This Environmental Risk Assessment Report for Section 3 of the Western Highway Project ("Report"): 

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2. May only be used for the purpose of informing the Environment Effects Statement and Planning Scheme Amendment for the Western Highway Project (and must not be used for any other purpose); and 
3. May be provided to the Department of Planning and Community Development for the purpose of public exhibition as part of the Environment Effects Statement and Planning Scheme Amendment for the Western Highway Project. 

The services undertaken by GHD in connection with preparing this Report were limited to those specifically detailed in Sections ‘1.3 Risk Assessment Scope and Objectives’ and ‘4. Risk Assessment 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. Risk Assessment Methodology’ and throughout this Report. 

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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

The Western Highway Project, Section 3 – Ararat to Stawell (the Project), is part of a larger project to duplicate the Western Highway between Ballarat and Stawell, Victoria. In October 2010 the then Victorian Minister for Planning determined that an Environment Effects Statement (EES) was required for the Project. The Scoping Requirements for the EES state that in providing an integrated assessment of the project, the EES should describe the implications of potential effects and associated risks.

This report documents the approach and outcomes of the risk assessment only. It does not provide discussion of the risk assessment pathways or the mitigation measures as this discussion is provided in the technical reports prepared by each specialist, which are appended to the EES. The technical appendices inform the chapters of the EES document and conclusions about the impact of the project.

Approach

An environmental risk assessment was undertaken to identify impact pathways and appropriate mitigation measures that could reduce the impact of the Project. The objectives of the risk assessment were to:

- Identify impact pathways and key project environmental risks which require detailed investigation;
- Facilitate a consistent approach to risk assessment across the various project disciplines; and
- Guide the level of investigation and environmental management measures, in proportion to the relative risk of issues.

As many environmental risks are difficult to quantify, a semi-quantitative risk assessment has been used for the Project. This means that risks have been quantified where possible, however if that is not possible without significant assumptions, then a qualitative assessment has been made.

The scope of the risk assessment included construction and operational risks of the Project in relation to social, environmental and economic values on both a local and regional scale. The risk assessment did not consider risks of project delays or reputational, financial or organisational effectiveness risks posed to VicRoads or the contractor(s) managing or undertaking the project.

An initial risk assessment was undertaken for each impact pathway as identified by specialists for the Section 3 proposed alignment. This initial rating assumed implementation of the standard VicRoads environmental management procedures and design measures. After each risk was assigned a rating, proportional management and mitigation measures were developed. The risk rating was then re-evaluated, taking into account the additional management and mitigation measures, to identify the residual risk from the Project.

Once a preliminary risk register was completed by each technical specialist, a risk workshop was held to discuss the key risks. This workshop allowed technical specialists from each discipline to collectively discuss risks which were interrelated. The cultural heritage specialists were not present at the workshop as their field work was being completed. A separate workshop was held with selected specialists to review the risk assessment for cultural heritage in context of the other disciplines.
Outcomes

A simple analysis of the number of risks within each discipline was undertaken. Discussion of the risk pathways and the significance of risks within each discipline are provided in the specialist reports.

In the final analysis of the risks associated with the Project, there were 146 impact pathways identified. Following consideration of risk treatment measures, the risk pathways and ratings included:

- 42 negligible residual risks
- 70 low residual risks
- 27 medium residual risks
- 7 high residual risks
- 0 extreme residual risks.

No extreme residual risks were identified by specialists. The most significant potential impact was identified by the soils and geology specialists, who recorded an extreme initial risk. Biodiversity and habitat, cultural heritage and visual and landscape each recorded multiple high initial risks. Suitable mitigation measures are available for most of these risks however, lowering 36 high initial risks to seven high residual risks. Further assessment was undertaken to define risk treatment measures to reduce these risks. The residual high risks are associated with the biodiversity and habitat (3) and cultural heritage (4) disciplines. The biodiversity and habitat risks related to impacts on EPBC listed fauna, Ecological Vegetation Classes and scattered/hollow bearing trees, and are described in Table 3. The cultural heritage risks relate to the destruction of three occasional occurrence (e.g. scarred trees) Aboriginal heritage sites, the potential destruction of one rare occurrence (e.g. burned mounds) Aboriginal heritage site and the potential destruction of a previously unidentified Aboriginal mortuary tree. The initial and residual risk ratings for each discipline are illustrated in Figure 1.

A detailed risk assessment was undertaken to identify the activities that could lead to pathways which impact on environmental, social or economic values of the Project area. The risk assessment was used as a tool to identify potentially significant risk events for more detailed assessment of impact and mitigation measures. The process enabled activities and events with relatively high levels of risk to be prioritised from those with a lower level of risk or which were easily managed.

The impact assessment then verifiess the impact pathway, considers and evaluates the measures available to mitigate the effect, reviews the probability of the effect materialising through the pathway, and determines the net impact from the pathway. The purpose of the impact assessment is to draw conclusions, on balance, as to the likely impacts of the Project in the context of existing conditions and identified measures available to mitigate likely impacts.

The impact pathways and the proposed mitigation and management measures have been used to inform the Environmental Management Framework for the Project, described in Chapter 21 of the EES document.
Figure 1   Frequency of Initial and Residual Risk Ratings by Discipline
1. Introduction

1.1 Background

The Western Highway (A8) is being progressively upgraded as a four lane divided highway between Ballarat and Stawell. As the principal road link between Melbourne and Adelaide, it serves interstate trade and is the key corridor through Victoria’s west, supporting farming, grain production, regional tourism and a range of manufacturing and service activities.

Section 3 of the Western Highway Project (the Project) commences at Pollard Lane, Ararat and extends northwest for approximately 24 kilometres (km) to Gilchrist Road, Stawell. It includes a bypass of the township of Great Western and crossing of the Australian Rail Track Corporation’s (ARTC) interstate rail line which experiences both freight and interstate passenger movements.

In October 2010 the then Victorian Minister for Planning determined that an Environment Effects Statement (EES) was required for the Project. The EES has been prepared in accordance with the Minister for Planning’s ‘Guidelines for assessment of environmental effects under the Environment Effects Act 1978’ and the finalised ‘Scoping Requirements: Western Highway Duplication – Section 3 Ararat to Stawell, Environment Effects Statement (September 2011)’ (Scoping Requirements).

The Scoping Requirements state that in providing an integrated assessment of the project, the EES should describe the implications of potential effects and associated risks. The following requirements are identified for risk assessment:

*The EES documentation should be prepared in the context of the principles of a systems approach and proportionality to risk, as set out in the Ministerial guidelines for assessment of environmental effects under the Environment Effects Act 1978 (Ministerial Guidelines) (Section 4.1, Scoping Requirements).*

The Ministerial Guidelines set out the following (page 14):

*A risk-based approach should be adopted in the assessment of environmental effects so that suitable, intensive, best practice methods can be applied to accurately assess those matters that involve relatively high levels of risk of significant adverse effects and guide the design of strategies to manage these risks. Simpler or less comprehensive methods of investigation may be applied to matters that can be shown to involve lower levels of risk.*

*Implementation of a risk-based approach means that a staged study design may be appropriate. The initial phase of investigation should characterise environmental assets that may be affected, potential threats arising from a project, and the potential environmental consequences. This phase should enable the design of any necessary further studies proportionate to the risk to analyse the consequences and likelihood of adverse effects.*

The development of the risk assessment process, its implementation and findings are documented in this report.

1.2 Approach to EES Investigations

Development of the alignment options and environmental investigations for the Project has been undertaken in three phases:
Phase 1 involved developing a range of alignment options, followed by a rapid assessment to identify a shortlist through a high level consideration of potential impacts and benefits.

Phase 2 involved the detailed assessment of the options shortlisted in Phase 1 to identify a proposed alignment through a more detailed consideration of potential impacts and benefits.

Phase 3 involved an Environmental Risk Assessment of the proposed alignment and commencement of the specialist impact assessments to identify areas where further micro refinements were required to mitigate potential areas of impact.

1.3 Report Objectives

The objectives of this report are to:

- Outline how the risk assessment fits within the context of the broader EES evaluation framework for the Project;
- Describe the risk assessment process that was undertaken;
- Summarise the construction and operation risks associated with Project activities; and
- Demonstrate that the risk assessment meets the EES Scoping Requirements.

This report documents the approach and outcomes of the risk assessment only. It does not provide discussion of the risk assessment pathways or the mitigation measures as this discussion is provided in the technical reports prepared by each specialist. The specialist reports will be technical appendices to the EES and inform the chapters of the EES document and conclusions about the impact of the project.

This report will also be a technical appendix to the EES document for Section 3 of the Western Highway Project.

1.4 Risk Assessment Scope and Objectives

This scope of the risk assessment was to evaluate the proposed alignment for Section 3 as identified through the options assessment process (refer to the Section 3 Options Assessment Report, GHD, February 2012). The risk assessment was undertaken on the concept design of the proposed alignment that was developed for the EES. The alignment options are described in detail in the Project Alternatives chapter (Chapter 5) and further details of the proposed alignment are provided in the Project Description chapter (Chapter 6) of the EES document. The proposed alignment considered in the risk assessment is shown in detail in the map book contained in Appendix A of this report and overall in Figure 2.

The objectives of the risk assessment process are to:

- Identify the impact pathways and key project environmental risks which require detailed investigation;
- Facilitate a consistent approach to risk assessment across the various project disciplines; and
- Guide the level of investigation and environmental management measures, in proportion to the relative risk of issues.
2. Standard for Risk Assessment

2.1 Risk Management Standard AS/NZS ISO 31000:2009

The risk assessment approach to be followed for the Project is not prescribed by legislation. The Australian/New Zealand and International Standard for Risk Management is AS/NZS ISO 31000:2009, and this provides a structured approach which has been adopted for this assessment. This Standard is widely recognised and routinely used as a basis for EES and other risk assessments.

The risk management process outlined in AS/NZS ISO 31000 is iterative and can be applied to specific projects and activities. The steps in the risk management process are shown in Figure 3. The main elements are:

- **Communicate and Consult** – communicate and consult with internal and external stakeholders at each stage of the risk management process.
- **Establish the Context** – establish the external, internal and risk management context in which the rest of the process will take place.
- **Identify Risks** – identify where, when, why and how events could prevent, degrade, delay or enhance the achievement of the objectives.
- **Analyse Risks** – identify existing controls, determine likelihood and consequences and determine the level of risk.
- **Evaluate Risks** – compare estimated levels of risk against the criteria and consider the balance between potential benefits and adverse outcomes.
- **Treat Risks** – develop and implement specific cost-effective strategies and action plans for increasing potential benefits and reducing potential costs.
- **Monitor and Review** – monitor the effectiveness of all steps of the risk management process.
Figure 3  Risk Management Process (AS/NZS ISO 31000:2009)
3. Key Concepts

3.1 Definitions

Commonly used terms in the risk assessment for this EES are defined as follows:

**Impact Pathway**
This is the cause and effect ‘pathway’ that exists between a particular project activity and a component of the environment. It describes how aspects of project construction and operation interact with assets, values and uses.

**Consequence**
Consequence is an outcome of a risk event (AS/NZS ISO 31000:2009); in this case through an environmental impact pathway.

**Likelihood**
Likelihood is the chance of something happening (AS/NZS ISO 31000:2009). A general description of the probability or frequency of an event occurring is used as a guide.

**Risk**
- AS/NZS ISO 31000:2009 defines risk as the effect of uncertainty on objectives. It is expressed in terms of a combination of the consequences of an event (including changes in circumstances) and the associated likelihood of occurrence.
- Risk is a condition involving exposure to events that would have an adverse impact, in this case, on the biophysical, social or economic elements of the environment.
- The EES risk assessment specifically focuses on the negative impacts resulting from the Project. Positive opportunities or impacts have not been considered.
- A risk event can only occur if a cause and effect ‘impact pathway’ exists between a particular project activity and a component of the environment.

**Initial Risk**
The risks prior to the application of treatment measures, other than measures inherent in the standard project design and environmental management framework.

**Residual Risk**
The risk that remains after applying risk treatment or control measures to the initial risk.
3.2 Risk Treatment / Controls

A control is a measure that is modifying risk (AS/NZS ISO 31000:2009).

In the context of this EES, risk treatment measures are the controls that are proposed to avoid, remedy, or mitigate the risk for potential adverse environmental impact. This includes design changes to avoid impacts, mitigation to reduce severity or remedial action to rectify a consequence after the fact. Controls were assessed at two stages in this EES:

- ‘Planned Controls’ are those base level controls inherent in the project design, project description and standard VicRoads Environmental Management Framework, and these were considered prior to the initial risk assessment. This framework comprised a standard set of environmental protection measures which are typically incorporated into VicRoads construction contracts for road works and bridge works, and are described in a document identified as ‘VicRoads, Contract Shell DC1: Design & Construct’, April 2012.
- ‘Controls to Reduce Risk’ are the additional measures proposed to reduce the initial risk to an acceptable residual risk level.

The risk controls are documented in specialist reports and in the Environmental Management Framework chapter of the EES.
4. Risk Assessment Methodology

4.1 Introduction

Risk assessments may be quantitative, semi-quantitative or qualitative. As many environmental risks are difficult to quantify, a semi-quantitative risk assessment has been used for the Project. This means that risks have been quantified where possible, however if that is not possible without significant assumptions, then a qualitative assessment has been made.

The risk management process consists of a cycle of formulation of risk criteria, identification of risk events, assessment of risks, formulation of measures to reduce risk and review. The process enables risk treatment actions to be formulated based on the source of the risk (the impact pathway) and the components of the risk (likelihood and consequence).

A risk assessment process can be used to identify impact pathways and activities related to a project that pose the greatest risk and therefore an impact to social, environmental and economic values.

4.2 Process Overview

An overview of the environmental risk assessment process used for the Project is presented in Figure 4. This shows feedback loops to allow for risk re-evaluation and continuous development of the risk assessment and the Project Description.

The early steps in the process involved establishing the context of the risk assessment. A key consideration is setting the boundaries and scope for the assessment. An initial Project Description was developed for technical specialists (e.g. ecologist) to describe the design details such as the proposed construction method, details of waterway crossings and road design information. The Project Description formed the basis for the impact assessments and environmental risk assessment. The Project Description was updated as the impact assessment progressed to reflect mitigation measures recommended. The final version informed Chapter 6 of the EES document.

After the context was established, technical specialists identified impact pathways describing how project construction or operation activities and events interact with assets, values and uses. Standard planned controls, comprising standard VicRoads environmental management procedures and design measures, were identified from the Project Description and matched to the appropriate impact pathway.

An initial risk assessment was then undertaken on each impact pathway, by considering the consequences and likelihood of the impact occurring. This initial rating assumed implementation of the standard planned controls.

After each risk was assigned a rating, proportional management and mitigation measures were developed. The risk rating was then re-evaluated, taking into account the additional management and mitigation measures, to identify the residual risk from the Project.
Once a preliminary risk register was completed by each technical specialist, a risk workshop was held to discuss the key risks. This workshop allowed technical specialists from each discipline to collectively discuss risks which were interrelated.

The impact assessments undertaken by the specialists followed the risk workshop and further refined impact pathways, the associated risks and mitigation measures.

---

**Figure 4  EES Risk Assessment Process**

1. **Establish Context**
   - **Review:**
     - Project Description
     - VicRoads Environmental Management Framework
     - Existing Conditions Reports
   - **Establish:**
     - Consequence Criteria
     - Likelihood Guide
     - Environmental, Social and Economic Values of the Project Area

2. **Identify Potential Impact Pathways**

3. **Analyze Risks**
   - Assess risks by assigning a likelihood and consequence rating for each pathway

4. **Risk Evaluation**
   - Decide whether Risks are acceptable

5. **Risk Treatment**
   - Identify management and mitigation measures that could reduce the risk to an acceptable level

6. **Prepare Risk Register**

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**Assess Residual Risks** with additional management and mitigation where appropriate
4.3 Establishing the Context

4.3.1 Boundaries and Scope
The scope of the risk assessment included construction and operational risks of the Project in relation to social, environmental and economic values on both a local and regional scale.

The risk assessment did not consider risks of project delays or reputational, financial or organisational effectiveness risks posed to VicRoads or the contractor(s) managing or undertaking the Project.

The Project Description was issued to all technical specialists and this, along with existing conditions reports, is the basis for the risk assessments. The Project Description provides details of the:

- Dimensions of the proposed route and interchanges to define the footprint of the development;
- Proposed gradeline and generalised cut and fill requirements;
- Proposed changes to existing roads and access arrangements;
- Predicted levels of traffic following project construction; and
- Construction methodology, including activities, staging, equipment and management procedures.

