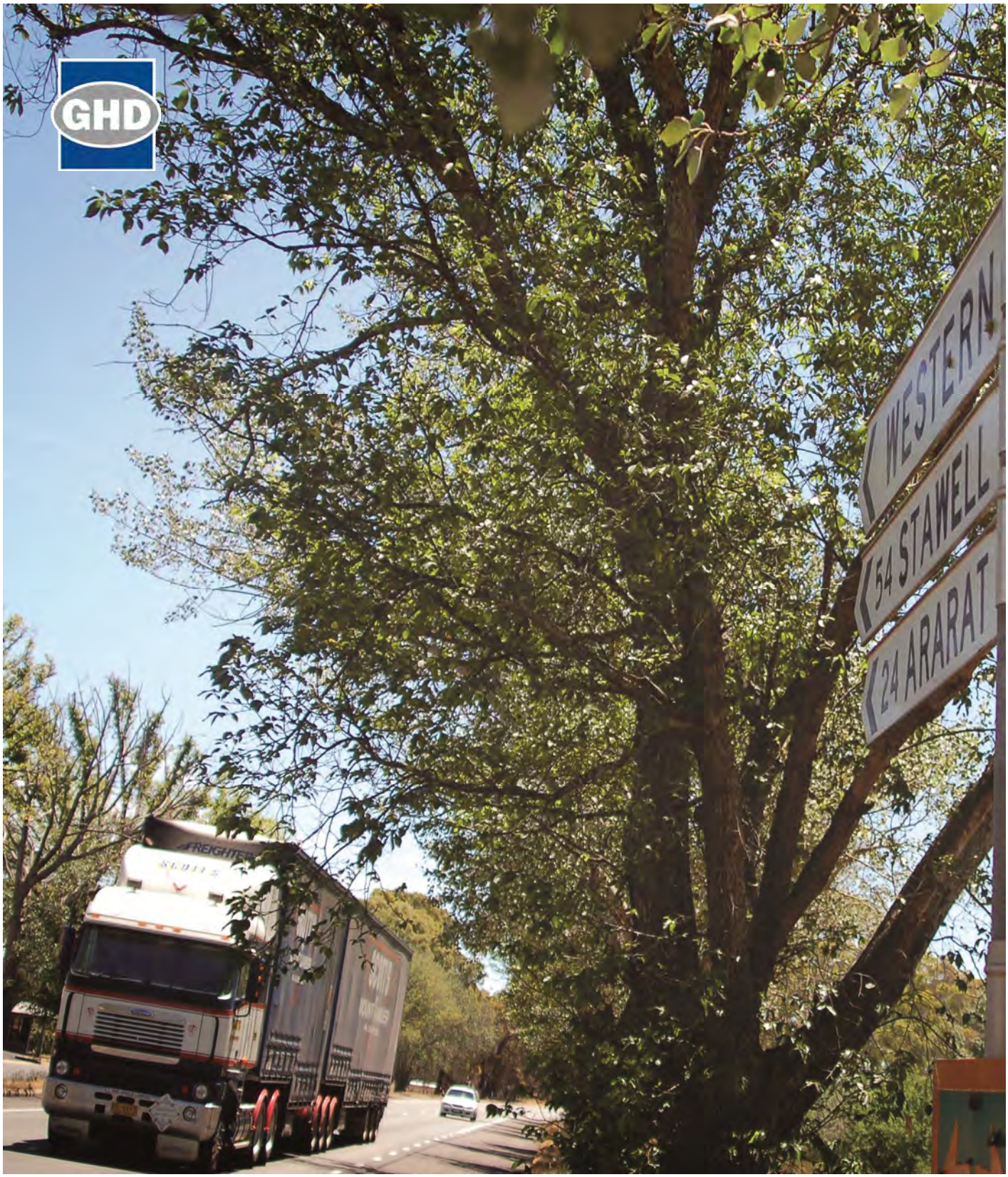

VicRoads

Western Highway Project – Section 3: Ararat to Stawell

Environmental Risk Assessment Report

November 2012

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

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

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

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

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Executive Summary

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 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.

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.

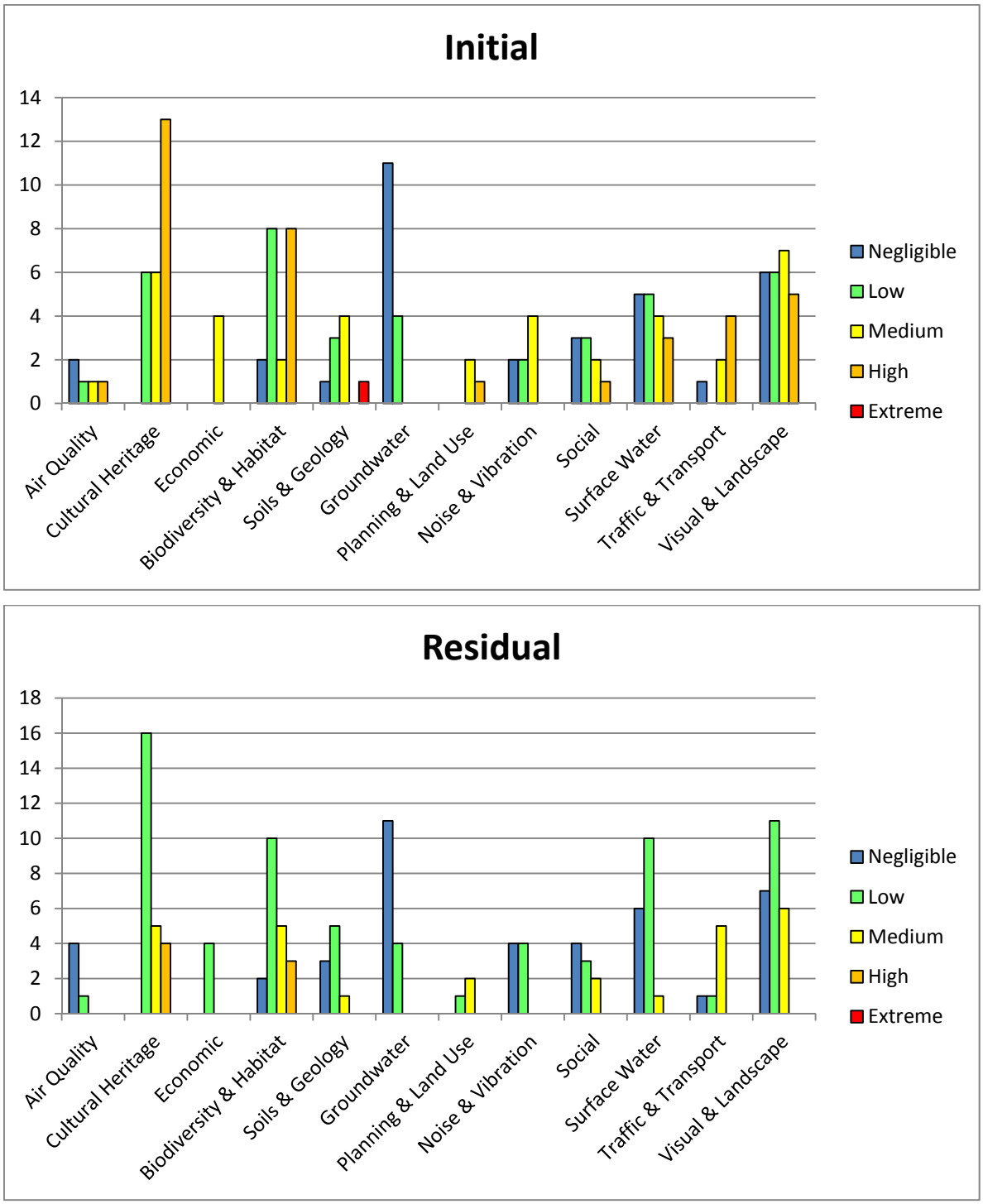


Figure 1 Frequency of Initial and Residual Risk Ratings by Discipline

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.

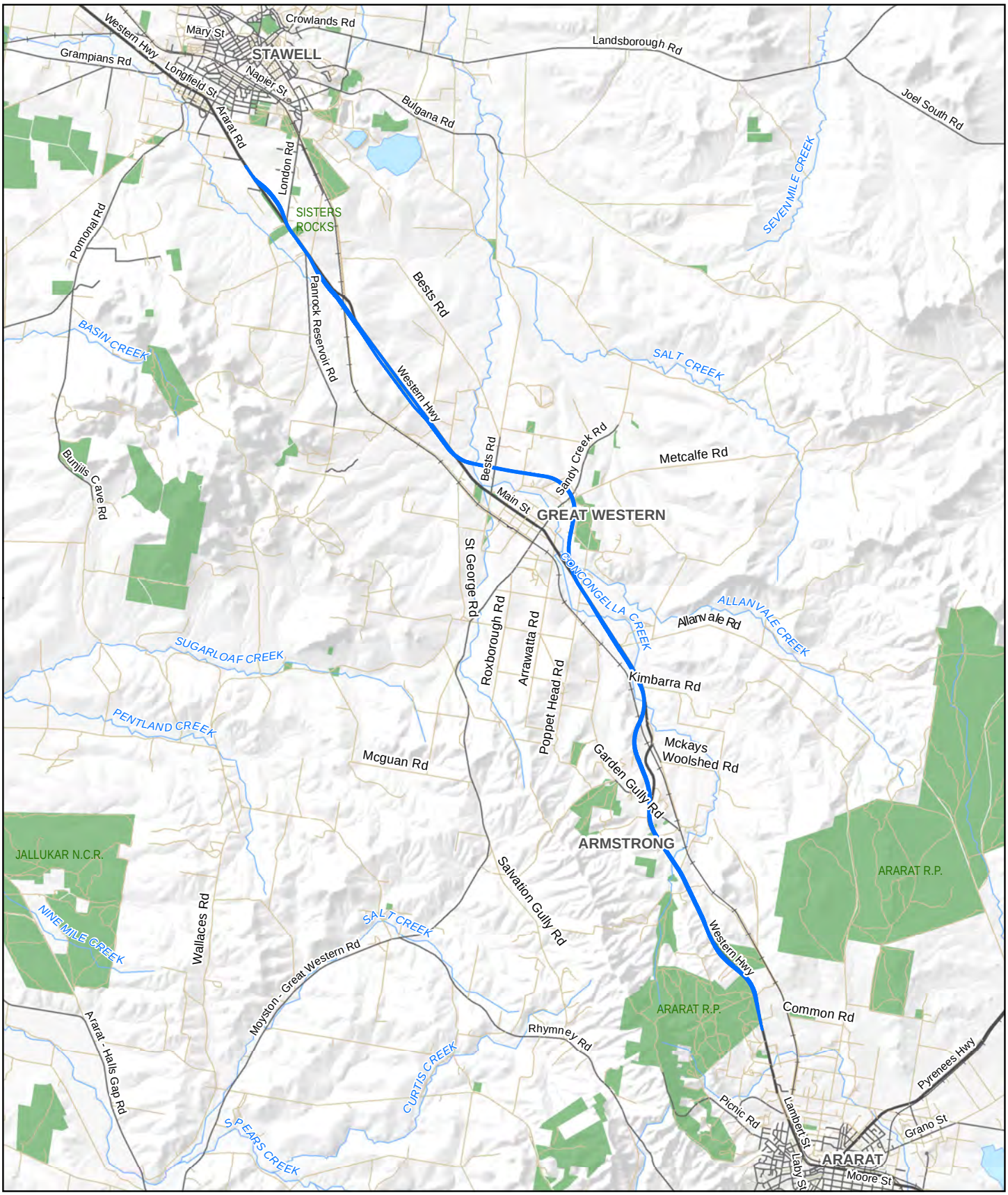
This report will also be a technical appendix to the EES document for Section 3 of the Western Highway Project.

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.



LEGEND

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

Paper Size A4

0 0.5 1 2 3 4

Kilometers

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

N

GHD CLIENTS | PEOPLE | PERFORMANCE

vicroads

VicRoads
Western Highway Project

Section 3: Ararat to Stawell
Proposed Alignment

Job Number 31-27558
Revision A
Date 27 Nov 2012

Figure 2

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

G:\31\27558\GIS\Maps\Deliverables\Stage 3\RISK AND IMPACT ASSESSMENT\12_RISK\3127558_S3_001_Study_Area_A4P.mxd

Data source: DSE, VicMap, 2012; VicRoads, 2011; GHD, Design, 2012. Created by:splaird

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.

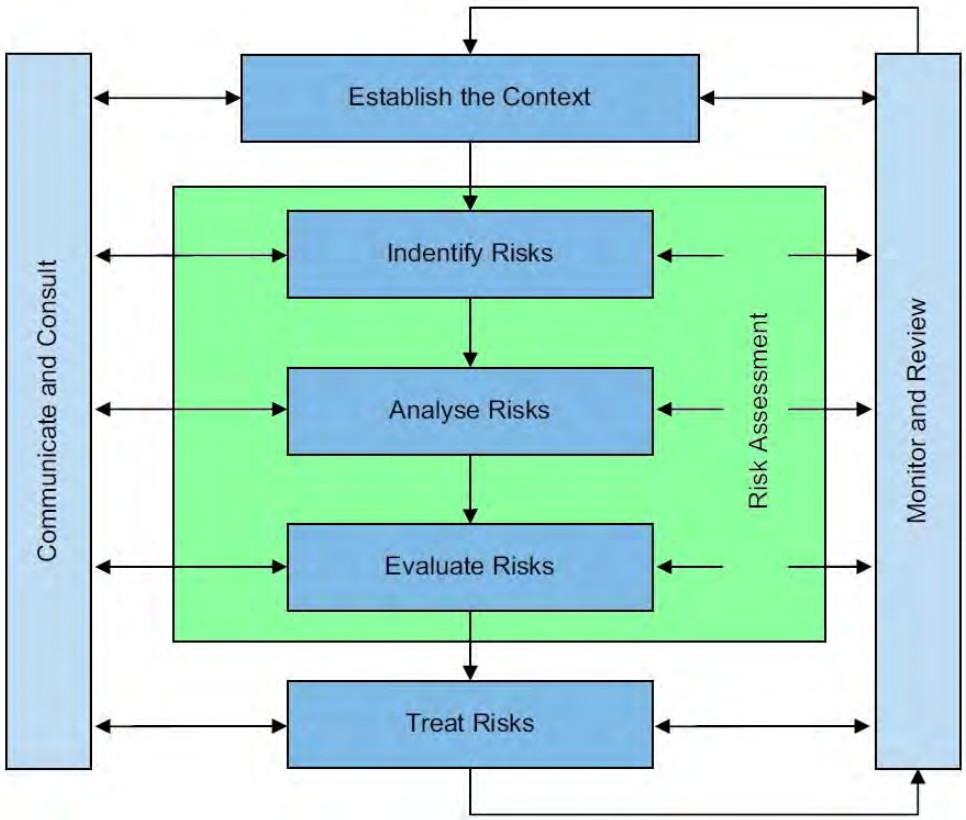


Figure 3 Risk Management Process (AS/NZS ISO 31000:2009)

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.

