in cost and inconvenience in having to transport stock across the freeway; and
  - An assumed reduction in farming efficiency due to increases in time, costs and management flexibility.

- ***Impacts on infrastructure***

Infrastructure impacts on dams, buildings, yards, drains, power pole relocation and plantation removal were some of the effects anticipated. Most, if not all, can be replaced or relocated.

- ***Direct land loss***

Direct land loss for the total alignment is substantial (over 350 ha). However, most landholders appeared reconciled to this loss, probably because it mostly occurs on boundaries and does not represent a large proportion of the total property.

- ***Vehicle and stock movement***

It is common for land holders in the district to own several non-contiguous parcels of land. There can be some distance between properties which requires the frequent movement of machinery including stock and grain transport, cultivators, seeding equipment and harvesters. A variety of transport strategies are currently employed by farmers being determined by access availability, road condition and intensity of use, travel distance and equipment portability. Cropping machinery may not be able to travel on the dual carriageway and movement of farm equipment (share farming) could be hampered. However, service roads would be available for the movement of machinery and may also encourage more use.

The transport of stock between properties is also affected. There are situations where the transport of stock across the existing highway is required to meet normal husbandry and management needs (shearing, stock handling, changes in grazing rotation). An upgrade of the existing highway to dual carriageway status would prevent livestock from crossing the road directly; increased severance may require the duplication of facilities on the affected blocks.

- ***Impact on Access***

The impact of upgrading the existing highway to dual carriageway (AMP3), could prevent direct access to adjoining properties and require the greater use of service roads and, other existing roads and overpasses. Depending on network design, this is expected to increase travel time, reduce convenience of access and in some cases, require changes in facilities (gateways, access lanes) to accommodate equipment and vehicles. The estimate of cost would ultimately be determined at the individual property level.

- ***Other Impacts***

Other potential impacts mentioned include:

- An increase in the noise level through the Project being closer to farm residences and disturbance to stock at critical periods such as lambing or calving;
- Removal of vegetation, modification to water catchments, lowered aesthetic values, potential damage to wetlands and trees.

- ***Amelioration strategies***

Proposed amelioration strategies are mostly directed at the individual farm level. They involve facility replacement, facility extension and for improved access arrangements.

### 6.2.2 Non-Agricultural Business Impacts

The AustRoads methodology and parameters do not include non-agricultural business impacts, however these have been reported and are considered to be a valid economic impact.

The impact on non-agricultural businesses includes access disruptions during construction. Alternative routing during the construction phase could create access issues. The aggregation of each individual aspect is predicted to create an economic impact less than $100,000 overall in terms of loss or revenue. There is a separate impact around the prospect of the loss of passing trade, which would impact one business as a result of the bypass of Buangor. The loss is predicted to be less than $100,000 overall. This is the broad estimate of the overall impacts in terms of loss of annual revenue to businesses.

## 6.3 Impact Pathways

This section identifies and describes economic cause and effect pathways associated with the construction and operation of the Project.

The economic impact pathways are those for agriculture and other businesses listed below.

### 6.3.1 Agriculture

- Construction of the Project would result in the loss of agricultural facilities and infrastructure across the alignment.
- Construction of the Project would result in the loss of agricultural land and severance of properties across the alignment.

### 6.3.2 Non-agricultural businesses

- The Project may disrupt access to businesses during construction across the alignment.
- The Project may reduce passing trade opportunities for businesses.

## 6.4 Risk Assessment

The Risk Assessment has been assembled through the impact pathways identified and the consequence and likelihood of each pathway.

VicRoads has a standard set of environmental protection measures, which are typically incorporated into its construction contracts for road works and bridge works. These are described in VicRoads Contract Shell DC1: Design & Construct, April 2012, hereafter referred to as the “VicRoads standard environmental protection measures”. These measures have been used as the starting point for the impact assessment. Those that are relevant to economic impacts are included in the “planned controls” column of the risk assessment (Table 24) and outlined in more detail in Section 7 (Mitigation Measures).

As a result of the initial risk assessment, in some cases additional Project specific controls have been proposed to reduce risks. These are outlined in the “additional controls” column of the risk assessment in Table 24, and are described in more detail in Section 7.

Both VicRoads standard environmental protection measures and the additional Project specific controls have been included in the Environmental Management Framework for the Project.

The residual risks have been scored after the additional identified mitigation measures have been considered.

Key observations from the risk assessment of the proposed alignment and associated construction corridor are ‘medium’ and ‘high’ risks in the initial risk assessment, which all change to a ‘low’ risk in the residual risk assessment, once suitable interventions have been made.

All impact pathways identified are pertinent to each of the three different alignment options that exist for Section 2. The risk assessment is presented in Table 24.