The Project Description also established the base level of planned controls that are inherent in the project design, or within VicRoads’ standard Environmental Management Framework. This framework comprised a standard set of environmental protection measures which are typically incorporated into VicRoads construction contracts for road works and bridge works, and are described in a document identified as “VicRoads, Contract Shell DC1: Design & Construct”. These measures are inherent to the project design and are therefore considered before undertaking the initial risk assessment.

When the project design changed significantly through the impact assessment process (perhaps due to the adoption of new mitigation measures or a realignment to avoid an impact) the Project Description was updated and reissued to all technical specialists in order to allow the impact of the change to be reassessed. Chapter 6 of the EES presents the finalised Project Description as a result of this cyclical process of continual improvement. The alignment assessed in the risk assessment is shown in totality in Figure 2 and in detail in Appendix A.

4.3.2 Establishing Consequence and Likelihood Criteria
A risk rating is determined by the likelihood of an event occurring and the consequences of that event. Descriptions for the range of possible consequences and likelihoods were established in consultation with key technical specialists (e.g. surface water engineers, botanists, etc.). These were influenced by the requirements of relevant legislation and guidelines, as well as the draft evaluation objectives for the EES defined in the EES Scoping Requirements. The outcome was parameters that were reasonable and representative for their given disciplines.

The likelihood guide is shown in Table 1, and contains a general description of the probability or frequency of an event occurring.
Table 1  Likelihood Guide

<table>
<thead>
<tr>
<th>Descriptor</th>
<th>Explanation</th>
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<tr>
<td>Almost Certain</td>
<td>The event is expected to occur in most circumstances</td>
</tr>
<tr>
<td>Likely</td>
<td>The event will probably occur in most circumstances</td>
</tr>
<tr>
<td>Possible</td>
<td>The event could occur</td>
</tr>
<tr>
<td>Unlikely</td>
<td>The event could occur but is not expected</td>
</tr>
<tr>
<td>Rare</td>
<td>The event may occur only in exceptional circumstances</td>
</tr>
</tbody>
</table>

Consequence criteria were defined for each discipline, and range on a scale of magnitude from ‘insignificant’ to ‘catastrophic’ as shown in Appendix B. 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 size 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.

4.4 Identifying Impact Pathways

To determine risks it is necessary to identify and describe cause and effect pathways for the project. This was done systematically for each discipline area (e.g. noise, groundwater) to determine links between project activities and their subsequent consequences. Impact pathways identify the activity or event associated with construction (including site establishment and restoration) or operation project phases, and gives consideration to the assets, values and uses requiring protection which were established in existing conditions assessments.

Linkages between discipline areas were identified and explored in a multi-disciplinary workshop, explained further in Section 4.7. If a particular risk had ‘downstream’ implications for other specialist areas, this linkage was brought to the attention of the wider EES team to evaluate whether appropriate action was being taken. An example is construction dust emissions (an air quality impact pathway) potentially affecting biodiversity and habitat, and adjacent business’ or nearby residents (economic and social receivers).

4.5 Analysing Risks

Risk ratings were established for each pathway by technical specialists assigning a level of likelihood in accordance with the Likelihood Guide shown in Table 1 and assigning levels of consequence in accordance with the Consequence Table provided in Appendix B.

The likelihood of the risk occurring took into account the probability of the maximum credible consequence as described in the Consequence Table, assuming the planned controls specified in the project description are in place and operating at their expected level of performance. A base level of mitigation is inherent through the implementation of VicRoads’ standard Environmental Management Framework. The adequacy of these controls to manage the risk was considered when assigning the likelihood rating.
The descriptors in the Consequence Table were used to assign consequence levels to risks within each specialist’s area of study. These were conservatively assigned on the basis of the ‘credible worst case’ scenario which considers the range of possible outcomes and the mode (most common outcome), to supply a credible worst case rating. This approach enabled prioritisation of risks and plausible pathways from activities to receptor. Otherwise, there was the potential that the Project activities could, by considering an implausible and nearly impossible event scenario, be assessed as an extreme outcome which would not be credible or of use in informing a proportionate treatment response. The Consequence Criteria were treated as a guide only, and professional judgment and experience was also used to assign consequence levels.

Uncertainty was considered when assigning likelihood and consequence levels. In cases where information was incomplete, a conservative assessment was made on the basis of the maximum credible consequence. Areas where further work could be done to reduce uncertainty (and therefore provide a more precise risk rating) were identified and prioritized.

The degree of risk was then established by considering its constituent components of likelihood and consequence in the matrix shown in Table 2. A risk event may pose a ‘high’ risk because it is likely to occur frequently, although the consequences may not be substantial for any single event. A risk event may also pose a ‘high’ risk if it has a low likelihood of occurrence but the magnitude of consequences will be substantial. A risk event that poses an ‘extreme’ risk will represent both a high likelihood of occurrence and substantial consequences. The matrix shown in Table 2 is commonly used in environmental impact assessment, and complies with AS/NZS ISO 31000:2009.

<table>
<thead>
<tr>
<th>Likelihood Level</th>
<th>Consequence Level</th>
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<tr>
<td></td>
<td>Insignificant</td>
</tr>
<tr>
<td>Almost Certain</td>
<td>Low</td>
</tr>
<tr>
<td>Likely</td>
<td>Low</td>
</tr>
<tr>
<td>Possible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Unlikely</td>
<td>Negligible</td>
</tr>
<tr>
<td>Rare</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

### 4.6 Risk Evaluation and Treatment

Risk treatment involves identifying measures for reducing the identified risks, and implementing those measures. Risk treatment involves a cyclical process of:

- Assessing a risk treatment;
- Deciding whether residual risk levels are tolerable;
- If not tolerable, generating a new risk treatment; and
- Assessing the effectiveness of that treatment.

Risk treatment measures are not necessarily mutually exclusive or appropriate in all circumstances and can include the following:
Avoiding the risk by deciding not to start or continue with the activity that gives rise to the risk;

Removing the risk source. For example, by moving a chemical storage area away from a watercourse;

Changing the likelihood. For example, the probability of traffic crashes may decrease if large fauna wildlife crossings are incorporated;

Changing the consequences. For example, providing screen planting may reduce the consequences to visual amenity; or

Retaining the risk by informed decision.

The risk ratings (Table 2) were used to evaluate impact pathways which required detailed investigation, areas where additional mitigation or remedial measures were necessary, or where changes to the Project were needed to avoid risks. It also provided a way to screen out the less significant issues.

Where initial risks were considered unacceptable, mitigation measures in addition to those inherent in the design and VicRoads standard Environmental Protection Measures were recommended by the specialist to reduce the level of risk. The risks were then rated again to confirm that the mitigation measure had the desired effect. This second rating is known as the ‘residual risk rating’.

Where mitigation measures caused a significant change to the Project Description, the Project Description was updated and the impact pathways reassessed as appropriate.

4.7 Risk Workshop

After all technical specialists had completed their risk assessments, a multi-disciplinary workshop was held on 19 January 2012 to address the interactions between impact pathways in differing disciplines and their consequences.

The systematic application of the risk assessment process in a workshop involving experienced technical specialists from different disciplines achieved the following:

- As much as possible, all risks of relevance were identified;
- Knowledge and information transfer occurred between the various practitioner disciplines, enabling inter-disciplinary pathways and interactions to be captured;
- Greater understanding of identified risks, in terms of the range of potential consequences and their likelihood of occurrence;
- Assessment was carried out of individual risks relative to other risks to support priority setting and resource allocation; and
- Environmental risk management measures could be developed to take account of opportunities to address more than one risk.

The cultural heritage specialists were not present at the workshop as their field work was yet to be completed. Once the field work was complete, the risk register for both non-Aboriginal and Aboriginal cultural heritage was completed and reviewed with selected specialists to consider the risks in context of other disciplines.
4.8 Risk Register

A risk register was established to document the findings of the risk assessment process. The risk register contains details of impact pathways, their consequences, planned controls inherent in the Project Description, an initial risk assessment, additional treatment measures, and the revised risk assessment. This is presented complete in Appendix C. Sections of the risk register are also contained in the relevant Specialists Report appended to the EES.

The final risk register presented in Appendix C is a refinement on the draft register that was initially reviewed at the workshop. Specialists reviewed and updated their risk assessment during the writing of their impact assessment process, and as such the final risk register has changed to match the final impact assessments.
5. Risk Assessment Outcomes

Please note that all information on impact pathways and associated risks are cited from the specialist reports (ALA 2012a/b, ASPECT 2012, EHP 2012, GHD 2012a-i) appended to the EES.

5.1 Risk Assessment Analysis

The following section provides a simple analysis of the number of risks within each discipline. Discussion of the risk pathways and the significance of risks within each discipline will be provided in the specialist reports.

There were 146 impact pathways identified prior to and during the workshop. Following consideration of risk mitigation measures, the risk pathways and ratings included:

- 42 negligible residual risks
- 70 low residual risks
- 27 minor residual risks
- 7 high residual risks
- 0 extreme residual risks.

The effect of the mitigation measures is shown in Figure 5. This graph compares the frequency of initial risk magnitude ratings to the corresponding residual risk counts, and illustrates the substantial shift in the distribution of risk magnitudes towards the low and negligible end of the scale following treatment. Only seven high residual risks, and no extreme residual risks, were identified.
No extreme residual risks were identified by specialists. The most significant potential impact was identified by the soils and geology specialists, who recorded an extreme initial risk. Biodiversity and habitat, cultural heritage and visual and landscape each recorded multiple high initial risks. Suitable mitigation measures are available for most of these risks however, lowering the 36 high initial risks to seven high residual risks. Further assessment was undertaken to define risk treatment measures to reduce these risks. The residual high risks are associated with the biodiversity and habitat (3) and cultural heritage (4) disciplines. The biodiversity and habitat risks related to impacts on EPBC listed fauna, Ecological Vegetation Classes and scattered/hollow bearing trees, and are described in Table 3, while the cultural heritage risks relate to the destruction of three occasional occurrence (e.g. scarred trees) Aboriginal heritage sites, the potential destruction of one rare occurrence (e.g. burned mounds) Aboriginal heritage site and the potential destruction of a previously unidentified Aboriginal mortuary tree (also in Table 3).

A comparison of the initial and residual risk ratings for each discipline is illustrated in Figure 6.

A detailed risk assessment was undertaken to identify the activities that could lead to pathways which impact on environmental, social or economic values of the Project area. The risk assessment was used as a tool to identify potentially significant risk events for more detailed assessment of impact and mitigation measures. The process enabled activities and events with relatively high levels of risk to be prioritised from those with a lower level of risk or which were easily managed.

The impact assessment then verifies the impact pathway, considers and evaluates the measures available to mitigate the effect, reviews the probability of the effect materialising through the pathway, and determines the net impact from the pathway. The purpose of the impact assessment is to draw conclusions, on balance, as to the likely impacts of the Project in the context of existing conditions and identified measures available to mitigate likely impacts. For example, it is expected that small realignments of the carriageways will provide opportunity to reduce or avoid impacts to sensitive ecological communities. These impact pathways are detailed in the relevant impact assessment reports.
Figure 6  Frequency of Initial and Residual Risk Ratings by Discipline
<table>
<thead>
<tr>
<th>Discipline</th>
<th>Risk No.</th>
<th>Impact Pathway Description</th>
<th>Description of consequences</th>
<th>Planned Controls to Manage Risk (as per Project Description, and VicRoads Contract Shell DC1: Design &amp; Construct (April 2012)).</th>
<th>Initial Risks</th>
<th>Controls Recommended to Reduce Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biodiversity &amp; Habitat</td>
<td>FF4</td>
<td>Construction encounters EPBC listed Golden Sun Moth from known habitats. (Recorded locations at Ch. 1800-2800, 3700-5000).</td>
<td>Removal of fauna habitat, possible injury/death to listed fauna species individuals during construction.</td>
<td>Vegetation/habitat sites and areas of significance, and native flora/fauna sites or habitat discovered during works under the Contract shall not be damaged, disturbed or otherwise adversely impacted without prior approval of the Superintendent and obtaining all relevant permits. Plant, equipment, material or debris shall not be placed or stored within the limit of the root zone of vegetation to be retained. Fencing and signage to protect populations during construction.</td>
<td>Almost Certain</td>
<td>High</td>
</tr>
<tr>
<td>Biodiversity &amp; Habitat</td>
<td>FF9</td>
<td>Construction encounters Ecological Vegetation Communities (EVCs) (Native vegetation and fauna habitat)</td>
<td>Removal of EVCs of high and very high conservation significance including: Grassy Dry Forest, Grassy Woodland, Creekline Grassy Woodland, Plains Grassy Woodland and Heathy Woodland.</td>
<td>As for FF4.</td>
<td>Likely</td>
<td>High</td>
</tr>
<tr>
<td>Biodiversity &amp; Habitat</td>
<td>FF10</td>
<td>Construction encounters Large and Very Large Scattered Trees/Hollow-bearing trees/fauna habitat</td>
<td>Removal of scattered trees</td>
<td>As for FF4.</td>
<td>Almost Certain</td>
<td>High</td>
</tr>
<tr>
<td>Discipline</td>
<td>Risk No.</td>
<td>Impact Pathway Description</td>
<td>Description of consequences</td>
<td>Planned Controls to Manage Risk (as per Project Description, and VicRoads Contract Shell DC1: Design &amp; Construct (April 2012)).</td>
<td>Initial Consequence</td>
<td>Controls Recommended to Reduce Risk</td>
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<tr>
<td>Aboriginal Cultural Heritage</td>
<td>ACH1</td>
<td>Construction encounters the following previously identified Aboriginal cultural heritage places: 7423-0712 Junction Bridge 1 7423-0713 Junction Bridge 2 Ch. ~4200-4300</td>
<td>Destruction of two occasional occurrence Aboriginal cultural heritage places (scarred trees).</td>
<td>Approvals must be obtained from AAV prior to impacting the Aboriginal cultural heritage places.</td>
<td>Almost Certain Moderate High</td>
<td>An approved Cultural Heritage Management Plan (CHMP).</td>
</tr>
<tr>
<td>Aboriginal Cultural Heritage</td>
<td>ACH2</td>
<td>Construction encounters the following previously identified Aboriginal cultural heritage place: 7423-0736 Armstrong ST 1 Ch. ~6600-6700</td>
<td>Destruction of one occasional occurrence Aboriginal cultural heritage place (scarred tree).</td>
<td>Approvals must be obtained from AAV prior to impacting the Aboriginal cultural heritage place.</td>
<td>Almost Certain Moderate High</td>
<td>An approved Cultural Heritage Management Plan (CHMP).</td>
</tr>
<tr>
<td>Aboriginal Cultural Heritage</td>
<td>ACH11</td>
<td>Construction encounters previously unregistered and unassessed rare occurrence (e.g. burned mounds) Aboriginal cultural heritage place.</td>
<td>Destruction of a rare occurrence (e.g. burned mounds) Aboriginal cultural heritage place.</td>
<td>Undertake a Complex Assessment.</td>
<td>Major Possible High</td>
<td>An approved Cultural Heritage Management Plan (CHMP).</td>
</tr>
<tr>
<td>Aboriginal Cultural Heritage</td>
<td>ACH12</td>
<td>Construction encounters previously unregistered and unassessed mortuary tree Aboriginal cultural heritage place.</td>
<td>Destruction of a mortuary tree Aboriginal cultural heritage place.</td>
<td>Undertake a Complex Assessment.</td>
<td>Catastrophic Possible High</td>
<td>To consider realignment if a mortuary tree is identified in the future.</td>
</tr>
</tbody>
</table>
5.2 Key Outcomes of the Risk Assessment Process

The key outcomes of the risk assessment process are summarised below:

- A risk register that documents the outcomes of the risk identification process.
- Confirmation of the identified risk events, allowing prioritisation.
- A project management tool for informing project decisions, the Project Description and the EES.
- Integration and interaction between technical specialists fostering a cross disciplinary approach to the project.
- Identification of some key areas for further work and/or clarification.
- Achievement of key risk assessment process requirements and objectives as set out in the EES Scoping Requirements and this risk report.
- Increased understanding amongst the technical specialists of all aspects of the project and how their research impacts on other technical disciplines. This is a key component of the systems approach as set out in the Ministerial Guidelines, as the interactions between the Project and different environmental aspects are considered.
- Technical specialists reporting on impacts, risks, controls and proposing mitigation and management plans. This is used to inform the Environmental Management Framework.

The outcomes highlight the integrated approach applied through the risk assessment process.

5.3 Conclusion

A risk-based approach was adopted to identify and assess each impact pathway associated with the Project. The approach assessed the worst case consequence and the likelihood of that consequence occurring for each impact pathway.

Overall 146 risk pathways were identified and through the application of risk treatment measures there are no residual extreme risks, and only seven residual high risks associated with the biodiversity and habitat and cultural heritage disciplines. Further assessment was undertaken to define risk treatment measures to reduce these risks. The risk assessment was conservative in approach, providing repeatable results.