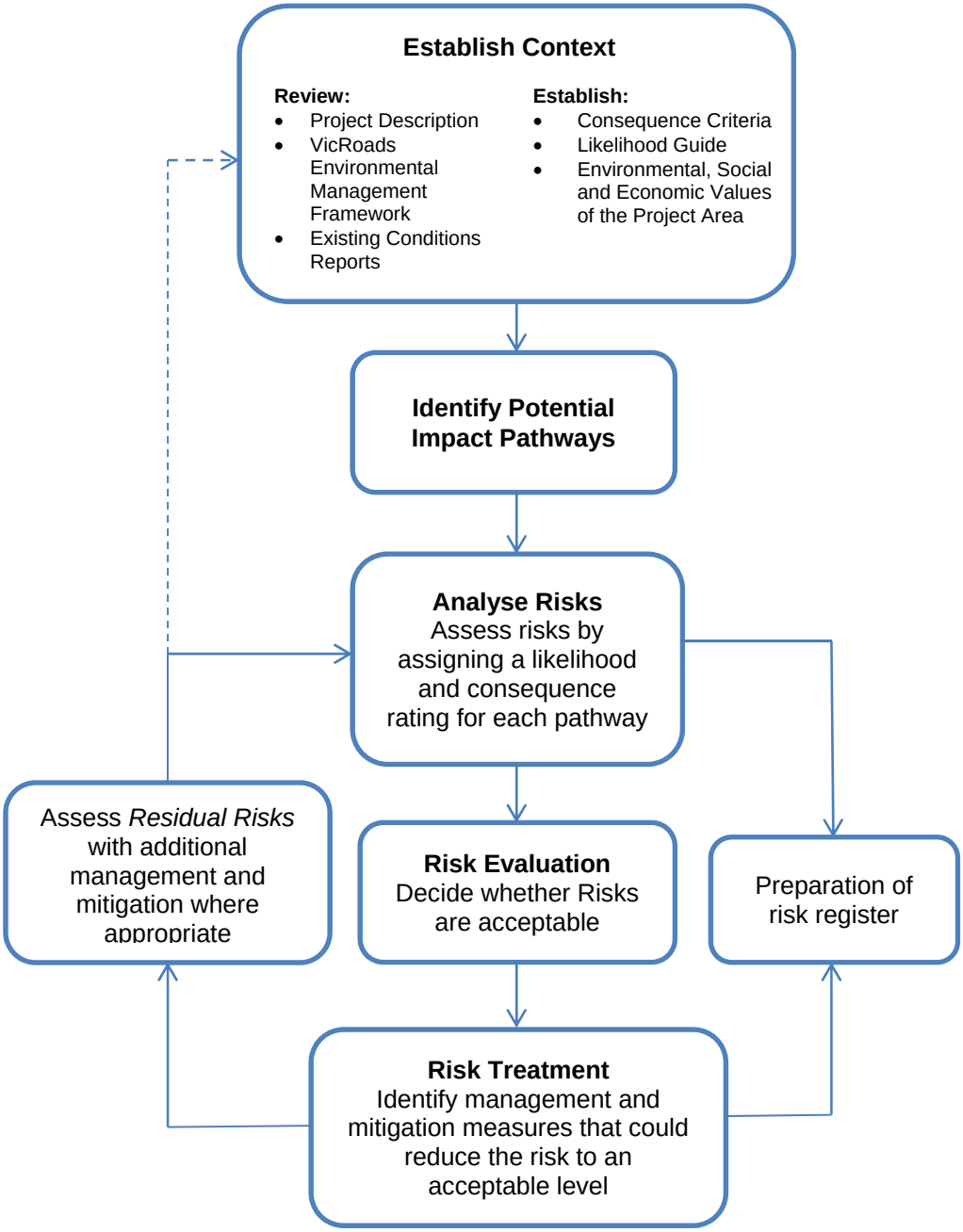


Figure 4 EES Risk Assessment Process

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

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

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 2 Risk Matrix

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

4.6 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.

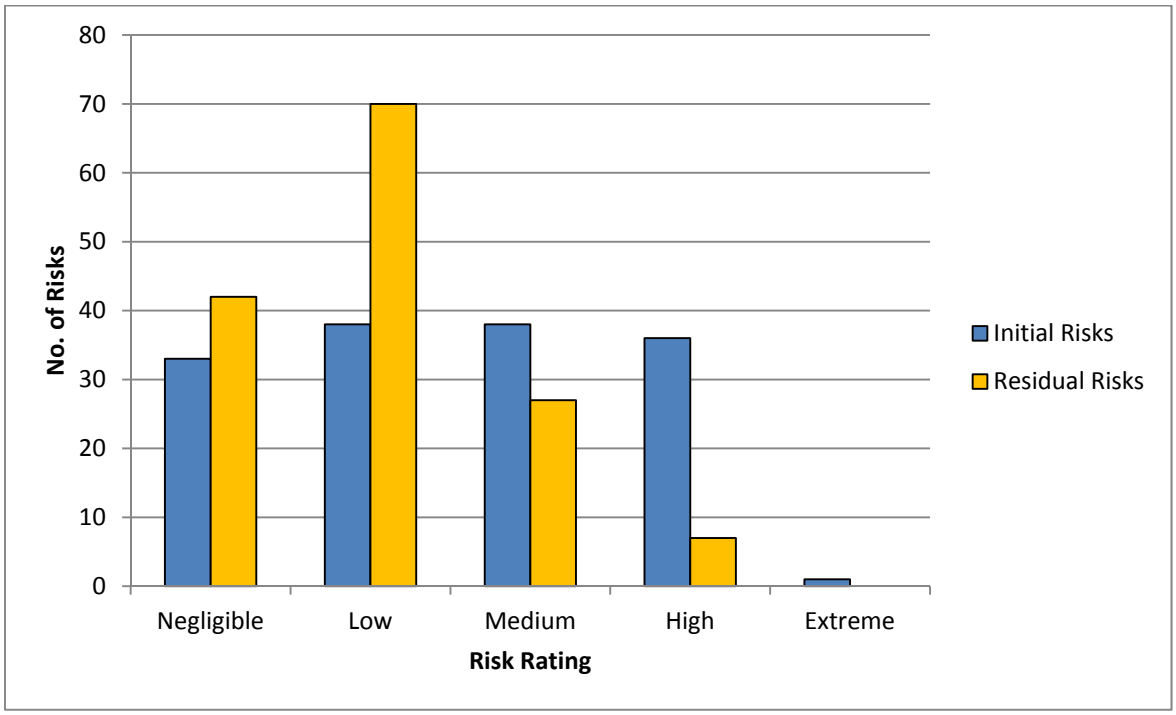


Figure 5 Frequency of Initial and Residual Risks by Rating Category

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.

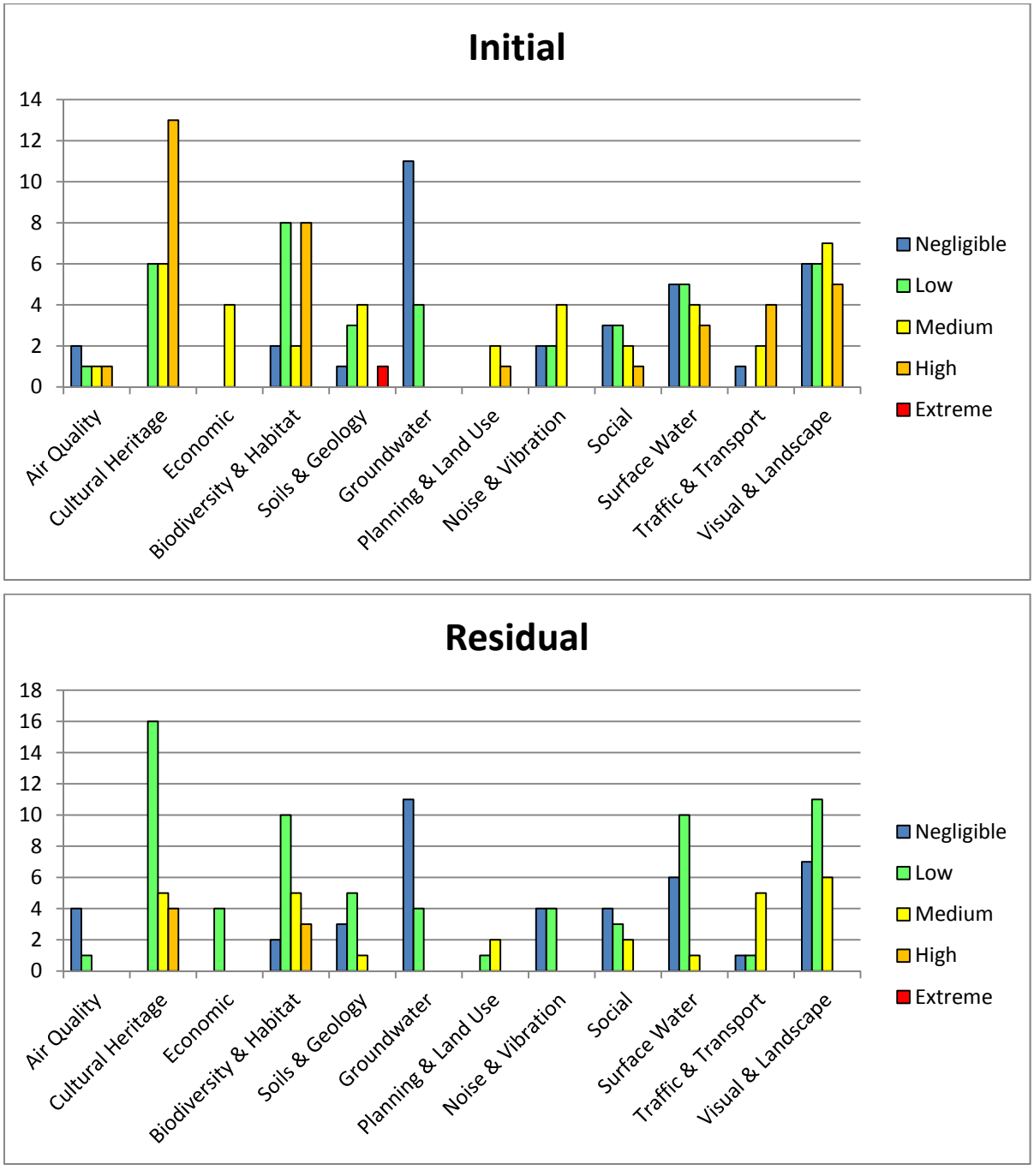


Figure 6 Frequency of Initial and Residual Risk Ratings by Discipline

Table 3 Impact Pathways and Consequences with Residual Risks rated 'High' or greater

Discipline	Risk No.	Impact Pathway Description	Description of consequences	Planned Controls to Manage Risk (as per Project Description, and VicRoads *Contract Shell DC1: Design & Construct* (April 2012)).	Initial Risks			Controls Recommended to Reduce Risk	Residual Risks		
					Consequence	Likelihood	Risk Rating		Consequence	Likelihood	Risk Rating
Biodiversity & Habitat	FF4	Construction encounters EPBC listed Golden Sun Moth from known habitats. (Recorded locations at Ch. 1800-2800, 3700-5000).	Removal of fauna habitat, possible injury/death to listed fauna species individuals during construction.	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.	Moderate	Almost Certain	High	Potential for detailed design or construction planning to avoid impact at known locations (e.g. micro alignment change to construction corridor). Revegetate ROW with grassland species favoured as food source by GSM (e.g. Rytidosperma sp.) where GSM populations are known to be present.	Moderate	Almost Certain	High
Biodiversity & Habitat	FF9	Construction encounters Ecological Vegetation Communities (EVCs) (Native vegetation and fauna habitat)	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.	As for FF4.	Moderate	Likely	High	Potential for detailed design or construction planning to avoid impact at known locations/habitats (e.g. micro alignment change to construction corridor). Revegetation or landscape plantings to include species appropriate to the local EVC.	Moderate	Likely	High
Biodiversity & Habitat	FF10	Construction encounters Large and Very Large Scattered Trees/Hollow-bearing trees/fauna habitat	Removal of scattered trees	As for FF4.	Moderate	Almost Certain	High	Detailed design and construction planning to minimise loss of trees, particularly MOTs, LOTs and VLOTs and those which are hollow bearing, with the advice of an aborist.	Moderate	Likely	High

Discipline	Risk No.	Impact Pathway Description	Description of consequences	Planned Controls to Manage Risk (as per Project Description, and VicRoads *Contract Shell DC1: Design & Construct* (April 2012)).	Initial Risks			Controls Recommended to Reduce Risk	Residual Risks		
					Consequence	Likelihood	Risk Rating		Consequence	Likelihood	Risk Rating
Aboriginal Cultural Heritage	ACH1	Construction encounters the following previously identified Aboriginal cultural heritage places: 7423-0712 Junction Bridge 1 7423-0713 Junction Bridge 2 Ch. ~4200-4300	Destruction of two occasional occurrence Aboriginal cultural heritage places (scarred trees).	Approvals must be obtained from AAV prior to impacting the Aboriginal cultural heritage places.	Moderate	Almost Certain	High	An approved Cultural Heritage Management Plan (CHMP).	Moderate	Almost Certain	High
Aboriginal Cultural Heritage	ACH2	Construction encounters the following previously identified Aboriginal cultural heritage place: 7423-0736 Armstrong ST 1 Ch. ~6600-6700	Destruction of one occasional occurrence Aboriginal cultural heritage place (scarred tree).	Approvals must be obtained from AAV prior to impacting the Aboriginal cultural heritage place.	Moderate	Almost Certain	High	An approved Cultural Heritage Management Plan (CHMP).	Moderate	Almost Certain	High
Aboriginal Cultural Heritage	ACH11	Construction encounters previously unregistered and unassessed rare occurrence (e.g. burned mounds) Aboriginal cultural heritage place.	Destruction of a rare occurrence (e.g. burned mounds) Aboriginal cultural heritage place.	Undertake a Complex Assessment.	Major	Possible	High	An approved Cultural Heritage Management Plan (CHMP).	Major	Possible	High
Aboriginal Cultural Heritage	ACH12	Construction encounters previously unregistered and unassessed mortuary tree Aboriginal cultural heritage place.	Destruction of a mortuary tree Aboriginal cultural heritage place.	Undertake a Complex Assessment.	Catastrophic	Possible	High	To consider realignment if a mortuary tree is identified in the future.	Catastrophic	Unlikely	High

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).