## Table 24 Economic Risk Assessment

| Risk Number | Impact Pathway Description | Description of consequences | Planned Controls to Manage Risk | Initial Risk Assessment | | | Additional Controls Recommended to Reduce Risk | Residual Risk Assessment | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Consequence | Likelihood | Risk Rating | | Consequence | Likelihood | Risk Rating |
| E1 | Construction of the Project would reduce passing trade for some businesses (Buangor) | Some businesses along the alignment rely for a portion of their turnover on passing traffic. This traffic would be reduced with a consequent reduction in turnover. | | Insignificant | Almost Certain | Low | Install signage for any business areas affected by reduction in passing trade and maintain existing signage that relates to areas of interest for tourists. | Insignificant | Almost Certain | Low |
| E2 | Construction of the Project would result in the loss of agricultural facilities and infrastructure plus the loss of agricultural land and severance of properties across the alignment | Stock yards, sheds, access lanes and other infrastructure may require replacement or relocation. Some agricultural land would be lost as a result of the construction and there would be severance and access issues to some properties | Consultation with existing land owners who would be affected by the alignment options | Moderate | Almost Certain | High | Compensation measures for loss of infrastructure, land, severance and access issues. Optimise intersections and access opportunities for affected properties. | Insignificant | Almost Certain | Low |

| Risk Number | Impact Pathway Description | Description of consequences | Planned Controls to Manage Risk | Initial Risk Assessment | | | Additional Controls Recommended to Reduce Risk | Residual Risk Assessment | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Consequence | Likelihood | Risk Rating | | Consequence | Likelihood | Risk Rating |
| E3 | Construction of the Project would disrupt access to non-agricultural businesses during construction | Some agricultural and other businesses along the route would have access disrupted during the construction process | Continuous access would be maintained to commercial property, consistent with business operating hours. Any alteration would be with written agreement of proprietor.<br><br>Traffic Management Plans (TMPs) would be prepared to identify, assess and appropriately eliminate, reduce or mitigate road safety hazards and to be reviewed by VicRoads prior to implementation.<br><br>TMPs would comply with standard VicRoads practices, the Traffic Management Code of Practice and the *Road Management Act 2004*. Examples include: speed reduction where appropriate, worksite safety barriers, advance warning signage, hazard visibility, etc.<br><br>Various businesses may actually benefit during the construction period due to displacement of trade away from other businesses | Insignificant | Almost Certain | Low | Work with businesses to optimise construction schedules | Insignificant | Almost Certain | Low |

Agricultural land and property would be lost or severed as a result of the new alignment. The likely aggregated value of these lost assets (described in Section 6.2.1) was scored as a 'moderate' consequence (i.e. having a severe impact at the locality, or of significance at regional level) that is 'almost certain' in terms of its likelihood of occurrence. Therefore the overall initial risk rating for the impact to agriculture is scored as 'high'. The appropriate intervention factor designed to mitigate and reduce the risk was identified as the offer of a suitable level of compensation and optimisation of intersections and access for affected properties, reducing the consequence to 'insignificant' (i.e. minimal impact at locality) and therefore the residual risk to 'low'.

Non-agricultural business access impacts (the economic impact arising from the aggregation of impacts to all affected businesses) during construction were scored as a 'low' risk rating, and remained at a 'low' risk rating in the residual risk assessment, following an intervention to sign existing business areas and maintain existing tourist-related business activities.

The impact of the alignment on passing trade was scored as a 'low' risk rating in the base case, which remained at a 'low' risk rating in the residual risk case with appropriate signage to business areas, facilities or amenities, which would be expected to further mitigate this impact.

## 6.5 Impact Assessment

The Economic Impact Assessment has been undertaken using a conventional Benefit Cost Assessment approach and an assessment of the wider economics impacts, which have been reported in the areas of agriculture, non-agricultural business and employment impacts.

### 6.5.1 Benefit Cost Assessment

Table 25 outlines the key timing, discount rate and capital cost assumptions used in the benefit cost assessment.

**Table 25 Overall benefit cost assumptions and estimates**

| Description | | | Source |
|---|---|---|---|
| Discount Rate (rate that future benefits and costs are discounted to determine present values) | 4.4% real | | VicRoads |
| Project life for economic assessment | 30 years | | VicRoads |
| Construction cost estimate in current dollars | Option 1 | $346.9m | GHD estimate |
| | Option 2 | $344.3m | |
| | Option 3 | $345.5m | |
| Construction period | 3 years elapsed time | | GHD estimate |
| Construction begins | 2012/13 | | GHD estimate |
| Construction ends | 2015/16 | | GHD estimate |

### *Travel Time Savings*

The parameter values that are applied to the travel times to assess the extent of the time savings benefits of the Project are calculated using the methodology outlined in the Austroads publication *Guide to Project Evaluation, Part 4: Project Evaluation Data* (2008), and based on seasonally adjusted full time weekly earnings for Australia. The crew costs for freight vehicles were also sourced from Austroads (2008) and have been updated to 2012 values using the average annual increase in average wages. Freight travel time values have also been sourced from Austroads (2008) and adjusted to 2012 values. (Refer Table 26).