The results of the risk assessment have been reported in the individual impact assessment reports for each discipline area, providing justification for the rating and proposing mitigation and management measures to reduce risk.

The impact pathways and the proposed mitigation and management measures were used to inform the Environmental Management Framework for the Project, described in Chapter 21 of the EES document. In particular, the aspects in the Environmental Management Plan and associated monitoring programs. (The proposed measures in the risk register attached have changed from the initial measures at the workshop; this is due to updates made following the risk workshop and throughout the completion of the impact assessments).
6. References


Appendix A

Alignment Map Book

Note that this is the alignment as initially assessed by the Risk Assessment. The following is not the final alignment presented in the EEs, which has been refined as a result of the risk and subsequent impact assessment.
Appendix B

Consequence Criteria

Consequence Criteria guide specialists in assigning consequence levels to impact pathways for their relevant impact assessment discipline, in conjunction with their judgment and experience. The reason(s) for assigning consequence levels are documented in the relevant Impact Assessment Reports.
<table>
<thead>
<tr>
<th>Category of Impact</th>
<th>Aspect</th>
<th>Insignificant</th>
<th>Minor</th>
<th>Moderate</th>
<th>Major</th>
<th>Catastrophic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air</td>
<td>Emissions (construction and operation)</td>
<td>Applicable air quality standards met at all sensitive receptors (e.g. dwellings), at all times.</td>
<td>Isolated temporary exceedance of air quality standards at a sensitive receptor.</td>
<td>Minor temporary exceedance of applicable air quality standards in a local area.</td>
<td>Exceedance of applicable air quality standards in a number of local areas.</td>
<td>Widespread exceedance of applicable air quality standards.</td>
</tr>
<tr>
<td>Economic</td>
<td>Economic impacts on businesses</td>
<td>Total loss of annual revenue less than $100,000.</td>
<td>Total loss of annual revenue less than $1M, but greater than $100,000.</td>
<td>Loss of revenues less than $10 M but greater than $1 M</td>
<td>Loss of revenues less than $100 M but greater than $10 M</td>
<td>Loss of revenues less than $1B but greater than $100 M</td>
</tr>
<tr>
<td>Biodiversity &amp;</td>
<td>Listed Threatened Fauna Species</td>
<td>Population change not detectable for any fauna species listed under the EPBC Act, FFG Act or DSE Advisory List.</td>
<td>Removal of &lt; 1% of the project area population for an EPBC-listed species, OR Removal of &lt; 1% of the regional area population for an FFG or DSE Advisory-listed species.</td>
<td>Removal of &gt; 1% of the project area population BUT &lt; 1% of the regional area population for an EPBC-listed species, OR Removal of &gt; 1% of the regional area population BUT &lt; 2% of the State population for an FFG- or DSE Advisory-listed species.</td>
<td>Removal of &gt; 1% of the regional population BUT &lt; 10% of the national population for an EPBC-listed species, OR Removal of &gt; 10% of the State population for an FFG- or DSE Advisory-listed species.</td>
<td>Removal of &gt; 1% of the State population for an EPBC-listed species.</td>
</tr>
<tr>
<td>Habitat</td>
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</tr>
<tr>
<td>Biodiversity &amp;</td>
<td>Listed Flora Species</td>
<td>Population change not detectable for any flora species listed under the EPBC Act, FFG Act or DSE Advisory List.</td>
<td>Removal of &lt; 1% of the project area population for an EPBC-listed species, OR Removal of &lt; 1% of the regional area population for an FFG or DSE Advisory-listed species.</td>
<td>Removal of &gt; 1% of the project area population BUT &lt; 1% of the regional area population for an EPBC-listed species, OR Removal of &gt; 1% of the regional area population BUT &lt; 2% of the State population for an FFG- or DSE Advisory-listed species.</td>
<td>Removal of &gt; 1% of the regional population BUT &lt; 1% of the State population for an EPBC-listed species, OR Removal of &gt; 1% of the regional population BUT &lt; 2% of the State population for an FFG- or DSE Advisory-listed species.</td>
<td>Removal of &gt; 1% of the State population for an EPBC-listed species.</td>
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<tr>
<td>Habitat</td>
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</tr>
<tr>
<td>Biodiversity &amp;</td>
<td>Ecological Vegetation Classes</td>
<td>No measurable impacts on the extent of an EVC.</td>
<td>Loss of &lt; 0.1% of an EVC of High or Very High conservation significance from the region (based on the total area of an EVC from the bioregion). Net Gain achievable.</td>
<td>Loss of 0.1- 1% of an EVC of High or Very High conservation significance from the region (based on the total area of an EVC from the bioregion). Net Gain achievable.</td>
<td>Loss of &gt; 1% BUT &lt; 5% of an EVC of High or Very High conservation significance from the region (based on the total area of an EVC from the bioregion). Net Gain not achievable.</td>
<td>Loss of &gt; 5% of anEVC of High or Very High conservation significance from the region (based on the total area of an EVC from the bioregion). Net Gain not achievable.</td>
</tr>
<tr>
<td>Habitat</td>
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<tr>
<td>Biodiversity &amp;</td>
<td>EPBC listed community - Grassy Eucalypt Woodland of the VVP, Natural Temperate Grassland of the VVP FFG listed community - Western (Basalt) Plains Grassland community</td>
<td>No measurable impacts on the extent of a community listed under the EPBC Act or FFG Act.</td>
<td>Loss of &lt; 1 ha of an EPBC Act or FFG Act-listed community.</td>
<td>Loss of 1-10 ha of an EPBC Act or FFG Act-listed community.</td>
<td>Loss of 10-50 ha of an EPBC Act or FFG Act-listed community.</td>
<td>Loss of &gt; 50 ha of an EPBC Act or FFG Act-listed community.</td>
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<tr>
<td>Habitat</td>
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<tr>
<td>Biodiversity &amp;</td>
<td>Scattered trees / wildlife habitat</td>
<td>Loss of &lt; 5 scattered trees (including MTs, LOTs and VLOTs).</td>
<td>Loss of 6-50 scattered trees (including MTs, LOTs and VLOTs).</td>
<td>Loss of 51-500 scattered trees (including MTs, LOTs and VLOTs).</td>
<td>Loss of 501-5000 scattered trees (including MTs, LOTs and VLOTs).</td>
<td>Loss of &gt; 5000 scattered trees (including MTs, LOTs and VLOTs).</td>
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<tr>
<td>Habitat</td>
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<tr>
<td>Category of Impact</td>
<td>Aspect</td>
<td>Insignificant</td>
<td>Minor</td>
<td>Moderate</td>
<td>Major</td>
<td>Catastrophic</td>
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</tr>
<tr>
<td>Biodiversity &amp; Habitat</td>
<td>Fauna habitat/wildlife corridor</td>
<td>No measurable impact on the quantity and extent of wildlife corridors. Alignment does not intercept or reduce any existing wildlife corridors or habitat linkages.</td>
<td>Alignment reduces the width of the wildlife corridor by up to 10%. Alignment intercepts 1 - 2 habitat linkages.</td>
<td>Alignment reduces the width of the wildlife corridor by 10-50%. Alignment intercepts 3 - 4 habitat linkages.</td>
<td>Alignment reduces the width of the wildlife corridor by 50-75%. Alignment intercepts 5 habitat linkages.</td>
<td>Alignment reduces the width of the wildlife corridor by greater than 75%. Alignment intercepts 6 or more habitat linkages.</td>
</tr>
<tr>
<td>Soils &amp; Geology</td>
<td>Erosion / sediment generation potential</td>
<td>Negligible potential.</td>
<td>Potential for erosion and sediment mobilisation in small isolated locations along the alignment.</td>
<td>Potential for erosion and sediment mobilisation in multiple locations along the alignment.</td>
<td>Potential for erosion and sediment mobilisation along the majority of the alignment.</td>
<td>Potential significant erosion, sediment generation or land instability along the majority of the alignment.</td>
</tr>
<tr>
<td>Soils &amp; Geology</td>
<td>Land Contamination (historic, construction or operation)</td>
<td>Insignificant risk of encountering historic land contamination during construction, or contaminating land through construction or operation.</td>
<td>Potential for minor land contamination, but minimal risk to sensitive receivers.</td>
<td>Potential for moderate land contamination, some risk to sensitive receivers.</td>
<td>Potential for gross land contamination, confined to a localised area. Significant risk to sensitive receivers, health.</td>
<td>Potential for gross and widespread land contamination. Significant risk to sensitive receivers, health.</td>
</tr>
<tr>
<td>Soils &amp; Geology</td>
<td>Soil settlement due to poor (compressible) ground conditions</td>
<td>No potential.</td>
<td>Potential for significant soil settlement in small isolated locations along the alignment.</td>
<td>Potential for significant soil settlement in multiple locations along the alignment.</td>
<td>Potential for significant soil settlement along many sections of the alignment.</td>
<td>Potential significant soil settlement along the majority of the alignment.</td>
</tr>
<tr>
<td>Groundwater</td>
<td>Construction and Operation</td>
<td>Negligible change to groundwater regime, quality and availability.</td>
<td>Temporary changes to groundwater regime, quality and availability but no significant implications.</td>
<td>Changes to groundwater regime, quality and availability with minor groundwater implications for a localised area.</td>
<td>Groundwater regime, quality or availability significantly compromised.</td>
<td>Widespread groundwater resource depletion, contamination or subsidence.</td>
</tr>
<tr>
<td>Cultural Heritage</td>
<td>Aboriginal cultural heritage</td>
<td>It is not possible to insignificantly affect cultural heritage values.</td>
<td>Destruction of common occurrence Site containing: (a) a small number (e.g. 0-10 artefacts) or limited range of cultural materials with no evident stratification. Site destroyed or in a deteriorated condition with a high degree of disturbance; some cultural materials remaining.</td>
<td>Destruction of occasional occurrence Site containing: (a) a larger number, but limited range of cultural materials: and/or (b) some intact stratified deposit remains. Site in a fair to good condition, but with some disturbance.</td>
<td>Destruction of rare occurrence Site (e.g. burnt mounds) containing: (a) a large number and diverse range of cultural materials; and/or (b) largely intact stratified deposit; and/or (c) surface spatial patterning of cultural materials that still reflect the way in which the cultural materials were laid down. Site in an excellent condition with little or no disturbance. For surface artefact scatters this may mean that the spatial patterning of cultural materials still reflects the way in which the cultural materials were laid down.</td>
<td>Destruction of Site containing: (a) a mortuary tree. A response to AAV identifying that these sites types were of high cultural heritage significance and their presence could prevent construction of an alignment.</td>
</tr>
<tr>
<td>Cultural Heritage</td>
<td>Non-Aboriginal cultural heritage</td>
<td>No impact to heritage sites. Sites remain unaffected.</td>
<td>Disturbance to a locally significant heritage feature or site (HO or DSE local listing).</td>
<td>Complete removal of heritage site of local significance (HO); and/or Disturbance of a historical heritage inventory site (HI).</td>
<td>Disturbance of a heritage site of State or National significance (VHR).</td>
<td>Complete removal of a heritage site of State or National significance (VHR).</td>
</tr>
<tr>
<td>Category of Impact</td>
<td>Aspect</td>
<td>Insignificant</td>
<td>Minor</td>
<td>Moderate</td>
<td>Major</td>
<td>Catastrophic</td>
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</tr>
<tr>
<td>Planning &amp; Land Use</td>
<td>Land use change</td>
<td>Land use changes that would not result in inconsistency with planning policies.</td>
<td>Land use changes that would result in minor inconsistency with local planning policies.</td>
<td>Land use changes that would result in significant inconsistency with local planning policies.</td>
<td>Land use changes that would result in significant inconsistency with local and State planning policies.</td>
<td>Land use changes that would result in extensive conflict with planning policies.</td>
</tr>
<tr>
<td>Planning &amp; Land Use</td>
<td>Utility and infrastructure services</td>
<td>No impact on existing utilities.</td>
<td>Temporary impediment to operation and/or maintenance of existing utilities during construction but still able to be adequately operated and maintained with mitigation measures.</td>
<td>Impediment to operation and/or maintenance of existing utilities but still able to be adequately operated and maintained with mitigation measures.</td>
<td>Significant disruption to the operation and/or maintenance of existing utilities but still able to be adequately operated and maintained with mitigation measures.</td>
<td>Utilities of regional or State significance not able to be maintained and/or operated.</td>
</tr>
<tr>
<td>Planning &amp; Land Use</td>
<td>Acquisition and fragmentation of existing land uses and landholdings</td>
<td>No or negligible fragmentation of land uses or land holdings (such as the acquisition of land within 10m of the existing property boundary).</td>
<td>Some minor fragmentation / acquisition of land but properties still able to be used for existing purposes.</td>
<td>Fragmentation of land results in 1-10 properties no longer being viable / accessible / useable for existing purpose (assumes acquisition through the centre of existing parcels of land).</td>
<td>Fragmentation / acquisition of land results in 10-20 properties no longer being viable / accessible / useable for existing purpose (assumes acquisition through the centre of existing parcels of land).</td>
<td>Fragmentation / acquisition of land results in 20+ properties no longer being viable / accessible / useable for existing purpose (assumes acquisition through the centre of existing parcels of land).</td>
</tr>
<tr>
<td>Noise &amp; Vibration</td>
<td>Construction and Operation</td>
<td>Applicable standards met at all sensitive receptors (e.g. dwellings, schools, hospitals), at all times.</td>
<td>Isolated and temporary exceedance of standards at a sensitive receptor.</td>
<td>Exceedance of applicable standards in a local area.</td>
<td>Exceedance of applicable standards in a number of local areas.</td>
<td>Widespread exceedance of applicable standards across the region.</td>
</tr>
<tr>
<td>Social</td>
<td>Displacement of residents</td>
<td>No displacement of residents.</td>
<td>Displacement of one or two households.</td>
<td>Displacement of three to six households.</td>
<td>Displacement of households significantly affects a local area.</td>
<td>Displacement of households significantly affects a number of local areas.</td>
</tr>
<tr>
<td>Social</td>
<td>Displacement of businesses</td>
<td>No displacement of businesses.</td>
<td>Displacement of businesses with social or economic impacts on a small number of individuals.</td>
<td>Displacement of businesses with significant social or economic impacts on part of a local area.</td>
<td>Displacement of businesses significantly affects a local area.</td>
<td>Displacement of businesses significantly affects a number of local areas.</td>
</tr>
<tr>
<td>Social</td>
<td>Severance of residents or businesses</td>
<td>No severance of local movement patterns.</td>
<td>Severance of local movement patterns for less than 10 residents or businesses.</td>
<td>Severance of local movement patterns of 10 to 20 residents or businesses.</td>
<td>Severance of movement patterns significantly affects a local area.</td>
<td>Severance of movement patterns significantly affects a number of local areas.</td>
</tr>
<tr>
<td>Social</td>
<td>Impacts on community facilities and public open space</td>
<td>No noticeable effects.</td>
<td>Effects on facilities with social or economic impacts on a small number of individuals.</td>
<td>Effects on facilities with social or economic impacts on a local area.</td>
<td>Effects on facilities with significant social or economic impacts on a local area.</td>
<td>Effects on facilities with significant social or economic impacts on a number of local areas.</td>
</tr>
<tr>
<td>Social</td>
<td>Amenity</td>
<td>No detrimental impacts on amenity.</td>
<td>Detrimental impacts on amenity affect a small number of households.</td>
<td>Detrimental impacts on amenity affect a local area.</td>
<td>Detrimental impacts on amenity significantly affect a local area.</td>
<td>Detrimental impacts on amenity significantly affect a number of local areas.</td>
</tr>
<tr>
<td>Category of Impact</td>
<td>Aspect</td>
<td>Insignificant</td>
<td>Minor</td>
<td>Moderate</td>
<td>Major</td>
<td>Catastrophic</td>
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</tr>
<tr>
<td>Surface Water</td>
<td>Construction activities result in disturbance of channel planform, geometry and/or river health values.</td>
<td>Medium level impact to waterway, river health or floodplain function on minor waterway.</td>
<td>High level impact to waterway, river health or floodplain function on minor waterway.</td>
<td>Severe level impact to waterway, river health or floodplain function on minor waterway.</td>
<td>Severe level impact to waterway, river health or floodplain function on significant waterway.</td>
<td>Severe level of impact to a major riverway.</td>
</tr>
<tr>
<td>Surface Water</td>
<td>Construction or operation activities result in increased stormwater runoff, sediment and contaminant loading to waterway</td>
<td>Minor increases to stormwater runoff, sediment and or contaminant loading to a minor waterway as described in the impact assessment report.</td>
<td>Significant increases to stormwater runoff, sediment and or contaminant loading to a significant waterway as described in the impact assessment report.</td>
<td>Significant increases to stormwater runoff, sediment and or contaminant loading to a major waterway.</td>
<td>An uncontained spill of contaminants directly to a major waterway as described in the impact assessment report.</td>
<td></td>
</tr>
<tr>
<td>Surface Water</td>
<td>Construction of the road results in changes to the floodplain characteristics</td>
<td>No additional floodplain impacts to any houses, outbuildings or infrastructure.</td>
<td>Slight increase in flooding at a rural scale.</td>
<td>Medium increase in flooding at a rural scale or slight increase in flooding at a township scale.</td>
<td>Significant increase in flooding at a township scale.</td>
<td>Significant increase in flooding at a township scale.</td>
</tr>
<tr>
<td>Traffic &amp; Transport</td>
<td>Road safety (construction)</td>
<td>Occurrence of road accidents resulting in less than 10 property damage or minor injury to less than 20 individuals during construction period.</td>
<td>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.</td>
<td>Occurrence of road accidents causing minor injury to between 20 and 100 individuals or major injury to less than 5 individuals during construction period.</td>
<td>Occurrence of road accidents causing minor injury to between 20 and 100 individuals or major injury to between 5 and 50 individuals during construction period.</td>
<td>Occurrence of road accidents resulting in major injury to more than 100 individuals or one or more fatalities during construction period.</td>
</tr>
<tr>
<td>Traffic &amp; Transport</td>
<td>Road safety (operation)</td>
<td>Occurrence of road accidents resulting in less than 10 property damage only road accidents during a 5-year period.</td>
<td>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.</td>
<td>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.</td>
<td>Occurrence of road accidents causing minor injury to between 20 and 100 individuals or major injury to between 5 and 50 individuals during a five-year period.</td>
<td>Occurrence of road accidents resulting in major injury to more than 100 individuals or one or more fatalities during a five-year period.</td>
</tr>
<tr>
<td>Traffic &amp; Transport</td>
<td>Traffic and transport operations (construction &amp; operation)</td>
<td>Negligible adverse impact on traffic and transport conditions.</td>
<td>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.</td>
<td>Detectable adverse change in traffic and transport conditions (decrease in Level of Service) at multiple locations.</td>
<td>Traffic and transport congestion and delays exceed acceptable levels at multiple locations.</td>
<td>Traffic and transport congestion and delays severely restrict the safe operation and efficiency of the transport network.</td>
</tr>
<tr>
<td>Traffic &amp; Transport</td>
<td>Traffic access (construction &amp; operation)</td>
<td>Negligible impact on access routes during construction/operation.</td>
<td>Less than 5 routes with access compromised.</td>
<td>Greater than 5 and less than 10 routes with access compromised.</td>
<td>Greater than 10 and less than 30 routes with access compromised.</td>
<td>Greater than 30 routes with access compromised.</td>
</tr>
<tr>
<td>Category of Impact</td>
<td>Aspect</td>
<td>Insignificant</td>
<td>Minor</td>
<td>Moderate</td>
<td>Major</td>
<td>Catastrophic</td>
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<tr>
<td>Visual &amp; Landscape</td>
<td>Amenity of adjacent residents</td>
<td>Moderate impact upon low number of households. Minor impact upon medium number of households. Insignificant impact upon high number of households.</td>
<td>Significant visual impact upon low number of households. Moderate impact upon medium number of households. Insignificant impact upon high number of households.</td>
<td>Significant visual impact upon medium number of households. Moderate impact upon high number of households.</td>
<td>Significant visual impact upon high number of households.</td>
<td>Significant visual impact upon households across the entire region.</td>
</tr>
<tr>
<td>Visual &amp; Landscape</td>
<td>Impact upon townships and places of landscape and cultural value</td>
<td>Negligible visual change from townships and places of cultural and natural value.</td>
<td>Minor visual change from townships and places of cultural and natural value.</td>
<td>Moderate visual change from townships and places of cultural and natural value.</td>
<td>Significant visual change from townships and places of cultural and natural value.</td>
<td>Catastrophic visual change from townships and places of cultural and natural value.</td>
</tr>
</tbody>
</table>
Appendix C