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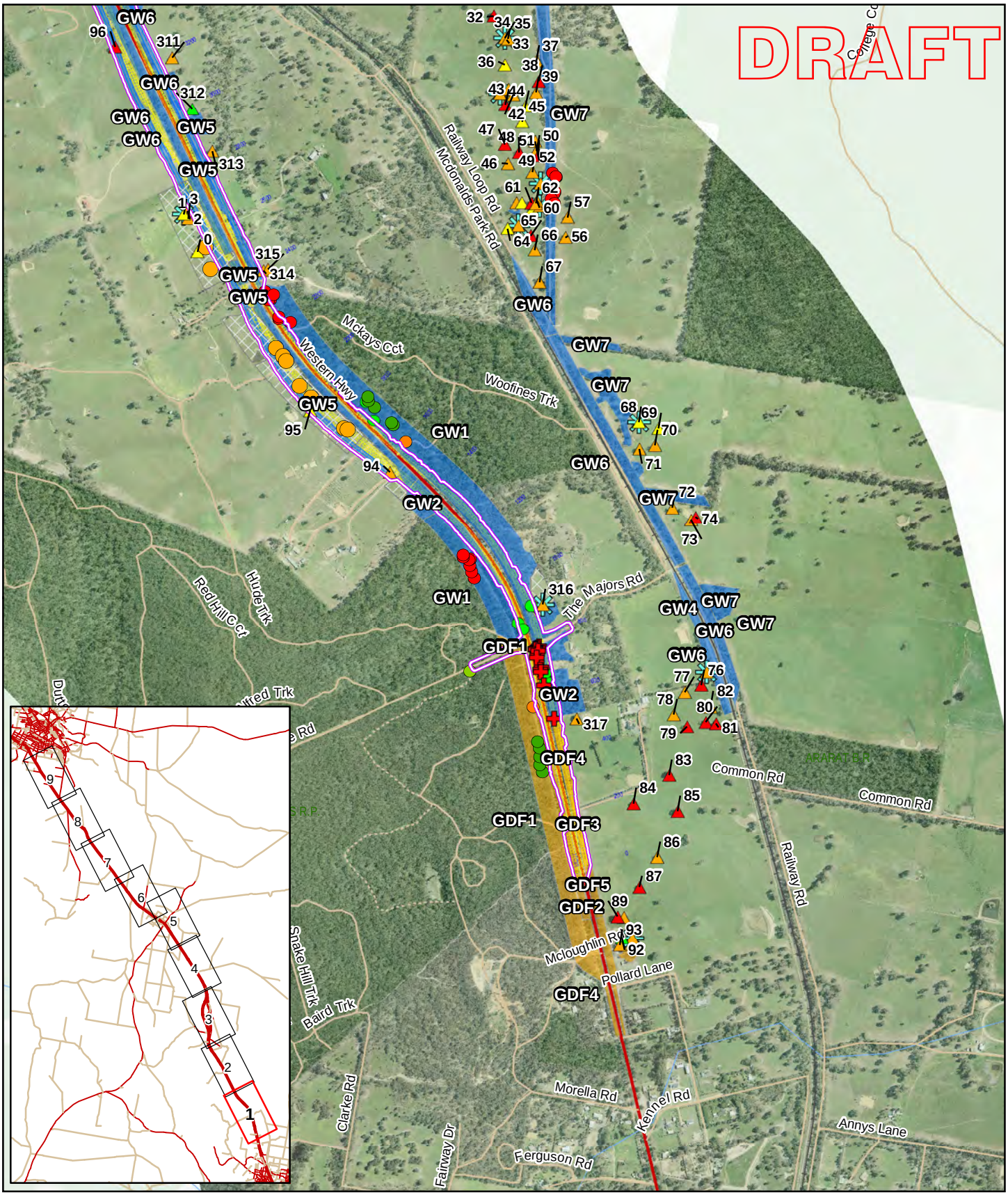
Appendix A

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.



LEGEND

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- Carriageway & Interchanges
- Service Road
- GSM Survey Points

Fauna Survey
- Arboreal mammal
- Brown Toadlet
- Incidental Survey
- Owl
- Terrestrial mammal
- Tile Grids
- Woodland bird

Targeted Flora
- Emerald-lip Greenhood
- Rosemary Grevillea

Scattered Trees
- Very Large old trees
- Large old trees
- Medium old trees
- Small trees
- Hollow bearing trees
- Degraded Treeless Vegetation

EVC Mapping
- Grassy Woodland
- Grassy Dry Forest
- Major water area
- Major water course
- Highway
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- Unsealed road
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Meters

Map Projection: Transverse Mercator
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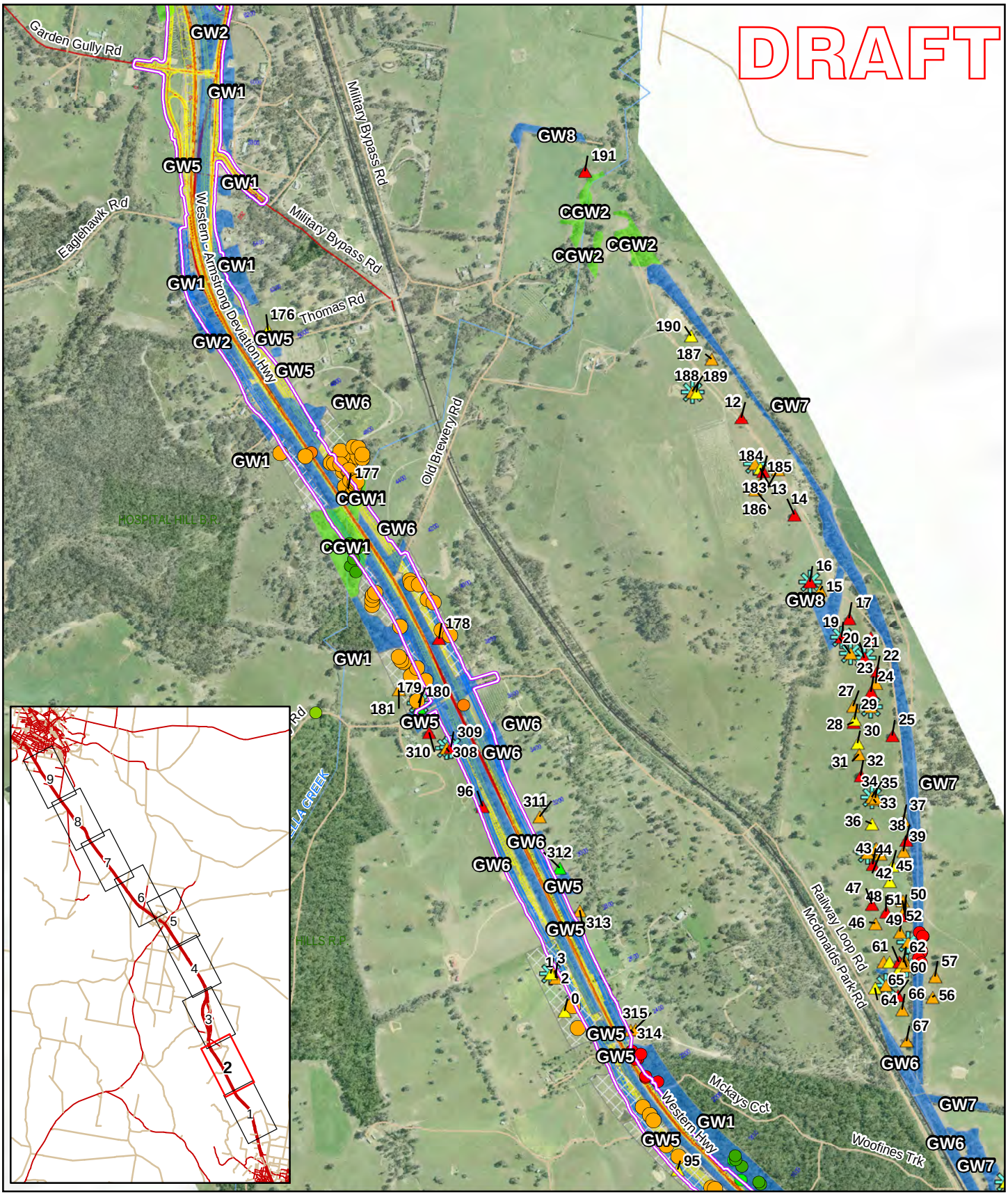

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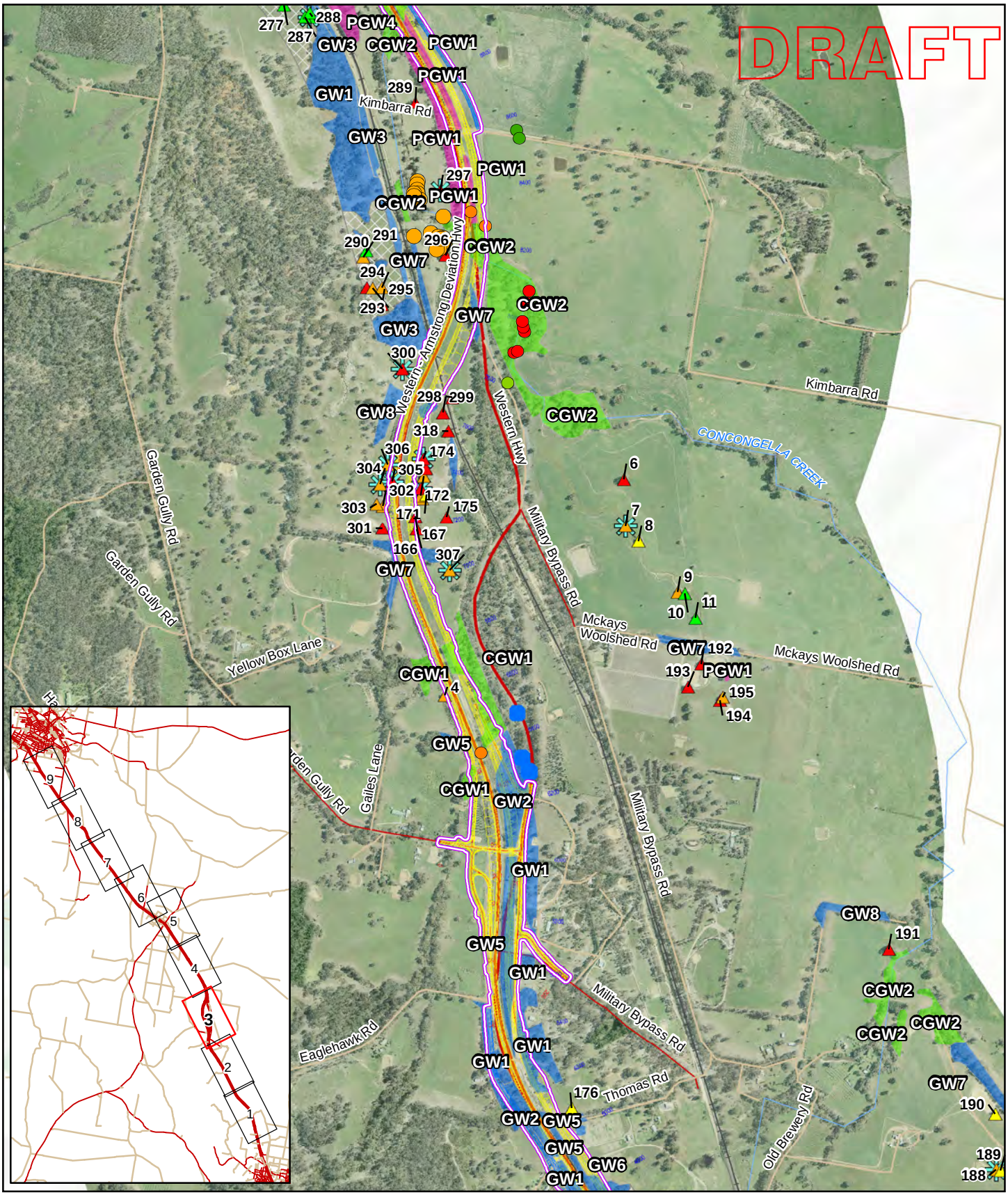

