VicRoads

Western Highway Project – Section 3: Ararat to Stawell

Traffic and Transport Impact Assessment Report

November 2012

This Traffic 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, Ararat to Stawell 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 Environment Effects Statement and Planning Scheme Amendment for the Western Highway Project, Ararat to Stawell.*

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 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.

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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 3 (Ararat to Stawell) of the Western Highway Project (the Project) is the subject of this report.

On 27 October 2010, 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 a traffic and transport impact assessment for the Project as part of the EES.

Following a multi-criteria assessment of numerous potential alignment options, VicRoads selected an alignment for the Project which was subjected to the risk and impact assessment presented in this report (Proposed Alignment). The Proposed Alignment is outlined in Section 6.1 of this report.

This impact and risk assessment has assessed the proposed upgrade of the Western Highway between Ararat and Stawell (Section 3). The assessment involved assessing the interim[1] and ultimate[2] upgrade solutions. The Project includes a duplicated highway to allow for two lanes in each direction separated by a central median.

The EES scoping requirements for the traffic and transport impacts assessment of the Project are detailed in Section 2 of this report. In summary, the draft evaluation objectives relating to the traffic and transport impacts assessment are:

- *To provide for the duplication of the Western Highway between Ararat and Stawell to address safety, efficiency and capacity issues; 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.*

The traffic and transport impact assessment undertaken by GHD involved a review of available information to assess the existing traffic and transportation conditions within the project area (as outlined in Section 1.2). It also involved an assessment of the Proposed Alignment against the existing conditions to determine the potential positive and negative impacts of the Project on all modes of transport utilising the Western Highway during the construction, interim operation and ultimate operation stages.

A number of benefits regarding road safety and capacity are anticipated. Of note, the duplication is expected to provide sufficient capacity to cater for the forecasted traffic volume until at least 2040. Additionally, the duplication is expected to enable the Highway to increase the posted speed limit from 100 km/h to 110 km/h and provide significantly increased opportunities for overtaking.

[1] The interim alignment involves, duplicated highway- wide centre median treatments for some intersections and 'left in' and 'left out' access arrangements for all other intersecting roads and properties with current access locations to the Western Highway

[2] The ultimate alignment involves, duplicated freeway – restricted access limited to grade separated interchanges and service road connecting to the interchanges

In summary, the following impacts (positive and negative) have been identified:

Construction Impacts

The key outcomes from the impact and risk assessment during the construction stage include:

- Traffic generated during peak construction activities is not anticipated to have an unmanageable impact on the operation of the Western Highway;
- More significant impacts are likely to result from temporary changes to road environments and localised speed reductions, which are expected to be a regulatory requirement;
- The arterial road network is expected to provide connection and capacity for haulage routes, hence minimising operations on the local road network; and
- Accessibility consideration and detour routes, where appropriate, are expected to be detailed in Traffic Management Plans (TMPs) to mitigate impacts to motorists, local residents, public transport services, emergency services vehicles and other road users.

Overall, the construction of the duplicated highway as part of the Project is expected to have acceptable impacts to the operation of the Highway. The risk assessment outlined in this report has addressed potential operational and road safety impacts arising from the Project, and outlines mitigation measures of the identified road users.

Impacts Common to Interim and Ultimate Solutions

The key outcomes from the impact and risk assessment during the interim and ultimate operational stages of the Project (both positive and negative impacts) include:

- Improved road safety across the project area through:
  - Increased clear zone widths;
  - Ability for drivers to safely overtake vehicles along the length of the Project;
  - Grade separation of Garden Gull Road/Military Bypass Road, Great Western (north and south) and London Road;
  - Bypassing the township of Great Western; and
  - Providing adequate rest area facilities that comply with the rest area guidelines.
- Improved traffic operation through:
  - Reduction of access points, which reduces interruption to traffic flow;
  - Opportunities to overtake along the length of the Project;
  - Increased posted speed limit; and
  - Increased capacity to accommodate future traffic volume growth.
- Improvements to the freight task by designing the road to accommodate high productivity freight vehicles thereby allowing:
  - Improvements to efficiency of the freight task by allowing for transporting a greater volume in a single vehicle;
  - Reducing the overall heavy vehicle volume by allowing for vehicles to have the ability to transport a greater volume; and

  - Travel time savings for freight vehicles due to a reduction in at-grade intersections and access points and improved overtaking opportunities.
- No impacts to the operation of the rail caused by the Project, as the Highway and rail line would continue to be grade separated. The construction methodology would be required to not impact the rail operation (a requirement of ARTC); and
- Travel time savings for bus routes travelling along the Highway.

Specific Interim Solution Impacts

The interim solution of the Project (duplicated highway to AMP3 standard) would be expected to have impacts different to the ultimate solution. These impacts (both positive and negative) include:

- Improved road safety across the project area through wide median intersection treatments at key intersections to improve sight distance and stage movements; and
- There is expected to be some localised impacts on travel times for landowners, due to access arrangements. Access for intersecting side roads and direct property access is generally maintained through the provision of 'left-in' and 'left-out' arrangements and therefore this is likely to increase travel distance for one direction of travel. However, this impact is considered to be acceptable due to the overall benefits for road safety and highway operations provided for general users.

Specific Ultimate Solution Impacts

Additionally, the ultimate solution of the Western Highway Project would also be expected to have impacts which would not be expected in the interim solution. These impacts (both positive and negative) include:

- Improved road safety across the project area through:
  - Removal of at-grade intersections; and
  - Key intersection grade-separation to improve vehicle conflict movements;
- Improved traffic operation through a reduction of access points and grade-separation of key intersections; and
- Access for intersecting side roads and direct property access is generally maintained through the provision of services roads. There are expected to be some localised impacts on travel times for landowners, particularly the owners with property on both sides of the Highway who require farm machinery to move from one side to another. However, this impact is considered to be acceptable due to the overall benefits for road safety and highway operations that would be provided for general users.

The design features for the Project are expected to eliminate a high proportion of existing road safety risks and provide for a higher road safety standard than currently exists.

All of the identified risks are considered to be negligible, low or medium provided that the identified mitigation measures (specified in Section 7 of this report) are implemented. Where the residual risk is medium it is predominantly due to the potential for a fatality, which is a catastrophic impact, however whilst the potential likelihood can be reduced it is acknowledged that the risk of fatality remains, as is the case for any other road. Provided all mitigation measures are implemented the risk is considered to be acceptable.

1. Introduction

1.1 Background and Project Description

The Western Highway (A8) is being progressively upgraded to 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. The route supports agriculture, grain production, regional tourism and a range of manufacturing and service activities. Currently, more than 5,500 vehicles per day travel the Highway, west of Ballarat, including 1,500 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.

The three sections to be duplicated are depicted in Figure 1.

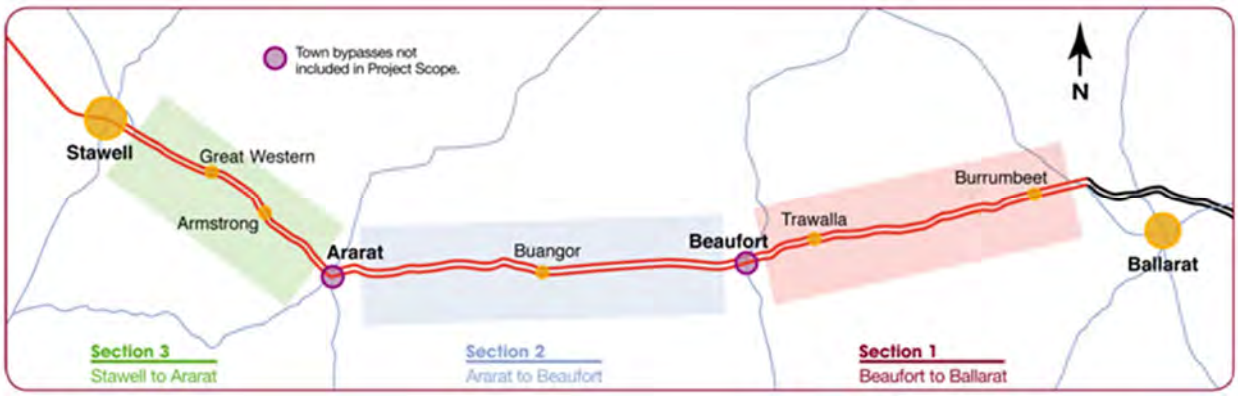


Figure 1 Western Highway Project Area

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-Carngham Road) commenced in early 2012 and is expected to be completed by June 2014. The last 3 km section from Beaufort-Carngham Road to Smiths Lane in Beaufort (Section 1C) commenced in late 2011 and will finish in 2012. 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 will be completed to duplicated highway standard 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 of the Project commences at Pollard Lane, Ararat and extends for approximately 24 km to Gilchrist Road, Stawell.

The EES for Section 3 will focus on assessment of the proposed ultimate upgrade of the Western Highway between Ararat 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 duplicated 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 Project 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 would involve:

- Constructing two new traffic lanes adjacent to the existing Highway, separated by a central median;
- Converting the existing Highway carriageway to carry two traffic lanes in one direction; or
- 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.

The Project is seeking to increase the speed limit from 100 kilometres per hour (km/h) to 110 km/h on the initial opening of the Western Highway alignment.

Town bypasses of Beaufort, Ararat and Stawell are not included in the current proposals and are subject to further planning studies. 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;
  - Improving safety of access to adjoining properties.
- Improve efficiency of freight by designing for High Productivity Freight Vehicles;
- Provide adequate and improved rest areas; and
- Locate alignment to allow for possible future bypasses of Beaufort and Ararat.

1.2 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 (east and west) of the edge of the road reserve except around Great Western where the project area extends up to 1800 m (encompassing the extent of new alignment possibilities). The project area commences at Pollard Lane, west of Ararat and extends for a distance of approximately 24 km to Gilchrist Road, east of Stawell. This length, in relation to the length of the Western Highway, is shown in Figure 1. The study area for the Traffic and Transport assessment is the same as the project area.

The bypasses of Ararat and Stawell are not included in the scope of the EES or Planning Scheme Amendment (PSA). Consequently, for the purposes of the assessment, it has been assumed that the towns are not bypassed. The bypass of Great Western has been included within the scope of works and therefore is considered within the study.

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 a Proposed Alignment for further consideration in the EES for Section 3. The Proposed Alignment and associated construction corridor are the subject of the risk and impact assessment presented in this report and are described in more detail in Section 6. The assessment of alignment options and selection of the Proposed Alignment is documented in Chapter 5 of the EES, and in the Options Assessment Report (Technical Appendix to the EES).

2. EES Scoping Requirements

On 27 October 2010, the Victorian Minister for Planning advised that an EES would be required for the Project. Western Highway Project – Section 3 – Ararat to Stawell Environment Effects Statement (Scoping Requirements) were prepared by the Department of Planning and Community Development to provide guidance on the matters to be addressed by VicRoads in the EES.

2.1 EES Objectives

For the Traffic and Transport aspects of the Western Highway Project, the relevant draft evaluation objectives outlined in the EES Scoping Requirements are:

- *To provide for the duplication of the Western Highway between Ararat and Stawell to address safety, efficiency and capacity issues;* 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

Sections 4.2 and 4.5 of the Scoping Requirements, September 2011, stipulate that traffic issues are to be addressed as follows:

- *Outline the rationale for the Project in terms of relevant policies, strategies, standards and government commitments;*
- *Identify expected or modelled transport outcomes of the Project in terms of capacity, traffic volumes, travel times, safety and accessibility;*
- *Describe road design features and the chosen alignment that have been adopted to optimise the benefits (including increased safety) of the duplication for road users, having regard to effects on other environmental and social values;*
- *Address potential risk areas to road safety, such as wildlife corridors, and outline any specific measures to avoid, minimise and mitigate road safety issues;*
- *Characterise the current traffic conditions, in the context of the road network and in relation to capacity , travel times, safety and accessibility;*
- *Identify and assess potential effects of the Project on existing traffic conditions, including traffic movement (i.e. rail, freight, buses, cyclists and pedestrians) and access. The assessment should address potential effects of temporary road closures, heavy vehicles required for construction on nearby existing arterial roads as well as the ability of these roads to accommodate increased traffic during the Project's construction;*
- *Identify and assess potential effects of road construction and operation on the rail line and interface, especially near intersections and crossings; and*
- *Identify traffic management and safety principles for the construction and operation phases, covering (where appropriate) road safety, different traffic routes, hours of use, traffic speeds, types of vehicles and emergency services access provisions.*

The EES should assess the consistency of the Project proposal with the provisions of the *Transport Integration Act 2010*.

3. Legislation, Guidelines and Policy

3.1 State

This section provides an overview of the key legislation and policy documents which form the regulatory framework for traffic management within Victoria.

Road management in Victoria is supported primarily through the following legislation and policies:

- *Transport Integration Act 2010*;

  Victoria's new principal transport statute, the *Transport Integration Act 2010* (the TIA), came into effect on 1 July 2010. The TIA creates new charters for Victoria's transport agencies and aligns them with the TIA's vision, objectives and principles for the transport system.

  The new charters build sustainability into agencies' objectives and functions, giving them a 'triple bottom line' focus.

  For example, part of VicRoads' new charter is to "manage the road system in a manner which supports a sustainable Victoria by seeking to increase the share of public transport, walking and cycling trips as a proportion of all transport trips in Victoria".

  All new transport projects must be assessed using a triple bottom line framework which considers the economic, environmental and social costs and benefits of the Project.

  Given that this is a Traffic and Transport assessment, all elements of the TIA are directly relevant and have been considered throughout this assessment. The Social Impact Assessment specialist has also assessed the Project against the TIA. The TIA has six transport system objectives and seven decision-making principles, which are listed in Table 1.

Table 1 TIA Objectives and Decision-Making Principles

Objectives	Decision-Making Principles
– Social and economic inclusion – Economic prosperity – Environmental sustainability – Integration of transport and land use – Efficiency, coordination and reliability – Safety and health and wellbeing.	– Integrated decision making – Triple bottom line assessment – Equity – Transport system user perspective – Precautionary principle – Stakeholder engagement and community participation – Transparency

- *Road Management Act 2004*;

  The *Road Management Act 2004* provides '*practical guidance to any person conducting, or proposing to conduct, any works on a road in Victoria.*' The Act has been established to promote safe and efficient road networks and a coordinated approach for the management of public roads. The *Road Management Act (General) Regulations, 2005* and the *Road Management Act (Works and Infrastructure) Regulations, 2005* have been established under the Road Management Act and are to be complied with for all public roads.

  Under the Act a number of codes of practice have been made to provide the guidance required for road authorities and works and infrastructure managers. These codes include:

  – Code of Practice for Operational Responsibility for Public Roads;
  – Code of Practice for Clearways and Declared Arterial Roads;
  – Code of Practice for Road Management Plans;
  – Code of Practice for Management of Infrastructure in Road Reserves; and
  – Code of Practice for Worksite Safety – Traffic Management.

- VicRoads Access Management Policies, May 2006;

  The duplication of the Western Highway is to be designed for Access Management Policy 3 (AMP3) and planned to provide for Access Management Policy 1 (AMP1).

  A road classified as AMP1 is to have no direct access except via grade separated interchanges (i.e. freeway standard). This policy facilitates effective management and control of the road network by eliminating the traffic flow interference and conflicts associated by providing total functional separation between the road and adjacent land.

  The principal characteristics of AMP1 include:

  – Allowing the freeway to operate at 110 kilometres/hour (km/h) speed on some rural freeways;
  – The cross section of the road is typically divided;
  – Access to adjacent land is only via grade-separated interchanges and the arterial road network;
  – Auxiliary lanes are provided for the purpose of acceleration and deceleration at all entry/exit points to the main carriageways;
  – U-turns would not be permitted except for emergency vehicles at median breaks designated for that purpose;
  – There is no direct access to land abutting the freeway; and
  – Parking is not permitted on the freeway carriageways and access ramps or on intersecting cross roads in the vicinity of the ramp terminals.

  A road classified as AMP3 is to have limited vehicle access from adjacent land which is primarily via widely spaced intersections. This policy facilitates effective management and control of the road network by minimising traffic flow interference and collisions associated with access movements on major rural roads.

  The principal characteristics of AMP3 include:

  – Allowing the road to operate typically at the 100 km/h speed limit;
  – The cross section of the road can be divided or undivided;

- There is a high level of control over site access points, intersection spacing, vehicle turns and crossing movements. Intersections are desirably spaced a minimum of 800 m apart;
- The location and design of all intersections are required to conform with the specified layout or be approved by the Road Authority;
- On divided roads, right turns and U-turns are controlled by medians and median breaks;
- Provision is made for turns to be separated from the through lanes of AMP3 road through the use of deceleration and acceleration lanes;
- Access to land abutting the AMP3 road should be minimised and sites with access to more than one road should generally be from the road with a lower access management policy; and
- Parking on the roadway is restricted adjacent to intersections in accordance with standard practices and may be restricted at other locations as determined by the Road Authority.

- Arrive Alive 2008-2017: Victoria's Road Safety Strategy

  This strategy has the objective of significantly improving road safety across the State and substantially reducing the incidence of deaths and serious injuries on Victorian roads. Improvement works to this section of the Western Highway are expected to offer crash reductions over the life of the Project (30 years), which would ultimately contribute to the achievement of this Government objective.

4. Methodology

4.1 Existing Conditions

The traffic and transport existing conditions assessment for the Project has consisted of on-site observations and a desktop assessment of the Project Area, utilising aerial photography and relevant reports and databases.

A number of tasks have been completed for the existing conditions assessment, including:

- Review of completed reports related to the Project including review of traffic data collected in 2009 and 2012 for the Project Area;
- Visiting the site on a typical day to understand the existing traffic conditions and identify any safety and/or accessibility issues along the route. In addition, any pedestrian, cyclist, public transport and heavy vehicle facilities were identified;
- Undertaking an up-to-date crash history assessment for the Project Area; and
- Review of the public transport timetables and identifying any existing bus and rail services within the vicinity of the Project Area.

The review of the existing conditions has provided a basis to inform the options selection and the resulting impacts of those options selected. The alignment options are discussed in Section 6 of this report.

4.2 Impact and Risk Assessment

The following risk assessment methodology was used to determine the traffic and transport pathways for the Western Highway Project – Section 3:

1. Determine the 'impact pathway' (how the Project impacts on a given traffic and transport value or issue).
2. Describe the 'consequences' of the impact pathway.
3. Determine the maximum credible 'consequence level' associated with the risk. Table 2 provides the framework for assigning the level of consequence. The consequence guide was developed with regard to the impacts on general desirable outcomes as informed by typical risk consequence considerations from the Code of Practice for Worksite Safety - Traffic Management (2010), Traffic Management Plans and an understanding of the scale of impacts on the Project Area.
4. Determine the 'likelihood' of the consequence occurring to the level assigned in step 3. Likelihood descriptors are provided in Table 3.
5. Using the Consequence Level and Likelihood Level in the Risk Matrix in Table 4 to determine the risk rating.

Table 2 Traffic and Transport Impacts Consequence Table

Aspect	Insignificant	Minor	Moderate	Major	Catastrophic
Road safety (construction)	Occurrence of road accidents resulting in less than 10 property damage only road accidents during construction period.	Occurrence of road accidents resulting in more than 10 property damage only road accidents or minor injury to less than 20 individuals during construction period.	Occurrence of road accidents causing minor injury to between 20 and 100 individuals or major injury to less than 5 individuals during construction period.	Occurrence of road accidents causing minor injury to more than 100 individuals or major injury to between 5 and 50 individuals during construction period.	Occurrence of road accidents resulting in major injury to more than 50 individuals or one or more fatalities during construction period.
Road safety (operation)	Occurrence of road accidents resulting in less than 10 property damage only road accidents during a 5-year period.	Occurrence of road accidents resulting in more than 10 property damage only road accidents or minor injury to less than 20 individuals during a five-year period or major injury to less than 5 individuals during a five-year period.	Occurrence of road accidents causing minor injury to between 20 and 100 individuals or major injury to less than 10 individuals during a five-year period.	Occurrence of road accidents causing minor injury to more than 100 individuals or major injury to between 5 and 50 individuals during a five-year period.	Occurrence of road accidents resulting in major injury to more than 50 individuals or one or more fatalities during a five-year period.
Traffic and transport operations (construction & operation)	Negligible adverse impact on traffic and transport conditions.	Detectable adverse changes in traffic and transport condition (decrease in Level of Service) at one or two locations at any one point in time during the construction period or at a single location during duplicated highway operation.	Detectable adverse change in traffic and transport conditions (decrease in Level of Service) at multiple locations.	Traffic and transport congestion and delays exceed acceptable levels at multiple locations	Traffic and transport congestion and delays severely restrict the safe operation and efficiency of the transport network.

Aspect	Insignificant	Minor	Moderate	Major	Catastrophic
Traffic access (construction & operation)	Negligible impact on access routes during construction/ operation.	Less than 5 routes with access compromised.	Greater than 5 and less than 10 routes with access compromised.	Greater than 10 and less than 30 routes with access compromised.	Greater than 30 routes with access compromised.