Risk Register
<table>
<thead>
<tr>
<th>Discipline</th>
<th>Risk No.</th>
<th>Impact pathway</th>
<th>Description of consequences</th>
<th>Likelihood</th>
<th>Consequence</th>
<th>Ctrl</th>
<th>Residual Risk</th>
<th>Additional Controls Recommended to Reduce Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air A2</td>
<td>A2</td>
<td>Construction emissions impact a local area (community) such as: *Gilchrist Road - Commercial Properties, Stawell (Ch. 24600-25000) *Robbin Road Community, Stawell (Ch. 21200 - 24900) *Toowoomba Park Lifestyle Park, Armstrong Road, Stawell (Ch. 20300-23300) *Griffith Street Community, Great Western (Ch. 13000-15000) *Stawell Gully Road Community, Armstrong (Ch. 4300-7400) *McKillop Manor Road Community, Ararat (Ch. 0 - Ararat Township)</td>
<td>Exceedance of State Environment Protection Policy (Air Quality Management) within a local area, pedestrian transport and deposition potentially affecting human health, flora, fauna, visual and social aspects, and water quality.</td>
<td>High</td>
<td>Almost Certain</td>
<td>120.07 (AP Quality)</td>
<td>As for Risk A1</td>
<td>As for Risk A1 and use of dust suppression techniques to reduce PM10 quantities from the working area such as: 1. Watering roads and exposed areas as required at better than 2 L/m2/h or at a chemical suppressant. 2. Reduce vehicle speed and/or seal haul roads and other exposed areas by means of crushed rock or paving where necessary.</td>
</tr>
<tr>
<td>Air A3</td>
<td>A3</td>
<td>Construction operational emissions deposit on residential housing that drains into domestic water supplies (i.e. tank water).</td>
<td>Exceedance of Australian Drilling Water Guidelines (ADWG:2005) for residential/industrial water tanks along the alignment used for residential water supply.</td>
<td>High</td>
<td>Almost Certain</td>
<td>120.07 (AP Quality)</td>
<td>As for Risk A1</td>
<td>As for Risk A1 and others natural or man-made erosion of sensitive receptors on roof water supplies should be encouraged, or their roof, to have ‘self flush device’ installed between the water tank and tank.</td>
</tr>
<tr>
<td>Air A4</td>
<td>A4</td>
<td>Construction emissions impact on agricultural/horticultural businesses at an individual sensitive receptor location such as: *Farmers A1-2554 (D. 2000-25000) *Farmers A1-2556 (D. 2000-25000) *Farmers A1-2702 (D. 4000-4700) *Farmers A1-2705 (D. 4000-4700)</td>
<td>Potential detrimental effects on agricultural/horticultural businesses (i.e. vineyards and olive groves nearby (properties with common boundary)) and water quality.</td>
<td>Moderate</td>
<td>Likely</td>
<td>120.07 (AP Quality)</td>
<td>As for Risk A1</td>
<td>As for Risk A1 and use of dust suppression techniques to reduce PM10 quantities from the working area such as: 1. Watering roads and exposed areas as required at better than 2 L/m2/h or at a chemical suppressant. 2. Reduce vehicle speed and/or seal haul roads and other exposed areas by means of crushed rock or paving where necessary.</td>
</tr>
<tr>
<td>Air A5</td>
<td>A5</td>
<td>Operation of the Western Highway generates an emission from vehicular traffic.</td>
<td>Exceedance of State Environment Protection Policy (Air Quality Management).</td>
<td>High</td>
<td>Almost Certain</td>
<td>Air quality issues during operation determined through existing compliance procedures.</td>
<td>As for Risk A1</td>
<td>As for Risk A1s Cultural heritage A1D1</td>
</tr>
<tr>
<td>Cultural heritage A1D1</td>
<td>A1D1</td>
<td>Construction encounters the following previously identified Aboriginal cultural heritage place: *7423-0724 J历on Bridge 1 *7423-0724 J历on Bridge 2 Ds: ~6600-7400</td>
<td>Destruction of two occasional occurrence Aboriginal cultural heritage places (recommenced).</td>
<td>Low</td>
<td>Negligible</td>
<td>2012.15</td>
<td>Approach must be obtained from AARV before impacting the Aboriginal cultural heritage place.</td>
<td>An approved Cultural Heritage Management Plan (CHMP)</td>
</tr>
<tr>
<td>Cultural heritage A1D2</td>
<td>A1D2</td>
<td>Construction encounters the following previously identified Aboriginal cultural heritage place: *7423-0734 Armstrong ST 1 Ds: ~6600-7400</td>
<td>Destruction of one occasional occurrence Aboriginal cultural heritage place (recommenced).</td>
<td>Low</td>
<td>Negligible</td>
<td>2012.15</td>
<td>Approach must be obtained from AARV before impacting the Aboriginal cultural heritage place.</td>
<td>An approved Cultural Heritage Management Plan (CHMP)</td>
</tr>
</tbody>
</table>
### Cultural Heritage

#### CHH1
- **Description:** Western Highway Project - Section 3: Ararat to Stawell. Note: the risk register is also contained in the Technical Appendices of the EES for each discipline.

#### CHH2
- **Description:** Cultural Heritage

#### CHH3
- **Description:** Cultural Heritage

#### CHH4
- **Description:** Cultural Heritage

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#### CHH190
- **Description:** Cultural Heritage
## Cultural Heritage

### CHH13
- Construction encounters CHH13-0385 Armstrong Alluvial Gold Mining Area No.1 Site partially within proposed alignment. Ch. 4000 – 6500
- Damage to, or complete destruction of previously registered historical archaeological site (HI).

### CHH12
- Construction encounters CHH12-0362 McKay Family Historical Site Staging area Site partially within proposed alignment. Ch. 9200 – 12000
- Damage to, or complete destruction of previously registered historical archaeological site (HI).

### CHH11
- Construction encounters CHH11-0388 Armfield Place Site Staging area Site partially within proposed alignment. Ch. 3000 – 3500
- Damage to, or complete destruction of previously registered historical archaeological site (HI).

### CHH8
- Construction encounters CHH8-0385 Armstrong Alluvial Gold Mining Area No.2 Site partially within proposed alignment. Ch. 5150 - 5700
- Damage to, or complete destruction of previously registered historical archaeological site (HI).

### CHH7
- Construction encounters CHH7-0382 Garden Gully Road House Site No.1 Site partially within proposed alignment. Ch. 6150 – 7500
- Damage to, or complete destruction of previously registered historical archaeological site (HI).

### CHH5
- Construction encounters CHH5-0383 Garden Gully Road House Site No.2 Site partially within proposed alignment. Ch. 10050 – 10150
- Damage to, or complete destruction of previously registered historical archaeological site (HI).

### CHH4
- Construction encounters CHH4-0385 Armstrong Alluvial Gold Mining Area No.3 Site partially within proposed alignment. Ch. 12750 – 13000
- Damage to, or complete destruction of previously registered historical archaeological site (HI).

## Socio-Economic

### Economic
- **Economic 1**
  - **Description**: Operation of the Western Highway would reduce public access to some businesses (Great Western).  
    - **Impacts**: Some businesses along the alignment rely on a portion of their turnover from passing traffic. This traffic would be reduced with a consequent reduction in turnover and potential for cumulative effects with one business closure leading to other business closures.
    - **Socio-Economic Risk**: Severe

- **Economic 2**
  - **Description**: Construction of the Western Highway would result in the loss of agricultural land and encroachment of properties across the alignment.  
    - **Impacts**: Stock yards, sheds, access lanes and other improvements may require replacement or relocation. Some agricultural land would be lost as a result of the construction and there would be reversion and access issues to some properties.
    - **Socio-Economic Risk**: Severe

## Risk Register

### Additional Controls to Manage Risk

<table>
<thead>
<tr>
<th>Risk No.</th>
<th>Impact pathway (how the Project interacts with assets, values, uses and location (state chainage))</th>
<th>Description of consequence (test whether is design, construction or operation)</th>
<th>Linkages</th>
<th>Contract Shell (CS) Reference</th>
<th>Planned Controls to Manage Risk</th>
<th>Risk Rating</th>
<th>Likelihood</th>
<th>Consequence</th>
<th>Additional Controls Recommended to Reduce Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHH13</td>
<td>Construction encounters CHH13-0385 Armstrong Alluvial Gold Mining Area No.1 Site partially within proposed alignment. Ch. 4000 – 6500</td>
<td>Damage to, or complete destruction of previously registered historical archaeological site (HI).</td>
<td>CHH13.08.15</td>
<td>Approval would be obtained from Heritage Victoria prior to damaging, disturbing or otherwise impacting cultural heritage sites.</td>
<td>Low</td>
<td>Unlikely</td>
<td>Insignificant</td>
<td>None.</td>
<td></td>
</tr>
<tr>
<td>CHH12</td>
<td>Construction encounters CHH12-0362 McKay Family Historical Site Staging area Site partially within proposed alignment. Ch. 9200 – 12000</td>
<td>Damage to, or complete destruction of previously registered historical archaeological site (HI).</td>
<td>CHH12.08.15</td>
<td>Approval would be obtained from Heritage Victoria prior to damaging, disturbing or otherwise impacting cultural heritage sites.</td>
<td>Low</td>
<td>Rare</td>
<td>Insignificant</td>
<td>None.</td>
<td></td>
</tr>
<tr>
<td>CHH11</td>
<td>Construction encounters CHH11-0388 Armfield Place Site Staging area Site partially within proposed alignment. Ch. 3000 – 3500</td>
<td>Damage to, or complete destruction of previously registered historical archaeological site (HI).</td>
<td>CHH11.08.15</td>
<td>Approval would be obtained from Heritage Victoria prior to damaging, disturbing or otherwise impacting cultural heritage sites.</td>
<td>Low</td>
<td>Rare</td>
<td>Insignificant</td>
<td>None.</td>
<td></td>
</tr>
<tr>
<td>CHH8</td>
<td>Construction encounters CHH8-0385 Armstrong Alluvial Gold Mining Area No.2 Site partially within proposed alignment. Ch. 5150 - 5700</td>
<td>Damage to, or complete destruction of previously registered historical archaeological site (HI).</td>
<td>CHH8.08.15</td>
<td>Approval would be obtained from Heritage Victoria prior to damaging, disturbing or otherwise impacting cultural heritage sites.</td>
<td>Low</td>
<td>Rare</td>
<td>Insignificant</td>
<td>None.</td>
<td></td>
</tr>
<tr>
<td>CHH7</td>
<td>Construction encounters CHH7-0382 Garden Gully Road House Site No.1 Site partially within proposed alignment. Ch. 6150 – 7500</td>
<td>Damage to, or complete destruction of previously registered historical archaeological site (HI).</td>
<td>CHH7.08.15</td>
<td>Approval would be obtained from Heritage Victoria prior to damaging, disturbing or otherwise impacting cultural heritage sites.</td>
<td>Low</td>
<td>Rare</td>
<td>Insignificant</td>
<td>None.</td>
<td></td>
</tr>
<tr>
<td>CHH5</td>
<td>Construction encounters CHH5-0383 Garden Gully Road House Site No.2 Site partially within proposed alignment. Ch. 10050 – 10150</td>
<td>Damage to, or complete destruction of previously registered historical archaeological site (HI).</td>
<td>CHH5.08.15</td>
<td>Approval would be obtained from Heritage Victoria prior to damaging, disturbing or otherwise impacting cultural heritage sites.</td>
<td>Low</td>
<td>Rare</td>
<td>Insignificant</td>
<td>None.</td>
<td></td>
</tr>
<tr>
<td>CHH4</td>
<td>Construction encounters CHH4-0385 Armstrong Alluvial Gold Mining Area No.3 Site partially within proposed alignment. Ch. 12750 – 13000</td>
<td>Damage to, or complete destruction of previously registered historical archaeological site (HI).</td>
<td>CHH4.08.15</td>
<td>Approval would be obtained from Heritage Victoria prior to damaging, disturbing or otherwise impacting cultural heritage sites.</td>
<td>Low</td>
<td>Rare</td>
<td>Insignificant</td>
<td>None.</td>
<td></td>
</tr>
</tbody>
</table>

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Note: the risk register is also contained in the Technical Appendices of the EIS for each discipline.
### Risk Register