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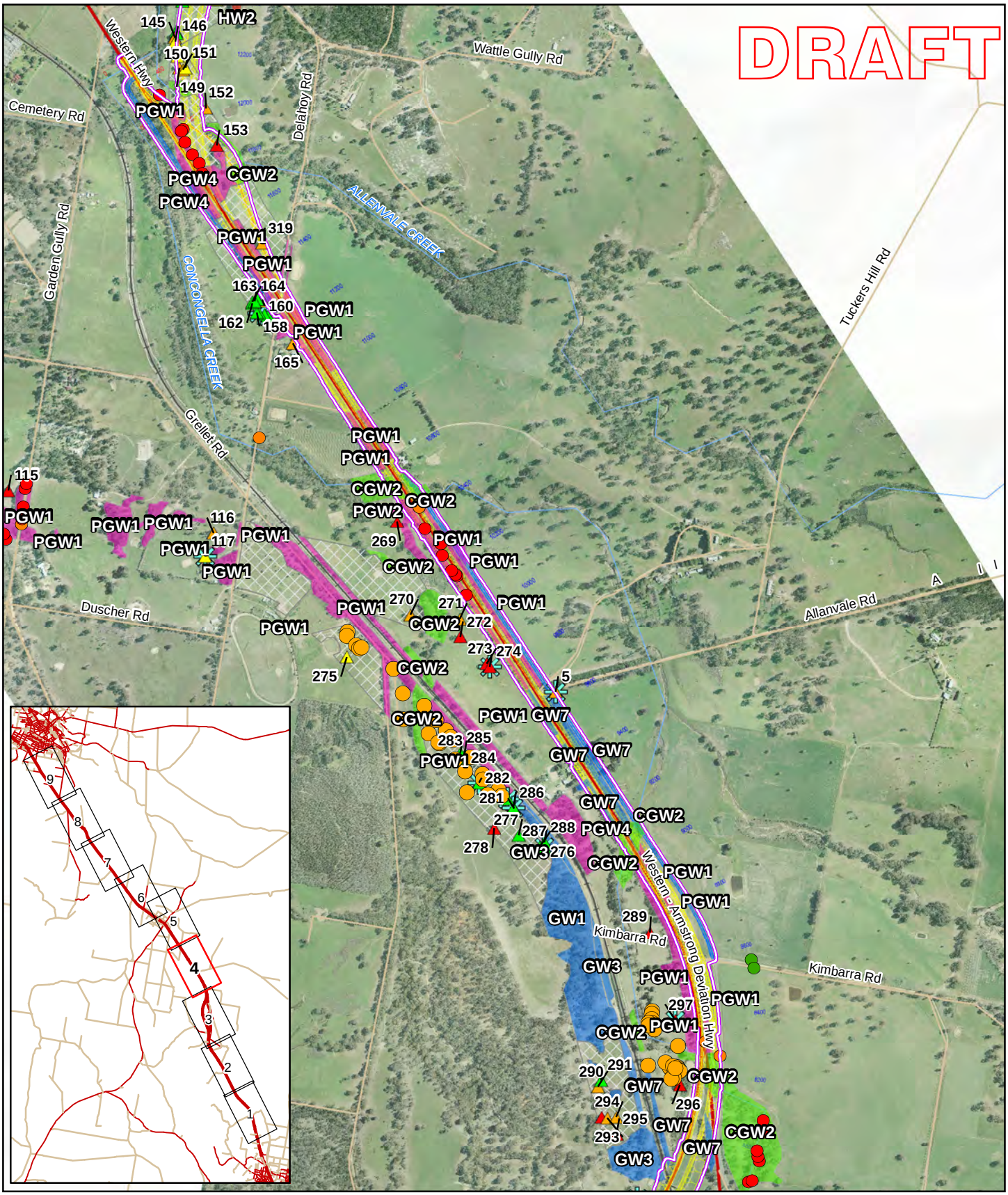

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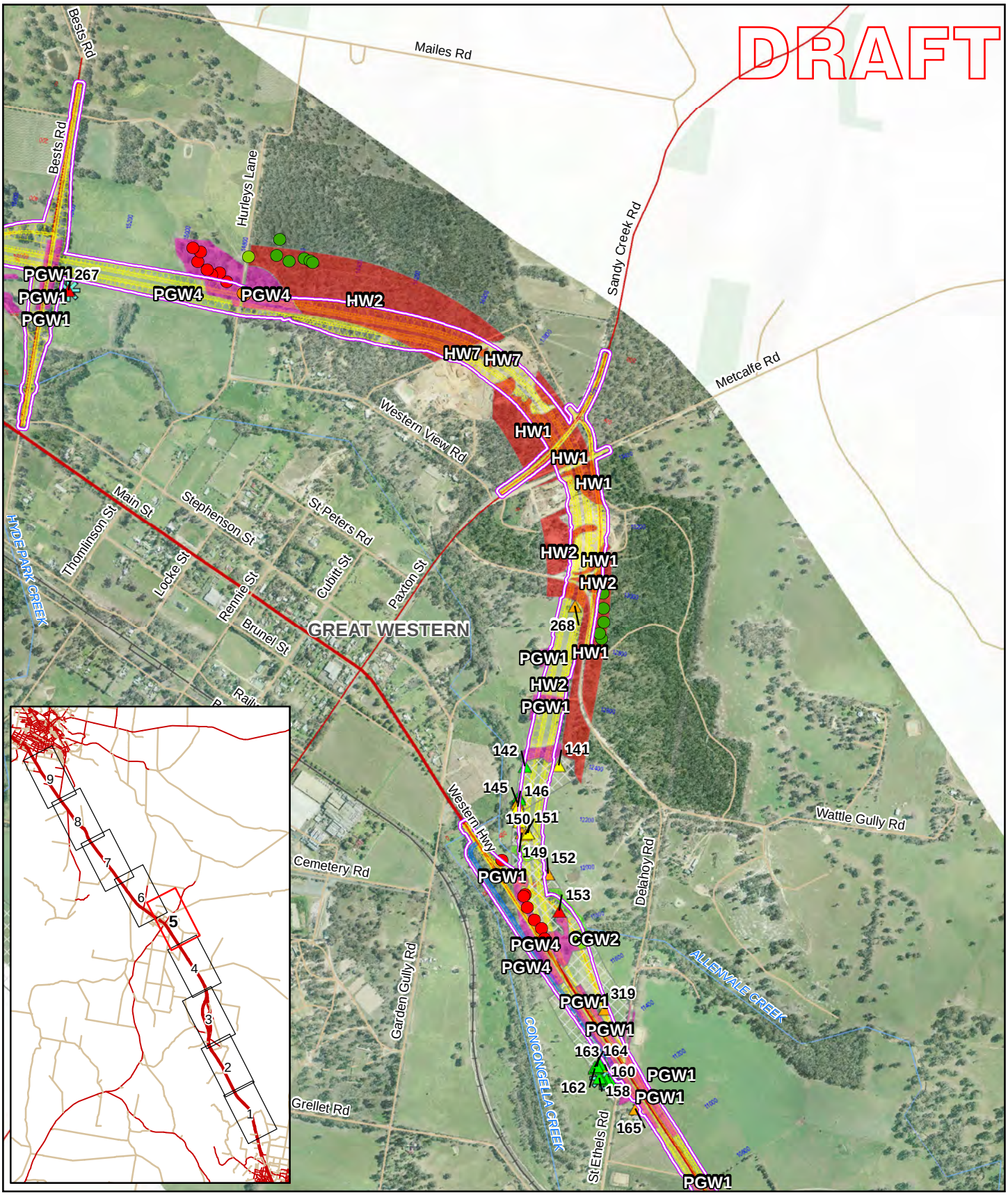

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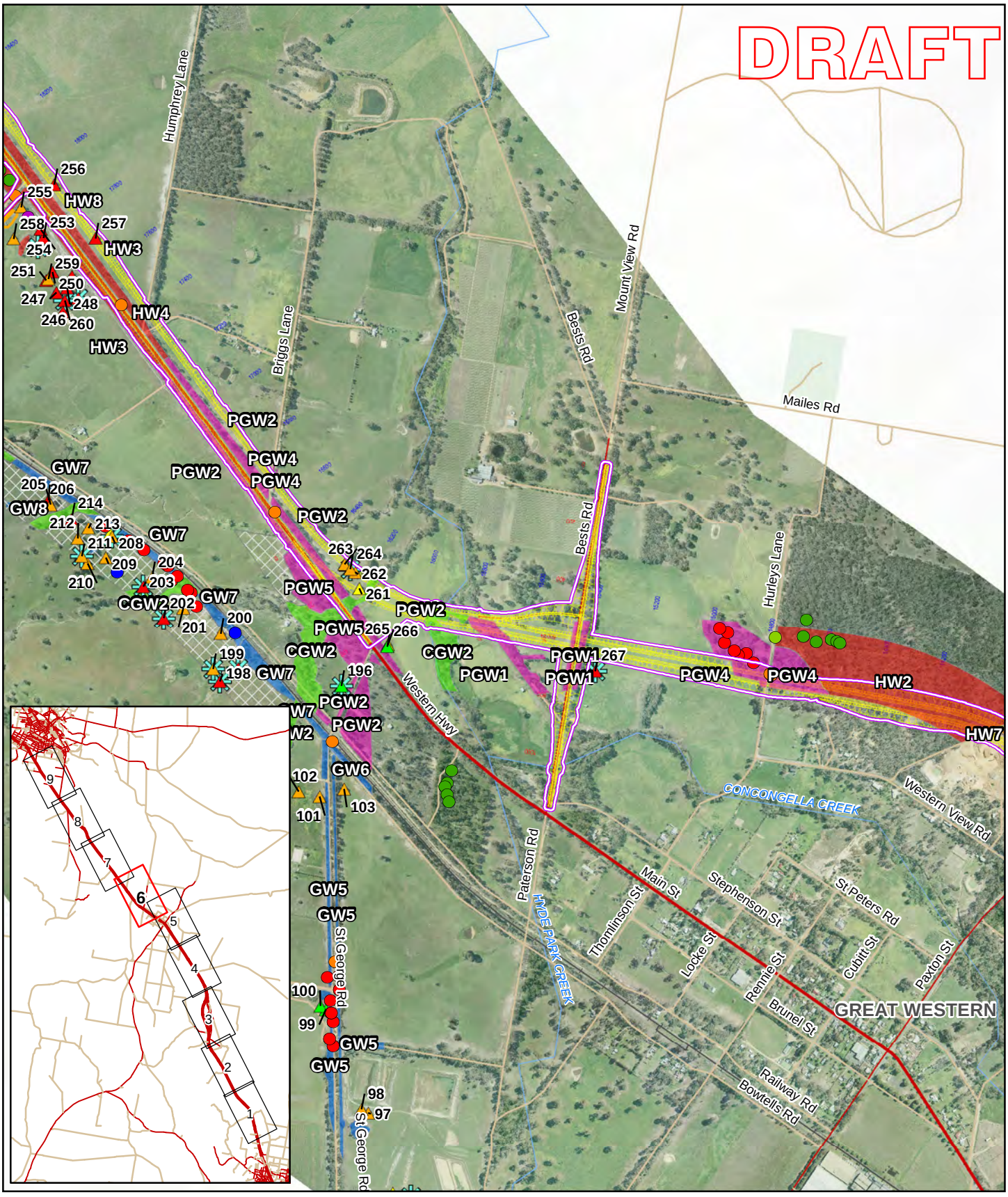

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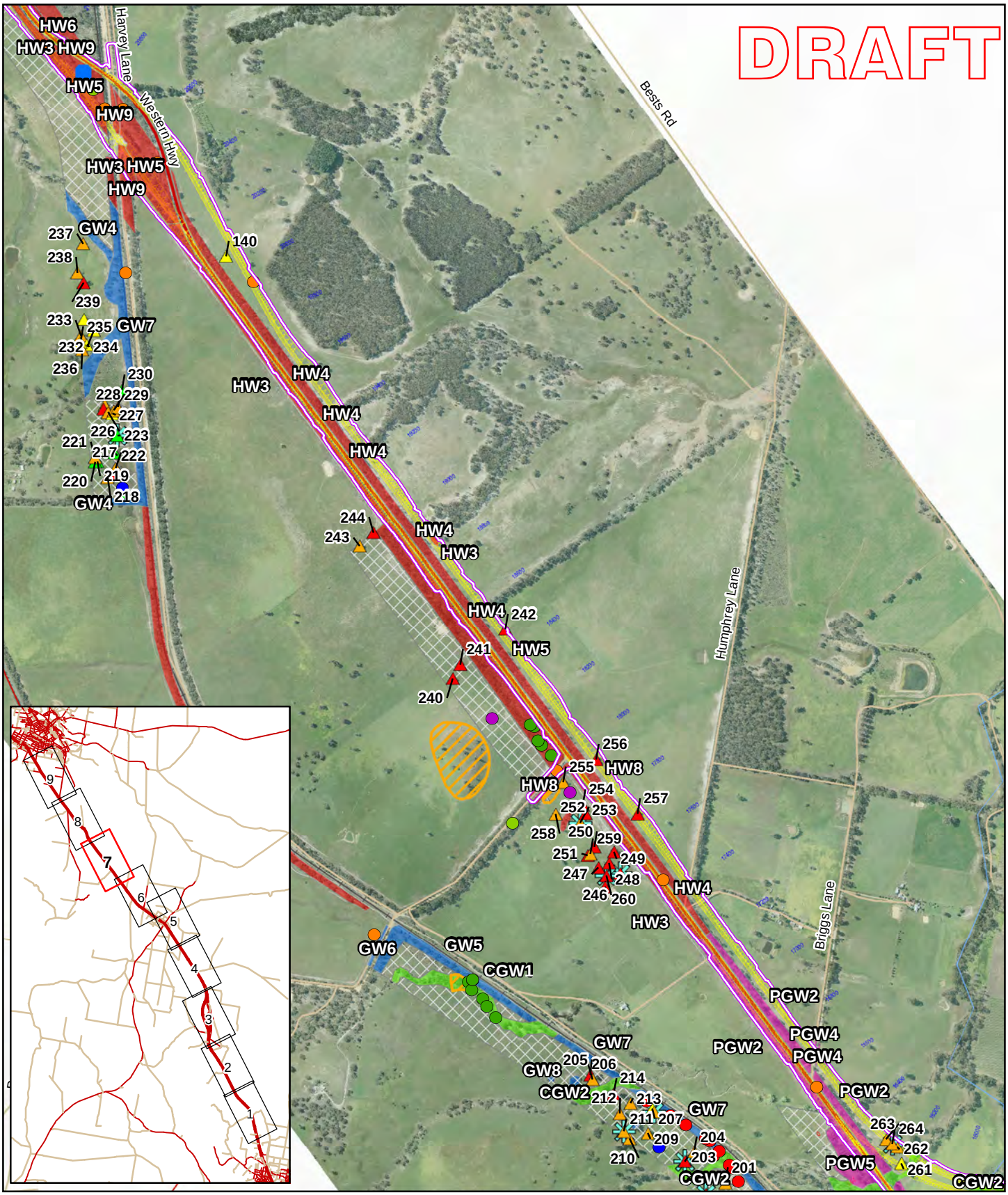