Table 3 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 4 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

The consequence criteria, outlined in Table 2, range on a scale of magnitude from “insignificant” to “catastrophic”. Magnitude was considered a function of the size of the impact, the spatial area affected, and expected recovery time of the environmental system. 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 traffic and transport consequence criteria for the impact assessment have been established for the effects of:

- Road safety during construction;
- Road safety during operation;
- Traffic and transport operations during construction and operation; and
- Traffic access during construction and operation.

The consequence criteria range was identified by initially establishing the catastrophic consequence, for each element, which had a State-wide impact or a severe impact to an individual.

For the purposes of this assessment, the rationale for a catastrophic event for each element is detailed below:

- A 'road safety' catastrophic event is a single fatality or major injury to more than 50 individuals. If this occurred there is significant impact to the individuals and families of these individuals, as well as the response, repair and support costs incurred by the State. Separate criteria have been set for road safety during construction and operation to better reflect the different timeframes.
- A 'traffic and transport operations' catastrophic event is considered to be extended delays and congestion which restrict the safe and efficient operation of the highway. As the highway is a critical link between Melbourne and Adelaide, particularly for freight, closure of the highway or reduced capacity such that traffic flow is severely affected is not acceptable due to increased costs to transport and the economy.
- A catastrophic event for 'traffic access' is considered to be where existing accesses to the highway are severed and there is no alternate route to connect to Western Highway without a significant detour.

4.3 Traffic and Transport Data Sources

The traffic and transport assessment has utilised the following data sources:

- Aerial photography of the corridor, 2012;
- CPG Western Highway Duplication Ballarat to Stawell – Traffic Analysis, 2009;
- AECOM Alignment Options Identification and Evaluation Report – Ararat to Stawell, 2010;
- VicRoads Inter-Office Memo – Western Highway Project (Duplication: Ballarat to Stawell) Proposed Operating Speed Zones, 2011;
- VicRoads publicly available crash data (CrashStats), 2012;
- VicLink website for public transport timetables, 2012; and
- VicRoads Rest Area Route Plan, Western Highway Project, Ballarat to Stawell, May 2011.

4.4 Assumptions and Limitations

The following are noted as limitations and assumptions adopted in undertaking this existing conditions assessment:

- The existing conditions assessment focuses on the existing alignment of the Western Highway and not any of the option corridors. The exact location of option corridors beyond the current Highway alignment were not available at the time of the existing conditions assessment and were generally located on private property. As a result, these locations could not be assessed, however this has had negligible impact on the assessment;
- In terms of intersecting roads, the assessment focuses on those identified in CPG's Traffic Analysis Report and VicRoads Western Highway Project Proposed Operating Speed Zones report. It is assumed that these are of major importance to the local road network; and
- There is little information regarding the use of direct property accesses to the Western Highway. The property accesses have been noted and it is assumed that property access, where required, would be provided via service roads in the AMP1 (freeway) scenario.

5. Existing Conditions

5.1 Definitions

Throughout this section the following acronyms may be referred to:

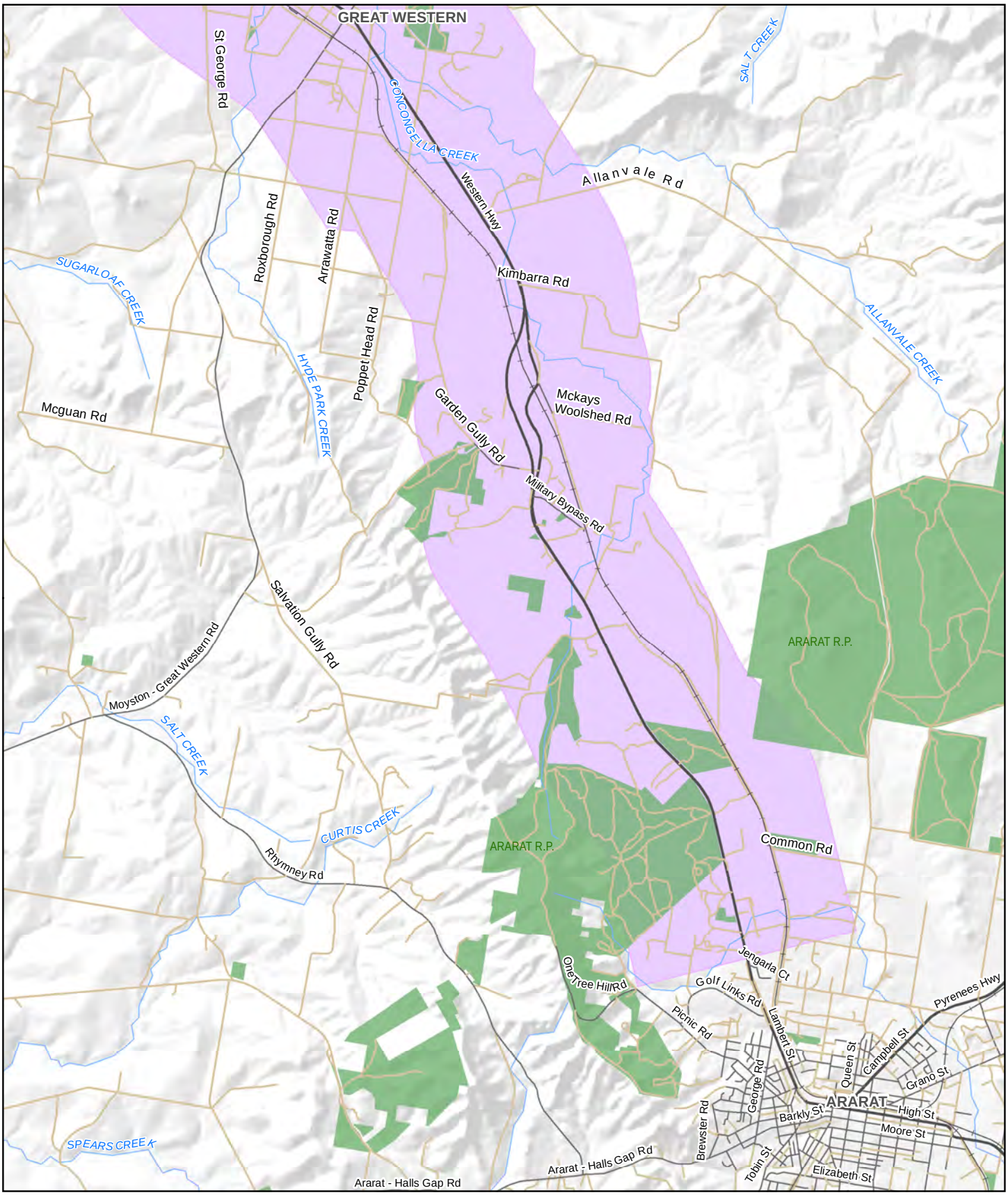
- AUL – Auxiliary left-turn treatment on the major road, i.e. additional short left-turn only lane;
- AUR – Auxiliary right-turn treatment on the major road, i.e. shared through and right-turn lane and additional through lane for overtaking vehicles;
- BAL – Basic left-turn treatment on the major road, i.e. shared left-turn and through lane with minor widening of the shoulder;
- BAR – Basic right-turn treatment on the major road, i.e. shared through and right-turn lane with minor widening of the shoulder;
- CHL – Channelised left-turn treatment on the major road, i.e. additional short left-turn only lane separated from through traffic by a painted or physical island; and
- CHR – Channelised right-turn treatment on the major road, i.e. additional short right-turn only lane separated from through traffic by a painted island.

5.2 Site Locality

The Western Highway (A8) is the key road link between Melbourne and Adelaide. From Melbourne's western fringe to the Suraysia Highway (B220) in Ballarat, it is a freeway standard, dual-carriageway road. However, beyond this point, it reduces to a single carriageway two-lane two-way rural highway with overtaking lanes in specific locations. The Western Highway is a VicRoads declared arterial road (highway) which facilitates vehicle movement and supports regional industries. The Highway also carries traffic travelling between Melbourne and Adelaide and forms part of the national highway network.

The Western Highway Project – Section 3 commences at Pollard Lane, Ararat, and extends for 24 km to Gilchrist Road, Stawell. Within this length, it passes through the town of Great Western (Census Collection District 2070808, population 193, ABS 2006) and bypasses the town of Armstrong.

A locality plan indicating the location of this Project and surrounding road network is provided in Figure 2.



LEGEND

- Study Area
- Parks
- Highway
- Sealed road (arterial & local)
- Unsealed road

Paper Size A4

0 250 500 1,000 1,500 2,000 2,500

Meters

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

N

GHD CLIENTS | PEOPLE | PERFORMANCE

vicroads

VicRoads
Western Highway Project

Ararat to Stawell
Site Locality Map

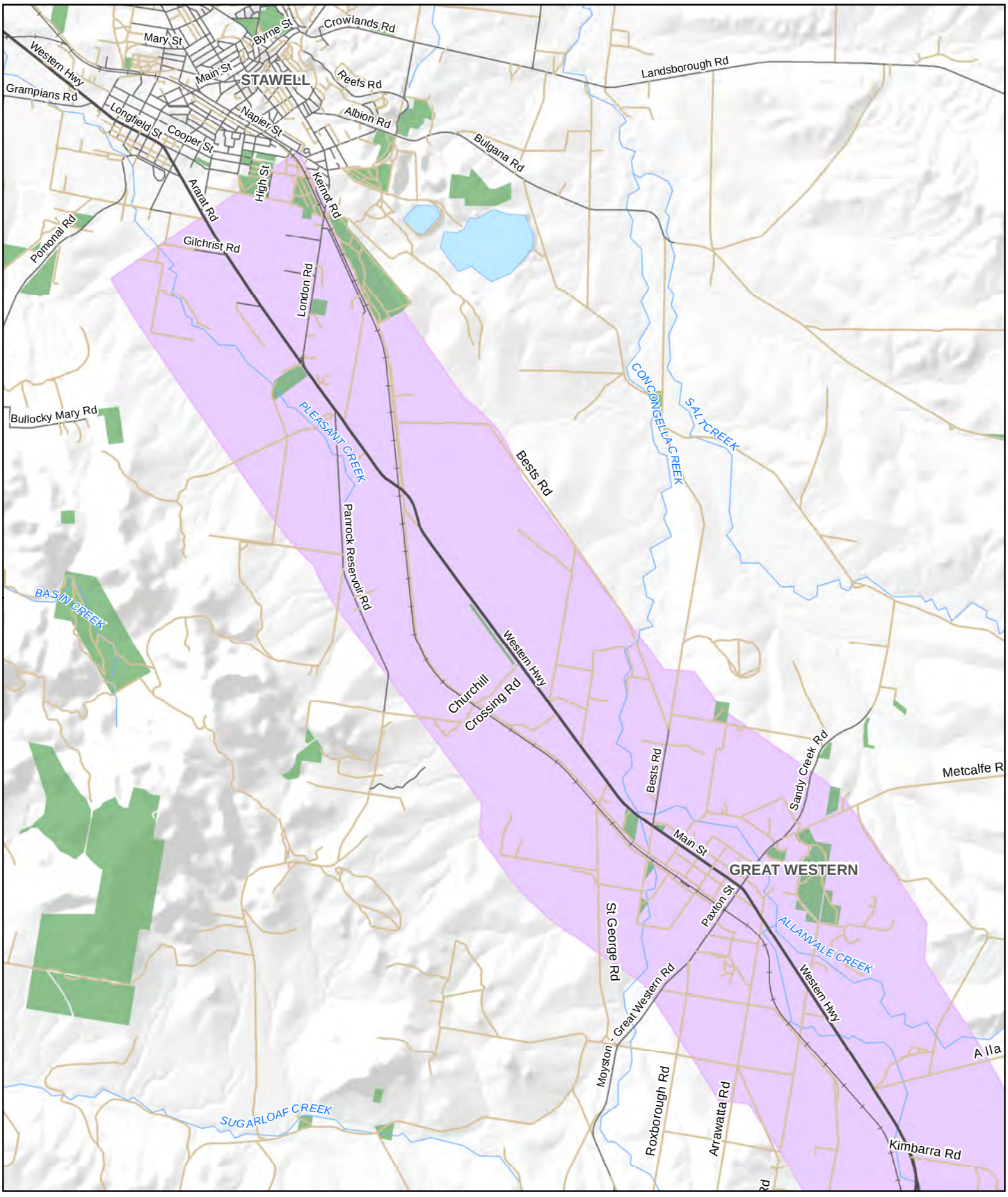
Job Number	31-27558
Revision	B
Date	02 Nov 2012

Figure 2A

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

G:\31\27558\GIS\Maps\Deliverables\Stage 3\RISK AND IMPACT ASSESSMENT\09_TRANSPORT\3127558_S3_001_Study_Area_A4P.mxd

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



LEGEND

- Study Area
- Parks
- Highway
- Sealed road (arterial & local)
- Unsealed road

Paper Size A4

0 250 500 1,000 1,500 2,000 2,500

Meters

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

N

GHD CLIENTS | PEOPLE | PERFORMANCE

vicroads

VicRoads
Western Highway Project

Ararat to Stawell
Site Locality Map

Job Number 31-27558
Revision B
Date 02 Nov 2012

Figure 2B

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

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

5.3 Existing Road Network

This section presents the existing road network within the Project Area (as defined in Section 1.2). It focuses on the proposed length of the Western Highway to be duplicated and the current intersecting side roads along this section.

5.3.1 Western Highway

The Western Highway (A8) is a national highway that extends from the Sunraysia Highway, north-west of Ballarat to the South Australian border. From the Sunraysia Highway to the outskirts of Melbourne, the road is known as the Western Freeway. Within the Project Area, it is generally an undivided rural arterial road with one lane in each direction. The carriageway is typically 12 m wide, consisting of two 3.5 m traffic lanes and sealed shoulders of 2.5 m width. The carriageway widens to accommodate auxiliary turn lanes and overtaking lanes at various locations. The overtaking lanes are summarised in Table 5, with the turn lanes detailed by the intersecting road in Section 5.3.2.

Table 5 Location of Overtaking Lanes

Southbound Direction			Northbound Direction		
Start:	Ch. 24200 m (Gilchrist Road, Stawell)		**Start:**	Ch. 24200 m (Gilchrist Road, Stawell)	
Additional Lane	**From Chainage**	**To Chainage**	**Additional Lane**	**From Chainage**	**To Chainage**
Added lane	22500 m	22100 m			
			Overtaking lane	18500 m	19600 m
Overtaking lane	17000 m	15900 m			
Overtaking lane	10900 m	9900 m	Overtaking lane	9600 m	10600 m
Overtaking lane	3900 m	2300 m			
			Overtaking lane	300 m	1900 m
Finish:	Ch. 0 m (Pollard Lane, Ararat)		**Finish:**	Ch. 0 m (Pollard Lane, Ararat)	

The Western Highway has a posted speed limit of 100 km/h that reduces to 60 km/h through the town of Great Western. The existing highway is generally a straight and flat road. The rail overpasses (Armstrong and Oddfellows rail bridges) and the natural topography can create crests or curves, however site inspections identified no locations where there were significant sight distance issues due to the alignment of the road.

Typical cross sections of the Western Highway are shown in Figure 3 and Figure 4.

Figure 3 Western Highway at Ch. 23500 m, view south-east

Western Highway located east of Robson Road, Stawell.

Figure 4 Western Highway at Ch. 20500 m, view south-east

Western Highway located west of Oddfellows rail bridge.

Traffic volumes and capacity

The theoretical capacity of the Western Highway within the Project Area is calculated as 1,275 vehicles per hour (vph) in each direction (i.e. 2,550 vph, two-way), in accordance with Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis. This figure is based on:

- 27% heavy vehicles;
- Level terrain (defined: terrain permitting heavy vehicles to maintain a similar speed to light vehicles);
- 3.5 m wide traffic lanes and 2.0 m wide shoulder widths; and
- An even directional distribution of traffic.

Traffic volume information was collected by CPG for the week 19 May 2009 to 25 May 2009. Additional traffic volume information along the Western Highway was also collected for the week 28 April 2012 to 3 May 2012. The traffic volumes collected in 2009 is still considered relevant for assessments of the intersecting side roads as it is understood traffic conditions in the area have not changed significantly for these roads. This data is summarised in Table 6 by direction in terms of average daily volumes and median peak hour volumes.

Table 6 Western Highway Traffic Volumes between Harvey Lane and Panrock Reservoir Road

Direction	Average 7-Day Volume (veh/day)	Average Weekday Volume (veh/day)	Maximum Average Midweek AM Peak Volume (veh/h)	Maximum Average Midweek PM Peak Volume (veh/h)
Northbound	All Veh: 2,997 HV: 908 (30.3 %)	All Veh: 3,204 HV: 1,083 (33.8%)	202 (11:00 am-12:00 pm)	275 (4:00 pm-5:00 pm)
Southbound	All Veh: 3,077 HV: 629 (27.3 %)	All Veh: 3,258 HV: 770 (30.0 %)	207 (9:00 am-10:00 am)	254 (4:00 pm-5:00 pm)
TOTAL	All Veh: 6,074	All Veh: 6,462	400 (8:00 am-9:00 am)	529 (4:00 pm-5:00 pm)

All Veh – all vehicles; HV – heavy vehicles Source: VicRoads, 2012

The above data can be summarised as follows:

- There is a relatively even split (per direction) in total traffic volumes over an average 24 hour period, though PM peak volumes are generally higher than in the AM peak in both directions by between 19% and 26%; and
- The volume of heavy vehicles is up to 33.8% on an average weekday, which is a significant proportion of overall traffic, indicating its demand as a freight route.

The hourly volumes presented in Table 6 demonstrate that the Western Highway is currently operating well below theoretical capacity. The maximum observed peak hour volume for available data on Western Highway (Section 3) is 275 vehicles in the north-westbound direction at the survey location, approximately 900 vehicles per direction per hour below theoretical capacity.

As a comparison, traffic volume information was previously collected by CPG for the week 18 May 2009 to 24 May 2009. This data is summarised in Table 7 by direction, for average daily volumes and median peak hour volumes.

Table 7 Western Highway Traffic Volumes East of Great Western (Approx. Ch. 11000 m)

Direction	Average 7-Day Volume (veh/day)	Average Weekday Volume (veh/day)	Maximum Average Midweek AM Peak Volume (veh/h)	Maximum Average Midweek PM Peak Volume (veh/h)
Northbound	All Veh: 2,693 HV: 659 (24.4%)	All Veh: 2,893 HV: 784 (27.0%)	174 (11:00 am-12:00 pm)	233 (4:00 pm-5:00 pm)
Southbound	All Veh: 2,681 HV: 629 (23.5%)	All Veh: 2,868 HV: 770 (26.9%)	186 (10:00 am-11:00 am)	217 (4:00 pm-5:00 pm)
TOTAL	All Veh: 5,374	All Veh: 5,761	359 (11:00 am-12:00 pm)	450 (4:00 pm-5:00 pm)

All Veh – all vehicles; HV – heavy vehicles Source: CPG Traffic Assessment, 2009

The above data indicates that the directional traffic volume splits and percentage of heavy vehicles are similar to the VicRoads data. Additionally, the data indicates that traffic volumes have increased by approximately 10% over the past three years.

Forecast Traffic Volumes

The CPG Traffic Assessment Report, 2009 (source for the traffic volumes) has adopted the DOTARS 2007 Melbourne – Adelaide Corridor Strategy growth rate of 1.59%. This growth rate has a design period until 2040. To maintain consistency this growth rate has been utilised for the Western Highway EES assessment. It is assumed that the proportion of heavy vehicles does not change.

Based on the above growth rate, the daily two-way traffic volumes are expected to increase to 9,395 vehicles per day (vpd), for a 5-day average. The forecasted traffic volumes are presented in Table 8.

Table 8 Forecast Future Traffic Volumes (two-way direction)

Year	7 day average (veh/day)	7 day %HV (HV/day)	5 day average (veh/day)	5 day %HV (HV/day)
2009	5,374	24% (1,290)	5,761	27% (1555)
2016	6,002	24% (1,440)	6,434	27% (1737)
2026	7,027	25% (1,757)	7,533	28% (2109)
2040	8,764	25% (2191)	9,395	28% (2630)

Source: CPG Traffic Assessment, 2009, GHD Analysis

Travel Times

While travel time data for the length of the Project has not been collected as part of this study, an assessment of travel time impacts can be derived by considering estimated travel times based on observed travel speeds.

Traffic data collected east of Great Western (Ch. 11000 m) reveal the mean operating traffic speed to be 96 km/h and the 85th percentile speed to be 101.5 km/h. To estimate travel time, it has been conservatively assumed that the average operating speed is 5 km/h below the posted speed limit at all times. This assumption is based on the recoded mean speed at a point location and takes into consideration vehicles slowing to enter/exit the highway and therefore slowing vehicles travelling behind. Additionally, there was congestion observed during site inspections and the traffic volumes indicate there is sufficient capacity not to create congestion along the link, therefore it has been assumed that no other delays are likely to regularly occur. The speed limit reduces to 60 km/h through the Great Western township, which has been approximated to be a length of 2 km and has been taken into account. Accordingly, the estimated travel time for the Project length (approximately 24 km) is approximately 16 minutes.