**Table 26 Value of travel times by vehicle type**

| Vehicle type | $ value per hour |
|---|---|
| Articulated trucks | 48.38 |
| Rigid trucks | 34.00 |
| Light commercial vehicle | 35.04 |
| Cars undertaking business travel | 55.99 |
| Cars undertaking private travel | 22.89 |

Source: Austroads (2008) (adjusted to 2012 values)

Since the project options induce higher average travel speeds there is a reduction in total vehicle hours travelled over the base case. Table 27 displays vehicle hours travelled (per day) in the base ('no project') and project case options and the resultant reduction in vehicle hours travelled. These are shown for the forecast year of 2025.

**Table 27 Vehicle hours travelled per day by vehicle type, 2025**

| Vehicle type | Base case | Option 1 | Option 2 | Option 3 |
|---|---|---|---|---|
| Light vehicles | 1,809 | 1,611 | 1,603 | 1,611 |
| Heavy vehicles | 845 | 753 | 749 | 753 |
| | Reduction in vehicle hours travelled over base case | | | |
| Light vehicles | NA | 198 | 206 | 198 |
| Heavy vehicles | NA | 92 | 96 | 92 |

Source: GHD traffic engineering estimates

The daily reduction in vehicle hours travelled due to the project (from Table 27) is applied to the hourly value of travel time (from Table 26) to generate estimates of daily travel time savings. These estimates are subsequently annualised to give annual travel time savings for the project case options (in undiscounted dollar terms).

After discounting the annual stream of travel time savings, a total (or cumulative) travel time benefit of $46.2m, $48.1m and $46.2m for Option 1, 2 and 3, respectively, was estimated over the 30-year evaluation period.

### *Vehicle Operating Cost Savings*

The calculation of Vehicle Operating Costs (VOC) was based on standard NIMPAC algorithms for rural roads (Harmonisation of Non-Urban Road User Cost Models, Austroads 2005). Using these algorithms, the process for calculating vehicle operating costs in the base case and project case options involved a number of steps. These are as follows:

- Identified longitudinal grades by road section;
- Identified NAASRA roughness meter (NRM) counts by road section (assumed NRM=100 for base case and NRM=49 for project options);
- Identified model road state (MRS) by road section (assumed MRS=13 for majority of base case and MRS=22 for project options);
- Calculated passenger car equivalents (PCE) by road section using longitudinal grades;
- Calculated volume-capacity ratios by road section using PCE;
- Calculated adjusted free speeds for light vehicles (LV) and heavy vehicles (HV) using longitudinal grades and MRS; and
- Calculated VOC (for both LV and HV) using adjusted free speeds, volume-capacity ratios, and pavement roughness.

The final step in the above process utilises a distance-weighted average to calculate VOC in dollars per vehicle kilometre travelled ($/VKT). The resultant vehicle operating cost parameters in the base and project case options are displayed in Table 28.

**Table 28 Vehicle operating cost parameters, $ per VKT**

| Vehicle type | Base case | Option 1 | Option 2 | Option 3 |
|---|---|---|---|---|
| Light vehicles | 0.30 | 0.27 | 0.27 | 0.27 |
| Heavy vehicles | 1.20 | 0.98 | 0.98 | 0.98 |

Source: Austroads (2005) and GHD estimates

Table 29 displays vehicle kilometres travelled (per day) in the base and project case options. These are shown for the forecast year of 2025. There is an increase in VKT in the project case options due to the project generating induced travel demand.

**Table 29 Vehicle kilometres travelled per day, 2025**

| Vehicle type | Base case | Option 1 | Option 2 | Option 3 |
|---|---|---|---|---|
| Light vehicles | 170,088 | 177, 250 | 176,354 | 177,250 |
| Heavy vehicles | 79,458 | 82,804 | 82,385 | 82,804 |

Source: GHD traffic engineering estimates

The vehicle kilometres travelled (in Table 29) is applied to the vehicle operating cost rates (in Table 28) to generate estimates of daily vehicle operating costs in the base and project case options. Project option VOC costs are subtracted from base case VOC costs to obtain VOC

savings on a daily basis. These estimates are subsequently annualised to give annual vehicle operating savings for the project case options (in undiscounted dollar terms).

After discounting the annual stream of vehicle operating cost savings, a total (or cumulative) travel time benefit of $86.6m, $88.1m and $86.6m for Option 1, 2 and 3, respectively, was estimated over the 30-year evaluation period. The rationale behind this result is the VOC unit cost reduction (over the base case) more than offsets the increase in VKT (over the base case) to provide an overall reduction in VOC as a result of the project.