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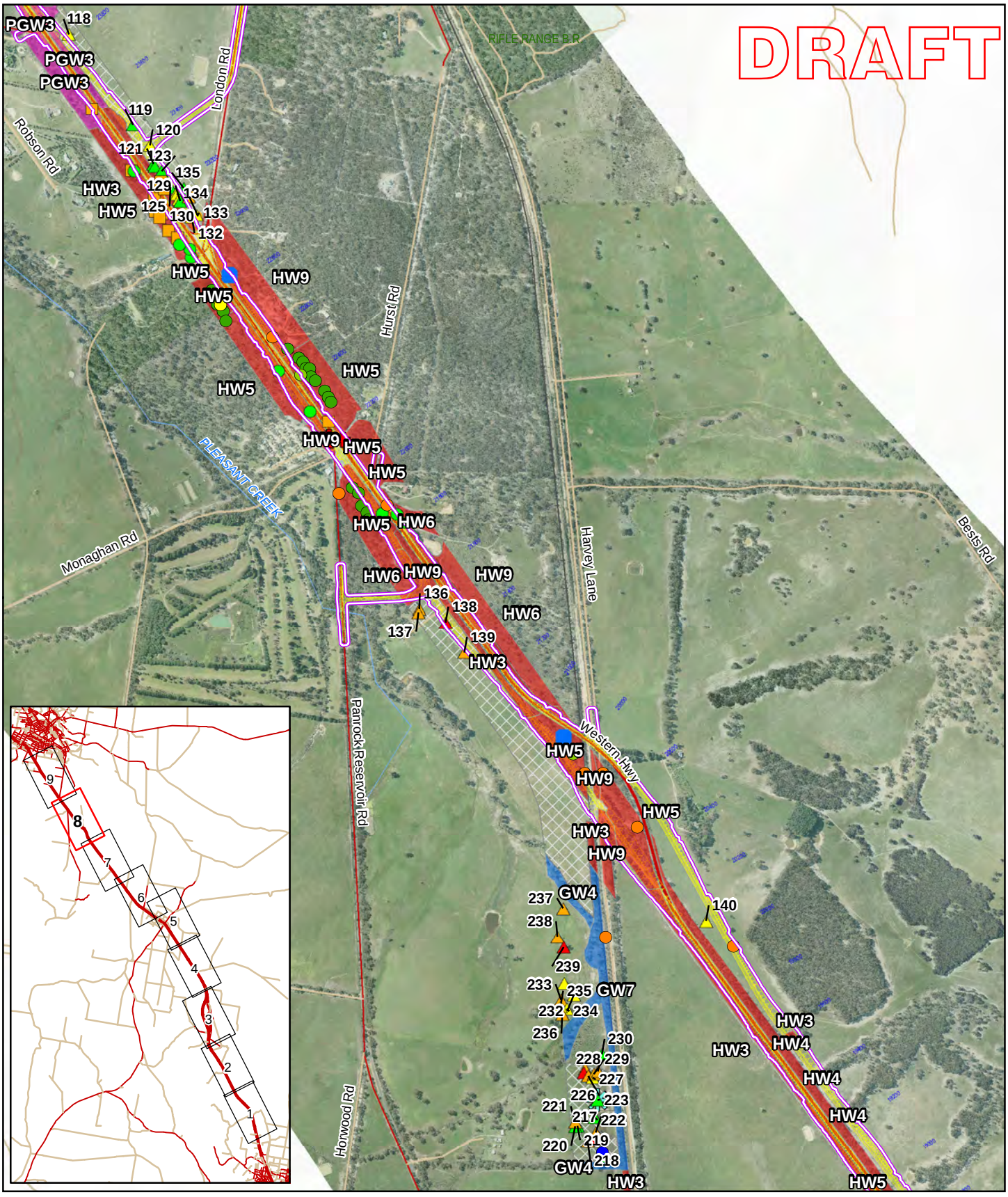

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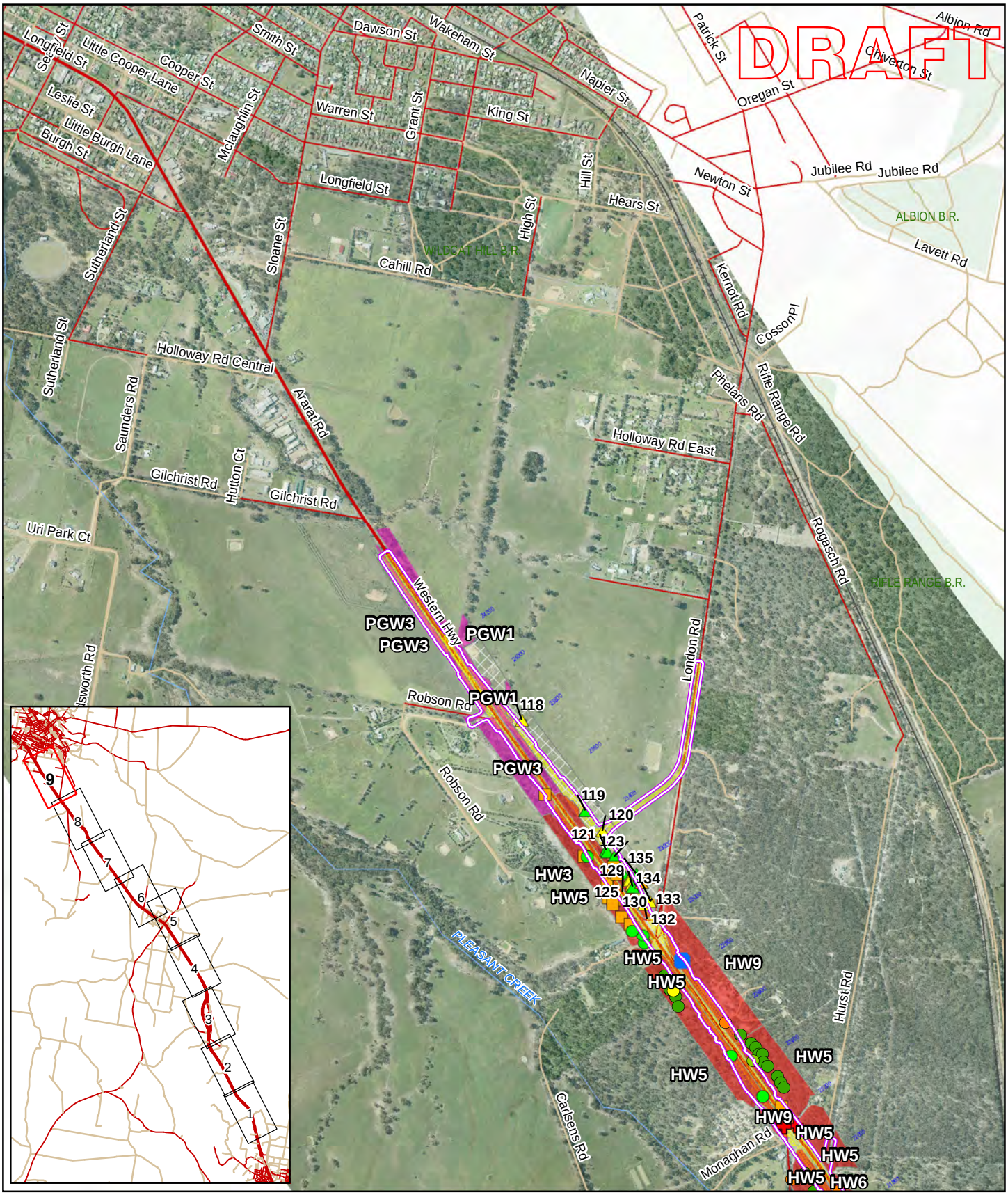

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- Rosemary Grevillea
- Trailing Hop-bush

Scattered Trees

- Large old trees
- Medium old trees
- Small trees

- Rocky outcrops
- Degraded Treeless Vegetation

EVC Mapping

- Plains Grassy Woodland
- Heathy Woodland

- Major water area
- Major water course

Paper Size A4

0 125 250 500 750

Meters

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

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CLIENTS | PEOPLE | PERFORMANCE

VicRoads
Western Highway Project

Ararat to Stawell
Ecology Partners Flora & Fauna Data Sheet 9

Job Number 31-27558
Revision A
Date 15 Feb 2012

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Data source: DSE, VicMap, 2011; VicRoads, 2011; Ecology Partners, 2011. Created by:splaird

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.

Consequence Guide

Category of Impact	Aspect	Insignificant	Minor	Moderate	Major	Catastrophic
Air	Emissions (construction and operation)	Applicable air quality standards met at all sensitive receptors (e.g. dwellings), at all times.	Isolated temporary exceedance of air quality standards at a sensitive receptor.	Minor temporary exceedance of applicable air quality standards in a local area.	Exceedance of applicable air quality standards in a number of local areas.	Widespread exceedance of applicable air quality standards.
Economic	Economic impacts on businesses	Total loss of annual revenue less than $100,000.	Total loss of annual revenue less than $1M, but greater than $100,000.	Loss of revenues less than $10 M but greater than $1 M	Loss of revenues less than $100 M but greater than $10 M	Loss of revenues less than $1B but greater than $100 M
Bidoversity & Habitat	Listed Threatened Fauna Species	Population change not detectable for any fauna species listed under the EPBC Act, FFG Act or DSE Advisory List.	Removal of < 1% of the project area population for an EPBC-listed species, OR Removal of < 1% of the regional area population for an FFG or DSE Advisory-listed species.	Removal of > 1% of the project area population BUT < 1% of the regional area population for an EPBC-listed species, OR Removal of > 1% of the regional population BUT < 2% of the State population for an FFG- or DSE Advisory-listed species.	Removal of > 1% of the regional population BUT < 1% of the State population for an EPBC-listed species, OR Removal of > 2% of the State population for an FFG - or DSE Advisory-listed species.	Removal of > 1% of the State population for an EPBC-listed species.
Bidoversity & Habitat	Listed Flora Species	Population change not detectable for any flora species listed under the EPBC Act, FFG Act or DSE Advisory List.	Removal of < 1% of the project area population for an EPBC-listed species, OR Removal of < 1% of the regional area population for an FFG or DSE Advisory-listed species.	Removal of > 1% of the project area population BUT < 1% of the regional area population for an EPBC-listed species, OR Removal of > 1% of the regional population BUT < 10% of the State population for an FFG- or DSE Advisory-listed species.	Removal of > 1% of the regional population BUT < 10% of the national population for an EPBC-listed species, OR Removal of > 10% of the State population for an FFG- or DSE Advisory-listed species.	Removal of > 10% of the national population for an EPBC-listed species.
Bidoversity & Habitat	Ecological Vegetation Classes	No measurable impacts on the extent of an EVC.	Loss of < 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.	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.	Loss of > 1% BUT < 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 achievable.	Loss of > 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.
Bidoversity & Habitat	EPBC listed community - Grassy Eucalypt Woodland of the VVP, Natural Temperate Grassland of the VVP FFG listed community - Western (Basalt) Plains Grassland community	No measurable impacts on the extent of a community listed under the EPBC Act or FFG Act.	Loss of <1 ha of an EPBC Act or FFG Act-listed community.	Loss of 1-10 ha of an EPBC Act or FFG Act-listed community.	Loss of 10-50 ha of an EPBC Act or FFG Act-listed community.	Loss of > 50 ha of an EPBC Act or FFG Act-listed community.
Bidoversity & Habitat	Scattered trees / wildlife habitat	Loss of < 5 scattered trees (including MTs, LOTs and VLOTs).	Loss of 6-50 scattered trees (including MTs, LOTs and VLOTs).	Loss of 51-500 scattered trees (including MTs, LOTs and VLOTs).	Loss of 501-5000 scattered trees (including MTs, LOTs and VLOTs).	Loss of > 5000 scattered trees (including MTs, LOTs and VLOTs).

Category of Impact	Aspect	Insignificant	Minor	Moderate	Major	Catastrophic
Bidoversity & Habitat	Fauna habitat/wildlife corridor	No measurable impact on the quantity and extent of wildlife corridors. Alignment does not intercept or reduce any existing wildlife corridors or habitat linkages.	Alignment reduces the width of the wildlife corridor by up to 10%. Alignment intercepts 1 - 2 habitat linkages.	Alignment reduces the width of the wildlife corridor by 10-50%. Alignment intercepts 3 - 4 habitat linkages.	Alignment reduces the width of the wildlife corridor by 50-75%. Alignment intercepts 5 habitat linkages.	Alignment reduces the width of the wildlife corridor by greater than 75%. Alignment intercepts 6 or more habitat linkages.
Soils & Geology	Erosion / sediment generation potential	Negligible potential.	Potential for erosion and sediment mobilisation in small isolated locations along the alignment.	Potential for erosion and sediment mobilisation in multiple locations along the alignment.	Potential for erosion and sediment mobilisation along the majority of the alignment.	Potential significant erosion, sediment generation or land instability along the majority of the alignment.
Soils & Geology	Land Contamination (historic, construction or operation)	Insignificant risk of encountering historic land contamination during construction, or contaminating land through construction or operation.	Potential for minor land contamination, but minimal risk to sensitive receivers.	Potential for moderate land contamination, some risk to sensitive receivers.	Potential for gross land contamination, confined to a localised area. Significant risk to sensitive receivers, health.	Potential for gross and widespread land contamination. Significant risk to sensitive receivers, health.
Soils & Geology	Soil settlement due to poor (compressible) ground conditions	No potential.	Potential for significant soil settlement in small isolated locations along the alignment.	Potential for significant soil settlement in multiple locations along the alignment.	Potential for significant soil settlement along many sections of the alignment.	Potential significant soil settlement along the majority of the alignment.
Groundwater	Construction and Operation	Negligible change to groundwater regime, quality and availability.	Temporary changes to groundwater regime, quality and availability but no significant implications.	Changes to groundwater regime, quality and availability with minor groundwater implications for a localised area.	Groundwater regime, quality or availability significantly compromised.	Widespread groundwater resource depletion, contamination or subsidence.
Cultural Heritage	Aboriginal cultural heritage	It is not possible to insignificantly affect cultural heritage values.	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.	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.	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.	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).
Cultural Heritage	Non-Aboriginal cultural heritage	No impact to heritage sites. Sites remain unaffected.	Disturbance to a locally significant heritage feature or site (HO or DSE local listing).	Complete removal of heritage site of local significance (HO); and/or Disturbance of a historical heritage inventory site (HI).	Disturbance of a heritage site of State or National significance (VHR).	Complete removal of a heritage site of State or National significance (VHR).