5.3.2 Intersecting Roads

Along the length of the Project Area, there are a number of intersecting roads and access points. As part of CPG's Traffic Analysis Report and VicRoads Western Highway Project Proposed Operating Speed Zones report, potential intersection treatments for the major intersecting roads have been identified in order to accommodate an increase in the posted speed limit to 110 km/h. The major intersecting side roads are listed as:

- Garden Gully Road/Military Bypass Road/Eaglehawk Road;
- Kimbarra Road;
- St Ethels Road/Delahoy Road;
- Garden Gully Road/Stephenson Street;
- Sandy Creek Road/Moynston-Great Western Road;
- Bests Road/Paterson Road;
- St George Road;
- Churchill Crossing Road;
- Panrock Reservoir Road; and
- London Road.

It is noted that these intersecting roads are currently priority controlled, with Western Highway the priority movement.

The Austroads Guide to Road Design Part 4A stipulates that the Safe Intersection Sight Distance (SISD) to be provided on a major 100 km/h road (the existing speed limit of Western Highway) at any intersection is 262 m. If and when the Western Highway is upgraded to a 110 km/h road, the required SISD is 300 m. Unless it is specifically noted, the intersecting roads have a SISD in excess of 300 m and this distance is considered satisfactory.

5.3.2.1 Garden Gully Road/Military Bypass Road/Eaglehawk Road

Access to Garden Gully Road, Military Bypass Road and Eaglehawk Road is provided at the same Give Way priority controlled staggered cross-intersection on the Western Highway. Garden Gully Road has direct access to Western Highway, however access to Military Bypass Road and Eaglehawk Road are provided by service roads. Vertical and horizontal grade at the intersection provides for adequate sight distance at the intersection.

Garden Gully Road and Military Bypass Road are sealed two-lane, two way roads. Eaglehawk Road is an unsealed two-lane, two-way road with a short 60 m sealed section at the intersection with the service road. It also has no posted speed limit. It is assumed that the default rural speed limit of 100 km/h applies to each of these roads. Of the three roads, Garden Gully Road is the only road that provides through access, leading to Garden Gully. Military Bypass Road and Eaglehawk Road generally provide local access only.

The intersection layout is shown in Figure 5.

Along Western Highway, a channelised right –turn (CHR) treatment and auxiliary left-turn (AUL) treatment providing for right-turn and left-turn movements exists on both approaches to the intersection. Accordingly, through this section, Western Highway has four traffic lanes.

Figure 5 Garden Gully Road/Military Bypass Road/Western Highway Intersection

Aerial photograph shows Garden Gully Road and service road access to Military Bypass Road and Eaglehawk Road. CHR and AUL treatments exist on both approaches of Western Highway.

Traffic volume information for Garden Gully Road, Military Bypass Road and Eaglehawk Road was collected for the week 24 May 2009 to 3 June 2009. This data is summarised in Table 9 by direction, in terms of average daily volumes and median peak hour volumes.

Table 9 Traffic Counts: Garden Gully Road, Military Bypass Road and Eaglehawk Road

Direction	Average 7-day volume (veh/day)	Average 5-day volume (veh/day)	Median Midweek AM Peak Volume (veh/h)	Median Midweek PM Peak Volume (veh/h)
Garden Gully Road, 200 m south of Western Highway				
Northbound	51 (8% HV)	55 (9% HV)	6 (8:00 am-9:00 am)	8 (4:00 pm-5:00 pm)
Southbound	51 (8% HV)	55 (9% HV)	4 (8:00 am-9:00 am)	7 (4:00 pm-5:00 pm)
TOTAL	102	110	10 (8:00 am-9:00 am)	16 (4:00 pm-5:00 pm)
Military Bypass Road, 20 m north of Western Highway				
Northbound	47 (11% HV)	40 (12% HV)	4 (11:00 am-12:00 pm)	6 (1:00 pm-2:00 pm)
Southbound	51 (6% HV)	46 (9% HV)	4 (9:00 am-10:00 am)	8 (4:00 pm-5:00 pm)
TOTAL	98	86	6 (11:00 am-12:00 pm)	12 (4:00 pm-5:00 pm)
Eaglehawk Road, 20 m north of Western Highway				
Eastbound	5 (0% HV)	5 (20% HV)	1 (7:00 am-8:00 am)	0 (7:00 pm-8:00 pm)
Westbound	6 (0% HV)	5 (0% HV)	1 (11:00 am-12:00 pm)	1 (5:00 pm-6:00 pm)
TOTAL	11	11	2 (11:00 am-12:00 pm)	1 (7:00 pm-8:00 pm)

All Veh – all vehicles; HV – heavy vehicles

Source: CPG Traffic Assessment, 2009

5.3.2.2 Kimbarra Road

Kimbarra Road is an unsealed two-lane, two-way road with a 150 m sealed section on approach to the intersection with Western Highway. Kimbarra Road forms a Give Way priority controlled T-intersection with Western Highway, where AUL and CHR treatments are provided along Western Highway approaches. The vertical and horizontal grade at the intersection provides for adequate sight distance at the intersection. Photographs illustrating the intersection arrangement are presented in Figure 6 and Figure 7.

Kimbarra Road has no posted speed limit and accordingly the rural speed limit of 100 km/h applies.

Figure 6 Kimbarra Road, view north-east

Kimbarra Road cross-section

Figure 7 Western Highway at Ch. 8700 m, view south

Kimbarra Road intersection view from Western Highway, showing CHR and AUL intersection treatments.

Traffic volume information was collected for the week 25 May 2009 to 31 May 2009. This data is summarised in Table 10 by direction, in terms of average daily volumes and median peak hour volumes.

Table 10 Traffic Counts: Kimbarra Road, 20 m north of Western Highway

Direction	Average 7-day volume (veh/day)	Average 5-day volume (veh/day)	Median Midweek AM Peak Volume (veh/h)	Median Midweek PM Peak Volume (veh/h)
Northbound	20 (15% HV)	21 (15% HV)	2 (11:00 am-12:00 pm)	2 (12:00 pm-1:00 pm)
Southbound	20 (5% HV)	21 (5% HV)	1 (11:00 am-12:00 pm)	3 (4:00 pm-5:00 pm)
TOTAL	40	41	3 (11:00 am-12:00 pm)	5 (12:00 pm-1:00 pm)

All Veh – all vehicles; HV – heavy vehicles

Source: CPG Traffic Assessment, 2009

5.3.2.3 St Ethels Road/Delahoy Road

St Ethels Road and Delahoy Road are local unsealed two-lane, two-way roads that form a Give Way priority controlled cross intersection with Western Highway. Both roads have no posted speed limit and accordingly the default 100 km/h rural speed limit applies. It is noted that Delahoy Road has two access points to Western Highway, as described below and shown in Figure 8 and Figure 9:

- A left-out, right-in and through access; and
- A left-in, right-out access.

Along the Western Highway, minimum standard basic left-turn (BAL) and basic right-turn (BAR) treatments are provided for left-turning and right-turning vehicles into either of the intersecting roads.

Figure 10 and Figure 11 present photographs of St Ethels Road and the intersection view from the highway.

Figure 8 Delahoy Road, view south-east to Western Highway

Delahoy Road cross section showing two access points at Western Highway.

Figure 9 Delahoy Road left-in/right-out access, view south-east to Western Highway

Left-in and right-out access point on Western Highway.

Figure 10 St Ethels Road, view south-east

St Ethels Road cross-section

Figure 11 Western Highway at Ch. 11200 m, view north-west

Western Highway at the intersection with Delahoy Road and St Ethels Road. It is noted that no channelised or auxiliary lane treatments are provided.

Traffic volume information for St Ethels Road and Delahoy Road was collected for the week 19 May 2009 to 25 May 2009. This data is summarised in Table 11 by direction, in terms of average daily volumes and median peak hour volumes.

Table 11 Traffic Counts: St Ethels Road and Delahoy Road

Direction	Average 7-day volume (veh/day)	Average 5-day volume (veh/day)	Median Midweek AM Peak Volume (veh/h)	Median Midweek PM Peak Volume (veh/h)
St Ethels Road, 300 m south of Western Highway				
Northbound	12 (0% HV)	13 (0% HV)	3 (8:00 am-9:00 pm)	1 (1:00 pm-2:00 pm)
Southbound	13 (0% HV)	13 (0% HV)	2 (8:00 am-9:00 am)	1 (5:00 pm-6:00 pm)
TOTAL	25	26	5 (8:00 am-9:00 am)	2 (5:00 pm-6:00 pm)
Delahoy Road, 200 m north of Western Highway				
Northbound	13 (0% HV)	14 (0% HV)	1 (10:00 am-11:00 am)	3 (5:00 pm-6:00 pm)
Southbound	13 (0% HV)	13 (0% HV)	2 (8:00 am-9:00 am)	1 (5:00 pm-6:00 pm)
TOTAL	26	27	3 (8:00 am-9:00 am)	5 (5:00 pm-6:00 pm)

All Veh – all vehicles; HV – heavy vehicles Source: CPG Traffic Assessment, 2009

5.3.2.4 Garden Gully Road/Stephenson Street

Garden Gully Road and Stephenson Street form a staggered T-intersection with Western Highway in the Great Western township, where Garden Gully Road is Give Way priority controlled and Stephenson Street is Stop sign controlled.

Garden Gully Road is a sealed two-lane, two-way road with a posted speed limit of 60 km/h. Garden Gully Road crosses the rail line and links to Garden Gully further to the south.

On the northern side of Western Highway, Stephenson Street is an unsealed two-lane, two-way road running parallel to the highway that provides access to properties on the northern side. Stephenson Street has no posted speed limit, although given that it is within the Great Western township urban limit and unsealed, the default speed limit of 50 km/h applies.

In the vicinity of this intersection, the Western Highway has a posted speed limit of 60 km/h. A CHR and AUL treatment provides for right-turn and left-turn movements into Garden Gully Road, however only minimum BAR and BAL treatments are provided for Stephenson Street. Vertical and horizontal grade at the intersection provides for adequate sight distance at the intersection.

Photographs illustrating the intersection arrangement are presented in Figure 12 to Figure 15.

Figure 12 Garden Gully Road, view north

Garden Gully Road cross-section

Figure 13 Stephenson Street, view north to Western Highway

Stephenson Street cross-section showing a short sealed section at the mouth of the intersection.

Figure 14 Western Highway at Ch. 12400 m, view north-west

Western Highway at the intersection with Garden Gully Road showing AUL and CHR treatments

Figure 15 Western Highway at Ch. 12400 m, view north-west

Western Highway at the intersection with Stephenson Street. It is noted that no channelised or auxiliary turn lane treatments are provided.

Traffic volume information for Garden Gully Road was collected for the week 24 May 2009 to 30 May 2009. This data is summarised in Table 12 by direction in terms of average daily volumes and median peak hour volumes.

Table 12 Traffic Counts: Garden Gully Road, 300 m south of Western Highway

Direction	Average 7-day volume (veh/day)	Average 5-day volume (veh/day)	Median Midweek AM Peak Volume (veh/h)	Median Midweek PM Peak Volume (veh/h)
Northbound	58 (10% HV)	63 (13% HV)	6 (10:00 am-11:00 am)	11 (3:00 pm-4:00 pm)
Southbound	49 (14% HV)	53 (17% HV)	5 (10:00 am-11:00 am)	4 (12:00 pm-1:00 pm)
TOTAL	107	116	11 (10:00 am-11:00 am)	14 (3:00 pm-4:00 pm)

All Veh – all vehicles; HV – heavy vehicles

Source: CPG Traffic Assessment, 2009

5.3.2.5 Sandy Creek Road/Moyston-Great Western Road

Sandy Creek Road and Moyston-Great Western Road intersect with Western Highway at a Give Way priority controlled cross-intersection in the Great Western township. The roads are known locally in Great Western as Paxton Street.

Paxton Street is a sealed two-lane, two-way road with a posted speed limit of 60 km/h. At the urban limit of Great Western, the speed limit increases to 80 km/h, then to 100 km/h beyond that. In the vicinity of this intersection and through the Great Western township only minimal BAR and BAL intersection treatments are provided due to the reduced speed limit. Photographs showing Paxton Street cross-sections are presented in Figure 16 and Figure 17.

Figure 16 Paxton Street north, view to Moyston-Great Western Road

Sandy Creek Road cross-section

Figure 17 Paxton Street south, view to Sandy Creek Road

Moynston-Great Western Road cross-section

Traffic volume information for the north and south approaches of Paxton Street were collected by CPG for the week 9 June 2009 to 15 June 2009. This data is summarised in Table 13 by direction, in terms of average daily volumes and median peak hour volumes.

Table 13 Traffic Counts: Paxton Street, 20 m north and south of Western Highway

Direction	Average 7-day volume (veh/day)	Average 5-day volume (veh/day)	Median Midweek AM Peak Volume (veh/h)	Median Midweek PM Peak Volume (veh/h)
20 m north of Western Highway (Sandy Creek Road)				
Northbound	71 (17% HV)	76 (20% HV)	5 (8:00 am-9:00 am)	10 (4:00 pm-5:00 pm)
Southbound	94 (17% HV)	102 (19% HV)	8 (9:00 am-10:00 am)	11 (4:00 pm-5:00 pm)
TOTAL	165	178	12 (8:00 am-9:00 am)	20 (4:00 pm-5:00 pm)
20 m south of Western Highway (Moyston-Great Western Road)				
Northbound	132 (5% HV)	147 (6% HV)	12 (8:00 am-9:00 am)	14 (3:00 pm-4:00 pm)
Southbound	125 (6% HV)	139 (8% HV)	10 (10:00 am-11:00 am)	12 (4:00 pm-5:00 pm)
TOTAL	257	286	21 (8:00 am-9:00 am)	24 (3:00 pm-4:00 pm)

All Veh – all vehicles; HV – heavy vehicles Source: CPG Traffic Assessment, 2009

5.3.2.6 Bests Road/Paterson Road

Bests Road is a sealed two-lane, two-way road with a posted speed limit of 100 km/h, which provides access to Bests Winery and Stephenson Street, a local street running parallel to Western Highway through the town of Great Western.

Bests Road forms a Give Way priority controlled staggered cross-intersection with Paterson Road and Western Highway, with Bests Road and Paterson Road as the northern and southern approaches, respectively. Paterson Road is an unsealed two-lane, two-way road providing local access to properties.

In the vicinity of this intersection, the Western Highway has a posted speed limit of 80 km/h as it is within the urban limit of Great Western. Along the Western Highway, a CHR and AUL treatment provides for right-turn and left-turn movements into Bests Road, however only minimal BAR and BAL treatments are provided for Paterson Road. Vertical and horizontal grade at the intersection provides for adequate sight distance at the intersection.

Photographs illustrating the intersection arrangement are presented in Figure 18 to Figure 21.

Figure 18 Bests Road, view north

Bests Road cross-section.

Figure 19 Paterson Road, view south

Paterson Road cross-section

Figure 20 Western Highway at Ch. 15200 m, view north-west

Western Highway view showing CHR treatment (foreground) AUL treatment (background) into Bests Road.

Figure 21 Bests Road, view south to Paterson Road

View of Bests Road/Paterson Road/Western Highway intersection.

Traffic volume information for Bests Road was collected for the week 25 May 2009 to 31 May 2009. This data is summarised in Table 14 by direction, in terms of average daily volumes and median peak hour volumes.

Table 14 Traffic Counts: Bests Road, 300 m north of Western Highway

Direction	Average 7-day volume (veh/day)	Average 5-day volume (veh/day)	Median Midweek AM Peak Volume (veh/h)	Median Midweek PM Peak Volume (veh/h)
Northbound	66 (6% HV)	75 (8% HV)	12 (7:00 am-8:00 am)	8 (3:00 pm-4:00 pm)
Southbound	67 (6% HV)	77 (9% HV)	6 (11:00 am-12:00 pm)	9 (2:00 pm-3:00 pm)
TOTAL	133	152	14 (7:00 am-8:00 am)	14 (3:00 pm-4:00 pm)

All Veh – all vehicles; HV – heavy vehicles Source: CPG Traffic Assessment, 2009

5.3.2.7 St George Road

St George Road is a sealed narrow two-way road with no line marking or posted speed limit. It is therefore assumed that the rural speed limit of 100 km/h applies.

St George Road crosses the rail line to the west and links to Moynston-Great Western Road. St George Road forms a Give Way priority controlled T-intersection with Western Highway. Along Western Highway an AUL treatment provides for left turn movements, however only the minimal BAR treatment is provided for right-turn movements. Vertical and horizontal grade at the intersection provides for adequate sight distance at the intersection.

Photographs illustrating the intersection arrangement are presented in Figure 22 and Figure 23.

Figure 22 St George Road , view south-west

St George Road cross-section.

Figure 23 Western Highway at Ch. 15800 m, view north-west

Western Highway at the intersection with St George Road showing AUL treatment.

Traffic volume information was collected for the week 28 May 2009 to 3 June 2009. This data is summarised in Table 15 by direction, in terms of average daily volumes and median peak hour volumes.

Table 15 Traffic Counts: St George Road, 200 m south of Western Highway

Direction	Average 7-day volume (veh/day)	Average 5-day volume (veh/day)	Median Midweek AM Peak Volume (veh/h)	Median Midweek PM Peak Volume (veh/h)
Northbound	40 (5% HV)	42 (5% HV)	6 (8:00 am-9:00 am)	4 (4:00 pm-5:00 pm)
Southbound	37 (8% HV)	36 (6% HV)	4 (11:00 am-12:00 pm)	5 (5:00 pm-6:00 pm)
TOTAL	76	78	8 (8:00 am-9:00 am)	9 (5:00 pm-6:00 pm)

All Veh – all vehicles; HV – heavy vehicles

Source: CPG Traffic Assessment, 2009

5.3.2.8 Churchill Crossing Road

Churchill Crossing Road is an unsealed two-lane, two-way road with a short 60 m sealed section leading to the intersection with Western Highway. Churchill Crossing Road crosses the rail line to the west and links to Panrock Reservoir Road.

Churchill Crossing Road forms a Stop priority controlled T-intersection with Western Highway. Along Western Highway an AUL treatment provides for left turn movements, however only the minimal BAR treatment is provided for right-turn movements. Vertical and horizontal grade at the intersection provides for adequate sight distance at the intersection.

Photographs illustrating the intersection arrangement are presented in Figure 24 and Figure 25.

Figure 24 Churchill Crossing Road, view south-west from Western Highway

Churchill Crossing Road cross-section.

Figure 25 Western Highway at Ch. 18000 m, view south-east

Western Highway at the intersection with Churchill Crossing Road showing AUL treatment.

Traffic volume information was collected for the week 28 May 2009 to 3 June 2009. This data is summarised in Table 16 by direction, in terms of average daily volumes and median peak hour volumes.

Table 16 Traffic Counts: Churchill Crossing Road, 250 m south of Western Highway

Direction	Average 7-day volume (veh/day)	Average 5-day volume (veh/day)	Median Midweek AM Peak Volume (veh/h)	Median Midweek PM Peak Volume (veh/h)
Northbound	33 (9% HV)	33 (12% HV)	4 (8:00 am-9:00 am)	3 (3:00 pm-4:00 pm)
Southbound	32 (12% HV)	33 (15% HV)	3 (8:00 am-9:00 am)	5 (5:00 pm-6:00 pm)
TOTAL	65	66	7 (8:00 am-9:00 am)	8 (5:00 pm-6:00 pm)

All Veh – all vehicles; HV – heavy vehicles

Source: CPG Traffic Assessment, 2009

5.3.2.9 Panrock Reservoir Road

Panrock Reservoir Road is a sealed two-lane, two-way road with unsealed shoulders. There is no posted speed limit and accordingly the default rural speed limit of 100 km/h applies. A caravan park and golf course are located off Panrock Reservoir Road to the south of the Western Highway. Associated car parking is available on either side of Panrock Reservoir Road, which is set back approximately 10 m from the Western Highway roadway and shielded by guard fencing.

Panrock Reservoir Road forms a Give Way priority T-intersection with Western Highway, where it flares slightly but still consists of one lane in each direction. Along Western Highway a CHR treatment facilitates right turn movement into Panrock Reservoir Road and an AUL treatment provides for left turn movements. Vertical and horizontal grade at the intersection provides for adequate sight distance at the intersection.

Photographs illustrating the intersection arrangement are presented in Figure 26 and Figure 27.

Figure 26 Panrock Reservoir Road, view south

Panrock Reservoir Road cross-section.

Figure 27 Western Highway at Ch. 22100 m, view south-east

Western Highway at the intersection with Panrock Reservoir Road showing CHR and AUL treatments and car parking to the right of the picture.

Traffic volume information was collected for the week 28 May 2009 to 3 June 2009. This data is summarised in Table 17 by direction, in terms of average daily volumes and median peak hour volumes.

Table 17 Traffic Counts: Panrock Reservoir Road, 350 m south of Western Highway

Direction	Average 7-day volume (veh/day)	Average 5-day volume (veh/day)	Median Midweek AM Peak Volume (veh/h)	Median Midweek PM Peak Volume (veh/h)
Northbound	81 (6% HV)	75 (8% HV)	9 (8:00 am-9:00 am)	7 (4:00 pm-5:00 pm)
Southbound	83 (4% HV)	76 (5% HV)	6 (10:00 am-11:00 am)	10 (4:00 pm-5:00 pm)
TOTAL	165	151	12 (9:00 am-10:00 am)	17 (4:00 pm-5:00 pm)

All Veh – all vehicles; HV – heavy vehicles

Source: CPG Traffic Assessment, 2009

5.3.2.10 London Road

London Road (C238) connects Western Highway to the Stawell town centre. It is a sealed two-lane, two-way road with no posted speed limit and accordingly the default rural speed limit of 100 km/h applies.