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Risk No.</th>
<th>Impact pathway</th>
<th>Description of consequence (note whether it is design, construction or operation)</th>
<th>Linkages</th>
<th>Contract Shell (DC) Reference</th>
<th>Planned Controls to Manage Risk</th>
<th>Additional Controls Recommended to Reduce Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental</td>
<td>E0</td>
<td>The Western Highway would disrupt access to businesses during construction.</td>
<td>Some businesses along the route would have access disrupted during the construction process.</td>
<td>Environmental &amp; Social</td>
<td>(1460 and 2030)</td>
<td>Continue access would be maintained to connect local property, consistent with business operating hours. Any alteration would be with written agreement of proprietor. Traffic Management Plans (TMPs) would be prepared to identify, assess and appropriately mitigate, reduce or mitigate road safety hazards and be reviewed by VicRoads prior to implementation. TMPs would comply with standard VicRoads practices, the Traffic Management Code of Practice and the Road Management Act 2004. Examples include: speed reductions where appropriate, roadway safety barriers, advance warning signage, hazard visibility, etc.</td>
<td>Work with businesses to optimise construction schedules.</td>
</tr>
<tr>
<td>Environmental</td>
<td>E1</td>
<td>The duplicated Western Highway would complicate access to business post construction.</td>
<td>Issuance of roads into the duplicated Western Highway would permanently complicate access for some businesses to sell from Western Highway.</td>
<td>Environmental &amp; Social</td>
<td>(1460 and 2030)</td>
<td>Vegetation/habitat ideas and areas of significance, and native flora/flora ideas or habitat discovered during works under the Contract shall not be damaged, disturbed or otherwise adversely impacted without prior approval of the Superintendent and obtaining all relevant permits. Plant, equipment, material or debris shall not be placed or stored within the limit of the root zone of vegetation to be retained. Enclosing and signage to protect populations during construction.</td>
<td>Maintain existing signage for business destinations which are of tourist interest (e.g. Dieting villages). Otherwise, update signage to area of business or local amenities in accordance with VicRoads Traffic Signage guidelines.</td>
</tr>
<tr>
<td>Biodiversity &amp; Habitat</td>
<td>FF1</td>
<td>Potential removal of individuals of a known population of EPC listed flora at South of Stawell (Ch. 2300-24300).</td>
<td>A population of Trailing Hop-bush is present south of Stawell. 21 plants are within the proposed alignment.</td>
<td>Biodiversity &amp; Habitat</td>
<td>(1200 and 1300)</td>
<td>As for FF1.</td>
<td>As for FF1.</td>
</tr>
<tr>
<td>Biodiversity &amp; Habitat</td>
<td>FF2</td>
<td>Potential removal of individuals of a known population of the DSE advisory listed flora at Ch. 3500-24300.</td>
<td>Euphorbia Greenhead, King’s Crown Daisy, Flowers and Rosary Volubile are present throughout alignment. Site targeted flora may be found at locations.</td>
<td>Biodiversity &amp; Habitat</td>
<td>(1200 and 1300)</td>
<td>As for FF1.</td>
<td>As for FF1.</td>
</tr>
<tr>
<td>Biodiversity &amp; Habitat</td>
<td>FF3</td>
<td>Construction encounters unexpected listed flora species (species not known to be present from targeted survey).</td>
<td>Removal of small number of unknown listed flora species during pre-clearance / clearance work.</td>
<td>Biodiversity &amp; Habitat</td>
<td>(1200 and 1300)</td>
<td>As for FF1.</td>
<td>As for FF1.</td>
</tr>
<tr>
<td>Biodiversity &amp; Habitat</td>
<td>FF4</td>
<td>Construction encounters EPC listed Golden Sun-Rush from known habitats, (Recorded location at Ch. 1880-2000, 3750-5000).</td>
<td>Removal of fauna habitat, possible injury/death to listed fauna species individuals during construction.</td>
<td>Biodiversity &amp; Habitat</td>
<td>(1200 and 1300)</td>
<td>As for FF1.</td>
<td>As for FF1.</td>
</tr>
<tr>
<td>Biodiversity &amp; Habitat</td>
<td>FF6</td>
<td>Construction encounters EPC listed unexpected listed fauna species (species not known to be present from targeted survey).</td>
<td>Removal/distribution to small number as unknown number of listed fauna species during pre-clearance / clearance work.</td>
<td>Biodiversity &amp; Habitat</td>
<td>(1200 and 1300)</td>
<td>As for FF1.</td>
<td>As for FF1.</td>
</tr>
<tr>
<td>Biodiversity &amp; Habitat</td>
<td>FF7</td>
<td>The duplication removes or destroys wildlife corridors or fauna habitat. This is evident at the Ararat Regional Park, Ch. 2300-24300, and Glenelg Rocks Chs. 20000-23000.</td>
<td>Impacts on habitat or wildlife corridors may affect Brown Toadlet, Brown Treecreeper and Brush-tailed Phascogale, as well as numerous riparian and roadside corridors.</td>
<td>Biodiversity &amp; Habitat</td>
<td>(1200 and 1300)</td>
<td>As for FF1.</td>
<td>As for FF1.</td>
</tr>
<tr>
<td>Discipline</td>
<td>Risk No.</td>
<td>Impact pathway/How the Project interacts with assets, values, use and location (state change)</td>
<td>Description of consequences (and describe whether it is design, construction or operation)</td>
<td>Likelihood</td>
<td>Contract Shell DC1’s Reference</td>
<td>Planned Controls to Manage Risk</td>
<td>Additional Controls Recommended to Reduce Risk</td>
</tr>
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</tr>
<tr>
<td>Biodiversity &amp; Habitat</td>
<td>FF18</td>
<td>Increased road kill and injuries rates to arterial native fauna from traffic on additional / new carriageway, particularly where the carriageway passes through wooded areas and from the existing road (e.g. quarry area north of Great Western).</td>
<td>Potential for stress, and ultimately displacement of native fauna from impacted areas.</td>
<td>Likely</td>
<td>1200.13</td>
<td>As for FF11.</td>
<td>Vegetation or landscape plantings to include species appropriate to the local EVC.</td>
</tr>
<tr>
<td>Biodiversity &amp; Habitat</td>
<td>FF17</td>
<td>Construction encounters Ecological Vegetation Communities (EVCs) (Native vegetation and fauna habitat)</td>
<td>Removal of EVCs of high and very high conservation significance including: Grassy Dry Forest, Grassy Woodland, Creosote Grassy Woodland, Plains Grassy Woodland and Heathy Woodland.</td>
<td>Likely</td>
<td>1200.13</td>
<td>As for FF11.</td>
<td>Vegetation or landscape plantings to include species appropriate to the local EVC.</td>
</tr>
<tr>
<td>Biodiversity &amp; Habitat</td>
<td>FF16</td>
<td>Construction encounters Large and Very Large Scattered Trees/Hollow-bearing trees/Swamp Habitat</td>
<td>Removal of scattered trees</td>
<td>Likely</td>
<td>1200.13</td>
<td>As for FF11.</td>
<td>Vegetation or landscape plantings to include species appropriate to the local EVC.</td>
</tr>
<tr>
<td>Biodiversity &amp; Habitat</td>
<td>FF15</td>
<td>Construction encounters Large and Very Large Scattered Trees/Hollow-bearing trees/Swamp Habitat</td>
<td>Removal of scattered trees</td>
<td>Likely</td>
<td>1200.13</td>
<td>As for FF11.</td>
<td>Vegetation or landscape plantings to include species appropriate to the local EVC.</td>
</tr>
<tr>
<td>Biodiversity &amp; Habitat</td>
<td>FF14</td>
<td>Construction encounters Weed or Plant pests introduced or spread through construction activities.</td>
<td>Potential loss of or modification of native vegetation and/or fauna habitat that was intended to be retained.</td>
<td>Likely</td>
<td>1200.13</td>
<td>As for FF11.</td>
<td>Weed management and control program to control invasions would be implemented for 2 years following construction.</td>
</tr>
<tr>
<td>Biodiversity &amp; Habitat</td>
<td>FF13</td>
<td>Construction activities occur outside of agreed construction zone.</td>
<td>Potential loss or modification of native vegetation and/or fauna habitat that was intended to be retained.</td>
<td>Likely</td>
<td>1200.13</td>
<td>As for FF11.</td>
<td>Weed management and control program to control invasions would be implemented for 2 years following construction.</td>
</tr>
<tr>
<td>Biodiversity &amp; Habitat</td>
<td>FF12</td>
<td>Construction encounters Weed or Plant pests introduced or spread through construction activities.</td>
<td>Potential pathogens include Cinnamon Fungus Phytophthora cinnamomi, potato cyst nematode Globodera rostochiensis and E. coli O157.</td>
<td>Likely</td>
<td>1200.14</td>
<td>The Contractor shall develop a procedure to prevent the spread of declared weeds, pests and diseases within the site and off-site.</td>
<td>Pathogen management procedures developed to prevent spread.</td>
</tr>
<tr>
<td>Biodiversity &amp; Habitat</td>
<td>FF11</td>
<td>Construction encounters Weed or Plant pests introduced or spread through construction activities.</td>
<td>Potential loss of or modification of native vegetation and/or fauna habitat that was intended to be retained.</td>
<td>Likely</td>
<td>1200.14</td>
<td>The Contractor shall develop a procedure to prevent the spread of declared weeds, pests and diseases within the site and off-site.</td>
<td>Pathogen management procedures developed to prevent spread.</td>
</tr>
<tr>
<td>Biodiversity &amp; Habitat</td>
<td>FF10</td>
<td>Construction encounters Weed or Plant pests introduced or spread through construction activities.</td>
<td>Potential loss of or modification of native vegetation and/or fauna habitat that was intended to be retained.</td>
<td>Likely</td>
<td>1200.14</td>
<td>The Contractor shall develop a procedure to prevent the spread of declared weeds, pests and diseases within the site and off-site.</td>
<td>Pathogen management procedures developed to prevent spread.</td>
</tr>
<tr>
<td>Biodiversity &amp; Habitat</td>
<td>FF9</td>
<td>Construction encounters Weed or Plant pests introduced or spread through construction activities.</td>
<td>Potential loss of or modification of native vegetation and/or fauna habitat that was intended to be retained.</td>
<td>Likely</td>
<td>1200.14</td>
<td>The Contractor shall develop a procedure to prevent the spread of declared weeds, pests and diseases within the site and off-site.</td>
<td>Pathogen management procedures developed to prevent spread.</td>
</tr>
</tbody>
</table>
## Risk Register

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Risk No.</th>
<th>Impact pathway (how the Project interacts with assets, values, uses and location (site challenges))</th>
<th>Description of consequences (describe whether it is design, construction or operation)</th>
<th>Linkages</th>
<th>Contract Shell (DC) &amp; Reference</th>
<th>Planned Controls to Manage Risk</th>
<th>Additional Controls Recommended to Reduce Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geotechnical</td>
<td>G1</td>
<td>Presence of contaminated soil and rock along alignment.</td>
<td>Construction workers exposure through direct, ingestion and inhalation of potential contaminants of concern in soil or rock. This risk could occur at any location along the alignment but more likely locations are within the vicinity of agricultural land, waste disposal (controlled and uncontrolled), commercial and industrial activity and/or corridors close to the use of herbicides and other related oil uses, and areas that are receiving road runoff. The following areas may fall within concern including: Railway line intersections (Ch. 7600 and 20400). Farm sheds (Ch. 12100). Quarry (Chs. 13600 to 15600). Donald Creek (Ch. 20600 to 20800)</td>
<td>Biodiversity &amp; Habitat</td>
<td>1200.07 Implementation of a Construction EMP detailing air quality control measures and strict monitoring procedures.</td>
<td>Groundwater, Biodiversity, Economic, Biodiversity &amp; Habitat, Planning &amp; Land, Surface Water</td>
<td>The Construction Environmental Management Plan (CEMP) is to provide details on appropriate methods for managing contaminated soils and risks. In-situ investigation is to conduct in accordance with EPA Industry Waste Resource Guidelines (MWHS) 720 to comply along the proposed alignment to establish if contaminated soils are present. If contaminated soils or risks are present, the results of the investigation would assist to provide appropriate soil and risk management advice including disposal recommendations.</td>
</tr>
<tr>
<td>Geotechnical</td>
<td>G2</td>
<td>Uncontained spill or leak during construction.</td>
<td>Contamination of waterways with hydrocarbons or heavy metals. Impacts on water resources, flora, fauna, and human health. The risk could occur at any location along the alignment but the more sensitive locations are within the vicinity of waterways, including: Conoolooppa Creek (Chs. 12000 to 12500), Pilliga Creek (Ch 12100), Donald Creek (Ch. 12500)</td>
<td>Biodiversity &amp; Habitat</td>
<td>1200.10</td>
<td></td>
<td>Groundwater, Biodiversity, Economic, Biodiversity &amp; Habitat, Planning &amp; Land, Surface Water</td>
</tr>
<tr>
<td>Geotechnical</td>
<td>G3</td>
<td>Spill of hazardous materials from road transport during operation.</td>
<td>Contamination of waterways with hydrocarbons or heavy metals. Impacts on water resources, flora, fauna, and human health.</td>
<td>Biodiversity &amp; Habitat</td>
<td>1200.11</td>
<td></td>
<td>Groundwater, Biodiversity, Economic, Biodiversity &amp; Habitat, Planning &amp; Land, Surface Water</td>
</tr>
<tr>
<td>Geotechnical</td>
<td>G4</td>
<td>Rockfall or landslides during construction.</td>
<td>Rockfall or landslides during construction.</td>
<td>Geology &amp; Geology</td>
<td>1200.08</td>
<td></td>
<td>Geotechnical</td>
</tr>
</tbody>
</table>

### Risk Matrix

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Likelihood</th>
<th>Consequence</th>
<th>Risk Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geotechnical</td>
<td>Low</td>
<td>Negligible</td>
<td>Insignificant</td>
</tr>
<tr>
<td>Geotechnical</td>
<td>Medium</td>
<td>Moderate</td>
<td>Possible</td>
</tr>
<tr>
<td>Geotechnical</td>
<td>High</td>
<td>Significant</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

**Note:** The risk register is also contained in the Technical Appendices of the EES for each discipline.
### Soils and Geology

#### GW1
- Construction intersects historic gold mining works, location (state chainage) Ch. 20200 to 21000.
- Construction dewatering results in unacceptable impact to other assets, values, uses and locations: Ch. 0 to 3200, Ch. 10200 to 12600, Ch. 7800 to 9000, Ch. 9000 to 9400, Ch. 14600 to 17000.
- Imbalance of suitable cut-to-fill material during construction results in excessive material, location: Ch. 14600 to 17000.
- Surplus material that cannot be used on-site would be re-used in the following order of priority:
  1. Transfer to nearby VicRoads projects for immediate use or to an approved VicRoads recycled fill site for future use.
  2. Transfer to an alternative VicRoads approved site for reuse on concurrent VicRoads/local government project.
  3. Disposal at an accredited recycled materials recycling or waste disposal facility.

#### GW2
- Surplus material that cannot be used on-site would be re-used or disposed of in the following order of priority:
  1. Transfer to nearby VicRoads projects for immediate use or to an approved VicRoads recycled fill site for future use.
  2. Transfer to an alternative VicRoads approved site for reuse on concurrent VicRoads/local government project.
  3. Disposal at an accredited recycled materials recycling or waste disposal facility.

#### GW3
- Construction intersects Acid Sulfate Soils or peat-rich peat, potential diagenesis and exposure to air, location (state chainage) Ch. 7400 to 8100, Ch. 7400 to 9400.
- Presence of operational or former transfer shafts &/or culverts along the alignment.

#### GW4
- Construction intersects historic gold mining workings, including deep lead and shallow workings.

#### SDG
- Construction intersects historic gold mining workings, including deep lead and shallow workings.

### Additional Residual Risks

#### GW1
- Geotechnical investigations and Geology Studies would be conducted prior to design and construction to identify the extent and nature of the historic mine workings.

#### GW2
- Geotechnical investigations and Geology Studies would be conducted prior to design and construction to identify the extent and nature of the historic mine workings.

#### GW3
- Geotechnical investigations and Geology Studies would be conducted prior to design and construction to identify the extent and nature of the historic mine workings.