Category of Impact	Aspect	Insignificant	Minor	Moderate	Major	Catastrophic
Planning & Land Use	Land use change	Land use changes that would not result in inconsistency with planning policies.	Land use changes that would result in minor inconsistency with local planning policies.	Land use changes that would result in significant inconsistency with local planning policies.	Land use changes that would result in significant inconsistency with local and State planning policies.	Land use changes that would result in extensive conflict with planning policies.
Planning & Land Use	Utility and infrastructure services	No impact on existing utilities.	Temporary impediment to operation and/or maintenance of existing utilities during construction but still able to be adequately operated and maintained with mitigation measures.	Impediment to operation and/or maintenance of existing utilities but still able to be adequately operated and maintained with mitigation measures.	Significant disruption to the operation and/or maintenance of existing utilities but still able to be adequately operated and maintained with mitigation measures.	Utilities of regional or State significance not able to be maintained and/or operated.
Planning & Land Use	Acquisition and fragmentation of existing land uses and landholdings	No or negligible fragmentation of land uses or land holdings (such as the acquisition of land within 10m of the existing property boundary).	Some minor fragmentation / acquisition of land but properties still able to be used for existing purposes.	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).	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).	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).
Noise & Vibration	Construction and Operation	Applicable standards met at all sensitive receptors (e.g. dwellings, schools, hospitals), at all times.	Isolated and temporary exceedance of standards at a sensitive receptor.	Exceedance of applicable standards in a local area.	Exceedance of applicable standards in a number of local areas.	Widespread exceedance of applicable standards across the region.
Social	Displacement of residents	No displacement of residents.	Displacement of one or two households.	Displacement of three to six households.	Displacement of households significantly affects a local area.	Displacement of households significantly affects a number of local areas.
Social	Displacement of businesses	No displacement of businesses.	Displacement of businesses with social or economic impacts on a small number of individuals.	Displacement of businesses with significant social or economic impacts on part of a local area.	Displacement of businesses significantly affects a local area.	Displacement of businesses significantly affects a number of local areas.
Social	Severance of residents or businesses	No severance of local movement patterns.	Severance of local movement patterns for less than 10 residents or businesses.	Severance of local movement patterns of 10 to 20 residents or businesses.	Severance of movement patterns significantly affects a local area.	Severance of movement patterns significantly affects a number of local areas.
Social	Impacts on community facilities and public open space	No noticeable effects.	Effects on facilities with social or economic impacts on a small number of individuals.	Effects on facilities with social or economic impacts on a local area.	Effects on facilities with significant social or economic impacts on a local area.	Effects on facilities with significant social or economic impacts on a number of local areas.
Social	Amenity	No detrimental impacts on amenity.	Detrimental impacts on amenity affect a small number of households.	Detrimental impacts on amenity affect a local area.	Detrimental impacts on amenity significantly affect a local area.	Detrimental impacts on amenity significantly affect a number of local areas.

Category of Impact	Aspect	Insignificant	Minor	Moderate	Major	Catastrophic
Surface Water	Construction activities result in disturbance of channel planform, geometry and/or river health values.	Medium level impact to waterway, river health or floodplain function on minor waterwayLow level impact to waterway, river health or floodplain function on significant waterway.	High level impact to waterway, river health or floodplain function on minor waterway. Medium level impact to waterway, river health or floodplain function on significant waterway. Low level impact to waterway, river health or floodplain function on major waterway.	Severe level impact to waterway, river health or floodplain function on minor waterway. High level impact to waterway, river health or floodplain function on significant waterway. Medium level impact to waterway, river health or floodplain function on major waterway.	Severe level impact to waterway, river health or floodplain function on significant waterway. High level impact to waterway, river health or floodplain function on major waterway.	Severe level of impact to a major waterway.
Surface Water	Construction or operation activities result in increased stormwater runoff, sediment and contaminant loading to waterway	Minor increases to stormwater runoff, sediment and or contaminant loading to the waterway.	Significant increases to stormwater runoff, sediment and or contaminant loading to a minor waterway as described in the impact assessment report.	Significant increases to stormwater runoff, sediment and or contaminant loading to a significant waterway as described in the impact assessment report.	Significant increases to stormwater runoff, sediment and or contaminant loading to a major waterway as described in the impact assessment report.	An uncontained spill of contaminants directly to a major waterway as described in the impact assessment report.
Surface Water	Construction of the road results in changes to the floodplain characteristics	No additional floodplain impacts to any houses, outbuildings or infrastructure.	Slight increase in flooding at a rural scale.	Medium increase in flooding at a rural scale or slight increase in flooding at a township scale.	Significant increase in flooding at a rural scale or medium increase in flooding at a township scale.	Significant increase in flooding at a township scale.
Traffic & Transport	Road safety (construction)	Occurrence of road accidents resulting in less than 10 property damage only road accidents during construction period.	Occurrence of road accidents resulting in more than 10 property damage only road accidents or minor injury to less than 20 individuals during construction period.	Occurrence of road accidents causing minor injury to between 20 and 100 individuals or major injury to less than 5 individuals during construction period.	Occurrence of road accidents causing minor injury to more than 100 individuals or major injury to between 5 and 50 individuals during construction period.	Occurrence of road accidents resulting in major injury to more than 50 individuals or one or more fatalities during construction period.
Traffic & Transport	Road safety (operation)	Occurrence of road accidents resulting in less than 10 property damage only road accidents during a 5-year period.	Occurrence of road accidents resulting in more than 10 property damage only road accidents or minor injury to less than 20 individuals during a five-year period or major injury to less than 5 individuals during a five-year period.	Occurrence of road accidents causing minor injury to between 20 and 100 individuals or major injury to less than 10 individuals during a five-year period.	Occurrence of road accidents causing minor injury to more than 100 individuals or major injury to between 5 and 50 individuals during a five-year period.	Occurrence of road accidents resulting in major injury to more than 50 individuals or one or more fatalities during a five-year period.
Traffic & Transport	Traffic and transport operations (construction & operation)	Negligible adverse impact on traffic and transport conditions.	Detectable adverse changes in traffic and transport condition (decrease in Level of Service) at one or two locations at any one point in time during the construction period or at a single location during duplicated highway operation.	Detectable adverse change in traffic and transport conditions (decrease in Level of Service) at multiple locations.	Traffic and transport congestion and delays exceed acceptable levels at multiple locations.	Traffic and transport congestion and delays severely restrict the safe operation and efficiency of the transport network.
Traffic & Transport	Traffic access (construction & operation)	Negligible impact on access routes during construction/ operation.	Less than 5 routes with access compromised.	Greater than 5 and less than 10 routes with access compromised.	Greater than 10 and less than 30 routes with access compromised.	Greater than 30 routes with access compromised.

Category of Impact	Aspect	Insignificant	Minor	Moderate	Major	Catastrophic
Visual & Landscape	Amenity of adjacent residents	Moderate impact upon low number of households. Minor impact upon medium number of households. Insignificant impact upon high number of households.	Significant visual impact upon low number of households. Moderate impact upon medium number of households. Minor impact upon large number of households.	Significant visual impact upon medium number of households. Moderate impact upon high number of households.	Significant visual impact upon high number of households.	Significant visual impact upon households across the entire region.
Visual & Landscape	Impact upon townships and places of landscape and cultural value	Negligible visual change from townships and places of cultural and natural value.	Minor visual change from townships and places of cultural and natural value.	Moderate visual change from townships and places of cultural and natural value.	Significant visual change from townships and places of cultural and natural value.	Catastrophic visual change from townships and places of cultural and natural value.
Visual & Landscape	Impact upon existing landscape character	Moderate impact upon landscape character types of low landscape sensitivity. Minor impact landscape character types of medium to medium-high landscape sensitivity. Negligible impact upon landscape character types of high landscape sensitivity.	Significant impact upon landscape character types of low landscape sensitivity. Moderate impact landscape character types of medium to medium-high landscape sensitivity. Minor impact upon landscape character types of high landscape sensitivity.	Significant impact upon landscape character types of medium to medium to medium-high landscape sensitivity. Moderate impact upon landscape character types of high landscape sensitivity.	Significant impact upon landscape character types of high landscape sensitivity.	Catastrophic visual impact upon landscape character types of significant landscape sensitivity.

Appendix C

Risk Register

Discipline	Risk No.	Impact pathway (how the Project interacts with assets, values, uses and location (state chainage)	Description of consequences (and describe whether it is design, construction or operation)	Linkages	Contract Shell DC1 Reference	Planned Controls to Manage Risk (as per Project Description, and VicRoads *Contract Shell DC1: Design & Construct*, (April 2012)).	Initial Risks			Additional Controls Recommended to Reduce Risk	Residual Risks		
							Consequence	Likelihood	Risk Rating		Consequence	Likelihood	Risk Rating
Air	A1	Construction emissions impact at an individual sensitive receptor.	Exceedance of State Environment Protection Policy (Air Quality Management) within a small localised area affecting a sensitive receptor, Aeolian transport and deposition potentially affecting human health, flora, fauna, visual and social aspects, and water quality. The impact zone for construction dust where an exceedance of the SEPP (AQM) may occur (and therefore the " recommended controls" should be carried out to reduce risk at individual sensitive receptors) can be described by the following areas around Great Western: • East of the Project, a line 470 m from the construction boundary outer edge and running parallel to the boundary. • West of the Project, a line 520 m from the construction boundary outer edge and running parallel to the boundary.	Biodiversity & Habitat Social Surface Water	1200.07 (Air Quality)	• Emissions of visible smoke to the atmosphere from construction plant and equipment shall be for periods no greater than 10 consecutive seconds. • Emissions of odorous substances or particulates shall not create or be likely to create objectionable conditions for the public; • Materials of any type shall not be disposed of through burning; • Material that may create a hazard or nuisance dust shall be covered during transport; and • Dust generated from road construction activities shall not create a hazard or nuisance to the public, shall not disperse from the site or across roadways, nor interfere with crops, stock or dust-sensitive receptors. • Implement methods and management systems (including continuous air monitoring) to maintain air quality during construction consistent with State Environmental Protection Policy (Air Quality Management) intervention levels for particulates and EPA Best Practice Environmental Management: 'Environmental Guidelines for Major Construction Sites', (Environment Protection Authority (EPA), 1996). • Monitor PM10 close to sensitive receptors using a portable laser light scattering instrument with an alarm provided. • Minimise land disturbance by using phased approach, rehabilitate cleared areas promptly. • Keep vehicles to well-defined haul roads.	Minor	Likely	Medium	• Suitable measures are in the 'Dust Management Protocol Monitoring' table, contained in the EES Air Impact Assessment report (GHD Pty Ltd, 2011) and include: • Applying dust suppression measures (such as water cart sprays on haul roads and exposed areas as required at better than 2 L/m2/h) or a chemical suppressant. •Limit vehicle speed and/or seal haul roads and other exposed areas by means of crushed rock or paving where necessary.	Minor	Rare	Negligible
Air	A2	Construction emissions impact a local area (community) such as: *Gilchrist Road - Commercial Properties, Stawell (Ch. 24800) *Robsin Road Community, Stawell (Ch. 23200 - 24200) *Stawell Park Caravan Park, Monaghan Road, Stawell (Ch. 22200) *Great Western Community, Great Western (Ch. 11000 - 16600) *Garden Gully Road Community, Armstrong (Ch. 4200 - 7400) *Morella/Kennel Road Community, Ararat (Ch. 0 - Ararat Township).	Exceedance of State Environment Protection Policy (Air Quality Management) within a local area, Aeolian transport and deposition potentially affecting human health, flora, fauna, visual and social aspects, and water quality. The impact zone for construction dust where an exceedance of the SEPP (AQM) may occur (and therefore the " recommended controls" should be carried out to reduce risk at sensitive receptors) can be described by the following quadrants surrounding Great Western: • East of the Project, a line 470 m from the construction boundary outer edge and running parallel to the boundary. • West of the Project, a line 520 m from the construction boundary outer edge and running parallel to the boundary.	Biodiversity & Habitat Social Surface Water	1200.07 (Air Quality)	As for Risk A1.	Moderate	Likely	High	As for Risk A1, and Use of dust deposition gauges to judge effectiveness of EMP, and evaluate implementation of further controls such as halting work under certain conditions.	Moderate	Rare	Low
Air	A3	Construction/operational emissions deposit on residential housing that drain into domestic water supplies (i.e. tank water).	Exceedance of 2004 Australian Drinking Water Guideline (ADWG) for residential rainwater tanks along the alignment used for residential water supply.	Social	1200.07 (Air Quality)	As for Risk A1.	Minor	Rare	Negligible	As for Risk A1, and Where concerns are raised by land owners and if warranted, sensitive receptors on rain water supplies should be encouraged, at their cost, to have '1st flush devices' installed between the water runoff and tank.	Insignificant	Rare	Negligible
Air	A4	Construction emissions deposit on Agricultural/Horticultural businesses at an individual sensitive receptor location such as: • Parcel ID 2533 (Ch. 1600) • Parcel ID 2544 (Ch. 2200-2500) • Parcel ID 2584 (Ch. 2800-3000) • Parcel ID 2546 (Ch. 3400-3700) • Parcel ID 2710 and 2712 (Ch. 6000-6400) • Parcel ID 2806 (Ch. 10500-11200) • Parcel ID 2899-2904, 2923, 2928-2929 and 2934-2940 (Ch. 14700-16200) • Parcel ID 2965 (Ch. 20900-21800) • Parcel ID 3045 (Ch. 24200-25000).	Potential detrimental effects on agriculture/horticulture. In particular vineyards and olive groves nearby (properties with common boundary) the construction activity.	Social Economic	1200.07 (Air Quality)	As for Risk A1.	Minor	Unlikely	Low	As for Risk A1, and Use of dust deposition gauges to judge effectiveness of EMP, and evaluate implementation of further controls such as halting work under certain conditions.	Minor	Rare	Negligible
Air	A5	Operation of the Western Highway generates air emissions from vehicular traffic.	Exceedance of State Environment Protection Policy (Air Quality Management).	Biodiversity & Habitat Social		Air quality issues during operation determined through existing complaints procedure.	Insignificant	Unlikely	Negligible		Insignificant	Rare	Negligible
Cultural Heritage	ACH1	Construction encounters the following previously identified Aboriginal cultural heritage places: 7423-0712 Junction Bridge 1 7423-0713 Junction Bridge 2 Ch. ~4200-4300	Destruction of two occasional occurrence Aboriginal cultural heritage places (scarred trees).		2100.15	Approvals must be obtained from AAV prior to impacting the Aboriginal cultural heritage places.	Moderate	Almost Certain	High	An approved Cultural Heritage Management Plan (CHMP).	Moderate	Almost Certain	High
Cultural Heritage	ACH2	Construction encounters the following previously identified Aboriginal cultural heritage place: 7423-0736 Armstrong ST 1 Ch. ~6600-6700	Destruction of one occasional occurrence Aboriginal cultural heritage place (scarred tree).		2100.15	Approvals must be obtained from AAV prior to impacting the Aboriginal cultural heritage place.	Moderate	Almost Certain	High	An approved Cultural Heritage Management Plan (CHMP).	Moderate	Almost Certain	High