London Road forms a Give Way priority controlled T-intersection with Western Highway where the major movements (from and to London Road) are the north-to-east left-turn towards Ararat, and the east-to-north right-turn towards Stawell. London Road flares out on the approach side to include a continuous left-turn lane with a large radius to allow for higher speed turns and a channelised right-turn lane. Similarly, on the departure side, it includes a right-in lane and a merging left-in slip lane from Western

Highway. Vertical and horizontal grade at the intersection provides for adequate sight distance at the intersection.

Along Western Highway a CHR treatment facilitates right turn movement into London Road and a CHL treatment provides for left turn movements. It is noted that the CHL treatment has no deceleration length.

An aerial photograph illustrating the intersection arrangement is presented in Figure 28.

Figure 28 Western Highway/London Road Intersection

Aerial photograph shows channelised treatments on Western Highway and London Road. It is noted that the CHL treatment from Western Highway (north-west) to London Road (north) has no deceleration length.

Traffic volume information was collected for the week 28 May 2009 to 3 June 2009. This data is summarised in Table 18 by direction, in terms of average daily volumes and median peak hour volumes. The data indicates that London Road has a significantly greater volume of traffic travelling along the road compared to the other intersecting roads within this section of the Western Highway (Ararat to Stawell). At the time of the traffic counts (2009), London Road had approximately 6 times the average 7-day volume of traffic travelling along the road compared to Moyston Road, Great Western, (the next highest intersecting road within the section).

Table 18 Traffic Counts: London Road, 600 m north of Western Highway

Direction	Average 7-day volume (veh/day)	Average 5-day volume (veh/day)	Median Midweek AM Peak Volume (veh/h)	Median Midweek PM Peak Volume (veh/h)
Northbound	653 (6% HV)	693 (7% HV)	45 (11:00 am-12:00 pm)	69 (5:00 pm-6:00 pm)
Southbound	623 (6% HV)	627 (6% HV)	49 (11:00 am-12:00 pm)	55 (5:00 pm-6:00 pm)
TOTAL	1,276	1,361	93 (11:00 am-12:00 pm)	124 (5:00 pm-6:00pm)

All Veh – all vehicles; HV – heavy vehicles

Source: CPG Traffic Assessment, 2009

5.3.2.11 Other Minor Roads/Access Points

Along Section 3 of Western Highway there are a number of other minor roads in addition to those discussed. These are typically two-way gravel roads providing access to properties. Table 19 provides some detail of these minor roads.

Table 19 Other Intersecting Side Roads

Robson Road

Cross-section: Unsealed two-lane/two-way road

Western Highway intersection treatment: Give Way priority controlled, minimal BAR, overtaking lane in the south-eastbound direction

Hurst Road

Cross-section: Unsealed two-lane/two-way road

Western Highway intersection treatment: No sign control, therefore default T-intersection priority rule applies, minimal BAR and BAL

Harvey Lane

Note: Located on a curve immediately east of the Oddfellows rail bridge. Intersection sight distance is 350 m to the north-west and 150 m to the south-east. This intersection has substandard SISD (Safe Intersection Sight Distance).

Cross-section: Unsealed two-lane/two-way road

Western Highway intersection treatment: Stop priority controlled, minimal BAR and BAL

Humphrey Lane Cross-section: Unsealed two-lane/two-way road Western Highway intersection treatment: Stop priority controlled, minimal BAR, overtaking lane in the south-eastbound direction
Briggs Lane Cross-section: Unsealed two-lane/two-way road Western Highway intersection treatment: Give Way priority controlled, AUR treatment in the north-westbound direction, BAL in the south-eastbound direction, overtaking lane in the south-eastbound direction
Allanvale Road Cross-section: Sealed two-lane/two-way road Western Highway intersection treatment: Give Way priority controlled, CHR treatment and overtaking lane in the north-westbound direction, overtaking lane in the south-eastbound direction
Old Brewery Road Cross-section: Unsealed two-lane/two-way road Western Highway intersection treatment: Give Way priority controlled, minimal BAR and BAL
McDonalds Park Road/Petticoat Gully Road Note: Forms staggered T-intersection Cross-section: McDonalds Park Road is an unsealed track and Petticoat Gully Road is an unsealed two-lane/two-way road Western Highway intersection treatment: Stop priority controlled on Petticoat Gully Road, Give Way priority controlled on McDonalds Park Road, minimal BAR and BAL
The Majors Road/Main Divide Road Note: Forms staggered T-intersection Cross-section: Both unsealed two-lane/two-way roads Western Highway intersection treatment: Give Way priority controlled, minimal BAR and BAL, overtaking lane in the north-westbound direction

There are also a number of direct access points onto the road reserve of the Western Highway. These points are typically a gate or driveway at the property boundary. According to a VicRoads audit of the direct property accesses onto the Western Highway, there are 30 property access points, in Section 3. These roads have not been assessed due to the limited number of vehicle movements, however alternative access arrangements would need to be provided as part of the project.

5.4 Farm Machinery

VicRoads has noted the possibility of farm machinery (e.g. tractors, loaders etc.) movements across the Western Highway. Though these movements are expected to be infrequent (for the majority of the properties), and that none were observed during the on-site observations, consideration shall be given for these movements and how they can be managed.

During consultation, a few land owners have indicated that they currently have farm machinery movements across or along the Highway. The land parcels that would be affected include:

- Property ID: 2969 and 2982 – Located near Panrock Reservoir Road
- Property ID: 2952, 2953, 2954, 2968, 2970 and 2972 – Located near Great Western
- Property ID: 2899, 2900, 2901, 2902, 2903, 2904, 2923, 2928, 2929, 2934, 2935, 2936, 2937, 2938, 2939 and 2940 – Bests Winery.

5.5 Casualty Crash History

An assessment of the casualty crash history, provided directly from VicRoads, has been completed for the five year period between 1 January 2007 and 31 December 2011. A casualty crash is defined as any collision in which a police report was filed, regardless of the seriousness of the injury. The crash statistics are mapped in Appendix A.

The fact that crashes have (or have not) occurred at a particular site is not an indication of the current safety of that site, or of the likelihood of future crashes. They do however, provide valuable context of a site's past safety performance and crash trends may help identify a particular road safety problem. The assessment was completed for the length of the Western Highway to be duplicated between Pollard Lane, Ararat and Gilchrist Road, Stawell.

The review of the crash data indicates that in the five year period of 2007 to 2011, there have been 12 casualty crashes within the study area at 12 separate locations.

The following is a summary of the 12 crashes:

- No collisions resulted in a fatality;
- No collisions occurred in 2011;
- Four collisions resulted in serious injury;
- Six collisions were single vehicle run-off-road crashes, with five of these occurring on a straight section of road;
- Two single vehicle run-off-road to the left collisions occurred in the vicinity of Main Divide Road;
- Three collisions have occurred in the Great Western township. These were three separate crashes types and at separate locations and all resulted in 'other' type injuries;
- Four collisions were intersection related, (e.g. right-turn crash, rear-end crash etc.). These occurred at intersections of Petticoat Gully/McDonalds Park Road, Old Brewery Road, Rennie Street (Great Western) and Robson Road; and
- There is no obvious trend of collisions that suggest that there are road safety issues at specific locations along this section of Western Highway.

5.6 Bicycle Infrastructure

There is no designated bicycle infrastructure on Western Highway within the Project Area. There are 2.5 m sealed shoulders on the existing Highway which may be used by cyclists.

5.7 Heavy Vehicle Facilities

There are no major heavy vehicle rest areas along Western Highway within the study area (Section 3). Currently, the nearest rest areas suitable for heavy vehicles (e.g. service centres with truck parking) are located to the east of Ararat and west of Stawell.

There are however, three rest areas suitable for light vehicles along the length of Western Highway between Ararat and Stawell. These rest areas are all classified to be minor rest areas with rubbish bins, seating and shade from trees. Toilets are not provided at a minor rest area.

It is understood that rest area facilities would be provided along the Western Highway as part of the Project. These provisions would be in accordance with the current standards. The spacing of rest areas varies depending on the type of rest areas provided, the volume of traffic travelling along the road and the mix of traffic. As a general rule, the national rest area guidelines state:

- Major Rest Areas should be located at maximum intervals of 100 km;
- Minor Rest Areas should be located at maximum intervals of 50 km; and
- Truck Parking Bays should be located at maximum intervals of 30 km.

It is expected that the access to the rest areas provided along the Western Highway would be safe and also comply with the access requirements to a freeway standard road.

5.8 Public Transport

5.8.1 Rail Services

The Melbourne – Adelaide rail line is a standard gauge line with passenger and freight services. Within the study area, the rail line is a single bi-directional track which predominately follows the general alignment of the Western Highway. In general, the rail line is located on the east of the Western Highway from Ararat to Armstrong, to the west of the Western Highway from north of Armstrong to south of Stawell, then on the east to Stawell and beyond. The rail line does not directly interact with the Western Highway as both crossings, at Armstrong rail bridge and Oddfellows rail bridge, are grade separated.

The Melbourne-Adelaide Great Southern Rail 'The Overland' passenger rail service operates between Ararat and Stawell. There is one north-westbound service on Mondays, Wednesdays and Fridays; and one south-eastbound service on Tuesdays and Thursdays. There are approximately 25 – 30 freight trains that travel each way along the section of track between Ararat and Stawell each week (over a 6 day working week). These trains have schedules during the year and travel between Melbourne and Adelaide, Melbourne and Horsham and Melbourne and Perth.

5.8.2 Bus Services

Regional V/Line and inter-town bus services operate along the Western Highway within the study area. The bus stops are located within the townships of Ararat, Great Western and Stawell. The bus services are listed in Table 20.

Table 20 Bus Services

Route	Mon-Fri Services	Sat Services	Sun Services
Adelaide-Melbourne	1	1	1
Melbourne-Adelaide	1	1	1
Halls Gap-Melbourne	1 (Tue, Thu only)	1	1
Melbourne-Halls Gap	1 (Mon, Wed, Fri only)	0	1
Nhill-Melbourne	7	4	5
Melbourne-Nhill	7	4	5
Ouyen-Melbourne	1	0	1
Melbourne-Ouyen	1	0	1
Stawell-St Arnaud	1 (Tue only)	0	0
St Arnaud-Stawell	1 (Tue only)	0	0
Number of services	**19 to 21**	**11**	**16**

In addition, Stawell and Ararat both have schools which coordinate school bus routes that operate along the Western Highway. The route and numbers of buses can vary annually based upon changes in student enrolment and resultant demand.

5.9 Summary of Existing Conditions

This report has set out the existing conditions of the transport network within the study area, seeking to provide sufficient detail for the reliable assessment of impacts that may result from the proposed duplication of Western Highway – Ararat to Stawell.

Key findings of the existing conditions assessment include:

- The adjacent areas obtain access to the Western Highway along this section from a number of side roads. In general, CHR treatments and AUL treatments facilitate access to some intersecting side roads, though commonly no provision is made for acceleration or deceleration on Western Highway;
- Some rural residential properties adjacent to the roadside have direct access to Western Highway. These direct property accesses currently have unrestricted right-turn access;
- The percentage of heavy vehicle volumes makes up over 27% of total daily volumes, which indicates the Western Highway's importance as a freight route;
- Currently, the Western Highway is typically operating well below the assessed theoretical capacity. The western region of Victoria will continue to grow, and traffic volumes are expected to increase as a result. In addition, the freight task to Adelaide will also continue to increase along this corridor;
- The theoretical travel time for the length of the existing Western Highway between Ararat and Stawell is approximately 16 minutes;

- There are limited overtaking opportunities within the study area, potentially impacting the efficiency and safety of the Western Highway. There are overtaking lanes situated at three locations in each direction;
- In the past five years for which there is available data, there have been 12 casualty crashes within the study area and they have occurred at 12 locations. Of these, six resulted in serious injury and single vehicle run-off-road type crashes were the most common;
- The Ararat-Stawell rail line, which generally follows the alignment of the Western Highway, has two grade-separated crossings and does not directly interact with the Western Highway; and
- Up to 21 regional bus services and a limited number of school bus services operate on the Western Highway.

6. Impact Assessment

The detailed impact assessment documented in this report addresses the potential impacts of the construction and operation of the Proposed Alignment of Section 3 of the Project. The alignment assessed is a culmination of progressive refinement of the design and consideration of potential impacts. The process for assessment and rationale for selection of the Proposed Alignment assessed in the EES is described in the 'Western Highway Project Section 3 Options Assessment Report' (February 2012) (Technical Appendix B of the EES).

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 options assessment process. A single Proposed Alignment was selected for further detailed assessment in the EES. The impacts of the Proposed Alignment, 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 Alignment assessed in the EES. The environmental risk assessment methodology and complete risk register for all specialist disciplines is presented in 'Western Highway Project Section 3 EES Environmental Risk Assessment' (November 2012) report.

The Proposed Alignment assessed in this impact assessment report is the outcome of progressive refinement through each phase of the options assessment process. The Proposed Alignment was also refined following the initial consideration of the environmental risk assessment.

Extracts from the environmental risk register prepared for the EES are provided in this report and the identified impacts of the Proposed Alignment 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 Pollard Lane, Ararat, and extends north-west for approximately 24 km to Gilchrist Road, Stawell (refer to Figure 29). This impact assessment includes consideration of the traffic impacts for the ultimate freeway (AMP1) standard configuration, as well as the interim upgrade to duplicated highway (AMP3), and the construction scenario.

An AMP1 (freeway) restricts access, allowing for grade separated interchanges and connecting service roads only, while an AMP3 (duplicated highway) road does not require service roads or grade separation of intersections. The posted speed would be 110 km/h over the Project length in both the interim and ultimate operation scenarios.

Interim Scenario:

The proposed upgrades to the Western Highway in the interim scenario include duplication of the highway to AMP3 standard. Wide-median treatments are proposed at:

- Main Divide Road-The Majors Road;
- Petticoat Gully Road;
- Allanvale Road; and
- Churchill Crossing Road.

A grade-separated interchange is proposed in the interim scenario for Garden Gully Road-Military Bypass Road and London Road. Ramps would be provided at the eastern end of Great Western (Main Street) and the western end (Main Street and Bests Road)

The majority of the remaining intersecting roads and property access would be restricted to 'left-in' and 'left-out', however some roads have been truncated. Service roads are proposed to be provided to permit access for the truncated roads.

Ultimate Scenario:

For the ultimate scenario, the proposed upgrade would be to AMP1 (freeway standard). Wide median treatments would be removed and access to these roads is provided via additional service roads connecting to Garden Gully Road-Military Bypass Road or London Road.

Road Widths:

The total width of the duplicated highway would vary depending on topography and other site constraints. This variation is typically accommodated with the median between the carriageways varying in width. Generally, the typical cross-section consists of:

- Separate eastbound and westbound carriageways which each have:
  - Two lane service road approximately 10.2 m wide;
  - Outer separator between the service road and the main carriageway. This has a minimum width of 15 m; and
  - Carriageway consisting of two 3.5 m traffic lanes and a 3.0 m outer shoulder.
- The central median between the two carriageways, which has a minimum width of 15 m and includes a 1 m median shoulder for both carriageways. Medians have been designed to be wider at designated intersection locations, where there are variations to the existing carriageway geometry or where native vegetation is to be protected within the median.

The Proposed Alignment option is summarised in Table 21.

Table 21 Proposed Alignment Description

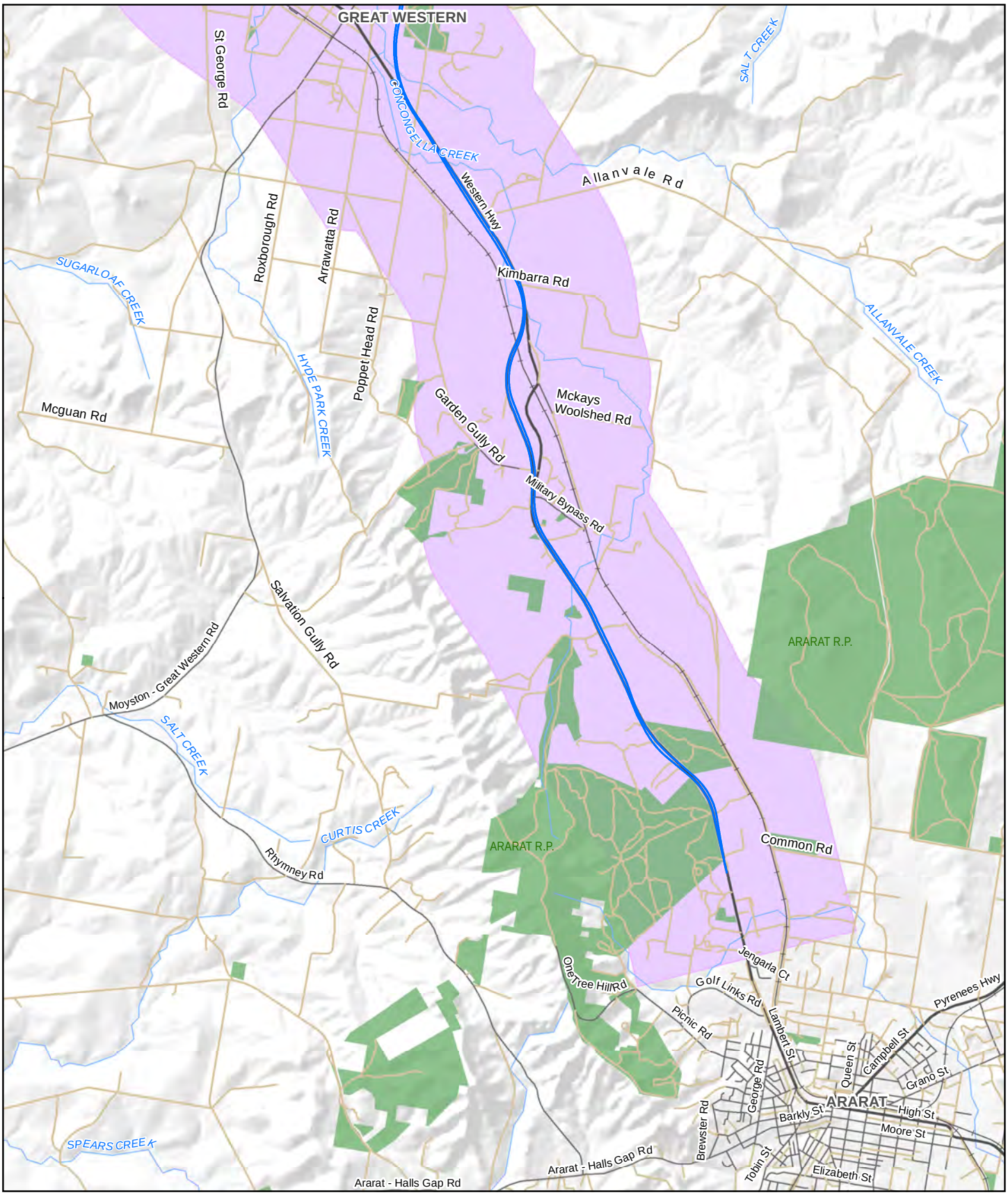
Location and Chainage (m) East to West	Description
Pollard Lane to Main Divide Road (Ch. 0 to Ch. 800)	**Duplication** of the existing highway on the southern side commencing west of McLaughlin Road with a wide median treatment at Main Di vide Road in the interim scenario.
Main Divide Road to Military Bypass Road (Ch. 800 to Ch. 5700)	**Duplication** of existing highway on the southern side transferring to the northern side west of Main Divide Road (Ch. 1400) and back to southern side eat of Petticoat Gully Road (Ch. 2600), with a median treatment from approximately 15 m to 30 m depending on the extent of constraints.
Military Bypass Road to Kimbarra Road (Ch. 5700 to Ch. 8600)	**New dual carriageway** south of the existing highway (the existing highway would be used as a service road).
Kimbarra Road to Main Street, Great Western (Ch. 8600 to Ch. 11400)	**Duplication** of existing highway on the southern side, maintaining a median from approximately 40 m in the east to 15 m in the west.
Main Street, Great Western, to Main Street, Great Western (Ch. 11400 to Ch. 16400)	**New dual carriageway** to the north of Great Western and meeting the existing highway west of Great Western at Main Street.
Main Street, Great Western to London Road (Ch. 16400 to Ch. 23500)	**Duplication** of existing highway on the southern side, with a median width varying from 15 m, in the east and west, to 100 m (near Churchill Crossing Road).
London Road to Gilchrist Road (Ch. 23500 to Ch. 24200	**New dual carriageway** south of the existing highway for the grade separated interchange of London Road. The new dual carriageway transfers to the existing highway east of Gilchrist Road approximately 24200.

The Maximum Construction Footprint comprises a 10 m buffer around all design elements, including Batter Slopes. This is sufficient to allow for manoeuvring and operation of construction equipment.

Overall, the Proposed Alignment involves two crossings of the Melbourne to Adelaide railway, eight crossings of major waterways and 26 minor waterways (tributaries, drainage lines and irrigation channels), and bypasses of both Armstrong and Great Western townships.