### Risk Register

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Risk No.</th>
<th>Risk Description</th>
<th>Likelihood</th>
<th>Consequence</th>
<th>Likelihood of Occurrence</th>
<th>Consequence of Occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soils and Geology</td>
<td>GW1</td>
<td>Construction intersects historic gold mining works, including deep lead and shallow workings.</td>
<td>Medium</td>
<td>Possible</td>
<td>1.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Soils and Geology</td>
<td>GW2</td>
<td>Construction intersects historic gold mining works, including deep lead and shallow workings.</td>
<td>Medium</td>
<td>Possible</td>
<td>1.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Soils and Geology</td>
<td>GW3</td>
<td>Construction intersects historic gold mining works, including deep lead and shallow workings.</td>
<td>Medium</td>
<td>Possible</td>
<td>1.0</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Note: The risk register is also contained in the Technical Appendices of the EIS for each discipline.
<table>
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<tr>
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<th>Risk No.</th>
<th>Impact pathway (how the Project interacts with assets, values, uses and location (state challenges))</th>
<th>Description of consequence (and describe whether it is design, construction or operation)</th>
<th>Likelihood</th>
<th>Contract Shell Reference</th>
<th>Planned Controls to Manage Risk as per Project Description, and VicRoads Contract Shell DC 3: Design &amp; Construct (April 2012)</th>
<th>Additional Controls Recommended to Reduce Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groundwater</td>
<td>GW2</td>
<td>Cuts below water table along alignment, requiring dewatering.</td>
<td>Temporary construction dewatering adversely affects groundwater flow to Grampians-Dandenong Ranges (GDWR). Cuts below grade that permanently result in change to groundwater flow regime. (Construction and/or operation).</td>
<td>Slight &amp; Geology</td>
<td>Implementation of a Groundwater Management Plan and Monitoring Program.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groundwater</td>
<td>GW4</td>
<td>Cuts below water table along alignment, requiring dewatering.</td>
<td>Temporary construction dewatering adversely affects groundwater flow to Grampians-Dandenong Ranges (GDWR). Cuts below grade that permanently result in change to groundwater flow regime. (Construction and/or operation).</td>
<td>Slight &amp; Geology</td>
<td>Implementation of a Groundwater Management Plan and Monitoring Program.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groundwater</td>
<td>GW6</td>
<td>Cuts below water table along alignment, requiring dewatering.</td>
<td>Temporary construction dewatering adversely affects groundwater flow to Grampians-Dandenong Ranges (GDWR). Cuts below grade that permanently result in change to groundwater flow regime. (Construction and/or operation).</td>
<td>Slight &amp; Geology</td>
<td>Implementation of a Groundwater Management Plan and Monitoring Program.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groundwater</td>
<td>GW7</td>
<td>Contamination of groundwater from construction activities, e.g. spillage, use of contaminated fill material, construction waste management, hazardous material handling.</td>
<td>Use of groundwater for construction water supply.</td>
<td>Slight &amp; Geology</td>
<td>Implementation of a Groundwater Management Plan and Monitoring Program.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groundwater</td>
<td>GW8</td>
<td>Contamination of groundwater from construction activities, e.g. spillage, use of contaminated fill material, construction waste management, hazardous material handling.</td>
<td>Use of groundwater for construction water supply.</td>
<td>Slight &amp; Geology</td>
<td>Implementation of a Groundwater Management Plan and Monitoring Program.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groundwater</td>
<td>GW9</td>
<td>Contamination of groundwater from operational activities, e.g. road runoff, traffic accidents, stormwater, spillage.</td>
<td>Use of groundwater for construction water supply.</td>
<td>Slight &amp; Geology</td>
<td>Implementation of a Groundwater Management Plan and Monitoring Program.</td>
<td></td>
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</tr>
<tr>
<td>Groundwater</td>
<td>GW10</td>
<td>Contamination of groundwater from operational activities, e.g. road runoff, traffic accidents, stormwater, spillage.</td>
<td>Use of groundwater for construction water supply.</td>
<td>Slight &amp; Geology</td>
<td>Implementation of a Groundwater Management Plan and Monitoring Program.</td>
<td></td>
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</tr>
<tr>
<td>Groundwater</td>
<td>GW11</td>
<td>Contamination of groundwater from operational activities, e.g. road runoff, traffic accidents, stormwater, spillage.</td>
<td>Use of groundwater for construction water supply.</td>
<td>Slight &amp; Geology</td>
<td>Implementation of a Groundwater Management Plan and Monitoring Program.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groundwater</td>
<td>GW12</td>
<td>Contamination of groundwater from operational activities, e.g. road runoff, traffic accidents, stormwater, spillage.</td>
<td>Use of groundwater for construction water supply.</td>
<td>Slight &amp; Geology</td>
<td>Implementation of a Groundwater Management Plan and Monitoring Program.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groundwater</td>
<td>GW13</td>
<td>Contamination of groundwater from operational activities, e.g. road runoff, traffic accidents, stormwater, spillage.</td>
<td>Use of groundwater for construction water supply.</td>
<td>Slight &amp; Geology</td>
<td>Implementation of a Groundwater Management Plan and Monitoring Program.</td>
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<td></td>
</tr>
<tr>
<td>Groundwater</td>
<td>GW14</td>
<td>Contamination of groundwater from operational activities, e.g. road runoff, traffic accidents, stormwater, spillage.</td>
<td>Use of groundwater for construction water supply.</td>
<td>Slight &amp; Geology</td>
<td>Implementation of a Groundwater Management Plan and Monitoring Program.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groundwater</td>
<td>GW15</td>
<td>Contamination of groundwater from operational activities, e.g. road runoff, traffic accidents, stormwater, spillage.</td>
<td>Use of groundwater for construction water supply.</td>
<td>Slight &amp; Geology</td>
<td>Implementation of a Groundwater Management Plan and Monitoring Program.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groundwater</td>
<td>GW16</td>
<td>Contamination of groundwater from operational activities, e.g. road runoff, traffic accidents, stormwater, spillage.</td>
<td>Use of groundwater for construction water supply.</td>
<td>Slight &amp; Geology</td>
<td>Implementation of a Groundwater Management Plan and Monitoring Program.</td>
<td></td>
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</tr>
<tr>
<td>Groundwater</td>
<td>GW17</td>
<td>Contamination of groundwater from operational activities, e.g. road runoff, traffic accidents, stormwater, spillage.</td>
<td>Use of groundwater for construction water supply.</td>
<td>Slight &amp; Geology</td>
<td>Implementation of a Groundwater Management Plan and Monitoring Program.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groundwater</td>
<td>GW18</td>
<td>Contamination of groundwater from operational activities, e.g. road runoff, traffic accidents, stormwater, spillage.</td>
<td>Use of groundwater for construction water supply.</td>
<td>Slight &amp; Geology</td>
<td>Implementation of a Groundwater Management Plan and Monitoring Program.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groundwater</td>
<td>GW19</td>
<td>Contamination of groundwater from operational activities, e.g. road runoff, traffic accidents, stormwater, spillage.</td>
<td>Use of groundwater for construction water supply.</td>
<td>Slight &amp; Geology</td>
<td>Implementation of a Groundwater Management Plan and Monitoring Program.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groundwater</td>
<td>GW20</td>
<td>Contamination of groundwater from operational activities, e.g. road runoff, traffic accidents, stormwater, spillage.</td>
<td>Use of groundwater for construction water supply.</td>
<td>Slight &amp; Geology</td>
<td>Implementation of a Groundwater Management Plan and Monitoring Program.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groundwater</td>
<td>GW21</td>
<td>Contamination of groundwater from operational activities, e.g. road runoff, traffic accidents, stormwater, spillage.</td>
<td>Use of groundwater for construction water supply.</td>
<td>Slight &amp; Geology</td>
<td>Implementation of a Groundwater Management Plan and Monitoring Program.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discipline</td>
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<td>Description of consequences (must describe whether it is design, construction or operation)</td>
<td>Likelihood</td>
<td>Contract Shell Reference</td>
<td>Planned Controls to Manage Risk (see per Project Description, and VicRoads Contract Shell DC 5: Design &amp; Construct, (April 2012))</td>
<td>Additional Controls Recommended to Reduce Risk</td>
</tr>
<tr>
<td>-----------------------</td>
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</tr>
<tr>
<td>Groundwater</td>
<td>GW15</td>
<td>Shallow groundwater or rising water tables. Rising water and/or precipitation of salts can damage road pavements.</td>
<td>Adequate road (under) drainage. Understanding of conditions of existing road i.e. unsustainable from existing behaviour.</td>
<td>Road Design</td>
<td>Victoria Council - Environmental Sustainability</td>
<td>Specification of the site would be undertaken in accordance with provider requirements.</td>
<td></td>
</tr>
<tr>
<td>Planning and Land</td>
<td>PLU1</td>
<td>Potential for short term impacts from the Project associated with existing infrastructure, utilities services, including fibre optic cables, overhead electricity lines, underground water pipelines, and the Melbourne - Adelaide Railway line.</td>
<td>The safe and efficient operation or maintenance of the utility or infrastructure is disrupted during construction, with services being relocated along the new carriage way or median, affecting continued service, and ongoing ability to safely maintain the utility.</td>
<td>Economic Social</td>
<td>Victoria Council - Environmental Sustainability</td>
<td>Specification of the site would be undertaken in accordance with provider requirements.</td>
<td></td>
</tr>
<tr>
<td>Planning and Land</td>
<td>PLU1</td>
<td>Potential for long term impact on short terms and longer term use of land for farming / agricultural purposes, activities resulting from acquisition and potential for land change.</td>
<td>Access to the lands would be limited to the edge of property boundaries except for maintenance of Great Western Properties that would form short term impacts include 2012. (meadows), 2013 &amp; 2015 (mowed), 2014 (fencing) track to be relocated. 2730 (mowed), 2803 &amp; 2806 (Gurley and former Victoria 2001), 2808, 2810 &amp; 2816 (Gurley), 2890, 2900, 2902, 2904 &amp; 2906 (fenced), 2904, 2001 and 2002. In each of these instances, the part of the property would be impacted and arrangements may need to be made to address ongoing land use.</td>
<td>Economic Social</td>
<td>Economic Social</td>
<td>Clause 22.02 of the Northern Grampians Planning Scheme seeks to protect the ongoing use of the Western Highway and its minimise potential effects on Great Western townships.</td>
<td>Where the small size of the allotment left following acquisition affects the agricultural viability of the land, or the ability to develop a dwelling in the lot consistent with the zoning or Council policy, consider consolidation of allotments where possible.</td>
</tr>
<tr>
<td>Noise and Vibrations</td>
<td>N1</td>
<td>Daytime construction of Western Highway at an individual sound receptor. Normal working hours under EPA Publication 1214 - Guidelines for Noise Control (2008) are: 7 am - 5 pm Monday to Friday.</td>
<td>Noise disturbance at a dwelling or other sensitive receptor. When noise disturbance to a dwelling occurs during the nighttime period, however there is still a duty to minimise noise impacts on the surrounding environment.</td>
<td>Architectural Engineering Social</td>
<td>Architectural Engineering Social</td>
<td>Limit noise production through use of noise reduction technology on machinery. The use of machinery where possible.</td>
<td>Contractor to implement a communication strategy with the key stakeholders and the community to manage the impacts of construction noise and road disturbance to local amenity.</td>
</tr>
<tr>
<td>Noise and Vibrations</td>
<td>N2</td>
<td>Daytime construction of Western Highway near sensitive receptors (e.g. more than one receptor), in a local area (community) such as:</td>
<td>Noise disturbance within the local community, dwellings or other sensitive receptors. There are no limiting noise criteria for the daytime period; however there is still a duty to minimise noise impacts on the surrounding environment.</td>
<td>Architectural Engineering Social</td>
<td>Architectural Engineering Social</td>
<td>As for Risk N1.</td>
<td>Contractor to implement a noise mitigation strategy for construction activities with consideration to the EPA Publication 480 - Environmental Guidelines for Major Construction Sites (1996) and EPA Publication 1254 - Environmental Guidelines for Noise Control (2008), as well as, referring to ‘Typical Construction Plant and Equipment Noise Attenuation Over Entourage’ guide, contained in the EDI Noise Impact Assessment report (GHD Pty Ltd, 2013).</td>
</tr>
</tbody>
</table>
### Noise and Vibration

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Risk No.</th>
<th>Impact pathway (how the Project interacts with assets, values, uses and location (state change))</th>
<th>Description of consequence (and describe whether it is design, construction or operation)</th>
<th>Linkages</th>
<th>Contract Shell DC1: Design &amp; Construct, (April 2015)</th>
<th>Planned Controls to Manage Risk</th>
<th>Additional Controls Recommended to Reduce Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise and Vibration</td>
<td>N3</td>
<td>Evening construction of Western Highway. Evening is as laid out in the EPA Publication 1254 as follows: 7 pm - 7 am Monday to Friday. 8 pm - 5 pm Saturday. 7 am - 5 pm Sunday and public holidays.</td>
<td>Noise disturbance within the local community, dwellings or other sensitive receptors, including individual receptions. Evening works are required EPA Publication 1254 - Guidelines for Noise Control (2008) will apply.</td>
<td>Biodiversity &amp; Habitat Economic Social</td>
<td>1/20/01/01</td>
<td>Limit noise production through use of noise reduction technologies on machinery. Enclosing machinery where possible. Use of smart movement alarms (alternatives to 'beeper' alarms) and construction noise monitoring. Construction noise shall be monitored where its impact is likely to create substantial nuisance or inconvenience to sensitive receptors. Scheduling work during normal daylight hours to meet the following requirements: (a) no work shall be carried out on any Sunday, public holiday, between Good Friday and Easter Monday inclusive, or during the Christmas to New Year period; (b) no work shall be carried out on the site outside the period between 7 am or sunrise, whichever is the later, and 7 pm or sunset, whichever is the earlier. Evening and weekend works may occur at certain stages during the Project. If the contractor is required to undertake work during evening or weekend times, this would need to be approved by the VicRoads Superintendent. A condition of VicRoads approval would be that all relevant stakeholders are consulted including nearby residents.</td>
<td>Contractor shall implement a communication strategy with the key stakeholders and the community to manage the impacts of construction noise and limit disturbance to local amenity. Contractor shall implement a communication strategy for construction activities with considerations to the EPA Publication 460 - Environmental Guidelines for Major Construction Sites (1996) and EPA Publication 1254 Guidelines for Noise Control (2008), as well as referring to ‘Typical Construction Plant and Equipment Noise Attenuation Over Distance’ Table, contained in the ES Noise Impact Assessment report (GHD Pty Ltd, 2013). Should ‘Unavoidable Works’ be required for evening or right time work, then where possible section 5.1.10 &amp; 5.1.11 of the Vic Roads Noise Guidelines – Construction and Maintenance Works 2007 should be adhered to.</td>
</tr>
<tr>
<td>Noise and Vibration</td>
<td>N4</td>
<td>Night time construction of Western Highway. The night period is laid out in the EPA Publication 1254 as follows: 8 pm - 7 am Monday to Saturday.</td>
<td>Noise disturbance within the local community, dwellings or other sensitive receptors, including individual receptions. Night time works are required EPA Publication 1254 - Guidelines for Noise Control (2008) will apply.</td>
<td>Biodiversity &amp; Habitat Economic Social</td>
<td>1/20/01/01</td>
<td>Limit noise production through use of noise reduction technologies on machinery. Enclosing machinery where possible. Use of smart movement alarms (alternatives to 'beeper' alarms) and construction noise monitoring. Construction noise shall be monitored where its impact is likely to create substantial nuisance or inconvenience to sensitive receptors. Scheduling work during normal daylight hours to meet the following requirements: (a) no work shall be carried out on any Sunday, public holiday, between Good Friday and Easter Monday inclusive, or during the Christmas to New Year period; (b) no work shall be carried out on the site outside the period between 7 am or sunrise, whichever is the later, and 7 pm or sunset, whichever is the earlier. Night time works are not separable for the Project. The contractor(s) need approval from VicRoads, and all relevant stakeholders will be consulted including nearby residents.</td>
<td>Contractor shall implement a communication strategy with the key stakeholders and the community to manage the impacts of construction noise and limit disturbance to local amenity. Contractor shall implement a communication strategy for construction activities with considerations to the EPA Publication 460 - Environmental Guidelines for Major Construction Sites (1996) and EPA Publication 1254 Guidelines for Noise Control (2008), as well as referring to ‘Typical Construction Plant and Equipment Noise Attenuation Over Distance’ Table, contained in the ES Noise Impact Assessment report (GHD Pty Ltd, 2013). Should ‘Unavoidable Works’ be required for evening or right time work, then where possible section 5.1.10 &amp; 5.1.11 of the Vic Roads Noise Guidelines – Construction and Maintenance Works 2007 should be adhered to.</td>
</tr>
<tr>
<td>Noise and Vibration</td>
<td>N5</td>
<td>Site compounds and laydown areas during construction.</td>
<td>Noise disturbance within the local community, dwellings or other sensitive receptors, including individual receptions. These are no binding noise criteria for the daytime period, however there is still a duty to minimise noise impacts on the surrounding environment. Evening weekend or night time works are required EPA Publication 1254 - Guidelines for Noise Control (2008) will apply.</td>
<td>Biodiversity &amp; Habitat Economic Social</td>
<td>1/20/01/01</td>
<td>Limit noise production through use of noise reduction technologies on machinery. Enclosing machinery where possible. Use of smart movement alarms (alternatives to 'beeper' alarms) and construction noise monitoring. Construction noise shall be monitored where its impact is likely to create substantial nuisance or inconvenience to sensitive receptors. Scheduling work during normal daylight hours to meet the following requirements: (a) no work shall be carried out on any Sunday, public holiday, between Good Friday and Easter Monday inclusive, or during the Christmas to New Year period; (b) no work shall be carried out on the site outside the period between 7 am or sunrise, whichever is the later, and 7 pm or sunset, whichever is the earlier. Contractor(s) need to ensure noise compounds away from sensitive receptors and limit noise as much as practicable. Evening and weekend works may occur at certain stages during the Project, as approved by VicRoads. All relevant stakeholders would be consulted including nearby residents.</td>
<td>Contractor shall implement a communication strategy with the key stakeholders and the community to manage the impacts of construction noise and limit disturbance to local amenity. Contractor shall implement a communication strategy for construction activities with considerations to the EPA Publication 460 - Environmental Guidelines for Major Construction Sites (1996) and EPA Publication 1254 Guidelines for Noise Control (2008), as well as referring to ‘Typical Construction Plant and Equipment Noise Attenuation Over Distance’ Table, contained in the ES Noise Impact Assessment report (GHD Pty Ltd, 2013). Should ‘Unavoidable Works’ be required for evening or right time work, then where possible section 5.1.10 &amp; 5.1.11 of the Vic Roads Noise Guidelines – Construction and Maintenance Works 2007 should be adhered to.</td>
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</table>
Noise and Vibration

Fibration caused by construction of Western Highway

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<tbody>
<tr>
<td>Noise and Vibration</td>
<td>N6</td>
<td>Fibration caused by construction of Western Highway</td>
<td>Fibre disturbance within the local community, dwellings or other sensitive receptors, including individual receptors. The magnitude of ground vibrations is not expected to be sufficient to cause structural damage, as defined by the DNR 4152.03 criteria.</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Noise and Vibration</td>
<td>N7</td>
<td>Operation of the Western Highway generates noise from vehicular traffic</td>
<td>Noise disturbance within the local community, dwellings or other sensitive receptors, including individual receptors.</td>
<td>Moderate &amp; high</td>
<td>Moderate &amp; high</td>
<td>Moderate &amp; high</td>
<td>Moderate &amp; high</td>
</tr>
<tr>
<td>Noise and Vibration</td>
<td>N8</td>
<td>Operation of the Western Highway generates noise from vehicular traffic</td>
<td>Noise disturbance within the local community, dwellings or other sensitive receptors, including individual receptors.</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

Social

The Project may lead to changes in the existing social and community conditions by creating pressures for the continued pattern to change.