### *Crash costs savings*

Crash cost savings were derived from estimates based on the previous crash history on the route and the known improvements to the standard of the infrastructure that would occur as a result of this Project. Overarching average casualty costs (originally sourced from the Austroads Guide to Project Evaluation) were then applied to the expected reduction of persons involved in 'fatal', 'serious', 'minor injury' incidents due to the project. These average casualty costs ($ per person) are described in Table 30.

**Table 30 Average Casualty Costs**

| Type of Crash | Cost per crash |
|---|---|
| Fatal | $2,494,995 |
| Serious injury | $574,236 |
| Minor injury | $24,141 |

Source: Austroads (2008) (adjusted to 2012 values)

Section 2, between Beaufort and Ararat, has a crash history of 4.51 crashes per 100 million vehicle kilometres travelled. These statistics include a total of 10 serious injury crashes and four fatalities within the past five years, involving two separate head-on collisions. (Source: VicRoads Crash Statistics, 2005-2010).

Victoria's Road Safety Strategy has an objective of reducing the incidence and severity of road crashes by 30% by 2017. The Project is expected to offer crash reductions (over the 30 year life of the Project) in accordance with this Government objective.

Total crash cost savings (over the base case) were estimated at $9.4 m in each of the project case options over the 30-year evaluation period.

### *Externalities Savings*

The savings in greenhouse gases, air and noise pollution as a result of the Project were estimated at zero over a 30 year Project lifespan. The parameter values used to calculate externality savings are displayed in Table 31 and Table 32. Future traffic split was assigned to these parameter values in order to estimate externality savings.

**Table 31 Externality parameter values**

| Vehicle Type | Values |
|---|---|
| Heavy Vehicles | $0.03 (per 1,000 ntkm) |
| Light Commercial | $0.25 (per 1,000 ntkm) |
| Passenger Vehicles | $0.07 (per 1,000 vkm) |

Source: Austroads (2008) (adjusted to 2012 values)

**Table 32 Heavy and light commercial payload parameter values**

| Vehicle Type | Values |
|---|---|
| Heavy Vehicles (Articulated trucks) | 25.1 (tonnes per trip) |
| Heavy Vehicles (Rigid trucks) | 7.3 (tonnes per trip) |
| Light Commercial | 0.3 (tonnes per trip) |

Source: Australian Bureau of Statistics, Survey of Motor Vehicle Use, 9208.0

### *Residual Value*

The Australian Transport Council National Guidelines (Volume 4) for cost benefit analysis of road transport projects specify a 50 year lifespan for road pavements. Since the project evaluation period is for 30 years, this gives rise to a residual value benefits item. With 20 years' worth of remaining asset value at the end of the evaluation period a proportion of 40% (i.e. 20 years divided by 50 years) is applied to undiscounted capital cost values in each of the project case options ($347M in Option 1, $344M in Option 2 and $345M in Option 3). This gives residual value estimates of $32.1M, $31.9M and $32.0M for Option 1, Option 2 and Option 3, respectively.

### *Capital Costs*

Capital costs (the sum of money required to oversee the construction of the road alignment) have been estimated to reflect a P90 confidence level (meaning that there is a 90 per cent chance that the base estimate would not be exceeded) as consistent with VicRoads risk based estimating requirements.

The capital costs due to the Project were estimated as being in the range from $344 million to $347 million over the project lifespan depending on the alignment option. Table 33 to Table 35 display the difference in capital costs across the three options.

The capital costs have been staged over a three year period and have been subject to an escalation factor of 4.6% - the escalation factor would account for the costs required in future dollar terms when considering the impact of inflation. The capital spend over the timeframe has then been subject to a discount rate of 4.4% (rate that future costs have been discounted to determine present value) to produce values which have been used in the modelling, which have informed the Benefit Cost Ratios observed.

## Table 33 Capital Expenditure Profile (Option 1)

| Year | cf base | Assumed Expenditure | | Escalation Factor | Required Budget |
|---|---|---|---|---|---|
| | | Expenditure % | Expenditure $ | | |
| 12/13 | 1 | 5% | $15,626,610 | 1.000 | $15,626,610 |
| 13/14 | 2 | 20% | $62,506,438 | 1.046 | $65,381,734 |
| 14/15 | 3 | 30% | $93,759,658 | 1.094 | $102,583,941 |
| 15/16 | 4 | 30% | $93,759,658 | 1.144 | $107,302,802 |
| 16/17 | 5 | 15% | $46,879,829 | 1.197 | $56,119,365 |
| | | 100% | $312,532,193 | | $347,014,452 |