The topography is undulating, and the surrounding land use predominately agricultural (grazing, cropping, viticulture), apart from the forested Ararat Regional Park and other small remnants.

No other state significant infrastructure, such as major pipelines or power lines, is located within the study area.



LEGEND

- Proposed Alignment
- Study Area
- Highway
- Sealed road (arterial & local)
- Unsealed road
- Parks

Paper Size A4

0 250 500 1,000 1,500 2,000 2,500

Meters

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

N

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VicRoads
Western Highway Project

Ararat to Stawell
Alignment of proposed option

Job Number 31-27558
Revision B
Date 02 Nov 2012

Figure 29A

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

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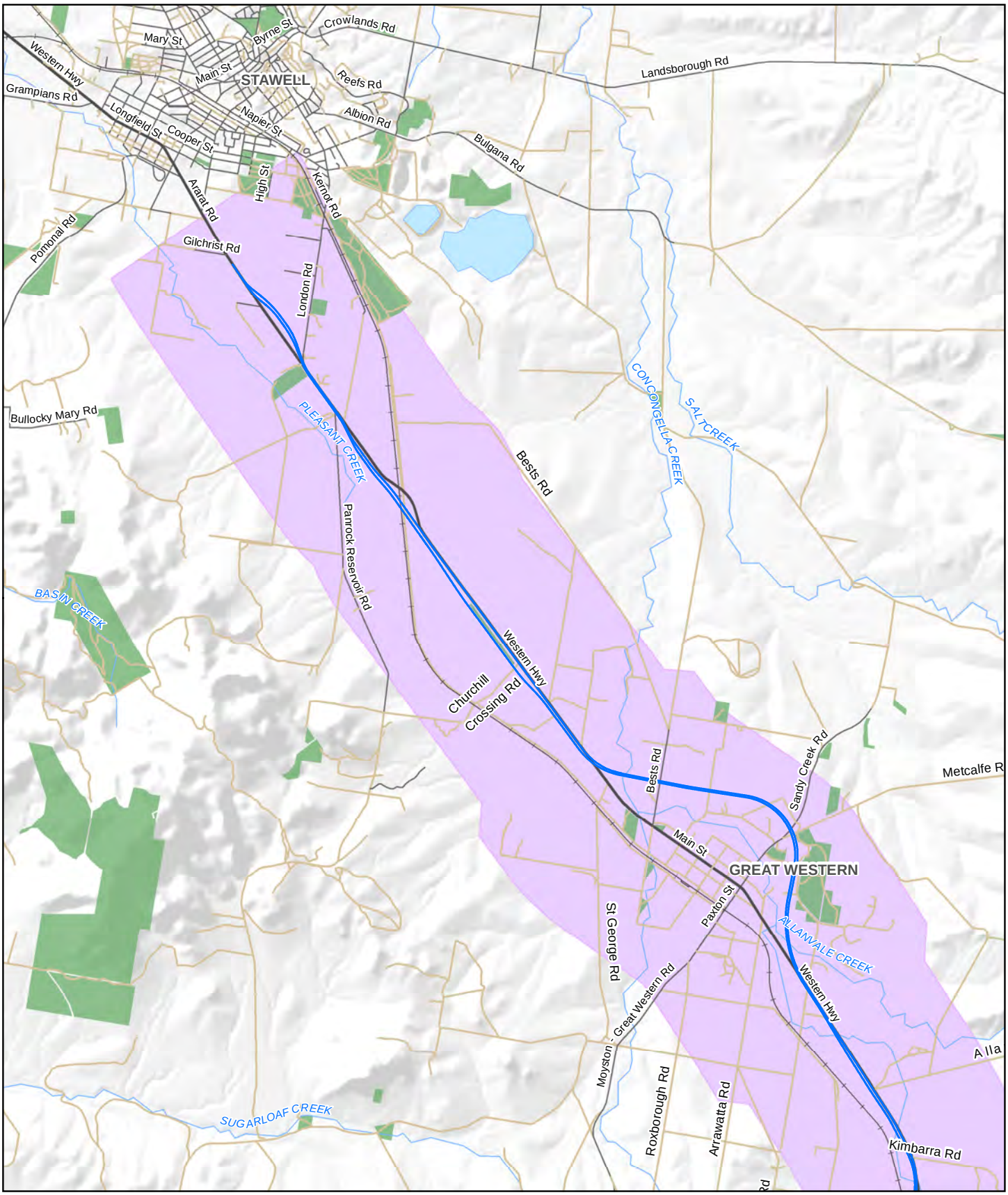
Data source: DSE, VicMap, 2012; VicRoads, 2012; GHD, Design, 2012. Created by:splaird



LEGEND

- Proposed Alignment
- Study Area
- Highway
- Sealed road (arterial & local)
- Unsealed road
- Parks

Paper Size A4

0 250 500 1,000 1,500 2,000 2,500

Meters

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

N

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Western Highway Project

Ararat to Stawell
Alignment of proposed option

Job Number 31-27558
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Figure 29B

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Data source: DSE, VicMap, 2012; VicRoads, 2012; GHD, Design, 2012. Created by:splaird

6.1.1 Direct Property Accesses

In line with the intention for the Project to achieve AMP1 access control for the ultimate solution, access points would be via grade separated intersections with freeway standard ramps or service roads.

The interim solution for the Project would have AMP3 access control for the entire length apart from a grade-separated interchange for Garden Gully Road – Military Bypass Road, London Road and ramps at the eastern and western ends of Main Street, Great Western. A number of intersections would be upgraded to have a wide median treatment allowing access to/from both directions while all other intersections would be restricted to 'left-in' and 'left-out' accesses. Additionally, existing direct property accesses would be maintained, however they would be restricted to be 'left-in' and 'left-out'.

6.1.2 Bicycle and Pedestrian Paths and Crossings

The duplicated highway is proposed to be ultimately constructed to VicRoads AMP1 standard. In rural settings, in Victoria, cyclists are generally permitted to use rural freeways, provided road access signs do not prohibit cyclists. Additionally, as stated in the VicRoads Traffic Engineering Manual, Volume 1, Section 5.4.7:

> *"Rule 95(2) (Schedule 2 of Road Rules-Victoria) enables a rider of a bicycle to use an emergency stopping lane. However, it is necessary that "Bicycle Excepted" supplementary plates continue to be erected under "Emergency Stopping Lane Only" signs (in conjunction with other signs) to encourage cyclists to use the shoulders of rural freeways rather than the traffic lane."*

For the interim solution, where the Western Highway would be AMP3 standard, cyclists would be permitted to continue to use the Highway provided road access signs do not prohibit cyclists. The VicRoads Traffic Engineering Manual, Volume 1, Section 5.4.4 states:

> *"Rule 317 of Road Rules – Victoria allows the highway authority to make inscriptions on signs limiting the operation of the sign in relation to classes of vehicles."*

Based on the VicRoads Access Management Policies and the Road Rules, it anticipated that cyclists would be able to continue using the eventual Western Highway between Ararat and Stawell for the interim and ultimate stages. The shoulder has been designed to be 3 m wide and sealed, which is sufficient width to allow cyclists to travel along the length of the Highway.

To maintain the connectivity for cyclists between Ararat and Stawell it is essential that cyclists are permitted along the highway. Accordingly, it would be important that this is supported by the signage used in the design.

No specific provisions have been included within the design for pedestrians. Pedestrians are not permitted to use the Highway under the road rules and would be required to use alternative roads.

6.1.3 Rest Areas/Truck Stops

According to VicRoads Rest Area Route Plan for the Western Highway Project, a truck parking bay is proposed on either side of the highway between Great Western and Stawell at approximately Ch. 22000. This area would permit longer term parking for heavy vehicles if required, as both Stawell and Ararat have limited facilities.

6.1.4 Lighting and Traffic Signals

It is envisaged that street lighting would be provided at all ramp access intersections for interchanges and wide median treatment locations in accordance with Chapter 6 of VicRoads Traffic Engineering Manual Volume 1 - Traffic Management which states a specified level of lighting at intersections. Flag lighting, where one or more luminaires are provided to indicate the location of the intersection, would be provided at all wide median treatment intersections. At the grade separated interchanges, lighting of the ramps and associated intersections would also be provided in accordance with Chapter 6 of VicRoads Traffic Engineering Manual Volume 1 - Traffic Management.

No traffic signals are proposed within the Project Area.

6.2 Key Issues

The Western Highway Project creates both positive benefits and adverse traffic and transport impacts for the State and surrounding region. This section provides a summary of these benefits and impacts with further detail described in Sections 6.5, 6.7 and 6.8.

The benefits the Project creates include:

- Increased capacity along the key arterial road between Melbourne and Adelaide, which would accommodate the expected future traffic volumes in 2040;
- Travel time saving by not having to reduce speed though townships and by reducing the number of intersections along the Western Highway;
- Increased safety for the township of Great Western by reducing the traffic volumes;
- Increased safety with all intersections becoming grade separated for the ultimate AMP1 (freeway) configuration. This is particularly important given the relatively high percentage of heavy vehicles travelling along the road;
- Increased safety along the route due to improved alignment, treatment of roadside hazards, provision of median, etc.;
- Improved efficiency and safety for freight by designing for High Productivity Freight Vehicles;
- Increased provision of Clear Zones;
- Improved safety due to provision of adequate rest areas; and
- Potential to reduce the traffic from local roads due to the Western Highway becoming the preferred route. This increases safety within the region as the highway is designed to be a higher standard road and would not have at-grade intersections.

The key adverse impacts the Project may create include:

- Changed road environment during construction may result in general reduction to road safety[3];
- Changed road environment during construction may result in general reduction to performance and efficiency of travel modes[4].

[3] Examples of road environment changes include heavy vehicles entering/exiting construction accesses, additional or closer roadside hazards, variable speed limits, unfamiliar conditions.

- The Project has the potential to disrupt local access routes post-construction; and
- Potential for some aspects of road safety to be degraded. For example, the increased crossing distance for wildlife may increase likelihood of collisions with wildlife.

6.3 Impact Pathways

The impact and risk assessment has been completed for the Proposed Alignment. This alignment has been chosen through an options assessment process which assessed the options against the six transport system objectives and seven decision-making principles under the *Transport Integration Act, 2010*.

The traffic and transport risk and impact assessment has taken the potential effects of the Project into consideration. The risk and impact assessment has been completed for the Proposed Alignment for both construction and post-construction (operating) conditions.

The assessment has made consideration of:

- Construction
  - Impacts on road safety;
  - Effects on traffic operations;
  - Impact on other road users, such as public transport, school buses, emergency services, cyclists, etc.;
  - Impact on road/rail crossings and interfaces;
  - Impact on existing private accesses;
  - Impacts from potential haulage routes; and
  - High-level inputs to a traffic management strategy have been developed for the Proposed Alignment. They seek to outline potential approaches to managing traffic during construction.
- Post-construction (during operation)
  - Impacts on road safety;
  - Effects on traffic operations, including impacts within the Project Area as well as consideration of impacts upstream and downstream;
  - Impact on other road users, such as public transport, school buses, emergency services, cyclists, etc.;
  - Impact on road/rail crossings and interfaces; and
  - Impact on existing private accesses and extended distances of travel for landowners.

[4] Examples of road environment changes include speed reductions, works resulting in temporary road or lane closures or cumulative impacts of the simultaneous construction of three sections of Western Highway.

The identified cause and effect pathways associated with the construction and operation of the Project may include:

- Changed road environment during construction results in general reduction to road safety[5];
- Changed road environment during construction results in general reduction to performance and efficiency of travel modes[6];
- The Project disrupts local access routes post-construction.
- Potential for some aspects of road safety to be degraded. For example:
  - Increased crossing distance for wildlife exacerbates frequency of accidents.
  - Increased distance for farm machinery to be travelling along the road.
  - Changes in atmospheric conditions i.e. fog, sunglare (due to changes of the alignment).
- Potential for some aspects of road safety to be degraded through inadequate design, including horizontal and vertical geometry, sight distance at all intersections and merge locations (ramps and service road entry/exit).
- Traffic volumes potentially increase due to induced demand and cause congestion.

These impacts are discussed in further detail in Section 6.5 and Section 6.7.

6.4 Risk Assessment

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 traffic and transport are included in the "planned controls" column of the risk assessment (Table 22) and outlined in more detail in Section 7.

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 22, 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.

Key observations from the risk assessment of the Proposed Alignment and associated construction corridor are:

- To address risks during construction, Traffic Management Plans (TMPs) would be critical to identify, assess and appropriately eliminate, reduce or mitigate road safety hazards and operational impacts in accordance with the Victorian Code of Practice for Worksite Safety – Traffic Management (2010) under the *Road Management Act 2004*;

[5] Examples of road environment changes include heavy vehicles entering/exiting construction accesses, additional or closer roadside hazards, variable speed limits, or unfamiliar conditions.
Impacted road users include private vehicles, public transport, school buses, cyclists and pedestrians.

[6] Examples of road environment changes include speed reductions, works resulting in temporary road or lane closures or cumulative impacts of the simultaneous construction of three sections of Western Highway.
Impacted users can include private vehicles, public transport, school buses, emergency services, cyclists, pedestrians and rail.

- TMPs would need to provide for all travel modes, including vehicle traffic, public transport, school buses, emergency services, cyclists, pedestrians (including school students) and rail interfaces. Haulage routes would also need to be assessed;
- Road safety audits should be completed at key design phases including functional and detailed design; and
- Engagement with community and stakeholder groups as part of a broader community consultation process would be important to minimise risks to acceptable levels. This would include distribution of information regarding likely construction impacts.

A number of risks have been identified for traffic and transport both during construction and operation of the Project. The risks are related to impacts to road safety, operations of the highway and access to local roads and private properties.

All risks were assessed to have a residual risk rating of low or negligible once the appropriate precautions are undertaken.

Table 22 Traffic and Transport Risk Assessment

Risk No.	Impact Pathway Description (how the Project interacts with assets, values and uses)	Description of consequences	Planned Controls to Manage Risk (as per Project Description, and VicRoads Contract Shell DC1: Design & Construct (April 2012)).	Initial Risk			Additional Controls Recommended to Reduce Risk	Residual Risk		
				Consequence	Likelihood	Risk Rating		Consequence	Likelihood	Risk Rating
1	Changed road environment during construction results in general reduction to road safety. Examples of road environment changes include heavy vehicles entering/exiting construction accesses, additional or closer roadside hazards, variable speed limits, unfamiliar conditions. Impacted road users include private vehicles, public transport, school buses, cyclists and pedestrians.	Increased incidence of accidents that one or more incident may result in a fatality.	Traffic Management Plans (TMPs) would need to be prepared to identify, assess and appropriately eliminate, reduce or mitigate road safety hazards and to be reviewed by VicRoads prior to implementation. TMPs to 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. Road Safety Audits (RSAs) to be undertaken on TMPs. Project Description stipulates that construction vehicles would not typically use local roads.	Catastrophic	Unlikely	High	Haulage routes for construction traffic and heavy vehicles to be appropriately designated and managed as part of TMPs, with consideration for safety. Implement a communication strategy with the key stakeholders to manage impacts, and inform road users and the community.	Catastrophic	Rare	Medium

Risk No.	Impact Pathway Description (how the Project interacts with assets, values and uses)	Description of consequences	Planned Controls to Manage Risk (as per Project Description, and VicRoads Contract Shell DC1: Design & Construct (April 2012)).	Initial Risk			Additional Controls Recommended to Reduce Risk	Residual Risk		
				Consequence	Likelihood	Risk Rating		Consequence	Likelihood	Risk Rating
2	Changed road environment during construction results in general reduction to performance and efficiency of travel modes. Examples of road environment changes include speed reductions, works resulting in temporary road or lane closures or cumulative impacts of the potential simultaneous construction of three sections of the Western Highway. Impacted users can include private vehicles, public transport, school buses, emergency services, cyclists, pedestrians and rail.	Increased disruption or displacement of road users, and increased travel time and/or distance.	TMPs prepared to identify, assess and appropriately minimise likely impacts on road operations. These would comply with standard VicRoads practices, the Traffic Management Code of Practice to the *Road Management Act 2004*. Road Safety Audits (RSAs) to be undertaken on TMPs. Buses would be provided for rail users in the event that rail operations are temporarily suspended (in consultation with PTV, bus and rail operators).	Moderate	Likely	High	Construction to be staged to allow one carriageway to be operational at all times and traffic flow not to be stopped for any extended period of time. Consideration of non-motorised road users (ensuring connectivity is not removed), public transport, school buses, emergency services and rail interfaces. This would include: * Local community, Department of Transport and other relevant stakeholders (such as transport operators) consulted and informed of likely disruption due to construction, including impacts to public transport and school bus services. * Haulage routes for construction traffic and heavy vehicles appropriately designated and managed as part of TMPs, with consideration for road operations. * Impact on travel times as a result of TMP implementation to be analysed prior to, and assessed during, construction. Implementation of alternative TMP measures to be considered during construction if impacts on operations are determined to be unacceptable. * Where possible schedule construction works to minimise the impacts at public holidays, school holidays or other times when the Western Highway would reasonably be expected to experience higher levels of demand and to minimise impacts on key user groups. * Communication between construction teams from each section and integration of Traffic Management Strategies.	Minor	Likely	Medium

Risk No.	Impact Pathway Description (how the Project interacts with assets, values and uses)	Description of consequences	Planned Controls to Manage Risk (as per Project Description, and VicRoads Contract Shell DC1: Design & Construct (April 2012)).	Initial Risk			Additional Controls Recommended to Reduce Risk	Residual Risk		
				Consequence	Likelihood	Risk Rating		Consequence	Likelihood	Risk Rating
3	The duplication disrupts/severs local access routes including cyclist connectivity post-construction (interim and ultimate operation).	Economic and social disruption through increased travel times and reduced accessibility. Vehicle traffic, public transport, school buses, emergency services, cyclists, pedestrians, rail crossings and private accesses affected.	Although local access travel distances and times may be longer, the design generally maintains access to side roads and properties during the interim and ultimate solutions. Access in the interim is via wide median treatments and 'left-in' and 'left-out access.	Minor	Likely	Medium	Local community and stakeholders to be engaged and informed of positive project outcomes as part of broader community consultation process to address perceptions of localised adverse impacts. Ensure signage and design permits cyclists to continue to use the shoulder of the Highway such that it meets the Road Rule 95(2) requirements. Possible compensation through the *Land Acquisition and Compensation Act.*	Minor	Possible	Low
4	Potential for some aspects of road safety, during (interim) operation of the new road to be degraded. For example: * Increased crossing distance for wildlife exacerbates frequency of accidents. * Increased distance for farm machinery to be travelling along the road. * Changes in atmospheric conditions, i.e. fog, sunglare, due to the changes in alignment orientation. * Movements at intersections and property accesses that are retained.	Increased incidence of accidents that one or more incident may result in a fatality.	Road safety audit completed for the design.	Catastrophic	Possible	High	Assess wildlife corridors and identify mitigation measures (such as culverts) to reduce the requirement for wildlife to cross the Western Highway. Assessment of atmospheric conditions within the Project Area, during detailed design.	Catastrophic	Rare	Medium

Risk No.	Impact Pathway Description (how the Project interacts with assets, values and uses)	Description of consequences	Planned Controls to Manage Risk (as per Project Description, and VicRoads Contract Shell DC1: Design & Construct (April 2012)).	Initial Risk			Additional Controls Recommended to Reduce Risk	Residual Risk		
				Consequence	Likelihood	Risk Rating		Consequence	Likelihood	Risk Rating
5	Potential for some aspects of road safety, during (ultimate) operation of the new road to be degraded. For example: * Increased crossing distance for wildlife exacerbates frequency of accidents. * Increased distance for farm machinery to be travelling along the road. * Changes in atmospheric conditions, i.e. fog, sunglare, due to changes in alignment orientation.	Increased incidence of accidents that one or more incident may result in a fatality.	Road safety audit completed for the design.	Catastrophic	Unlikely	High	Assess wildlife corridors and identify mitigation measures (such as culverts) to reduce the requirement for wildlife to cross the Western Highway. Assessment of atmospheric conditions within the Project Area, during detailed design.	Catastrophic	Rare	Medium
6	Potential for some aspects of road safety to be degraded through design, including horizontal and vertical geometry, sight distance at all intersections and merge locations (ramps and service road entry/exit).	Increased incidence of accidents that one or more incident may result in a fatality.	Appropriate standards are applied to the design. Road safety audit completed for the design.	Catastrophic	Rare	Medium	No additional controls.	Catastrophic	Rare	Medium

Risk No.	Impact Pathway Description (how the Project interacts with assets, values and uses)	Description of consequences	Planned Controls to Manage Risk (as per Project Description, and VicRoads Contract Shell DC1: Design & Construct (April 2012)).	Initial Risk			Additional Controls Recommended to Reduce Risk	Residual Risk		
				Consequence	Likelihood	Risk Rating		Consequence	Likelihood	Risk Rating
7	Traffic volumes significantly increase due to induced demand and cause congestion (for the interim and ultimate solutions).	Increased travel time for road users.	Risk is negligible due to adequate capacity and no other parallel routes of the same standard road, therefore no planned controls to manage risk.	Insignificant	Rare	Negligible	Risk is negligible therefore no additional controls to manage risks.	Insignificant	Rare	Negligible

6.5 Impact Assessment of Construction

This section addresses the anticipated impacts to the transport network and road users within the Project area during construction of the Project. The impact assessment presented in this section of the report was conducted on the Proposed Alignment only (as summarised in Section 6.1).