Discipline	Risk No.	Impact pathway (how the Project interacts with assets, values, uses and location (state chainage)	Description of consequences (and describe whether it is design, construction or operation)	Linkages	Contract Shell DC1 Reference	Planned Controls to Manage Risk (as per Project Description, and VicRoads *Contract Shell DC1: Design & Construct*, (April 2012)).	Initial Risks			Additional Controls Recommended to Reduce Risk	Residual Risks		
							Consequence	Likelihood	Risk Rating		Consequence	Likelihood	Risk Rating
Cultural Heritage	ACH3	Construction encounters the following previously identified Aboriginal cultural heritage places: 7423-0734 Armstrong SS I 7423-0755 Armstrong SS 1 Ch. ~7900-8000	Destruction of two common occurrence Aboriginal cultural heritage places (artefact scatters).		2100.15	Approvals must be obtained from AAV prior to impacting the Aboriginal cultural heritage places.	Minor	Almost Certain	Medium	An approved Cultural Heritage Management Plan (CHMP).	Minor	Almost Certain	Medium
Cultural Heritage	ACH4	Construction adjacent to (within 27 m) the following previously identified Aboriginal cultural heritage place: 7423-0738 Armstrong ST 3 Ch. ~7900-8000	Present design places the construction adjacent to this Aboriginal cultural heritage place whose precise place extent is undetermined. Alteration to design could destroy an occasional occurrence Aboriginal cultural heritage place (scarred tree).		2100.15	Determine precise place extent in relation to proposed construction.	Minor	Possible	Low	Maintain current design to avoid impact if it is determined to occur outside the construction. An approved Cultural Heritage Management Plan (CHMP) would be required if is determined construction would encounter it.	Minor	Possible	Low
Cultural Heritage	ACH5	Construction encounters the following previously identified Aboriginal cultural heritage place: 7423-0772 Kimburra Road 1 Ch. ~8300-8400	Destruction of one common occurrence Aboriginal cultural heritage place (artefact scatter).		2100.15	Approvals must be obtained from AAV prior to impacting the Aboriginal cultural heritage place.	Minor	Almost Certain	Medium	An approved Cultural Heritage Management Plan (CHMP).	Minor	Almost Certain	Medium
Cultural Heritage	ACH6	Construction adjacent to (within 47 m) the following previously identified Aboriginal cultural heritage place: 7423-0735 Armstrong SS II Ch. ~9100-9200	Present design places the construction adjacent to this Aboriginal cultural heritage place whose precise place extent is undetermined. Alteration to design could destroy a common occurrence Aboriginal cultural heritage place (artefact scatter).		2100.15	Determine precise place extent in relation to proposed construction.	Minor	Possible	Low	Maintain current design to avoid impact if it is determined to occur outside the construction. An approved Cultural Heritage Management Plan (CHMP) would be required if is determined construction would encounter it.	Minor	Possible	Low
Cultural Heritage	ACH7	Construction adjacent to (within 15 m) the following previously identified Aboriginal cultural heritage place: 7423-0179 Allanvale 6 Ch. ~9700-9800	Present design places the construction adjacent to this Aboriginal cultural heritage place whose precise place extent is undetermined. Alteration to design could destroy an occasional occurrence Aboriginal cultural heritage place (scarred tree).		2100.15	Determine precise place extent in relation to proposed construction.	Moderate	Possible	Medium	Maintain current design to avoid impact if it is determined to occur outside the construction. An approved Cultural Heritage Management Plan (CHMP) would be required if is determined construction would encounter it.	Moderate	Possible	Medium
Cultural Heritage	ACH8	Construction adjacent to (within 6.5 m) the following previously identified Aboriginal cultural heritage place: 7423-0771 Wattle Gully Road 1 IA Ch. ~12700-12800	Present design places the construction adjacent to this Aboriginal cultural heritage place whose precise place extent is undetermined. Alteration to design could destroy a common occurrence Aboriginal cultural heritage place (artefact scatter).		2100.15	Determine precise place extent in relation to proposed construction.	Minor	Possible	Low	Maintain current design to avoid impact if it is determined to occur outside the construction. An approved Cultural Heritage Management Plan (CHMP) would be required if is determined construction would encounter it.	Minor	Possible	Low
Cultural Heritage	ACH9	Construction encounters previously unregistered and unassessed common occurrence Aboriginal cultural heritage place.	Destruction of a common occurrence Aboriginal cultural heritage place (e.g. artefact scatter).		2100.15	Undertake a Complex Assessment.	Minor	Possible	Low	An approved Cultural Heritage Management Plan (CHMP).	Minor	Possible	Low
Cultural Heritage	ACH10	Construction encounters previously unregistered and unassessed occasional occurrence Aboriginal cultural heritage place.	Destruction of an occasional occurrence Aboriginal cultural heritage place (e.g. scarred tree).		2100.15	Undertake a Complex Assessment.	Moderate	Possible	Medium	An approved Cultural Heritage Management Plan (CHMP).	Moderate	Possible	Medium
Cultural Heritage	ACH11	Construction encounters previously unregistered and unassessed rare occurrence (e.g. burned mounds) Aboriginal cultural heritage place.	Destruction of a rare occurrence (e.g. burned mounds) Aboriginal cultural heritage place.		2100.15	Undertake a Complex Assessment.	Major	Possible	High	An approved Cultural Heritage Management Plan (CHMP).	Major	Possible	High
Cultural Heritage	ACH12	Construction encounters previously unregistered and unassessed mortuary tree Aboriginal cultural heritage place.	Destruction of a mortuary tree Aboriginal cultural heritage place.		2100.15	Undertake a Complex Assessment.	Catastrophic	Possible	High	To consider realignment if a mortuary tree is identified in the future.	Catastrophic	Unlikely	High
Cultural Heritage	CHH1	Construction encounters H7423-0080 (Former) Junction Township site, Armstrong Site partially within proposed alignment. Ch. 3800 - 4150	Damage to, or complete destruction of previously registered historical archaeological site (HI).		2100.15	Approval would be obtained from Heritage Victoria prior to damaging, disturbing or otherwise impacting cultural heritage sites.	Moderate	Almost Certain	High	Early application to Heritage Victoria for relocation (prior to construction) alleviates any potential delays resulting from unexpected finds and does not compromise the collection of data.	Moderate	Rare	Low
Cultural Heritage	CHH2	Construction encounters H7423-0072 Armstrong Hotel Ruins Site entirely within proposed alignment. Ch. 5600 – 5670	Damage to, or complete destruction of previously registered historical archaeological site (HI).		2100.15	Approval would be obtained from Heritage Victoria prior to damaging, disturbing or otherwise impacting cultural heritage sites.	Moderate	Almost Certain	High	Early application to Heritage Victoria for relocation (prior to construction) alleviates any potential delays resulting from unexpected finds and does not compromise the collection of data.	Moderate	Rare	Low
Cultural Heritage	CHH3	Construction encounters H7423-0083 Former Armstrong Primary School site Site entirely within proposed alignment. Ch. 5750 -5800	Damage to, or complete destruction of previously registered historical archaeological sites or features (HI).		2100.15	Approval would be obtained from Heritage Victoria prior to damaging, disturbing or otherwise impacting cultural heritage sites.	Moderate	Almost Certain	High	Early application to Heritage Victoria for relocation (prior to construction) alleviates any potential delays resulting from unexpected finds and does not compromise the collection of data.	Moderate	Rare	Low
Cultural Heritage	CHH4	Construction encounters H7423-0060 Armstrong No.1 ruins site Site partially within proposed alignment. Ch. 5700 – 6000 encounters site.	Damage to, or complete destruction of previously registered historical archaeological site (HI).		2100.15	Avoidance or Approval would be obtained from relevant authorities prior to damaging, disturbing or otherwise impacting cultural heritage sites.	Moderate	Almost Certain	High	Early application to Heritage Victoria for relocation (prior to construction) alleviates any potential delays resulting from unexpected finds and does not compromise the collection of data.	Moderate	Rare	Low

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Cultural Heritage	CHH5	Construction encounters H7423-0065 (Former) Armstrong Alluvial Gold Mining Area No.1 Site partially within proposed alignment. Ch. 6200 — 6700	Damage to, or complete destruction of previously registered historical archaeological site (HI).		2100.15	Approval would be obtained from Heritage Victoria prior to damaging, disturbing or otherwise impacting cultural heritage sites.	Moderate	Almost Certain	High	Early application to Heritage Victoria for relocation (prior to construction) alleviates any potential delays resulting from unexpected finds and does not compromise the collection of data.	Moderate	Rare	Low
Cultural Heritage	CHH6	Construction encounters H7423-0066 (Former) Armstrong Alluvial Gold Mining Area No.21 Site partially within proposed alignment. Ch. 6500 — 7100	Damage to, or complete destruction of previously registered historical archaeological site (HI).		2100.15	Approval would be obtained from Heritage Victoria prior to damaging, disturbing or otherwise impacting cultural heritage sites.	Moderate	Almost Certain	High	Early application from Heritage Victoria for consent to destroy (prior to construction) alleviates any potential delays resulting from unexpected finds and does not compromise the collection of data.	Moderate	Rare	Low
Cultural Heritage	CHH7	Construction encounters H7423-0082 McKay Family Homestead site Site partially within proposed alignment. Ch. 92300 — 92400	Damage to, or complete destruction of previously registered historical archaeological site (HI).		2100.15	Approval would be obtained from Heritage Victoria prior to damaging, disturbing or otherwise impacting cultural heritage sites.	Moderate	Almost Certain	High	Early application from Heritage Victoria for consent to destroy (prior to construction) alleviates any potential delays resulting from unexpected finds and does not compromise the collection of data.	Moderate	Rare	Low
Cultural Heritage	CHH8	Construction encounters H7423-0081 (Former) Allanvale Tollgate site Site entirely within proposed alignment. Ch. 10050 — 10150	Damage to, or complete destruction of previously registered historical archaeological site (HI).		2100.15	Approval would be obtained from Heritage Victoria prior to damaging, disturbing or otherwise impacting cultural heritage sites.	Moderate	Almost Certain	High	Early application to Heritage Victoria for relocation (prior to construction) alleviates any potential delays resulting from unexpected finds and does not compromise the collection of data.	Moderate	Rare	Low
Cultural Heritage	CHH9	Construction encounters H7423-0027 (Former) Great Western Lead Mine (HI and DSE listed) Site partially within proposed alignment. Ch. 12750 – 13000 directly adjacent to site. Ch. 13000 – 13200 encounters site.	Damage to, or complete destruction of previously registered historical archaeological sites (HI).		2100.15	Approval would be obtained from Heritage Victoria prior to damaging, disturbing or otherwise impacting cultural heritage sites.	Moderate	Almost Certain	High	Early application to Heritage Victoria for relocation (prior to construction) alleviates any potential delays resulting from unexpected finds and does not compromise the collection of data.	Moderate	Rare	Low
Cultural Heritage	CHH10	Construction encounters DSE locally listed Sisters Rock Graffiti Site Registered site extent partially within proposed alignment: Ch. 22500-22750	Damage to previously listed local historical site (DSE)		2100.15	Detailed mapping of the extent of the graffiti. Notification to DSE of site extent.	Minor	Unlikely	Low	Construction avoids graffitied rocks.	Minor	Unlikely	Low
Cultural Heritage	CHH11	Construction immediately adjacent to H7423-0071 Armstrong Brick Structure Ruins Ch. 5150- 5700	Present design places the construction adjacent to this previously registered historical archaeological site (HI). Surface evidence of site not detectable, but potential for as yet unidentified subsurface archaeological deposits may exist.		2100.15	Maintain current design to avoid impact.	Moderate	Rare	Low	Maintain current design to avoid impact.	Moderate	Rare	Low
Cultural Heritage	CHH12	Construction encounters H7423-0062 Garden Gully Road Ruin H7423-0063 Garden Gully Road House Site No.1 Registered site extents partially within proposed alignment. Ch. 6000-6400	Potential damage to two previously registered historical archaeological sites (HI). Surface evidence of sites not detectable, but potential for as yet unidentified subsurface archaeological deposits may exist.		2100.15	Involvement of a suitably qualified archaeologist during construction in recognition that the potential for as yet unidentified subsurface archaeological deposits may exist.	Moderate	Unlikely	Medium	In consultation with Heritage Victoria implement low level monitoring by a suitably qualified archaeologist: -site inspection on first day of work to confirm that proposed construction footprint intersects the periphery of the registered site extent. -on call during construction -one scheduled visit to site during works.	Moderate	Rare	Low
Cultural Heritage	CHH13	Construction encounters previously unregistered and unassessed historical cultural heritage sites.	Alteration to design could cause damage to, or completely destroy site previously unregistered and unassessed historical cultural heritage sites.		2100.15	Avoidance or Approval would be obtained from relevant authorities prior to damaging, disturbing or otherwise impacting cultural heritage sites.	Major	Unlikely	Medium	An EMP would be prepared to include contingency measures that manage the unexpected discovery of historical cultural heritage sites and features, in accordance with the *Heritage Act 1995* (Vic).	Major	Rare	Medium
Economic	E1	Operation of the Western Highway would reduce passing trade for some businesses (Great Western).	Some businesses along the alignment rely for a portion of their turnover on passing traffic. This traffic would be reduced with a consequent reduction in turnover Potential for cumulative effects with one business closure leading to other business closures.	Socio-Economic Social			Minor	Almost Certain	Medium	Install gateway signage for Great Western and maintain existing tourist signage in accordance with VicRoads Tourist Signage guidelines Fund and undertake detailed planning for the town in conjunction with sewage works that enable additional residential development, and a marketing strategy to ensure Great Western's planned role as a wine village is realised and new residents are attracted to settle there.	Insignificant	Almost Certain	Low
Economic	E2	Construction of the Western Highway would result in the loss of agricultural facilities and improvements plus the loss of agricultural land and severance of properties across the alignment.	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 severance and access issues to some properties.	Socio-Economic Social			Minor	Almost Certain	Medium	Compensation measures for loss of infrastructure, land, severance and access issues. Optimise intersections and access opportunities for affected properties.	Insignificant	Almost Certain	Low