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</thead>
<tbody>
<tr>
<td>Social</td>
<td>S1</td>
<td>The Project may lead to changes in the existing social and community conditions by creating pressures for the continued pattern to change.</td>
<td>Travel time changes from Ararat and, which may make it seem a more desirable location for residential development. If there is increased development pressure, this may have an effect on the delivery of infrastructure and community services.</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Social</td>
<td>S2</td>
<td>The Project may lead to changes in the existing social and community conditions by changing the distribution of goods and services in the vicinity of the Highway.</td>
<td>As per S1, there are several rural properties around Great Western which would be affected by the Project. If the land between the new alignment and the existing township was used for rural residential in the long term, this may increase the sustainability of the Project. Along the balance of Section Three the alignment is relatively close to the existing highway, with the potential to move the number of households living in close proximity to the road.</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Social</td>
<td>S3</td>
<td>The Project may change the existing social and community conditions by creating change processes which affect the demographic characteristics of the study area.</td>
<td>The social impacts of the Project are likely to be related to the demographic characteristics of the study area.</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Social</td>
<td>S4</td>
<td>The Project and changes to access arrangements may lead to changes in the existing social and community conditions</td>
<td>Changes to access arrangements might change the characteristics of the study area in the future.</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Discipline</td>
<td>Risk No.</td>
<td>Impact pathway (how the Project interacts with assets, values, use and location)</td>
<td>Description of consequences (If possible, describe to a design, construction or operation)</td>
<td>Linkages</td>
<td>Contract Shell DC1 Reference</td>
<td>Planned Contracts to Manage Risk</td>
<td>Additional Controls Recommended to Reduce Risk</td>
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</tr>
<tr>
<td>Water</td>
<td></td>
<td>The Project may affect local residents and communities during the construction stage.</td>
<td>The potential social impacts of construction include: Disruption from the presence of the construction workforce - most likely to be caused that movements to and from construction sites; Reduced amenity for adjacent residents from construction activities, including increased traffic noise, dust, visual impact and Property access interruptions during construction.</td>
<td>Social Noise Air</td>
<td>23/05/06</td>
<td>Construction Management controls described in VicRoads Contract Shell DC1 document, which includes relevant Air Quality, Geology (Contamination), Noise, and Traffic controls described in (VicRoads, 2012))</td>
<td>The social impacts of construction would be managed through the controls included in VicRoads construction contract conditions and the additional measures recommended in the Noise, Air and Traffic impact assessment reports. In addition, the construction contractor should be required to locate site office and lay-by areas away from sensitive locations.</td>
</tr>
<tr>
<td>Water</td>
<td></td>
<td>The Project may lead to effects on places with particular cultural, recreational or aesthetic values, particularly with respect to significant regional locations.</td>
<td>Access to Concongella Creek may be slightly changed to people coming into the town, but there would be minimal difference within the town. Access to Seggell’s Winery and Berri’s Winery would be changed, as travellers would need to make a conscious decision to leave the new road and enter Great Western. These may affect casual visitation to these facilities. Access to other areas within Great Western would only be slightly changed.</td>
<td>Social Indigent Fencing</td>
<td>23/10</td>
<td>Consultation with Council, local community and Indigenous community has been undertaken during the planning for this project to identify significant places and how to reduce potential impacts. Community interactions such as community liaison, publicity and community issue management would be in accordance with Section 1210 of the VicRoads DC1 contract conditions.</td>
<td>The northern Grampians Shire Council may wish to undertake a management plan for the historic sites. Given the importance of the site for the local community, a balance must be struck between preservation and accessibility, so that the site can remain a focus of social activity. VicRoads, tourism bodies and council could develop a signage strategy that encourages travellers to visit the wineries in the area.</td>
</tr>
<tr>
<td>Water</td>
<td></td>
<td>The Project may create a risk of dilatation for individuals and communities.</td>
<td>The dwelling on Property No. 2776 will be acquired.</td>
<td>Social</td>
<td>23/10</td>
<td></td>
<td>Note that mitigating amenity impacts (S9) may lead to dwelling acquisition in a few instances.</td>
</tr>
<tr>
<td>Water</td>
<td></td>
<td>The Project may create a risk of severance and accessibility changes for individuals and communities.</td>
<td>Most existing access roads would be changed by the Project, particularly at some future time when the highway would be upgraded to a four-lane standard (S3A). Under the four-lane standard, existing access points from properties to the highway would be removed. Some side roads may have restricted access and access into and around Great Western would be changed.</td>
<td>Traffic</td>
<td>23/10</td>
<td>Service roads have been identified and included in the concept design developed for the project.</td>
<td>The mitigation measures recommended to minimise the impact of new construction are detailed in the Traffic and Transport Impact Assessment Report. These measures address the expected potential social impacts of construction. Both councils could consider working with the local community to update to the Great Western Community Plan, which could include planning new facilities.</td>
</tr>
<tr>
<td>Water</td>
<td></td>
<td>The Project may create risks of reduction of amenity (A) (relation to visual amenity, none other changes to the character of the area) to individuals and communities.</td>
<td>Houses left to the ERF are located on Cl. 4500 (south), 4950 (south), 5250 (south), 5620 (south), 5970 (south), 6370 (south). The number of these dwellings are extremely close to the Project alignment and there would be significant amenity impacts.</td>
<td>Landscape Noise</td>
<td>23/10</td>
<td>To mitigate visual amenity impacts, VicRoads will develop a landscape plan to integrate the road reserve following construction. The design and species selection will be sympathetic to the existing landscape values of the project area. The noise and vibration impact assessment report documents the changes in the noise environment in the project study area. No number of houses which would have a high increase in noise levels (&lt;4 db(A)) is 24, or 3.7% of the total number of houses in the study area. This is a high negative impact.</td>
<td>Impacts to be further managed through landscaping and detailed design. Noise mitigation may be required in some circumstances as per the noise and vibration impact assessment report.</td>
</tr>
<tr>
<td>Water</td>
<td></td>
<td>Construction activities on significant crossings of Concongella Creek (Ch. 8000, WB 1210).</td>
<td>Construction activities on other Significant crossings of crossings on Allanvale Creek (Ch.12000, WB326), (Ch 10550, WB325) and Donald Creek (Ch. 16500, WB 6450, WB 320), (Ch 6750, WC 321), (Ch. 9100, WB 324), Concongella Creek and tributaries (Ch. 4400, WB 312), (Ch 6500, WB 309), (Ch. 17000, WB 316), (Ch. 21000, WB 318), (Ch. 22000, WB 319) may have restricted access and egress. Access into and around Great Western may be more difficult during the construction stage.</td>
<td>Biodiversity &amp; habitat</td>
<td>23/10</td>
<td>Reintroduction of aquatic and terrestrial habitat value in the vicinity of the crossing location.</td>
<td>Realignment of waterway to follow existing broadleaf of old highway. Leaving buffer control structures, bank stabilisation using a combination of rock, vegetation and erosion matting, creation of overstorens, introduction of large woody debris, synthesis of existing spoil and staff, relocation of old highway bridge and construction of a new bridge in the new configuration.</td>
</tr>
<tr>
<td>Water</td>
<td></td>
<td>Construction activities on significant crossings of Concongella Creek (Ch. 4500, WB 1210).</td>
<td>Local social disturbance of aquatic and terrestrial habitat value in the vicinity of the crossing location.</td>
<td>Biodiversity &amp; habitat</td>
<td>23/10</td>
<td>Reintroduction of aquatic and terrestrial habitat value in the vicinity of the crossing location.</td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td></td>
<td>Construction activities on significant crossings of Concongella Creek (Ch. 4500, WB 1210).</td>
<td>Local disturbance of aquatic and terrestrial habitat value in the vicinity of the crossing location.</td>
<td>Biodiversity &amp; habitat</td>
<td>23/10</td>
<td>Reintroduction of aquatic and terrestrial habitat value in the vicinity of the crossing location.</td>
<td></td>
</tr>
</tbody>
</table>
Surface Water

Cascades paticipate on all other Minor waterways resulting in fragmentation of river health impacts. Restrictions to aquatic and terrestrial fauna movement, impediments to future waterway and catchment rehabilitation efforts. 

Biodiversity & Habitat

Appropriate design standards (e.g. culvert size appropriately and set at bedlevel of waterway or span bridge where required).

Surface Water

Construction of the Western Highway at existing crossing locations results in the change in hydraulic conditions, geomorphologic response at crossing locations, increased erosion potential downstream/increase sedimentation upstream due to the construction of flow through a culvert or beneath a bridge. 

Biodiversity & Habitat

Appropriate design standards (e.g. adequately sized culverts, rock protection to stabilise waterway bed and banks at the crossing location if required).

Risk Register

Table 1: Risk Matrix

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Risk No</th>
<th>Impact Pathway</th>
<th>Description of Consequences</th>
<th>Likelihood</th>
<th>Consequence</th>
<th>Risk Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water</td>
<td>SW6B-2</td>
<td>Construction activities on all roads at SI4440, WC128, Concongella Creek (SC1125), WC226, WC228, WC229, WC230, WC231 resulting in disturbance of channel planforms, geometry and/or river health values.</td>
<td>Construction of the Western Highway results in changes to river health values.</td>
<td>Moderate</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Surface Water</td>
<td>SW6A</td>
<td>Construction activities on all other Minor waterways resulting in fragmentation of river health impacts. Restrictions to aquatic and terrestrial fauna movement, impediments to future waterway and catchment rehabilitation efforts.</td>
<td>Construction of the Western Highway results in changes to river health values.</td>
<td>Possible</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Surface Water</td>
<td>SW5B</td>
<td>Construction activities on all other Minor waterways resulting in fragmentation of river health impacts. Restrictions to aquatic and terrestrial fauna movement, impediments to future waterway and catchment rehabilitation efforts.</td>
<td>Construction of the Western Highway results in changes to river health values.</td>
<td>Possible</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Surface Water</td>
<td>SW4B</td>
<td>Construction activities on all other Minor waterways resulting in fragmentation of river health impacts. Restrictions to aquatic and terrestrial fauna movement, impediments to future waterway and catchment rehabilitation efforts.</td>
<td>Construction of the Western Highway results in changes to river health values.</td>
<td>Possible</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Surface Water</td>
<td>SW2B</td>
<td>Construction activities on all other Minor waterways resulting in fragmentation of river health impacts. Restrictions to aquatic and terrestrial fauna movement, impediments to future waterway and catchment rehabilitation efforts.</td>
<td>Construction of the Western Highway results in changes to river health values.</td>
<td>Possible</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Surface Water</td>
<td>SW2A</td>
<td>Construction activities on all other Minor waterways resulting in fragmentation of river health impacts. Restrictions to aquatic and terrestrial fauna movement, impediments to future waterway and catchment rehabilitation efforts.</td>
<td>Construction of the Western Highway results in changes to river health values.</td>
<td>Possible</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Surface Water</td>
<td>SW1E</td>
<td>Construction activities on all other Minor waterways resulting in fragmentation of river health impacts. Restrictions to aquatic and terrestrial fauna movement, impediments to future waterway and catchment rehabilitation efforts.</td>
<td>Construction of the Western Highway results in changes to river health values.</td>
<td>Possible</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
<tr>
<td>Surface Water</td>
<td>SW1D</td>
<td>Construction activities on all other Minor waterways resulting in fragmentation of river health impacts. Restrictions to aquatic and terrestrial fauna movement, impediments to future waterway and catchment rehabilitation efforts.</td>
<td>Construction of the Western Highway results in changes to river health values.</td>
<td>Possible</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

Note: The risk register is also contained in the Technical Appendices of the EIS for each discipline.
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<tr>
<td>Traffic and Transport</td>
<td>T1</td>
<td>Changes in road environment during construction in general reduces to road safety, and examples of road environment changes include heavy vehicles entering/exiting, construction access, additional or new roundabout boulders, possible speed limit changes, additional and/or alternative changes.</td>
<td>Incurred incidence of accidents that one or more incident may result in a failure.</td>
<td>Social</td>
<td>Traffic Management Plans (TMPs) would need to be prepared to identify, assess and appropriately manage risks to road safety 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, with pedestrian safety measures, advance warning signage, etc., and additional speed humps and kerb safety.</td>
<td>Investigate routes for construction traffic and heavy vehicles to be appropriately designed and managed as part of TMPs, with consideration for road safety.</td>
<td>Implement a communication strategy with the key stakeholders to manage impacts, and inform road users and the community.</td>
</tr>
<tr>
<td>Traffic and Transport</td>
<td>T2</td>
<td>Changes in road environment during construction in general reduces to performance and efficiency of travel. Examples of road environment changes include speed reductions, works requiring temporary road or lane closures or cancellation of travel.</td>
<td>Increased disruption or replacement of road users, and increased travel time and/or distance.</td>
<td>Social Economic Planning &amp; Local Use</td>
<td>TMPs prepared to identify, assess and appropriately manage road safety and environmental impacts on road operations. These would comply with standard VicRoads practices, the Traffic Management Code of Practice and the Road Management Act 2004. Local Traffic Audits (LTAs) to be undertaken on TMPs.</td>
<td>Investigate routes for construction traffic and heavy vehicles to be appropriately designed and managed as part of TMPs, with consideration for road safety.</td>
<td>Implement a communication strategy with the key stakeholders to manage impacts, and inform road users and the community.</td>
</tr>
<tr>
<td>Traffic and Transport</td>
<td>T3</td>
<td>The duplication disrupts local access routes, including cyclist connectivity post-construction (interim and alternate operation).</td>
<td>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.</td>
<td>Social</td>
<td>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 to this is via wider median treatments and &quot;left-in&quot; and &quot;left-out&quot; access.</td>
<td>Investigate routes for construction traffic and heavy vehicles to be appropriately designed and managed as part of TMPs, with consideration for road safety.</td>
<td>Implement a communication strategy with the key stakeholders to manage impacts, and inform road users and the community.</td>
</tr>
<tr>
<td>Traffic and Transport</td>
<td>T4</td>
<td>Potential for some aspects of road safety, during interim operation of the new road to be degraded. For example, increased crossing distance for wildlife exacerbated frequency of accidents. Increased distance for farm machinery to be travelling along the road. Changes in atmospheric conditions, i.e. fog, sun glare, due to changes in alignment orientation. Movements at intersections and access points affected.</td>
<td>Increased incidence of accidents that one or more incident may result in a failure.</td>
<td>Mobility &amp; Habitat Social Economic</td>
<td>Road safety audit completed for the design.</td>
<td>Additional controls recommended to reduce risk.</td>
<td>Additional controls recommended to reduce risk.</td>
</tr>
<tr>
<td>Traffic and Transport</td>
<td>T5</td>
<td>Potential for some aspects of road safety, during interim operation of the new road to be degraded. For example, increased crossing distance for wildlife exacerbated frequency of accidents. Increased distance for farm machinery to be travelling along the road. Changes in atmospheric conditions, i.e. fog, sun glare, due to changes in alignment orientation.</td>
<td>Increased incidence of accidents that one or more incident may result in a failure.</td>
<td>Mobility &amp; Habitat Social Economic</td>
<td>Road safety audit completed for the design.</td>
<td>Additional controls recommended to reduce risk.</td>
<td>Additional controls recommended to reduce risk.</td>
</tr>
<tr>
<td>Traffic and Transport</td>
<td>T6</td>
<td>Potential for some aspects of road safety to be degraded through design, including horizontal and vertical geometry, sight distance at all intersections and minor locations (ramps and service road entrances).</td>
<td>Increased incidence of accidents that one or more incident may result in a failure.</td>
<td>Mobility &amp; Habitat Social Economic</td>
<td>Road safety audit completed for the design.</td>
<td>Additional controls recommended to reduce risk.</td>
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</tr>
</tbody>
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### Risk Register