Traffic impacts considered for the construction of the Project include:

- The impacts of construction traffic on the existing road network; and
- Traffic management impacts associated with the construction of new carriageways, construction sites and haulage routes.

It is expected VicRoads would require the construction contractor(s) to develop a traffic management strategy and detailed traffic management plans (TMPs) for construction stages to provide for:

- The maintenance of appropriate levels of service to existing highway road users, local road users and adjoining land owners;
- Assessment of haulage route impacts as part of TMPs; and
- Road Safety Audits of TMPs.

The TMPs would also need to meet the requirements of VicRoads, municipal councils or other responsible authorities prior to the commencement of works. Additionally, Traffic Management would be required to be undertaken in accordance with established VicRoads practices, the Code of Practice for Worksite Safety - Traffic Management of the *Road Management Act 2004* and Australian Standard Manual of Uniform Traffic Control Devices, Part 3 - Traffic Control for Works on Road (AS1742.3 - 2009).

It is currently anticipated that construction of the Project would be able to be staged to minimise disruptions and maintain traffic flow along the Western Highway in both directions. The new carriageway is expected to be constructed while the existing carriageway continues current operation. Where the existing carriageway is being utilised as part of the duplication, the traffic would then be transferred to the new carriageway while the existing carriageway is upgraded. Based on this staging and the width of the median, the majority of construction would be completed whilst having minimal impact on the traffic flow operation.

For the sections where construction is closer to the operating traffic lanes (i.e. where traffic is diverted from one carriageway to another or where the median is not of sufficient width to provide a barrier) the typical traffic management is likely to include the installation of traffic barriers along the alignment as appropriate to separate the worksite from passing traffic, a reduction in the speed and other routine traffic management measures. It is not anticipated that much, if any, night works would be required, although these would be considered where they may mitigate the construction impacts on the community or travelling public.

However, in all cases a TMP would be prepared by the contractor to provide details of the traffic management to be implemented during construction to minimise impacts and maintain traffic flow on the surrounding network. This would include details of all traffic management measures and any temporary side tracks, if required, to minimise the overall impact on the public and local community.

Generally, the construction would be expected to necessitate similar traffic management requirements within the Project Area, though topography and other site constraints may necessitate traffic management to be different at specific locations.

6.5.1 Construction Traffic Volumes

Traffic generated by the construction of the Project would principally be associated with the transport of construction machinery and equipment to site, import and disposal of materials by trucks and the removal of machinery post-construction. Traffic would also be generated by worksite contractors accessing the site across the day during a six day working week.

The volume of traffic would ultimately depend on the program and staging of construction sections, where an increased rate of construction would result in higher traffic volumes on the network each day but over a shorter overall period.

The construction of the Project is estimated to generate traffic related to the following broad construction phases:

- Set out and preparation of the construction corridor;
- Adjust or protect utilities and other services, where required;
- Complete drainage works;
- Undertake surface preparation, compaction and associated earthworks;
- Construct pavement, including batters, kerb and channel, (where required);
- Apply flexible asphalt pavement and seal treatment; and
- Apply line markings, re-vegetate and install other road furniture.

An accurate estimate of construction traffic generation cannot be made until a program and staging of construction has been developed. However, the construction of similar duplication projects typically generates the greatest traffic volumes during the earthworks and pavement construction phases, and generally less traffic volumes at other times. These two phases could be expected to generate in the order of 100 – 150 truck trips per day, spread across the workday. Less than 100 light vehicle trips per day would be expected to be generated by worksite contractors accessing the site, typically expected to occur during early morning and late-afternoon periods.

Based on the above, at its peak, the construction of the Project would be typically expected to generate in the order of 250 vehicle trip ends per day, including 150 heavy vehicles.

It is conservatively assumed that 30% of light vehicle construction traffic would occur during the peak hour, associated with worksite employees arriving and departing the site. Similarly, it is conservatively assumed that 15% of heavy vehicle traffic would occur in the peak hour, associated with an even distribution of truck movements across the workday. It is also conservatively assumed that the construction peak hours would coincide with the peak hours of Western Highway. It is therefore estimated that the construction activities may generate up to 43 vehicle trip ends in the peak hour, including 13 heavy vehicles.

Given the existing observed peak period traffic volumes and relatively high percentage of heavy vehicle volumes on Western Highway in the Project Area, as identified in Section 5.3 of this report, the additional construction traffic is not anticipated to have an unmanageable impact on the operation of the Western Highway. More significant impacts are likely to result from temporary changes to road environments and localised speed reductions, as addressed in Section 6.5.3 of this report.

6.5.2 Haulage Routes

The haulage routes for heavy vehicle traffic for the duplication construction would broadly be determined by the construction contractor(s). Given the connectivity of Western Highway itself, it is anticipated that the majority of haulage would be undertaken on the Western Highway to the location of construction sites.

The declared arterial road network provides generally good localised connection within the region, including accessibility for over-dimensional vehicles. Pyrenees Highway in particular provides a good connection to the Western Highway at Ararat. Haulage materials that are anticipated to be transported on the broader road network include required fill material, which would be expected to be sourced from surplus on-site materials and local quarries in the vicinity of the works.

The VicRoads Heavy Vehicle Access Maps (reprinted July 2011) and Victoria Government Gazette Notice Special No. S406 - November 2009 indicate that none of the intersecting side roads to the Western Highway are approved as over-dimensional routes for B-doubles and higher mass limit trucks. However, this is not expected to be a significant issue as the capacity of the surrounding arterial road network is anticipated to accommodate construction traffic volume, and therefore not require local roads to be utilised.

It is noted that the construction may require the limited transportation of oversize materials, such as bridge beams or pipelines for the road, rail and water crossings. The movement of oversize loads would be expected to have slightly different impacts, such as potential slower speeds and potential decreased opportunity for overtaking for other vehicles. The movement of loads would be expected to adhere to VicRoads general operating requirements and any required permit conditions to provide for the safe movement of the over-dimensional loads and manage the impact to other road users.

Therefore, it is considered that the arterial road network would be able to provide connection for haulage routes and hence minimise the need to operate on the local road network.

6.5.3 Road Network Impacts

It is anticipated that construction of the Project would be completed with the objective that traffic disruptions are minimised. The duplicated carriageway would be constructed whilst maintaining current operation of the existing carriageway. Given the expected construction process and the observed peak hour traffic volumes along Western Highway, the estimated construction traffic generation volumes are expected to be able to be accommodated along the existing alignment of the Western Highway and would be managed though a broader TMP for construction.

However, significant potential impacts to Western Highway during construction are anticipated to result from the changed road environment, affecting transport operations and road safety. Specifically, these are the risks to the performance and efficiency of travel modes and a general reduction in road safety during the construction period.

By their nature, worksites in close proximity to traffic, and particularly road construction projects, generally result in non-standard road environments. Given the element of road user non-familiarity with changes to the local road environment, a higher level of driver awareness is typically required in such environments for road safety. In part to address this concern, worksites within close proximity to moving traffic, such as would be expected for this duplication, have regulatory requirements for speed reductions.

It is likely during construction that there would be detectable adverse changes in traffic and transport conditions, including decreases in level of service, at multiple locations during the construction stages.

Traffic management is anticipated to include a range of road users including vehicle traffic, public transport, school buses, emergency services, cyclists, pedestrians (including school students) and rail interfaces to manage road network operations during construction.

Given the key requirement to maintain a safe road environment during construction, the ability to minimise impacts to transport operations on Western Highway to an acceptable level is somewhat restricted. Effective community communication including informing of positive project outcomes would be important as part of a broader consultation process to manage road users' expectations during the construction stages. It is also proposed that consideration be given to assessing the impact to traffic operations during the construction stages and taking appropriate remedial action, if warranted.

As the construction of the alignment is expected to occur over an extended period, a comparison of the impact of construction activity during different seasons has not been undertaken. However, where possible, it is recommended that construction activity that significantly impacts on traffic operations and safety be minimised during peak seasons and holiday periods.

Further, heavy vehicles associated with construction may require access to and from the Western Highway directly from construction sites. Slow moving heavy vehicles entering or exiting the traffic stream of the Western Highway may have localised impacts on traffic operations. The development of TMPs would help to safely and efficiently accommodate such movements.

6.5.4 Access Impacts

It is anticipated that the construction activities associated with the Project may result in some short-term disruptions to local access points. Longer-term disruptions are not expected as VicRoads requires that the construction does not unduly restrict access to properties and side roads.

Where appropriate, detour routes would be provided and are expected to be detailed in the TMPs to be prepared by the Construction Contractor(s) prior to construction. The specific impacts of the closures and subsequent mitigation measures cannot be identified until construction staging and the associated closures have been determined, therefore it is expected that these impacts would be detailed in the TMPs. Based on similar projects, it is generally considered that the impacts would be able to be appropriately managed.

6.5.5 Public Transport Impacts

Rail Line

As identified in Section 5.8, the Melbourne – Adelaide rail line travels through the study area of the Project. The rail line is a single bi-directional track which predominately follows the general alignment of the Western Highway. The rail line crosses the Western Highway twice (once at Armstrong rail bridge and once as Oddfellows rail bridge) however there is no direct interaction with the Western Highway as both crossings are grade separated. There is one north-westbound passenger service on Mondays, Wednesdays and Fridays; and one south-eastbound passenger service on Tuesdays and Thursdays. The line is also used for freight transport, where there is approximately 25 - 30 services operating along the corridor per week in each direction.

It is understood that based on initial discussions between VicRoads and ARTC, the freight rail operations cannot be negatively impacted. Therefore the constructor appointed for the Project would be required to adhere to a construction methodology where the rail operations would not be impacted. It is anticipated that this methodology would be developed in collaboration with the rail operators to ensure no impacts to the operation occur whilst maintaining a safe working environment during construction. This methodology would need to be adopted next to the location of the two existing grade separated crossings and the existing Oddfellows rail bridge as it does not comply with modern standards, hence would also be required to be upgraded. During construction it would be a requirement to always have a traffic carriageway operational. Subsequently, the upgrade of the existing carriageway would occur at a different stage to construction of the new carriageway. It would be a requirement that relevant authorities and operators be consulted in this process and sufficient information provided to the community.

V/Line Bus Services and School Bus Services

Regional V/Line, inter-town and school bus services operate along the Western Highway within the study area. The bus stops are located within the townships of Ararat, Great Western and Stawell (there are some informal bus stops along the Western Highway for the school bus). The bus services are expected to be impacted by the construction of the alignment due to an increase to travel times, decrease to travel time reliability, and a potential increase to exposure of road safety hazards from changed road environments in line with general traffic.

Speed limit reductions would be expected to be required in some areas while construction stages are undertaken. At any one time, speed reductions are expected to be localised to the area of the construction stage, rather than across the entire Project Area. As a result, varying degrees of travel time delays should be expected during the construction stages. However, these delays are not expected to be extensive as construction would usually be occurring away from the operating carriageway. Public transport and school bus operators should allow additional journey time as part of service scheduling and would need to be consulted prior to construction.

Potential increase to exposure of road safety hazards from changed road environments during travel is expected to be addressed as part of the detailed TMPs. School bus stops currently located within the Project Area may need to be relocated during particular staging of the construction activities, in consultation with relevant authorities. As part of any relocation, consideration should be given to school students wanting to cross the road from bus stops. Safety considerations for temporary school bus stops and school bus stop access should be addressed as part of detailed TMPs and Road Safety Audits of such plans.

6.5.6 Other Road User Impacts

As identified in Section 5 of this report, there are limited existing formal facilities for cyclists and pedestrians along Western Highway and neither were observed during the on-site observations. Once duplicated, cyclists would be able to continue to use the sealed shoulder along the length of the Highway. During construction all Traffic Management Plans (TMPs) would be required to consider cyclists for any construction works and should not prevent cyclists travelling along the Western Highway for any extended period of time. If cyclists would not be permitted along a section of the highway for a short-term closure, appropriate detours and stakeholder consultation would be required. Localised closures of intersecting side roads and private property accesses may also impact accessibility for cyclists and pedestrians however, given the short-term nature of these closures, the impact is considered to be manageable.

Emergency service vehicles would be required to have access to properties and intersecting side roads. This access would need to be considered during the development of the detour routes and the TMPs to ensure travel times are acceptably managed. Consultation with the various emergency service bodies is recommended to understand the requirements and capabilities of the vehicles.

6.5.7 Summary of Construction Impacts

The following impacts would be expected during construction:

- Traffic generated during peak construction activities is not anticipated to have an unmanageable impact on the operation of Western Highway;
- More significant impacts are likely to result from temporary changes to road environments and localised speed reductions;
- The arterial road network is expected to provide connection and capacity for haulage routes, hence minimising operations on the local road network; and
- Accessibility consideration and detour routes, where appropriate, are expected to be detailed in TMPs to mitigate impacts to motorists, local residents, public transport services, emergency services vehicles and other road users.

6.6 Impact Assessment of Operation of Interim New Road (AMP3)

This section addresses the anticipated impacts to the transport network and road users post-construction within the Project Area as a result of the Project at the interim stage, i.e. duplicated rural highway (AMP3 standard). It is assumed that all of the mitigation measures identified in the risk assessment in Section 6.4 have been applied.

The anticipated interim project outcomes are identified and road safety benefits of the duplicated Highway are described. The expected effects on operational performance of the Western Highway, road users, access, rail line interfaces and high-level traffic management principles for the interim stage of the Project are considered.

6.6.1 Capacity and Operation Impacts

The interim upgrade to AMP3 standard for the Western Highway Project, including the provision of wide median treatments at key intersections, would increase capacity and improve the operational performance of the Western Highway.

Following the interim duplication, the theoretical capacity of the Western Highway within the Project Area is calculated, using the methodology detailed in Section 5.3.1, to increase from 2,551 vehicles to 5,063 vehicles per hour (for two-way traffic flow).

As outlined in Section 5.3.1, traffic volumes within the Project Area are predicted to grow by approximately 1.6 per cent per annum, resulting in forecast future traffic volumes as detailed in Table 8 of this report. On the basis of those forecast volumes, maximum two-way volumes are estimated to be 9,395 vehicles per day (5-day average) in 2040.

The Project is expected to provide travel time savings for vehicles travelling along the Western Highway. The theoretical travel time for the existing alignment and the Proposed Alignment in the interim scenario has been estimated to be:

- Existing: 16 minutes 0 seconds.
- Interim: 13 minutes 30 seconds.

The theoretical travel time for the interim scenario has been calculated using the average speed of vehicles to be conservatively assumed to be 3 km lower than the posted speed limit. This assumption has been influenced by the fact there are passing opportunities, at-grade intersections and property accesses which require vehicles to slow along the carriageway.

This saving of approximately two and a half minutes is expected to be accommodated through a number of aspects which include:

- The duplicated alignment allows for the bypass of the township of Great Western, maintaining a posted speed limit of 110 km/h. Currently, the posted speed limit along the Western Highway reduces to 60 km/h through the Great Western township;
- An increased posted speed limit. The current limit is 100 km/h, following the upgrade the posted speed limit is expected to be 110 km/h for the 24 km length of the section; and
- The duplication provides additional overtaking opportunities which may decrease travel time for vehicles that previously were travelling behind a slow vehicle.

Highway road users are anticipated to have various benefits across the Project Area including:

- Improved access and amenity for motorists;
- Improved travel time, accessibility and efficiency for road-based freight vehicles;
- Improved travel time for emergency service vehicles;
- Improved travel time for public and school buses; and
- Flow through benefits for residents, local businesses and tourist destinations through improved accessibility and travel times.

It is noted that travel times may increase for some landowners due to restrictions to 'left-in / left-out only' access treatments and service road access locations.

In the event a minor incident occurs along the length of the Western highway, the Project has allowed sufficient width to enable traffic to continue to safely pass the incident (under appropriate traffic control).

Further, in the event of a major traffic incident, the Project provides breaks in the medians to allow emergency/road authorities to permit the Highway to continue to operate past the incident but under contraflow along one carriageway (under appropriate traffic control)

It is anticipated contraflow operations would require traffic management and reduced speeds to ensure driver safety for the changed conditions. These impacts to drivers are expected to be less than closing the Western Highway and detouring traffic to the local road network.

It is recommended that VicRoads develop traffic management plans which can be implemented should an incident occur along the Western Highway which requires contraflow operations to ensure safety and traffic operations are managed effectively.

6.6.2 Road Safety Impacts

One of the key objectives and primary benefits of the Project is expected to be resultant improvements to road safety. The separation of opposing traffic movement by dual carriageways, improved safety treatments of roadside hazards, increased capacity and greater control of vehicle movements entering and exiting the traffic flow are anticipated to deliver the greatest benefits over the life of the Project.

Duplicating the Western Highway also provides increased opportunities for vehicles to pass slower moving vehicles and removes the requirement to overtake on the opposing traffic lane. The 5-year crash history indicates that there were no collisions resulting in a fatality. Additionally, the increased opportunity to overtake is important as there is currently a high proportion of heavy vehicles travelling along the Western Highway (these volumes are expected to continue to increase) and these vehicles generally obstruct sight lines for vehicles passing.

Increased clear zones to the side of the carriageways, wide medians in addition to wire rope safety barriers, where warranted, would assist in reducing the severity of run off road type crashes, while improvements to horizontal alignment and delineation are anticipated to assist in reducing the likelihood of run off road type crashes. Where topography is suitable, the alignment has been designed to accommodate a 10 meter clear zone on either side of the edge of the traffic lanes (inclusive of pavement areas for the inner and outer shoulders of the carriageway). Where this cannot be achieved, wire rope safety barriers would be provided to shield from the obstructions. The clear zone is generally a 10 m area from the edge of the carriageway that is to be kept clear from obstructions, such as trees and utilities. In many cases the maximum construction footprint would extend past the clear zone boundary to accommodate roadside design elements such as batter slopes.

Overall improvements to the horizontal and vertical alignment of the Western Highway are expected to improve sight distances, with benefits along the length of the Western Highway, at direct property accesses and at intersections. In particular, the realignment of Panrock Reservoir Road and London Road would improve the sight distance and vehicle access to these intersecting roads from the highway. Grade separating Garden Gully Road, Sandy Creek Road and Bests Road would reduce the potential conflicts at these intersections.

The proposed alignment of the Western Highway also involves a bypass of Great Western. Removing through highway traffic from the township is expected to improve road safety for all road users within the township, particularly given the high proportion of heavy vehicles travelling along the highway.

The Western Highway Project alignment generally follows the existing alignment with the exception of the Great Western bypass, which is to the north-east of the township. Consequently, the highway is generally aligned to the north-east and south-west. As the alignment is not proposed to alter significantly and the bypass is not aligned to be east-west, factors effecting driver performance (i.e. sun glare) are not expected to significantly alter from existing conditions. Given the 5-year crash history of this section of Western Highway did not indicate any significant trends related to this type of collision, it is not expected to be a considerable road safety issue in future.

Estimate of Road Safety Benefits

The road safety analysis involved quantifying the road safety benefits due to the Project, taking into consideration local conditions. This has been carried out in accordance with Austroads Guide to Road Safety Part 8: Treatment of Crash Locations, where the crash reduction rates for treatments have been obtained from Table 9.5 and Table 9.6. The past five years of historical casualty crash data within the

Project Area, as presented in Section 5.5 of this report, has been analysed to determine the expected casualty crash savings resulting from the Project.

Based on the crash history of the existing road and the crash reduction factors sourced from Austroads for each proposed treatment, it is estimated that the crashes per 100 million km travelled per year would reduce from 4.24 to 3.04 for the interim scenario. Hence, the Project is anticipated to substantially reduce the incidence of casualty crashes in the Project Area.

Road User Fatigue

Driver fatigue is a significant factor of driver deaths in Victoria each year. According to the Melbourne-Adelaide Corridor Strategy, this is specifically the case for the Western Highway. Forty-five per cent of the 805 casualty crashes that occurred on the Victorian section of the Western Highway (between South Australian boarder and Melbourne), between 1 January 2000 and 31 December 2004, were recorded to be run-off-the-road crashes and head-on collisions, which are common indicators in fatigue related crashes. Therefore, it is important to provide rest area facilities where drivers can stop and take a break from driving.

Additionally, the Western Highway has a relatively high percentage of heavy vehicles travelling along the road and rest areas are required to enable these drivers to meet the regulatory requirements enforced on the freight industry.

The proposed alignment of Section 3 of Western Highway proposes to include a truck parking rest area for both carriageways. The number of rest areas was established based on the '*Western Highway Project- Rest Area Route Plan May 2011*' which was presented to and endorsed by Panel Review Committee (PRC). Additionally, the spacing between rest areas meets the 'National Transport Commission's National Guidelines for the Provision of Rest Area Facilities (January 2004)'.

The national rest area guidelines categorise rest areas into three types based on the facilities provided. These are major, minor and truck stop. The interval requirements between the rest area categories vary, where:

- A major rest area is required every 100 km;
- A minor rest area is required every 50 km; and
- A truck stop is required every 30 km.