Source: GHD cost estimates

## Table 34 Capital Expenditure Profile (Option 2)

| Year | cf base | Assumed Expenditure | | Escalation Factor | Required Budget |
|---|---|---|---|---|---|
| | | Expenditure % | Expenditure $ | | |
| 12/13 | 1 | 5% | $15,506,432 | 1.000 | $15,506,432 |
| 13/14 | 2 | 20% | $62,025,730 | 1.046 | $64,878,914 |
| 14/15 | 3 | 30% | $93,038,595 | 1.094 | $101,795,016 |
| 15/16 | 4 | 30% | $93,038,595 | 1.144 | $106,477,587 |
| 16/17 | 5 | 15% | $46,519,297 | 1.197 | $55,687,778 |
| | | 100% | $310,128,649 | | $344,345,727 |

Source: GHD cost estimates

## Table 35 Capital Expenditure Profile (Option 3)

| Year | cf base | Assumed Expenditure | | Escalation Factor | Required Budget |
|---|---|---|---|---|---|
| | | Expenditure % | Expenditure $ | | |
| 12/13 | 1 | 5% | $15,559,009 | 1.000 | $15,559,009 |
| 13/14 | 2 | 20% | $62,236,038 | 1.046 | $65,098,895 |
| 14/15 | 3 | 30% | $93,354,057 | 1.094 | $102,129,330 |
| 15/16 | 4 | 30% | $93,354,057 | 1.144 | $106,797,040 |
| 16/17 | 5 | 15% | $46,677,000 | 1.197 | $55,872,369 |
| | | 100% | $311,180,161* | | $345,456,643 |

Source: *GHD cost estimates – indicative only

### *Maintenance Costs*

Maintenance costs for the Project have been estimated at $650,000 per year over the project's 30 year life, for each of the three alignment options. The assumptions that have been used to inform this estimate are:

- Maintenance costs are equal for both highway and freeway design standards;
- All items (as per Table 32) would be necessary as part of the maintenance requirement; and
- Quantities of each item have been drawn from a comparable rural highway i.e. the Princes Highway East Traralgon – Sale Business Case, and scaled to the length of Section 2 to inform the quantity estimates.

Table 36 includes all aspects that comprise the maintenance requirements:

**Table 36 Annual Maintenance Costs**

| Item | Unit Cost |
|---|---|
| Pavement and Roadside (Rural) | $9,000 per lane km |
| Structures | $2,800 per structure |
| Street lighting | $400 per lantern |
| Linemarking and pavement markers | $300 per lane km |
| Median wire rope safety barrier | $15,000 per km |
| Off-carriageway safety barriers | $10,000 per km |

Source: VicRoads cost estimates

### *Benefit Cost Ratio*

Table 37 summarises the contribution of the above benefits and costs to the Project's benefit cost ratio of:

- 0.5 for Option 1;
- 0.6 for Option 2; and
- 0.5 for Option 3.

With costs exceeding benefits in each of the project case options, the BCR and NPV results suggest the options are not economically justified. However, such BCRs are common for rural highway upgrades because of the high construction costs along long corridors.

**Table 37 Results of the Project's Benefit Cost Assessment**

| | Present Value (4.4% discount rate over 30 years) | | |
|---|---|---|---|
| | **Option 1** | **Option 2** | **Option 3** |
| Vehicle Operating Cost savings | $86.6M | $88.1M | $86.6M |
| Travel Time savings | $46.2M | $48.1M | $46.2M |
| Crash Cost savings | $9.4M | $9.4M | $9.4M |
| Externality savings | $0.0M | $0.0M | $0.0M |
| Residual value | $32.1M | $31.9M | $32.0M |
| **TOTAL BENEFITS** | **$174.3M** | **$177.4M** | **$174.2M** |
| Capital Costs | $313.8M | $311.4M | $312.5M |
| Maintenance Costs | $9.0M | $9.0M | $9.0M |
| **TOTAL COSTS** | **$322.8M** | **$320.4M** | **$321.5M** |
| **BCR** | **0.5** | **0.6** | **0.5** |
| **Net Present Value** | **$-148.5M** | **$-143.0M** | **$-147.3M** |

The BCRs have been calculated on the basis of a duplicated highway upgrade (AMP3 standard), however an upgrade to freeway standard (AMP1) is expected at some future date above and beyond the 30 year lifetime of the Project.

### 6.5.2 The Project Preferred Option

The assessment of each of the three options demonstrated that Option 1 had the greatest negative impact on agricultural land, property and severance. Option 1 involves substantial property severance between Hillside Road and Langi Ghiran Picnic Ground Road, including the severing several rural allotments. Option 2 was found to have the least severance, notwithstanding the fact that it poses some severance around Buangor.

There is no significant difference between the options in terms of direct land loss and facilities loss.