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Risk No.</th>
<th>Impact pathway (how the Project interacts with assets, values, uses and location (site change))</th>
<th>Description of consequences (how this will impact construction and operation)</th>
<th>Linkages</th>
<th>Contract Shell (AustRoads Reference)</th>
<th>Planned Controls to Manage Risk (consider project description, and VicRoads Contract Shell DC6: Design &amp; Construct, (April 2012))</th>
<th>Additional Controls Recommended to Reduce Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic and Transport</td>
<td>TP</td>
<td>Traffic volumes significantly increase due to induced demand and lane expansion (for the interests and alleviate issues).</td>
<td>Increased travel time for road users. Economic</td>
<td>Risk is negligible due to adequate capacity and no other parallel routes of the same standard road, therefore no planned controls to manage risk.</td>
<td></td>
<td></td>
<td>Risk is negligible therefore no additional controls to manage risks.</td>
</tr>
<tr>
<td>Landscape</td>
<td>LV2A</td>
<td>Construction and operation of the duplication along the existing Western Highway alignment would visually impact upon adjacent dwellings. (Ch. 400-900, 1400-3600, 4500-5000, 9300, 10600, 17000-24000)</td>
<td>Approximately 24 dwellings and those located within the caravan park would be visually impacted and would receive a moderate or minor visual change upon their views.</td>
<td>Social</td>
<td>3060.3 Technical Bulletin No. 36 [466] Part A</td>
<td>Provide planting within the duplication ROW.</td>
<td>Non-standard treatments to reduce impact include: Establishment of new and replanting of similar character to existing suitable vegetation in close proximity to the road edge (protective fencing treatments may be required). Establishment of new overpass vegetation within the ROW for views from affected dwellings and one of grasses upon fill embankments consistent with surrounding rural areas.</td>
</tr>
<tr>
<td>Landscape</td>
<td>LV2B</td>
<td>Construction and operation of the duplication along the current Western Highway alignment would visually impact upon adjacent dwellings. (Ch. 1300-4500)</td>
<td>Dwellings would be located adjacent to the Garden Gully Overpass and would receive a major visual change upon their views.</td>
<td>Social</td>
<td>3060.3 Technical Bulletin No. 36 [466] Part A</td>
<td>Provide planting within the duplication ROW.</td>
<td>Non-standard treatments to reduce impact include: Establishment of new and replanting of similar character to existing suitable vegetation in close proximity to the Road (protective fencing treatments may be required). Establishment of new overpass vegetation within the ROW for views from affected dwellings and sensitively designed fill embankments.</td>
</tr>
<tr>
<td>Landscape</td>
<td>LV2C</td>
<td>Construction and operation of the duplication along a new highway alignment including overpasses would visually impact upon adjacent dwellings. (Ch. 11500-12600)</td>
<td>Approximately 4 dwellings would be located adjacent to the Great Western Bypass and Southbound Overpass and would receive a major visual change upon their views.</td>
<td>Social</td>
<td>3060.3 Technical Bulletin No. 36 [466] Part A</td>
<td>Provide planting within the duplication ROW.</td>
<td>Non-standard treatments to reduce impact include: Establishment of new and replanting of similar character to existing suitable vegetation in close proximity to the Road (protective fencing treatments may be required). Establishment of new overpass vegetation within the ROW for views from affected dwellings and sensitively designed fill embankments.</td>
</tr>
<tr>
<td>Landscape</td>
<td>LV2D</td>
<td>Construction and operation of the duplication along a new highway alignment including overpasses would visually impact upon adjacent dwellings. (Ch. 14400-15600)</td>
<td>Approximately 10 dwellings would be located adjacent to the Great Western Bypass and Breezeway Overpass and would receive a major visual change upon their views.</td>
<td>Social</td>
<td>3060.3 Technical Bulletin No. 36 [466] Part A</td>
<td>Provide planting within the duplication ROW.</td>
<td>Non-standard treatments to reduce impact include: Establishment of new and replanting of similar character to existing suitable vegetation in close proximity to the Road (protective fencing treatments may be required). Establishment of new overpass vegetation within the ROW for views from affected dwellings and sensitively designed fill embankments.</td>
</tr>
<tr>
<td>Landscape</td>
<td>LV2E</td>
<td>Construction and operation of a new overpass along the existing Western Highway alignment would visually impact upon adjacent dwellings. (Ch. 20200-21000)</td>
<td>Dwellings would be located adjacent to the Rail Overpass and would receive a major visual change upon their views.</td>
<td>Social</td>
<td>3060.3 Technical Bulletin No. 36 [466] Part A</td>
<td>Provide planting within the duplication ROW.</td>
<td>Non-standard treatments to reduce impact include: Establishment of new and replanting of similar character to existing suitable vegetation in close proximity to the Road (protective fencing treatments may be required). Establishment of new overpass vegetation within the ROW for views from affected dwellings and sensitively designed fill embankments.</td>
</tr>
<tr>
<td>Landscape</td>
<td>LV2F</td>
<td>Construction and operation of a new overpass along the existing Western Highway alignment would visually impact upon adjacent dwellings. (Ch. 23000-24000)</td>
<td>Approximately 10 dwellings would be located adjacent to the Buninyong Overpass and would receive a major visual change upon their views.</td>
<td>Social</td>
<td>3060.3 Technical Bulletin No. 36 [466] Part A</td>
<td>Provide planting within the duplication ROW.</td>
<td>Non-standard treatments to reduce impact include: Establishment of new and replanting of similar character to existing suitable vegetation in close proximity to the Road (protective fencing treatments may be required). Establishment of new overpass vegetation within the ROW for views from affected dwellings and sensitively designed fill embankments.</td>
</tr>
<tr>
<td>Landscape</td>
<td>LV2G</td>
<td>Construction and operation of the duplication would visually impact upon the Ararat Regional Park. (Ch. 1300-2400)</td>
<td>It is not anticipated that the duplication would be visible from the Ararat Regional Park and would receive an insignificant visual change.</td>
<td>Social</td>
<td>3060.3 Technical Bulletin No. 36 [466] Part A</td>
<td>Provide planting within the duplication ROW.</td>
<td>Non-standard treatments to reduce impact include: Establishment of new and replanting of similar character to existing suitable vegetation in close proximity to the Road (protective fencing treatments may be required). Establishment of new overpass vegetation within the ROW for views from affected dwellings and sensitively designed fill embankments.</td>
</tr>
</tbody>
</table>

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## Risk Register

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Risk No.</th>
<th>Impact pathway (how the Project interacts with assets, values, uses and location (state chainage))</th>
<th>Description of consequence (and describe whether it is design, construction or operation)</th>
<th>Linkages</th>
<th>Contract Shell (DC 5) Reference</th>
<th>Planned Controls to Manage Risk</th>
<th>Additional Controls Recommended to Reduce Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual and Landscape</td>
<td>LV2J</td>
<td>Construction and operation of the duplication would visually impact upon Great Western Wester Town Centre.</td>
<td>The duplication would be visible from Great Western Wester Town Centre and would receive an insignificant visual change.</td>
<td>Social</td>
<td>Table 3. Technical Bulletin No. 36 AustRoads Part A1b</td>
<td>Provide planting within the duplication ROW.</td>
<td>None required.</td>
</tr>
<tr>
<td>Visual and Landscape</td>
<td>LV2E</td>
<td>Construction and operation of the duplication would visually impact upon Sisters Rocks.</td>
<td>The duplication would be visible from Sisters Rocks and would receive an insignificant visual change.</td>
<td>Social</td>
<td>Table 3. Technical Bulletin No. 36 AustRoads Part A1b</td>
<td>Provide planting within the duplication ROW.</td>
<td>None required.</td>
</tr>
<tr>
<td>Visual and Landscape</td>
<td>LV2G</td>
<td>Construction and operation of the duplication would visually impact upon Sisters Rocks Bushland Reserve.</td>
<td>The duplication would be visible from Sisters Rocks Bushland Reserve and would receive an insignificant visual change.</td>
<td>Social</td>
<td>Table 3. Technical Bulletin No. 36 AustRoads Part A1b</td>
<td>Provide planting within the duplication ROW.</td>
<td>None required.</td>
</tr>
<tr>
<td>Visual and Landscape</td>
<td>LV2H</td>
<td>Construction and operation of the duplication would visually impact upon Sisters Rocks.</td>
<td>The duplication would be visible from Sisters Rocks and would receive a minor visual change.</td>
<td>Social</td>
<td>Table 3. Technical Bulletin No. 36 AustRoads Part A1b</td>
<td>Provide planting within the duplication ROW.</td>
<td>None required.</td>
</tr>
<tr>
<td>Visual and Landscape</td>
<td>LV2I</td>
<td>Construction and operation of the duplication would visually impact upon Sisters Rocks Bushland Reserve.</td>
<td>The duplication would be visible from Sisters Rocks Bushland Reserve and would receive an insignificant visual change.</td>
<td>Social</td>
<td>Table 3. Technical Bulletin No. 36 AustRoads Part A1b</td>
<td>Provide planting within the duplication ROW.</td>
<td>None required.</td>
</tr>
<tr>
<td>Visual and Landscape</td>
<td>LV2K</td>
<td>Construction and operation of the duplication would visually impact upon Sisters Rocks.</td>
<td>The duplication would be visible from Sisters Rocks and would receive a minor visual change.</td>
<td>Social</td>
<td>Table 3. Technical Bulletin No. 36 AustRoads Part A1b</td>
<td>Provide planting within the duplication ROW.</td>
<td>None required.</td>
</tr>
<tr>
<td>Visual and Landscape</td>
<td>LV2M</td>
<td>Construction and operation of the duplication would visually impact upon Sisters Rocks.</td>
<td>The duplication would be visible from Sisters Rocks and would receive a moderate visual change.</td>
<td>Social</td>
<td>Table 3. Technical Bulletin No. 36 AustRoads Part A1b</td>
<td>Provide planting within the duplication ROW.</td>
<td>None required.</td>
</tr>
<tr>
<td>Visual and Landscape</td>
<td>LV2N</td>
<td>Construction and operation of the duplication would visually impact upon Sisters Rocks.</td>
<td>The duplication would be visible from Sisters Rocks and would receive a moderate visual change.</td>
<td>Social</td>
<td>Table 3. Technical Bulletin No. 36 AustRoads Part A1b</td>
<td>Provide planting within the duplication ROW.</td>
<td>None required.</td>
</tr>
<tr>
<td>Visual and Landscape</td>
<td>LV2O</td>
<td>Construction and operation of the duplication would visually impact upon Sisters Rocks.</td>
<td>The duplication would be visible from Sisters Rocks and would receive a moderate visual change.</td>
<td>Social</td>
<td>Table 3. Technical Bulletin No. 36 AustRoads Part A1b</td>
<td>Provide planting within the duplication ROW.</td>
<td>None required.</td>
</tr>
</tbody>
</table>

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<tr>
<th>Discipline</th>
<th>Risk No.</th>
<th>Impact pathway (how the Project interacts with assets, values, uses and location (state change))</th>
<th>Description of consequences (and describe whether it is design, construction or operation)</th>
<th>Likelihood</th>
<th>Risk Rating</th>
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<th>Risk Rating</th>
<th>Consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual and Landscape</td>
<td>LV3A</td>
<td>Construction and operation of the duplication would visually impact upon landscape character types of high landscape sensitivity. (Ch. 13000-14900)</td>
<td>The duplication would result in a minor visual change upon the bushland landscape character type through the removal of existing tree vegetation.</td>
<td>Social</td>
<td>Almost Certain</td>
<td>Minor</td>
<td>None required.</td>
<td>Almost Certain</td>
<td>Minor</td>
<td>None required.</td>
<td>Almost Certain</td>
<td>Minor</td>
<td>None required.</td>
<td>Almost Certain</td>
<td>Minor</td>
<td>None required.</td>
<td>Almost Certain</td>
<td>Minor</td>
</tr>
<tr>
<td>Visual and Landscape</td>
<td>LV3B</td>
<td>Construction and operation of the duplication would visually impact upon landscape character types of medium landscape sensitivity. (Ch. 14000-14800)</td>
<td>The duplication would result in a major visual change upon the rural landscape character type through the construction of the duplication, overpasses and removal of existing tree vegetation.</td>
<td>Social</td>
<td>Almost Certain</td>
<td>Minor</td>
<td>None required.</td>
<td>Almost Certain</td>
<td>Minor</td>
<td>None required.</td>
<td>Almost Certain</td>
<td>Minor</td>
<td>None required.</td>
<td>Almost Certain</td>
<td>Minor</td>
<td>None required.</td>
<td>Almost Certain</td>
<td>Minor</td>
</tr>
<tr>
<td>Visual and Landscape</td>
<td>LV3C</td>
<td>Construction and operation of the duplication would visually impact upon landscape character types of medium landscape sensitivity. (Ch. 13000-14900)</td>
<td>The duplication would result in a major visual change upon the rural landscape character type through the construction of the duplication, overpasses and removal of existing tree vegetation.</td>
<td>Social</td>
<td>Almost Certain</td>
<td>Minor</td>
<td>None required.</td>
<td>Almost Certain</td>
<td>Minor</td>
<td>None required.</td>
<td>Almost Certain</td>
<td>Minor</td>
<td>None required.</td>
<td>Almost Certain</td>
<td>Minor</td>
<td>None required.</td>
<td>Almost Certain</td>
<td>Minor</td>
</tr>
<tr>
<td>Visual and Landscape</td>
<td>LV3D</td>
<td>Construction and operation of the duplication would visually impact upon landscape character types of medium landscape sensitivity. (Ch. 13000-14900)</td>
<td>The duplication would result in a moderate visual change upon the rural landscape character type through the construction of the duplication, overpasses and removal of existing tree vegetation.</td>
<td>Social</td>
<td>Almost Certain</td>
<td>Minor</td>
<td>None required.</td>
<td>Almost Certain</td>
<td>Minor</td>
<td>None required.</td>
<td>Almost Certain</td>
<td>Minor</td>
<td>None required.</td>
<td>Almost Certain</td>
<td>Minor</td>
<td>None required.</td>
<td>Almost Certain</td>
<td>Minor</td>
</tr>
<tr>
<td>Visual and Landscape</td>
<td>LV3E</td>
<td>Construction and operation of the duplication would visually impact upon landscape character types of medium landscape sensitivity. (Ch. 13000-14900)</td>
<td>The duplication would result in a major visual change upon the rural landscape character type through the construction of the duplication, overpasses and removal of existing tree vegetation.</td>
<td>Social</td>
<td>Almost Certain</td>
<td>Minor</td>
<td>None required.</td>
<td>Almost Certain</td>
<td>Minor</td>
<td>None required.</td>
<td>Almost Certain</td>
<td>Minor</td>
<td>None required.</td>
<td>Almost Certain</td>
<td>Minor</td>
<td>None required.</td>
<td>Almost Certain</td>
<td>Minor</td>
</tr>
<tr>
<td>Visual and Landscape</td>
<td>LV3F</td>
<td>Construction and operation of the duplication would visually impact upon landscape character types of low landscape sensitivity. (Ch. 14000-14800)</td>
<td>The duplication would result in a minor visual change upon the bushland landscape character type through the removal of existing tree vegetation.</td>
<td>Social</td>
<td>Almost Certain</td>
<td>Minor</td>
<td>None required.</td>
<td>Almost Certain</td>
<td>Minor</td>
<td>None required.</td>
<td>Almost Certain</td>
<td>Minor</td>
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</tr>
</tbody>
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Melbourne, Victoria 3000
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Document Status

<table>
<thead>
<tr>
<th>Rev No.</th>
<th>Author</th>
<th>Reviewer</th>
<th>Approved for Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Draft</td>
<td>Katie Watt</td>
<td>Zoe Sellwood</td>
<td>Mark Tansley</td>
</tr>
<tr>
<td>0</td>
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