For situations where drivers do not break when fatigued, the VicRoads Arrive Alive 2008-2017 strategy outlines measures to reduce the incidence and severity of fatigue related crashes. Specifically,

> "*designing and modifying roads and roadsides to address head-on and run-off-road crashes through treatments such as road duplication, roadside and centre-road barriers, centre-road rumble lines, overtaking lanes and removal of roadside hazards such as trees and poles*" (VicRoads 2008).

Notably, the Project proposes to incorporate several of these design elements that would be expected to reduce the incidence and severity of fatigue related crashes within the Project Area. This analysis has been incorporated in the estimate of road safety benefits.

6.6.3 Road Network Impacts

The interim stage of the Western Highway Project would involve duplication of the existing Highway, which results in slight realignment of the Highway for a proportion of the Project length to accommodate

the increased road width. During the interim stage there would be grade-separated interchanges at three locations (Garden Gully Road-Military Bypass Road, Main Street Great Western and Bests Road) with the remainder of intersections being wide median treatments, 'left-in' and 'left-out' access to the Highway or via service roads.

The intersections which would be upgraded to have a wide median treatment include:

- Main Divide Road – The Majors Road;
- Petticoat Gully Road (Note access to Old Brewery Road is via this intersection);
- Allanvale Road; and
- Churchill Crossing Road.

Additionally, Harvey Lane and Hurst Road would have access to the upgraded Western Highway via a wide median treatment (located between the two roads) and service road connections.

Within the vicinity of the Great Western Bypass a number of intersecting side roads would have direct access to the Highway removed. Access to these roads would be provided through connections to Main Street and the ramps at either end. This access arrangement is likely to increase travel time for some users, however it is expected to be acceptable. The intersecting side roads proposed to have direct access removed include:

- Paxton Street (Sandy Creek Road);
- Cubitt Street;
- Rennie Street;
- Locke Street; and
- Fisher Street.

Intersecting side roads without a wide median treatment or alternative access arrangements and properties which currently have direct access onto the Western Highway would be restricted to 'left-in' and 'left-out' access. This is anticipated to increase the travel time for one direction of travel as vehicles would be required to travel along the Western Highway until the nearest wide median intersection treatment or median break. The proposed roads to have 'left-in' and 'left-out' access include:

- Briggs Lane;
- Humphrey Lane; and
- Panrock Reservoir Road.

The overall impact of 'left-in / left-out only' treatments and intersection closures is anticipated to provide improvements to road safety and traffic operations on the Western Highway, with limited impact on local access as the road network provides other connections.

It is therefore concluded that access for intersecting side roads to Western Highway, within the Project Area, would generally be retained by the Project. Only minor impacts on connectivity and travel times are anticipated. As part of the community consultation process, raising awareness of positive project outcomes resulting from 'left-in / left-out only' treatments and intersection closures would be addressed.

Direct Property Accesses

Existing direct property accesses to the Western Highway would typically be maintained, however the majority would be restricted to be 'left-in' and 'left-out'. To access those properties from the opposing direction, vehicles would be required to travel to the nearest wide median treatment or median break and complete a 'U-Turn'.

Given the 'left-in' and 'left-out' access restriction to the Western Highway, vehicles associated with direct property access may be required to drive further in order to drive in their desired direction of travel. The effect may be an increased travel time for those road users, with the actual extent depending on the destination of travel. Based on the typical distances of travel for the Project Area, the increase in travel time is not considered to be an unreasonable change in order to achieve desired road safety benefits.

As part of the Road Safety Audit process in the detailed design of the duplication, the impact of vehicles travelling from properties onto the Western Highway and the provision for specific vehicle types such as horse floats and farming machinery, through gentle acceleration and deceleration at such locations, should be considered.

6.6.4 Public Transport Impacts

Rail Line

As previously mentioned, the rail line crosses the Western Highway at two locations, both of which are grade separated.

The rail line crosses Old Brewery Road, Military Bypass Road, Western Highway (proposed service road), St Ethels Road, Garden Gully Road, Paxton Street, Paterson Road, St George Road and Churchill Crossing Road within the vicinity of the Project Area. These crossings are not proposed to be altered or moved for the interim solution and are located at the edge of the Project Area.

Consequently, it is anticipated that the Western Highway upgrade would have minimal impact on the safety and operation of the rail line, however it is recommended a Road Safety Audit be undertaken during the design process.

Bus Services

Regional V/Line bus services are anticipated to benefit from improved travel times and travel time reliability along the length of Western Highway within the Project Area, in line with general traffic. Currently, the only V/Line bus stop within the Project Area is within the Great Western township. The Proposed Alignment would bypass the township while still providing access to the township from both directions, allowing the bus to safely and efficiently access the stop. Accordingly, there would be no expected adverse impacts to bus services or public transport users.

School bus service routes managed by the Department of Transport (DOT) are noted to change on an annual basis due to changes in student enrolment and resultant demand, which ultimately affects the location of school bus stops. Currently, any new bus stop undergoes assessment with consideration of safety by the DOT in consultation with VicRoads. The location of school bus stops currently adapts to the existing built environment to service school bus demand catchments.

Following the duplication of the Western Highway, the proposed location of bus stops would need to consider how pedestrians can safely access the bus. If stops are maintained along the Highway and no formal pedestrian crossing facilities are provided, pedestrians would only legally be able to access the

bus from one side of the road as they are not permitted to cross the Highway. It is anticipated one of two impacts would occur for pedestrians' access to the bus service:

- The bus route is altered to ensure passengers are able to be picked-up/dropped on both sides of the Western Highway without the need to cross. This is likely to increase travel time for the bus and passengers; or
- If buses are not able to return passengers to the side of the Highway that they were picked up from, this may lead to pedestrians crossing the Western Highway illegally, which is a road safety issue. This is not considered to be an acceptable outcome and therefore the future bus routes and bus stop locations for the school bus would need to consider accessibility to the stops for pedestrians.

The Project would necessitate consideration by DOT for the potential relocation of school bus stops within the Project Area. Consideration should be made to providing adequate allowance for a bus to pull off the Highway and waiting areas for students and vehicles, and the ability for pedestrians to safely access the bus.

6.6.5 Other Road User Impacts

Cyclists and Pedestrians

Within the design, for the AMP3 (highway interim solution), no specific provision is made for cyclists and pedestrians, however cyclists would be permitted to use the sealed shoulder of the highway. Connectivity for cyclists to the highway would be impacted by the Project, particularly due to the 'left-in' and 'left-out' restriction, however cyclists would have the same level of access as other vehicles.

The centre median is expected to have wire rope barriers in sections where the clear zone requirements cannot be met; hence this may reduce the opportunity for mid-block crossing of the Highway. Pedestrian and cyclist activity is currently minimal and the duplication is not expected to increase the level of activity.

Provided cyclists can be permitted to use the sealed shoulder of the highway, it is anticipated that pedestrians and cyclists would adjust to the changed built environment and the impact is considered to be minimal, with the exception of issues associated with school bus stops outlined in Section 6.6.4.

Emergency Service Vehicles

It is anticipated that there would be positive and negative impacts to emergency service vehicles due to the duplication of the Highway. It is expected emergency service vehicles would benefit from the increased capacity and reduced travel time along the Highway and the increased ability to safely overtake other vehicles.

The decreased local accessibility due to the presence of the centre median i.e. 'left-in' and 'left-out' restriction at a number access points, is likely to result in increases to the distance travelled for calls within the local area for the emergency service vehicle. The wide median intersection treatments have been designed at regular intervals for the key intersecting side roads and therefore, the Project is not considered to adversely impact emergency service vehicles.

Horses, Livestock and Farming Machinery

The movement of livestock across the Western Highway may only be permitted via livestock underpasses. It is understood that there are currently no livestock crossings across the Western Highway within the Project Area and there would be no livestock underpasses constructed for the Project.

Several land owners, including those in the vicinity of the Great Western Bypass, own property on both sides of the Proposed Alignment. The need to move livestock across the Highway would be negotiated with VicRoads as part of the stakeholder engagement process.

The movement of farm machinery permitted on public roads under *Road Safety (Vehicles) Regulations 2009* (including tractors) would be allowed along the duplicated Highway (AMP3), subject to appropriate vehicle registration and permits, if required. To access opposite sides of the Western Highway, farm machinery vehicles would be required to utilise the existing Western Highway, some new service roads and the at-grade intersections. This would result in increased travel times however, given there are only a few property owners who own property on both sides of the Western Highway, the impact is considered to be manageable.

Heavy Vehicles

The Western Highway is a key freight route between Melbourne and Adelaide and consequently, has a high proportion of heavy vehicles travelling along the road. As previously mentioned, the duplicated Highway would be designed to accommodate High Productivity Freight Vehicles (HPFVs). This would provide industry the opportunity to improve efficiency of freight movements by increasing the volume transported by a single vehicle. Improved efficiency of freight movement benefits the State through reduced transport costs and benefits the local area by reducing the overall number of heavy vehicles required to be travelling along the Western Highway.

The Project would provide travel time savings for freight vehicles through reduced delays due to a reduction in at-grade intersections and access points and improved overtaking opportunities. Additionally, the duplication would provide opportunities for heavy vehicles to safely pass or be passed along the length of the Project Area.

6.6.6 Interim Duplication Impact Assessment Summary

The interim solution of the Western Highway Project (AMP3) would be expected to have the following impacts:

- Improved road safety across the Project Area through:
  - Increased clear zone widths;
  - Wide median intersection treatments at key intersections to improve sight distance and stage movements;
  - Ability for drivers to safely overtake vehicles along the length of the Project;
  - Bypassing the township of Great Western; and
  - Providing adequate rest area facilities that comply with the rest area guidelines.
- Improved traffic operation through:
  - Reduction of access points, which reduces interruption to traffic flow;
  - Opportunities to overtake along the length of the Project;
  - Increased posted speed limit; and
  - Increased capacity to accommodate future traffic volume growth.

- Improvements to the freight task by designing the road to accommodate high productivity freight vehicles thereby allowing:
  - Improvements to efficiency of the freight task by enabling the transporting of a greater volume in a single vehicle;
  - Reducing the overall heavy vehicle volume by allowing for vehicles to transport a greater volume; and
  - Travel time savings for freight vehicles due to the increased speed limit and improved overtaking opportunities.
- Access for intersecting side roads and direct property access is generally maintained through the provision of 'left-in' and 'left-out' access arrangements. There are expected to be some localised impacts on travel times for landowners, due to increased travel distance for one direction of travel. However, overall benefits for road safety and Highway operations provided for general users.
- Minimal impacts to the operation of the Melbourne-Adelaide rail line due to the Project, as the Highway and rail line would continue to be grade separated.
- Travel time savings for bus routes travelling along the Highway.

6.7 Impact Assessment of Operation of the Ultimate New Road (AMP1)

This section addresses the anticipated impacts to the transport network and road users post-construction within the Project Area as a result of the ultimate Project (upgrade to freeway – AMP1 standard). It is assumed that all of the mitigation measures identified in the risk assessment in Section 6.4 have been applied.

The anticipated ultimate project outcomes are identified and road safety benefits of the duplication are described. The expected effects on operational performance of the Western Highway, road users, access, rail line interfaces and high-level traffic management principles for the ultimate project are considered.

6.7.1 Capacity and Operation Impacts

The capacity and operational impacts due to the Project are generally expected to be the same for the interim and ultimate solutions. There would be a minor increase in travel times for intersecting side roads as several at-grade intersections are to be removed in the ultimate solution including the interim solution wide median treatments at:

- Main Divide Road-The Majors Road;
- Petticoat Gully Road;
- Allanvale Road; and
- Churchill Crossing Road.

The Project is expected to provide further travel time savings (in addition to the travel time savings gained in the interim solution) for vehicles travelling along the Western Highway for the ultimate scenario. The additional travel time savings would be gained through the restricted access arrangements as this would reduce the need for drivers to slow for vehicles entering or exiting the road. The theoretical travel time for the existing alignment and the interim scenario and the ultimate scenario has been estimated to be:

- Existing: 16 minutes 0 seconds.
- Interim: 13 minutes 30 seconds.
- Ultimate: 13 minutes 10 seconds.

The theoretical travel time for the ultimate scenario has been calculated using the average speed of vehicles to be assumed to be the posted speed limit as there are passing opportunities and all access is via grade-separated interchanges which would not require vehicles to slow along the carriageway.

Refer to Section 6.6.1 for other details on capacity and operational impacts.

As mentioned in Section 6.7.1**,** the Project provides opportunities to safely keep the Highway open in the event of a traffic incident.

Specifically, in the event a minor incident occurs along the length of the Western Highway, the Project has allowed sufficient width to enable traffic to continue to safely pass the incident (under appropriate traffic control).

Further, in the event of a major traffic incident, the Project provides breaks in the medians to allow emergency/road authorities to permit the Highway to continue to operate past the incident but under contraflow along one carriageway (under appropriate traffic control)

Refer to Section 6.6.1 for further discussion regarding the impacts and considerations required to enable contraflow operations to be effectively implemented.

6.7.2 Road Safety Impacts

As mentioned in Section 6.6.2, one of the key objectives and primary benefits of the Project is expected to be resultant improvements to road safety. The road safety impacts of the ultimate upgrade of the Western Highway would be similar to the impacts of the interim upgrade, however there are likely to be additional benefits from the ultimate upgrade.

The benefits associated with separating opposing traffic movements by dual carriageways, improved treatments of roadside hazards, increased capacity and greater control of vehicle movements entering and exiting the traffic flow would be similar for the interim and ultimate solutions. Additionally, the alignment of the Western Highway would be similar for the interim and ultimate solutions and therefore would also have the same road safety impacts associated with the town bypass of Great Western and the environment, i.e. sunglare and fog. Refer to Section 6.6.2 for discussion of these impacts.

The major difference between the interim and ultimate solutions in regard to road safety impacts is access to the freeway, which, in the ultimate scenario, is limited to grade-separated interchanges and service roads provide access to the local road network and adjacent properties. At-grade intersections that would be included in the interim solution but would be removed in the ultimate solution are listed in Section 6.7.3.

Estimate of Road Safety Benefits

The road safety analysis involved quantifying the road safety benefits due to the Project, taking into consideration local conditions. Similar to the road safety benefits for the interim solution, this has been carried out in accordance with Austroads Guide to Road Safety Part 8: Treatment of Crash Locations, where the crash reduction rates for treatments have been obtained from Table 9.5 and Table 9.6. The past five years of historical casualty crash data within the Project Area, as presented in Section 5.5 of this report, has been analysed to determine the expected casualty crash savings resulting from the Project.

Based on the crash history of the existing road and the crash reduction factors for each treatment, it is estimated that the crashes per 100 million km travelled per year would reduce further in the ultimate scenario compared to the interim scenario. It is anticipated the crashes would reduce from 4.24 (base) to 3.04 (interim scenario) to 2.9 (ultimate scenario). Hence, the ultimate Project upgrade is anticipated to substantially reduce the incidence of casualty crashes in the Project Area.

Road User Fatigue

As previously mentioned, driver fatigue is a significant factor of driver deaths in Victoria each year. The ultimate design of the Western Highway Project is expected to have the same number and type of rest area provisions as the interim solution. Therefore, for discussion on the location and impacts to road user fatigue refer to the discussion in Section 6.6.2.

6.7.3 Road Network Impacts

The existing intersecting side roads to the Western Highway within the Project Area would generally be retained by the Project through grade separated intersections or service roads, with minor impacts on local access and connectivity. The Project is predominantly designed in accordance with AMP1. In relation to intersecting side roads, the design would provide a high level of control over access points, vehicle turns and crossing movements.

As previously mentioned, Garden Gully Road, Sandy Creek Road and Bests Road would all be constructed as grade separated intersections. Additionally, London Road would be realigned to meet Western Highway at close to 90 degrees and would also be grade-separated. It is understood that the design for these intersections would make provision for heavy vehicles, which is consistent with consideration for road safety.

To enable access to be provided to the Western Highway whilst minimising the number of access points, two-way service roads have been incorporated within the design. These service roads do not connect the entire 24 km length of this section of the Highway, however the service roads have been located to ensure intersecting side roads and properties can maintain appropriate access. The following intersections would be provided with access to the Western Highway via a service road:

- Main Divide Road – The Majors Road;
- Petticoat Gully Road;
- Old Brewery Road;
- Eaglehawk Road;
- Kimbarra Road;
- Allanvale Road;
- St George Road;
- Briggs Lane;
- Harvey Lane;
- Hurst Road;
- Panrock Reservoir Road; and
- Robson Road.

A few intersecting side roads are not proposed to have service road access. These roads and the accesses provided include:

- Thomas Road does not need a service road connection as it connects to Military Bypass Road and can connect to the freeway via the Garden Gully Road-Military Bypass Road interchange;
- Delahoy Road is not proposed to have direct access or service road access to the Western Highway, however, it joins Sandy Creek Road which connects to Western Highway via Main Street, Great Western; and
- Humphrey Lane does not have a proposed service road, instead, a new road link is proposed connecting Humphrey Lane to Briggs Lane and Bests Road.

The overall impact of service road treatments and intersection closures is anticipated to provide improvements to road safety and traffic operations on the Western Highway with limited impact on local access as the road network provides other connections.

It is therefore concluded that access for intersecting side roads to the Western Highway within the Project Area would generally be retained by the Project, with only minor impacts on connectivity and travel times. As part of the community consultation process, raising awareness of positive project outcomes resulting from service road treatments and intersection closures would be addressed.

Direct Property Accesses

Access to the Western Highway from properties with existing access would be maintained, via service roads or the local road network which has a connection to the Western Highway, as part of the Project to ensure access for adjacent landholders. A further review and final access arrangements are anticipated to be addressed through detailed design.

Given the restriction of access to the Highway at grade-separated interchanges, only individuals that currently have direct property accesses may be required to drive further in order to drive in their desired direction of travel. The effect may be an increased travel time for those road users, with the actual extent depending on the destination of travel. Based on the typical distances of travel for the Project Area, the increase in travel time is not considered to be an unreasonable change in order to achieve desired road safety benefits.

At this level of investigation, it is expected that the restriction to service road access for property accesses would improve road safety for landholders and other users of the Western Highway. As part of the Road Safety Audit process in the detailed design of the Project, the impact of vehicles exiting properties onto service roads and the provision for specific vehicle types such as horse floats and farming machinery through gentle acceleration and deceleration at such locations should be considered.

6.7.4 Public Transport Impacts

Rail Line

As previously mentioned, the rail line crosses the Western Highway at two locations, both of which are grade separated.

The rail line crosses Old Brewery Road, Military Bypass Road, Western Highway (proposed service road), St Ethels Road, Garden Gully Road, Paxton Street, Paterson Road, St George Road and Churchill Crossing Road within the vicinity of the Project Area. These crossings are not proposed to be altered or moved for the ultimate solution and are located at the edge of the Project Area.

Therefore, the ultimate solution for the Western Highway Project would have minimal impact on the safety and operation of the rail line.

Bus Services

Impacts to V/Line and school buses operating along the Western Highway would be similar for the interim and ultimate solutions. Refer to Section 6.6.4 for discussion of impacts on bus services.

6.7.5 Other Road User Impacts

Cyclists and Pedestrians

The impacts to cyclists and pedestrians due to the Western Highway ultimate solution would be the same as the impacts for the interim solution. Within the design for the ultimate solution no specific provisions are made for pedestrians and cyclists. According to the road rules, cyclists would still be permitted to utilise the sealed shoulder of the freeway for AMP1 conditions provided the signage does not restrict this movement. For further information regarding the impacts to cyclists and pedestrians refer to Section 6.6.5.

Emergency Service Vehicles

Similar to the interim solution for the Western Highway Project, the ultimate solution would have positive and negative impacts to emergency service vehicles. It is anticipated that emergency service vehicles would benefit from the increased capacity and reduced travel times along the Highway and the increased ability to safely overtake other vehicles.

The decreased local accessibility due to the centre median and restricted access (only via grade-separated interchanges) may result in increases to the distance travelled for the emergency service vehicle for calls in the local area. However the grade-separated interchanges have been designed at regular intervals and therefore, the Project is not considered to adversely impact emergency service vehicles.

Horses, Livestock and Farming Machinery

The impacts to the movement of livestock across the Western Highway for the ultimate upgrade solution would be the same as for the interim solution. For further details regarding the impact to livestock, and horses associated with the Western Highway Project refer to Section 6.6.5.

Agricultural machinery is not permitted on ‘freeways’, therefore alternative access arrangements would be required in the ultimate solution for these vehicles if they are required at another location. It has been identified that a couple of land holders own property on both sides of the road, consultation would be required to understand their individual requirements. However, given the small number of properties affected and the agricultural machinery would still be permitted on the local road network, it is anticipated the impacts can be managed.

Heavy Vehicles

The impacts to heavy vehicles would be similar to the interim solution and may even be improved due to grade-separated intersections reducing the requirement to potentially slow at intersections. Refer Section 6.6.5 for the details of impacts on heavy vehicles due to the Project.