In terms of the impacts to non-agricultural businesses (i.e. access and passing trade) for each of the options the impact was found to be of a similar low magnitude.

The BCR for Option 2 (0.6) was slightly higher than Option 1 (0.5) and Option 3 (0.5).

Therefore, the preferred option from an overall economic impact assessment stance was found to be Option 2.

### 6.5.3 Other Economic Impacts

There are other economic impacts that are in addition to those identified and reported as part of the Benefit Cost Assessment (which utilises the Austroads guide (2008)).

***Construction Employment and Flow-on Effects***

Construction of the Project would require inputs from a number of industries and result in flow-on effects to other economic activity and generate significant short term employment during the construction phase, both in the construction industry and in the wider economy.

The ABS Year Book Australia 2002 provides a clear analysis of the construction industry's linkages. The analysis is based on the Australian National Accounts which provide a detailed analysis of the construction industry's input and outputs and linkages with other industries.

The Year Book analysis of the construction industry also provides employment multipliers that indicate the level of flow on effects of activity in the construction industry. Apart from the initial effects, there are production induced effects and consumption induced effects as a result of wages of construction workers being spent. Based on the this analysis, and updating the industry expenditure per job generated with the Consumer Price Index for the construction industry, it is estimated that $1 million of extra output by the construction industry generates approximately 6.4 direct Full Time Equivalent (FTE) jobs (additional jobs beyond direct project construction jobs) were generated, or one job per $156,000 in construction costs.

The construction costs for the Section 2 Options are estimated as follows:

- Option 1: $346.9 million
- Option 2: $344.3 million
- Option 3: $345.5 million

With an indicative construction period of three years, the Project is therefore estimated to generate the following employment on an average annual basis (rounded):

- Option 1: 2,220 FTE or 740 FTE jobs per annum during the three year construction period.
- Option 2: 2,200 FTE or 730 FTE jobs per annum during the three year construction period.
- Option 3: 2,210 FTE or 740 FTE jobs per annum during the three year construction period.

Flow-on effects in the wider economy are estimated using the employment multiplier of 1.86 for the construction industry (the employment multiplier has been adopted using a conservative multiplier of 65 per cent of the ABS stated maximum multiplier from the ABS *Feature Article: The Construction Industry's Linkages with the Economy, 2002*). Estimated flow-on effects are as follows (in Full Time Equivalent job years):

- Option 1: 4,130 FTE.
- Option 2: 4,090 FTE.
- Option 3: 4,110 FTE.

The flow-on effects would be distributed over a longer period than the three year construction period, as the consumption effect is diluted by superannuation contributions and other savings.

### *Effects on business and industries downstream from the Project*

Traffic and transport modelling undertaken to inform this assessment (GHD, 2012) indicated that the congestion benefits from the Project would improve travel times.

As outlined in section 5, the region's economic activity is reliant largely on the tourism and agricultural sectors. These industries rely to a certain degree on the movement of people (staff or customers) and the movement of freight in terms of inputs and outputs. Improvements to the speed and reliability of this major interstate corridor would have benefits in terms of improved connectivity. Speed and reliability benefits would also have a positive impact on freight, which would be particularly beneficial for High Productivity Freight Vehicles.

### *Values of Freight and Connectivity*

There are benefits in assessing the value of freight that is supported by the Western Highway and the improved connectivity that would be provided by the Project, particularly for import and export freight that involves a movement to or from the Port of Melbourne.

### *Impact of the Grain Harvest*

The impact of the Victorian grain harvest would mean that a higher quantity of grain would be moved between grain production silos in Victoria either interstate or to the Port of Melbourne for export. The Project would provide additional capacity for these movements.

### *Conclusion*

All of the above other economic benefits are significant and are in addition to the benefits factored into the benefit cost assessment using the Austroads guidelines.

# 7. Mitigation Measures

## 7.1 Construction

VicRoads would require the construction contractor to develop and implement a Construction Environmental Management Plan (CEMP) for the Project. VicRoads standard environmental protection measures and some additional Project specific controls identified below have been incorporated into the Environmental Management Framework for the Project. VicRoads would require the construction contractor to incorporate all of these measures into the CEMP.

VicRoads standard environmental protection measures for Economic Impact that would be adopted for this Project include:

- Consultation with existing land owners who would be affected by the alignment options.
- Continuous access would need to be maintained to commercial property, consistent with business operating hours.
- Traffic Management Plans (TMPs) would need to be prepared to identify, assess and appropriately eliminate, reduce or mitigate road safety hazards and would be reviewed by VicRoads prior to implementation.

Additional, Project specific controls are also proposed to reduce risks to Economic Impact include:

- Giving effect to compensation measures for loss of infrastructure, land, severance and access issues.
- Optimise intersections and access opportunities for affected properties.
- Work with businesses to optimise construction schedules.
- Provide improved signage for business destinations which are of tourism interest and to areas of business activity or local amenities.