6.7.6 Ultimate (Freeway) Duplication Impact Assessment Summary

The ultimate (freeway) duplication of the Western Highway would be expected to have the following impacts (positive and negative):

- Improved road safety across the Project Area through:
  - Increased clear zone widths;
  - Removal of at-grade intersections or conversion to grade-separated intersections to reduce conflicting vehicle movements;
  - Ability for drivers to safely overtake vehicles along the length of the Project;
  - Bypassing the township of Great Western; and
  - Providing adequate rest area facilities that comply with the rest area guidelines.
- Improved traffic operation through:
  - Reduction of access points, which reduces interruption to traffic flow;
  - Opportunities to overtake along the length of the Project;
  - Increased posted speed limit; and
  - Increased capacity to accommodate future traffic volume growth.
- Improvements to the freight task by designing the road to accommodate high productivity freight vehicles thereby allowing:
  - Improvements to efficiency of the freight task by enabling the transportation of a greater volume in a single vehicle;
  - Reducing the overall heavy vehicle volume by vehicles having the ability to transport a greater volume; and
  - Travel time savings for freight vehicles due to a reduction in at-grade intersections and access points and improved overtaking opportunities.
- There is expected to be some localised impacts on travel times for landowners, due to proposed access arrangements. Access for intersecting side roads and property access is generally maintained through the provision of service roads and therefore this is likely to increase travel distance for some local users. However, this impact is considered to be acceptable due to the overall benefits for road safety and Highway operations which would be provided for general users.
- Minimal impacts to the operation of the rail line due to the Project, as the Highway and rail line would continue to be grade separated.
- Travel time savings for bus routes travelling along the Highway.

6.8 Benefits and Opportunities

This section summarises the key potential benefits or opportunities to Traffic and Transport that the Project could provide, as identified in Section 6.7, and rates the significance of these benefits.

Benefit ratings are described in Table 23 while the benefits and associated rating for the Project are in Table 24.

Table 23 Benefit Ratings

Rating	Potential Project benefits
Very well	Significant benefit to the State Superior benefit to the region Policy consistency with superior positive impact
Well	Moderate benefit to the State Significant benefit to the region Superior benefit to the locality Policy consistency with significant positive impact
Moderately well	Moderate benefits to the region Significant benefit to the locality Policy consistency with moderate positive impact
Partial	Minor benefits at a local level or significant benefits for a small number of individuals
Negligible	Minimal benefit at any level

Table 24 Project Benefits and Associated Rating (Ultimate)

Benefit	Rating
Increased capacity along the key arterial road between Melbourne and Adelaide, which future proofs this key link;	Partial
Potential to reduce the traffic from local roads due to the Western Highway becoming the preferred route. This increases safety within the region as the Western Highway is designed to be a higher standard road and does not have at-grade intersections;	Partial
Improve efficiency of freight by designing for High Productivity Freight Vehicles.	Moderately Well
Travel time saving by not having to reduce speed though townships and by reducing the number of intersections along the Western Highway.	Partial
Increased safety through the township of Great Western.	Partial
Increased safety with all intersections becoming grade separated.	Moderately Well
Increased safety along the route by providing adequate and improved rest areas.	Partial
Increased provision of clear zones.	Partial

7. Mitigation Measures

This section outlines the control measures to address the identified and assessed impacts, which have been documented throughout Section 6 of this report. These control measures are recommended to reduce impacts to acceptable levels. The controls have been recommended in two levels with planned controls which are consistent with the VicRoads Contract Shell DC1: Design & Construct and additional controls to further reduce the impact of the risk. It is noted that there are no additional traffic and transport management measures recommended beyond those identified in this section.

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 which is documented in the Project Environment Protection Strategy (PEPS). The PEPS is a VicRoads Document that details the environmental management arrangements for the design, construction and operation of the Project. VicRoads would require the construction contractor to incorporate all of these measures into the CEMP. Refer to Chapter 21 of the EES for further explanation of the environmental management framework and documentation proposed for the project.

VicRoads standard environmental protection measures for traffic and transport that would be adopted for this Project include:

- DC 1160 Traffic Management
  - *1160.03 Performance Requirements*
    Functional Requirements

    The Contractor shall conduct all operations so as to minimise obstruction and inconvenience to the public, and shall not have under construction any greater length or amount of work than can be managed properly with due regard to the convenience of the public.

    The Contractor shall be responsible for all works associated with traffic management including but not limited to any earthworks, drainage, pavement, line marking, signing, traffic barriers, communication, meeting any specific requirements of municipal councils and any temporary works.

    The Contractor shall plan and undertake work under the Contract to avoid the intermingling of construction machinery and traffic. Where this is unavoidable, it shall be minimised and controlled. Appropriate traffic management and traffic control measures shall be provided at all times where construction machinery impacts or intermingles with traffic.

    Unless agreed otherwise by the Superintendent, the Contractor shall maintain all existing pedestrian movements through the Site at all times. Temporary pathways, as required, shall be provided and maintained by the Contractor to provide smooth, free-draining, clean and unimpeded access.

    Proposals for lane and/or shoulder closures shall take into consideration the safety of traffic and will be required to minimise the number of lanes affected at any one time and will be expected to only close the minimum length of road or lane necessary.

    The Contractor shall plan and undertake all works to avoid detours. Where alternative traffic arrangements are impracticable and may involve full lane closures, or an alternative route for a

turning movement is temporarily not available, proposals for detours may be considered. In these situations, the detour routes shall provide the shortest acceptable path around the closure, take account of local sensitivities, the capacity of the detour route and the need for any mitigating works, and have the agreement of the municipal council(s) if the detour route includes any roads under the control of the municipal council(s).

– *1160.04 Traffic Management Plans*

The Contractor shall prepare Traffic Management Plans for the management of individual events that impact on traffic in accordance with the Traffic Management Strategy, the performance requirements included in this specification, the requirements of the Road Management Act 2004 Worksite Safety – Traffic Management Code of Practice and the following requirements. The Traffic Management Plan shall be in accordance with Austroads Guide to Road Design and VicRoads Supplements to AGRD and Traffic Engineering standards as appropriate for the posted speed. Each Traffic Management Plan drawing shall be certified by the Contractor.

Where a discrepancy is identified between the requirements of this specification and the requirements of the Worksite Safety – Traffic Management Code of Practice, the Contractor shall adopt the more stringent requirements(s) as part of the work under the Contract.

The Contractor shall be responsible for obtaining all necessary approvals, and the co-ordination, implementation and other arrangements associated with Traffic Management Plans.

– *1160.06 Traffic Management Plan Audits*

The Contractor shall ensure that a Road Safety Audit is undertaken at the following times:

(a) at the final design stage for each proposed Traffic Management Plan not specifically covered by arrangements shown in AS 1742.3 and its various user guides;

(b) immediately upon implementing each TGS from an approved Traffic Management Plan;

(c) during the first day and night a.m. and p.m. peak hours following the implementation of each TGS; and

(d) at any other time nominated in the Worksite Safety – Traffic Management Code of Practice.

Audits and auditors shall be in accordance with the requirements of Section 1180.

- DC 1180 Road Safety Audits

  The Contractor shall ensure that road safety audits are carried out in accordance with the Austroads Guide to Road Safety - Part 6: Road Safety Audit (2009) and by a company pre-qualified with VicRoads at the Road Safety Audit (RSAUDIT) Level. The Contractor shall be responsible for all costs associated with the completion of the audits and the implementation of the findings of the audits.

Additional, Project specific controls are also proposed to reduce risks to traffic and transport which include:

- Identification of appropriate haulage routes for construction traffic and heavy vehicles to be carefully selected and managed as part of TMPs with consideration for safety;
- Implement a communication strategy with the key stakeholders to manage impacts and inform road users and the community;
- Traffic management strategies and plans would be prepared by the construction contractor(s) prior to the commencement of construction activities to identify, assess and appropriately minimise likely impacts on road operations and road safety for road users during construction, covering:

- Consideration is anticipated to include a range of road users including vehicle traffic, slower moving farm machinery, public transport, school buses, emergency services, cyclists, pedestrians, rail interfaces and haulage routes.
- Accessibility and detour routes for local landholders to be considered, where appropriate.
- Monitoring and auditing is to be undertaken during construction to assess impact of the TMPs and advise of remedial action to be undertaken, if warranted.
- With relevant authorities, consideration should be made to the relocation of school bus stops and associated pedestrian connection within the Project Area during construction.
- Consider operation of at-grade road crossings of the rail line as part of the designation of haulage routes and address operational and safety impacts as part of the detailed TMPs.
- Detailed consideration should be made to ensure that impacts to travel times and accessibility for emergency services is acceptably managed.
- It is further anticipated that Road Safety Audits would be undertaken on the TMPs prior to implementation.
- TMPs are expected to be developed first as a framework document (Traffic Management Strategy) for VicRoads review and then developed in line with the works program for issue in a timely manner for review.
- Important objectives for the TMPs would be the minimisation of impacts to the surrounding arterial and local road networks. Elements of this are expected to include:
  - Provision of sufficient delineation and warning to provide safe and efficient movement of vehicles past the worksite;
  - Minimisation of the number of lanes and intersecting roads that are closed at the same time;
  - Minimisation of the duration of temporary lane/road closures;
  - Minimisation of speed limit reductions outside of work hours;
  - Minimisation of the impacts of construction works at public holidays, school holidays or other times when the Western Highway would reasonably be expected to experience higher levels of demand; and
  - Provision of adequate detour/guidance signage for motorists, where applicable.

- Road Safety Audits at the detailed design phase of the duplication would be required to review impacts to road safety from the Project.
  - The impact of vehicles exiting service road accesses, merging across through-lanes of traffic and performing U-turns at median breaks should be considered. The provision for specific vehicle types, including horse floats, through gentle acceleration and deceleration at such locations should be considered in the detailed design.
  - Consideration could be made to the potential relocation of school bus stops within the Project Area and any provision for school students to cross the highway.
- Consideration of non-motorised road users (ensuring connectivity is not removed), public transport, school buses, emergency services and rail interfaces. Train replacement bus services are expected to be provided in the event of planned works requiring track occupation during construction;
- The provision of information as part of the community consultation process for the Project, to inform and engage with the public prior to and during construction and in operation.

  - This would assist in informing the expectations of landholders and road users of highway operations and access arrangements during construction.
  - Information should also be provided regarding positive project outcomes (e.g. safety improvements by reducing conflict points, including from 'left-in / left-out only' treatments) to assist with perceptions of localised impacts to access post-construction.
- Ensure signage and design permits cyclists to continue to use the shoulder of the highway such that it meets the road rule 95(2) requirements.
- Assess wildlife corridors and identify mitigation measures to reduce the requirement for wildlife to cross Western Highway.

8. Conclusion

The Traffic and Transport Assessment for the EES of the Western Highway Project Section 3 has been guided by the scoping requirements and draft evaluation objectives for this EES and the resultant evaluation criteria, which set out key considerations regarding the traffic and transport impacts during the construction and operation of the proposed alignment.

The draft EES evaluation objectives relevant to the Traffic and Transport assessment outlined in the Scoping Requirements were as follows:

- *To provide for the duplication of the Western Highway between Ararat and Stawell to address safety, efficiency and capacity issues; 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.*

The assessment has been completed for the construction, interim operation and ultimate operation stages. Following the completion of the Traffic and Transport impact and risk assessment for the proposed alignment of the Western Highway – Section 3, a number of benefits regarding road safety and capacity are anticipated, while some negative impacts are also expected. All negative impacts are able to be managed or mitigated through implementation of the appropriate mitigation measures as detailed in Section 7 of this report.

Key Benefits

The key positive impacts of the Project as they relate to traffic and transport are outlined below.

The duplication is expected to provide sufficient capacity to cater for the forecasted traffic volume until at least 2040. Additionally, the duplication is expected to enable the Western Highway to increase the posted speed limit from 100 km/h to 110 km/h and provide significantly increased opportunities for safe overtaking. Delays due to vehicles slowing for intersections would also be improved as key intersections would be grade separated and local access would be provided via service roads, for the ultimate solution. Based on these factors, it is reasonable to assume a travel time saving for the majority of road users would be provided once the duplication is complete. Travel time savings would also occur for the interim solution as intersections are improved and the posted speed limit is increased from 100 km/h to 110 km/h.

The upgrade works to the Western Highway are also expected to provide road safety benefits through the following design elements:

- Horizontal and vertical alignments are designed to current standards;
- Clear zone width improvements or where this cannot be achieved, wire rope barriers would be provided to shield motorists in the event of run-off-the-road collisions;
- Provision of a central median to reduce the occurrence of head-on collisions through a driver veering onto the opposing carriageway;
- Grade separation of key intersections with ramps providing access to/from the Western Highway; and
- Local access controlled via service roads.

These design features for the duplication are expected to eliminate a high proportion of existing road safety risks and provide for a higher road safety standard than currently exists.

The Western Highway is a key freight route, the duplication is expected to provide benefit to freight traffic through travel time savings and the future ability for the highway to accommodate HPFVs, which would in-turn provide efficiencies for the movement of freight and reduce the number of heavy vehicles along the road.

Key Impacts

The key negative impacts of the Project as they relate to traffic and transport are outlined below.

It is anticipated that some local landowners may have slightly increased travel times in both the interim and ultimate solutions due to reduced access to the highway or freeway. However, there are sufficient opportunities to complete a U-Turn that this is not anticipated to be a significant issue. During the interim solution, the intersecting roads would be provided with access via wide centre median treatments or 'left in' and 'left out' arrangements, while the ultimate solution would further restrict access to only the grade separated interchanges with service roads providing connections to these interchanges.

Construction of the duplicated Highway is not expected to have unacceptable impacts to the operation of the Highway. The risk assessment has addressed potential operational and road safety impacts and outlined mitigation measures for the identified road users.

The majority of potential negative impacts of the Project with regard to road operations, safety and effects on road users would be expected to occur during the construction phase, where construction related activity would impact on the existing network. This assessment has identified that acceptable outcomes would be achieved through the implementation of detailed Traffic Management Plans and through community consultation to inform road users' expectations during the construction stages.

9. References

AECOM, 2010, *Alignment Options Identification and Evaluation Report – Ararat to Stawell*, AECOM,

Austroads 2009, *Guide to Road Design Part 3: Geometric Design,* Austroads, Sydney

Austroads 2009, *Guide to Road Safety Part 8: Treatment of Crash Locations,* Austroads, Sydney

Austroads 2009, *Guide to Traffic Management Part 3: Traffic Studies and Analysis,* Austroads, Sydney

Austroads 2010, *Road Safety Engineering Risk Assessment Part 6: Crash Reduction Factors,* Austroads, Sydney

CPG, 2009, *Western Highway Duplication Ballarat to Stawell – Traffic Analysis,* CPG, Melbourne

DPCD, 2011, *Western Highway Duplication Section 3 – Ararat to Stawell: EES Scoping Requirements,* Victorian State Government

Folkard, S. 1997, *Black times: temporal determinants of transport safety,* Accident Analysis and Prevention, 29, pp. 417 – 430

Road Management Act 2004 (Vic), Ansat, Melbourne

Road Safety Road Rules 2009 (Vic), Ansat, Melbourne

Transport Integration Act 2010 (Vic), Ansat, Melbourne

VicRoads 2006, *Access Management Policies,* VicRoads, Melbourne

VicRoads 2008, *Arrive Alive 2008-2017: Victoria's Road Safety Strategy*, VicRoads, Melbourne

VicRoads 2009, *Declaration of Route for B-doubles and Exemption of Longer B-doubles from Dimension Limits,* Victoria Government Gazette (S406 2009), Blue Star Print, Melbourne

VicRoads 2004, *B-double and Higher Mass Limits Trucks,* VicRoads, Melbourne

VicRoads, 2008, *Local Rods Approved for B-doubles and Higher Mass Limits Trucks*, VicRoads, Melbourne

VicRoads 2010, *Code of Practice for Worksite Safety – Traffic Management,* Victoria Government Gazette (S351 2010), Blue Star Print, Melbourne

VicRoads 2010, CrashStats Road Crash Statistics Victoria, VicRoads, viewed July 2011, <http://www.vicroads.vic.gov.au/Home/SafetyAndRules/AboutRoadSafety/StatisticsAndResearch/CrashStats.htm>.

VicRoads 2010, *Western Highway Project Duplication: Ararat to Stawell*, VicRoads, Melbourne

VicRoads, 2011, *Rest Area Route Plan, Western Highway Project, Ballarat to Stawell*, VicRoads, Melbourne

VicRoads, 2011, *Inter-Office Memo – Western Highway Project (Duplication: Ballarat to Stawell) Proposed Operating Speed Zones,* VicRoads, Melbourne

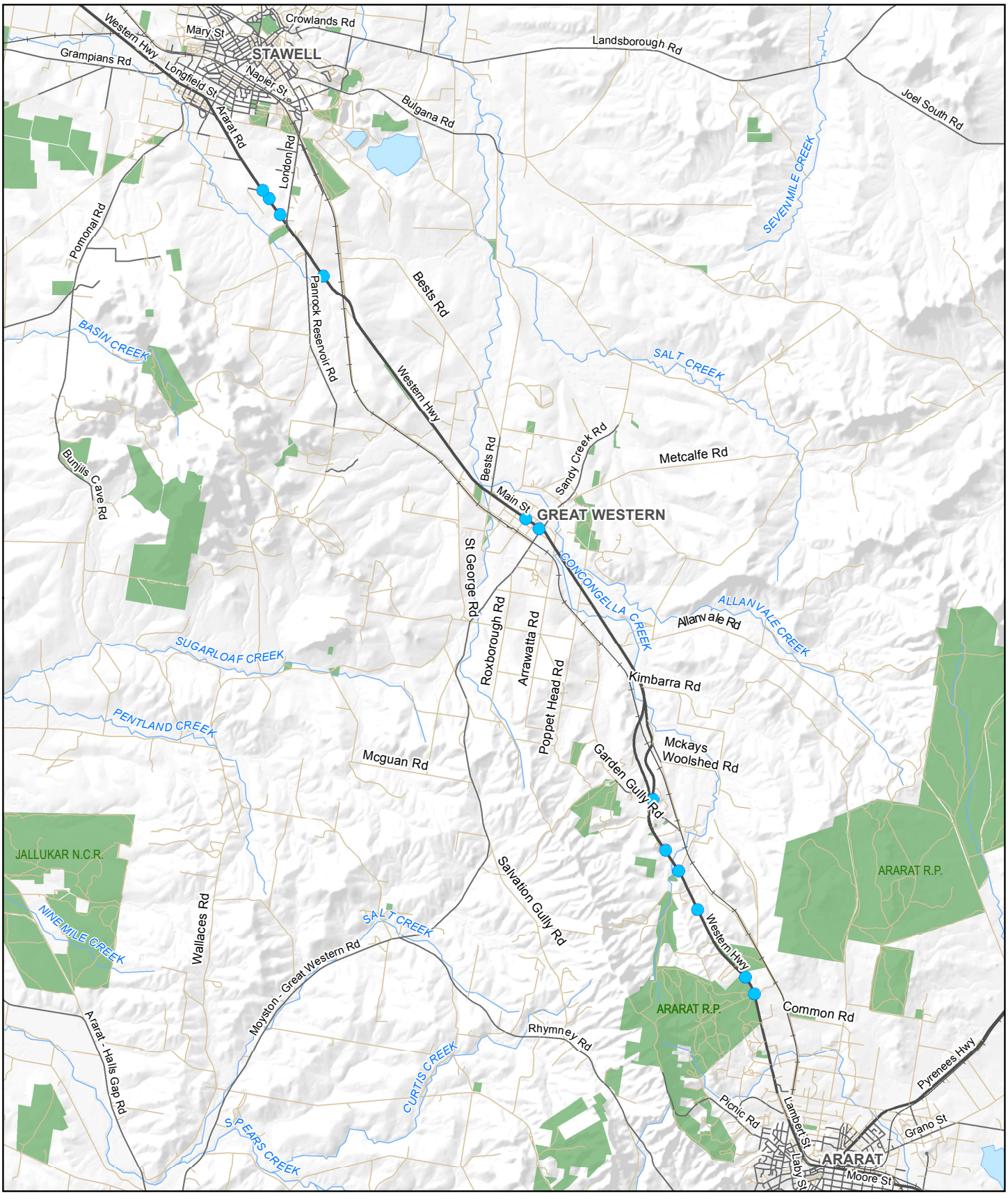
VicRoads, 2012, *VicRoads Traffic Count Data – Western Highway,* VicRoads, Melbourne

VicRoads, 2012, *VicRoads Contract Shell DC1: Design & Construct, April 2012,* VicRoads, Melbourne

VLine, 2011, *Timetable Information*, VLine, viewed July 2011, http://www.vline.com.au/timetables/timetables/train.html

Appendix A

Casualty Crash Statistics Map



LEGEND

- Crash Locations
- Highway
- Sealed road (arterial & local)
- Unsealed road
- Parks

Paper Size A4

0 0.5 1 2 3 4

Kilometers

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

N

CLIENTS | PEOPLE | PERFORMANCE

VicRoads
Western Highway Project

Ararat to Stawell
Casualty Crash Statistics Map

Appendix A

Job Number	31-27558
Revision	B
Date	02 Nov 2012

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Data source: DSE, VicMap, 2012; VicRoads, 2012; GHD, Design, 2012. Created by:splaird

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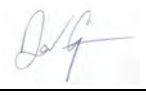
2	N.Guy	D.Gregor		M. Tansley		30.1.12
3	N.Guy M.Petrusma	D.Gregor		M.Tansley		14.9.12
4	N.Guy	D.Gregor		D.Gregor		2.11.12