## 7.2 Operation

VicRoads would need to both install and maintain signage for business-related areas and for tourism. VicRoads would need to consider the potential access issues to agricultural businesses caused by the construction.

VicRoads would also need to provide compensation measures for existing landowners impacted by loss of infrastructure, land, severance and access issues. A second mitigation measure could be through the optimisation of intersections and access opportunities for affected properties.

## 7.3 Summary

Table 38 presents a summary of the mitigation measures that have been identified to avoid, reduce or minimise impact risk. The measures comprise both relevant requirements of the VicRoads standard environmental protection measures as well as the additional measures identified by this impact assessment. The aim to achieve the relevant EES Objectives described in Chapter 2.

**Table 38 Environmental Management Measures**

| Risk No. | Risk Description | Management Measures | Responsibility |
|---|---|---|---|
| E1 | The Project has the potential to reduce passing trade levels for some businesses (Buangor) | Install new signage for any business areas affected by the reduction in passing trade and for creating an awareness of tourism opportunities (if new signage meets the VicRoads guidelines). | VicRoads |
| E2 | The Project would result in the loss of agricultural facilities and infrastructure, plus loss of agricultural land and severance of properties across the alignment | Compensation measures would be provided for loss of infrastructure, land, severance and access issues. | VicRoads |
| E3 | The Project would disrupt access to agricultural businesses during its construction | Communicating with businesses would occur to optimise construction schedules | VicRoads |

# 8. Conclusion

The Project in Section 2 between Beaufort and Ararat seeks to improve safety, improve the efficiency of freight by designing for High Productivity Freight Vehicles, and to allow for possible future bypasses of Beaufort and Ararat.

The Economic Impact Assessment is one study which informs a broader and comprehensive Environment Effects Statement (EES) for the Project for three possible alignment options.

A Benefit Cost Ratio (BCR) value was calculated at 0.6 for option 2, 0.5 for option 1 and option 3, respectively.

Wider economic impacts not captured as part of the BCA analysis include those to businesses in the region and agricultural impacts arising from each of the various alignment options.

The value of direct loss of productive agricultural land and severance of properties across the alignment options has been assessed in the range $2.2-$2.5 million, depending on the option considered. The value of loss for agricultural facilities has been estimated in excess of $1 million, which could be mitigated to a large degree by a suitable level of compensation to existing landowners.

The impact to non-agricultural businesses in terms of access impediments pre and post construction has been estimated at up to $100,000.The loss of passing trade for businesses has also been estimated as up to $100,000 in terms of lost annual revenue.

There would be an additional impact to employment as a result of the Project, with the creation of up to 2,200 FTE jobs over the construction profile of the Project, plus up to 4,090 indirect FTE jobs.

The assessment of each of the three options demonstrated that Option 1 had the greatest negative impact on agricultural land, property and severance, with Option 2 having the least severance.

In terms of impacts to non-agricultural businesses (i.e. access and passing trade) each of the options was found to be of a similar magnitude.

The Benefit Cost Analysis calculation for Option 2 was found to be slightly higher than that for Options 1 and 3. Therefore, the overall preferred option from an economic impact stance, was found to be Option 2.

If the upgrade of the Project is staged over its 30 year lifetime, the delay in capital expenditure costs as a result of upgrading from AMP3 design standard (highway) to AMP1 design standard (freeway) would provide an increase to the Benefit Cost Ratio. There are additional potential economic benefits to the future-proofing of infrastructure:

- Bridges to SM 1600 to accommodate future freight movements
- Double stacking of containers or freight cars accommodated by rail bridges

# 9. References

This report draws on information from a range of documents and sources, including but not limited to:


- Ararat Rural City (2009), *Economic Development Strategy 2009-2012,* available at http://www.ararat.vic.gov.au/
- Ararat Rural City, *Ararat Renewable Energy Park* (information sheet), available at http://www.ararat.vic.gov.au/
- Ararat Rural City (2009), Council Plan 2009-13, available at www.ararat.vic.gov.au
- Australian Bureau of Statistics (2012), *Australian National Accounts: Input-Output Tables – Electronic Publication, 2007-08 Final, Cat No. 5209.0.55.001* available at http://www.abs.gov.au
- Australian Bureau of Statistics (2009). *Average weekly earnings*, June 2009, cat. no. 6302.0, ABS, Canberra;
- Australian Bureau of Statistics, *2006 Census Data*
- Australian Bureau of Statistics, *National Regional Profile 2005-2009*, available at http://abs.gov.au
- Australian Bureau of Statistics (2002), Year Book Australia*, 2002, Cat No. 1301.0, Feature Article: The Construction Industry's Linkages with the Economy,* available from http://www.abs.gov.au
- Australian Transport Council (2006). *National Guidelines for Transport System Management in Australia*, Canberra;
- Austroads (2004). *Road Safety Engineering Risk Assessment – Stage 1;*
- Austroads (2008). *Guide to Project Evaluation, Part 4: Project Evaluation Data*, AGPE04/08, Sydney;
- Central Highlands Region Municipalities (2010), Central Highlands Strategic Plan Overview and Central Highlands Strategic Plan available at http://www.rdv.vic.gov.au/victorian-regions/grampians/central-highlands;
- Department of Transport, Victoria (2008) *The Victorian Transport Plan* available at http:://transport.vic.gov.au;
- Infrastructure Australia (2008). *Outline of Infrastructure Australia's Prioritisation Methodology*, Sydney;
- Network Planning Consultants Pty Ltd and Essential Economics Pty Ltd (2002), *Beaufort and Avoca Industrial Land Strategy*
- Network Planning Consultants Pty Ltd and Essential Economics Pty Ltd for Pyrenees Shire (2005), *Beaufort and Avoca Industrial Land Strategy, Supplementary Review,* available at http://www.pyrenees.vic.gov.au/Your_Council/Publications/Strategic_Plans

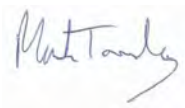
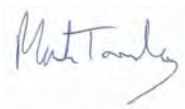
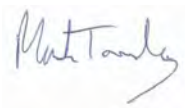
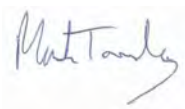
- Northern Grampians Shire, *Industry Snapshots – Manufacturing, Tourism (2008),* available at www.grampiansforgrowth.com.au
- Pyrenees Shire, *Pyrenees Shire Growth and Development Strategy 2010-14,* available at http://www.pyrenees.vic.gov.au/Your_Council/Publications/Strategic_Plans
- Tourism Research Australia, Department of Resources, Energy and Tourism, *Regional Expenditure,* available at http://www.ret.gov.au
- Tourism Victoria (2005), *Concept Proposals for Tourism Development in Victoria,* available at http://www.tourism.vic.gov.au/
- Tourism Victoria (2006), *Victoria's Aboriginal Tourism Development Plan 2006-2009,* available at http://www.tourism.vic.gov.au/
- Tourism Victoria (2008), *Victoria's Nature-Based Tourism Strategy 2008-2012,* available at http://www.tourism.vic.gov.au/
- Tourism Victoria (2008), *Regional Tourism Action Plan 2008-2011,* available at http://www.tourism.vic.gov.au/
- Tourism Victoria (2006), *10 Year Tourism and Events Industry Strategy* available at http://www.tourism.vic.gov.au/
- Tourism Victoria (2010), *10 Year Tourism and Events Industry Strategy: Progress report,* available at http://www.tourism.vic.gov.au/
- Tourism Victoria (2011), *Tourism Victoria's Regional Marketing and Development Plan 2011-2012,* available at http://www.tourism.vic.gov.au/
- Tourism Victoria (2011), Visitation Statistics – Domestic and International, and Economic Value of Tourism, available at http://www.tourism.vic.gov.au/
- *Transport Integration Act 2010,* available at http:://transport.vic.gov.au;
- TTF Australia (2005), Victorian Tourism Employment Atlas, available at http://www.ttf.org.au/
- Victorian Department of Planning and Community Development (2008). *Victoria in Future 2008 - One Page Profiles – Regional*;
- Victorian Department of Transport (2008). *Guidelines for Cost-Benefit Analysis*, Victoria;
- Victorian Department of Transport (2009). *Transport Demand Information Atlas for Victoria 2009 - Volume 2: Regional Victoria*.
- V/Line(2011), Timetable and service information available at http://www.vline.com.au last accessed 15 July 2011

**GHD**

180 Lonsdale Street
Melbourne, Victoria 3000
T: (03) 8687 8000 F: (03) 8687 8111 E: melmail@ghd.com.au



**Document Status**

| Rev No. | Author | Reviewer | | Approved for Issue | | |
|---|---|---|---|---|---|---|
| | | Name | Signature | Name | Signature | Date |
| 1 | Russell Tricker<br>Marianne Stoettrup<br>Ray Phillips | David Rolland |  | Mark Tansley |  | 1/2/12 |
| 2 | Russell Tricker<br>Marianne Stoettrup<br>Ray Phillips | David Rolland |  | Mark Tansley |  | 7/5/12 |
| 3 | Mende Gorgievski<br>Damien Smith | David Rolland |  | Mark Tansley |  | 25/5/12 |
| 4 | Mende Gorgievski | David Rolland |  | Mark Tansley |  | 08/6/12 |