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Economic	E3	The Western Highway would disrupt access to businesses during construction.	Some businesses along the route would have access disrupted during the construction process.	Socio-Economic Social	1160 and 2050	Continuous access would be maintained to commercial 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 eliminate, reduce or mitigate road safety hazards and to 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 reduction where appropriate, worksite safety barriers, advance warning signage, hazard visibility, etc.	Minor	Almost Certain	Medium	Work with businesses to optimise construction schedules.	Insignificant	Almost Certain	Low
Economic	E4	The duplicated Western Highway would complicate access to businesses post construction.	Closure of roads into the duplicated Western Highway would permanently complicate access for some businesses to and from Western Highway.	Socio-Economic Social	1160 and 2050		Minor	Almost Certain	Medium	Maintain existing signage for business destinations which are of tourist interest (including wineries). Otherwise, update signage to areas of business or local amenities in accordance with VicRoads Tourist Signage guidelines.	Insignificant	Almost Certain	Low
Biodiversity and Habitat	FF1	Potential removal of individuals of a known population of EPBC listed flora - South of Stawell (Ch. 22900-23600).	A population of Trailing Hop-bush is present south of Stawell. 21 plants intercept the proposed alignment.	Biodiversity & Habitat	1200.13	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.	Moderate	Almost Certain	High	Further targeted survey to be completed on final alignment prior to construction to identify all existing individuals. Potential for detailed design or construction planning to avoid impact at known locations (e.g. micro alignment change to construction corridor). Implement salvage and translocation program for any individuals to be removed. Translocation to be undertaken in accordance with a formal translocation plan approved by SEWPaC, which would include post-translocation monitoring.	Minor	Almost Certain	Medium
Biodiversity and Habitat	FF2	Potential removal of individuals of a known population of the DSE advisory listed flora (Ch. 500-2300, 20900-23500).	Emerald-lip Greenhood, Rising Star Guinea Flower and Rosemary Grevillea are present throughout alignment. See targeted flora map for exact locations.	Biodiversity & Habitat	1200.13	As for FF1.	Moderate	Almost Certain	High	As for FF1.	Minor	Almost Certain	Medium
Biodiversity and Habitat	FF3	Construction encounters unexpected listed flora species (species not known to be present from targeted survey).	Removal of small number of unknown listed flora species during pre-clearance / clearance work	Biodiversity & Habitat	1200.13	In the event that a significant flora or fauna site, species or habitat is discovered, the Contractor shall immediately notify the Superintendent. The Contractor shall submit to the Superintendent for approval the proposed actions to manage the site, species or habitat.	Minor	Possible	Low	Avoid impacts if possible, by altering the construction area. Otherwise where applicable, implement a translocation plan for these individuals.	Minor	Possible	Low
Biodiversity and Habitat	FF4	Construction encounters EPBC listed Golden Sun Moth from known habitats. (Recorded locations at Ch. 1800-2800, 3700-5000).	Removal of fauna habitat, possible injury/death to listed fauna species individuals during construction.	Biodiversity & Habitat	1200.13	As for FF1.	Moderate	Almost Certain	High	Potential for detailed design or construction planning to avoid impact at known locations (e.g. micro alignment change to construction corridor). Revegetate ROW with grassland species favoured as food source by GSM (e.g. Rytidosperma sp.) where GSM populations are known to be present.	Moderate	Almost Certain	High
Biodiversity and Habitat	FF5	Construction encounters FFG and DSE Advisory Act-listed Brush-tailed Phascogale, Barking Owl, Brown Toadlet, Fat-tailed Dunnart, Black-chinned Honeyeater and Brown Treecreeper, as well as FFG listed Victorian Temperate Woodland Bird community (Recorded locations at Ch. 300, 600, 3700, 4700, 6300, 8300, 14700, 17300, 18000, 18200, 21800, 22600).	Removal of fauna habitat, possible injury/death to listed fauna species individuals during construction.	Biodiversity & Habitat	1200.13	As for FF1.	Moderate	Almost Certain	High	Conduct further targeted surveys for Brown Toadlet within final alignment. Potential for detailed design or construction planning to avoid impact at known locations/habitats (e.g. micro alignment change to construction corridor). Prepare and implement a salvage and translocation plan. Where potential habitat for listed fauna species is identified to be removed a qualified ecologist would need to conduct a pre-clearance survey and attempt relocation where necessary/possible.	Minor	Almost Certain	Medium
Biodiversity and Habitat	FF6	Construction encounters unexpected listed fauna species (species not known to be present from targeted survey).	Removal/disturbance to small number an unknown number of listed fauna species during pre-clearance / clearance work	Biodiversity & Habitat	1200.13	As for FF3.	Minor	Possible	Low	As for FF3.	Minor	Possible	Low
Biodiversity and Habitat	FF7	The duplication removes or disrupts wildlife corridors or fauna habitat. This is evident at the Ararat Regional Park (Ch. 0-2300) and Sisters Rocks (Ch. 21000-23000), as well as numerous riparian and roadside corridors.	Impacts on habitat or wildlife corridors may affect Brown Toadlet, Brown Treecreeper and Brush-tailed Phascogale, as well as numerous locally common fauna species.	Biodiversity & Habitat	1200.13	As for FF1.	Moderate	Likely	High	Potential for detailed design or construction planning to avoid impact at known locations/habitats (e.g. micro alignment change to construction corridor). Install warning signs for potential fauna crossings. Investigate appropriate design response and implement recommendations, for example: - Installation of fauna sensitive road design features at wildlife corridors. - Implement before/after comparison study for fauna road mortality to investigate a) the impact of the road; b) the efficacy of crossing structures	Minor	Likely	Medium

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Biodiversity and Habitat	FF8	Increased road kill and injury rates to arboreal native fauna from traffic on additional / new carriageway, particularly where the carriageway passes through wooded areas away from the existing road (e.g. quarry area north of Great Western).	The proposed carriageway would create an additional barrier to the movement of aquatic and terrestrial fauna. This would result in a reduction of fauna populations due to increased mortality, particularly for predatory birds, reptiles, amphibians, and mammals. It is likely that fauna are more susceptible to vehicle collision during the dusk and dawn period, where the highway intercepts wildlife corridors (e.g. near and along key waterways) and in areas away from existing roads where fauna are unaccustomed to road traffic hazards.	Biodiversity & Habitat		-	Minor	Likely	Medium	As for FF7.	Minor	Possible	Low
Biodiversity and Habitat	FF9	Construction encounters Ecological Vegetation Communities (EVCs) (Native vegetation and fauna habitat)	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.	Biodiversity & Habitat	1200.13	As for FF1.	Moderate	Likely	High	Potential for detailed design or construction planning to avoid impact at known locations/habitats (e.g. micro alignment change to construction corridor). Revegetation or landscape plantings to include species appropriate to the local EVC.	Moderate	Likely	High
Biodiversity and Habitat	FF10	Construction encounters Large and Very Large Scattered Trees/Hollow-bearing trees/fauna habitat	Removal of scattered trees	Biodiversity & Habitat	1200.13	As for FF1.	Moderate	Almost Certain	High	Detailed design and construction planning to minimise loss of trees, particularly MOTs, LOTs and VLOTs and those which are hollow bearing, with the advice of an aborist.	Moderate	Likely	High
Biodiversity and Habitat	FF11	Construction of waterway crossings at Concongella Creek and confluence of creeks north of Great Western, and other works associated with the waterway crossing.	Local destabilisation of waterway banks and channel profile. Degraded river health values, reduction of key aquatic and associated terrestrial habitat.	Surface Water Biodiversity & Habitat	1200.04, 1200.08 and 1200.11	Implementation of a Construction EMP detailing: • Erosion and sediment control measures. • Fuel and chemical management procedures.	Moderate	Likely	High	No structures within the stream, and consistent with CMA requirements. Ensure fish sensitive design of structures to ensure safe fish passage. Schedule construction to no-flow or low-flow periods.	Minor	Likely	Medium
Biodiversity and Habitat	FF12	Placement of bridge structures within a minor waterway (e.g.culverts).	Degraded river health values, reduction of key aquatic and associated terrestrial habitat . Construction creates temporary barrier to movement of aquatic fauna.	Surface Water Biodiversity & Habitat	1200.04, 1200.08 and 1200.11	As for FF10.	Moderate	Possible	Medium	Implement fish sensitive design of structures to provide for safe fish passage. Schedule construction to no-flow or low-flow periods.	Minor	Possible	Low
Biodiversity and Habitat	FF13	Construction activities occur outside of agreed construction zone.	Potential loss or modification of native vegetation and/or fauna habitat that was intended to retained.	Biodiversity & Habitat	1200.13	Existing vegetation and native fauna habitat identified in the Contract to be retained, shall be identified as 'No Go Zones' and protected by temporary fencing and signage erected outside the limit of the canopy of the vegetation or the habitat site. Plant, equipment, material or debris not to be placed or stored within the limit of the root zone of vegetation to be retained.	Minor	Possible	Low	-	Minor	Possible	Low
Biodiversity and Habitat	FF14	Weeds and/or pathogens introduced or spread through construction activities.	Displacement/invasion of native vegetation and/or fauna habitat and increased spread of weed species or pathogens. Potential pathogens include Cinnamon Fungus Phytophthora cinnamomi, Bovine Johne's Disease Mycobacterium paratuberculosis, Grape phylloxera Daktulosphaira vitifoliae, Potato Cyst Nematode Globodera rostochiensis and Amphibian Chytrid Fungus Batrachochytrium dendrobatidis.	Biodiversity & Habitat	1200.14	The Contractor shall develop a procedure to prevent the spread of declared weeds, pests and diseases within the Site and off-site.	Minor	Possible	Low	A weed management and control program to control invasions would be implemented for 2 years following construction. Pathogen management procedures developed to prevent spread.	Minor	Possible	Low
Biodiversity and Habitat	FF15	Sediment discharge to waterways resulting from soil erosion or spoil earthworks.	Impacts to aquatic ecosystems at the site and downstream of the site.	Surface Water Biodiversity & Habitat Soils & Geology	1200.04, 1200.08	Implementation of a Construction EMP detailing erosion and sediment control measures.	Minor	Possible	Low	Installation of sediment fencing adjacent to waterways.	Minor	Possible	Low
Biodiversity and Habitat	FF16	Construction modifies hydrological/surface water flows.	Impact to retained native vegetation and fauna habitats.	Surface Water Biodiversity & Habitat Soils & Geology	1200.04, 1200.08	As for FF11.	Minor	Possible	Low	Installation of appropriate drainage systems. Schedule construction to no-flow or low-flow periods.	Minor	Possible	Low
Biodiversity and Habitat	FF17	Noise or vibration disturbance to native fauna during construction (daytime) and operation (traffic).	Potential for stress, and ultimately displacement of native fauna from affected habitats.	Biodiversity & Habitat Noise & Vibration	3110.01	Traffic noise levels shall not exceed the objectives specified in VicRoads Traffic Noise Reduction Policy for new and improved roads within and outside of the limit of works.	Minor	Possible	Low	-	Minor	Possible	Low
Biodiversity and Habitat	FF18	Light disturbance to native fauna (e.g., artificial light sources from street construction lights).	Potential for stress, and ultimately displacement of native fauna from affected habitats.	Biodiversity & Habitat Visual & Landscape			Minor	Possible	Low	-	Minor	Possible	Low

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Biodiversity and Habitat	FF19	Construction creates dust impacting on native fauna, native flora and surface water ecosystems.	Impact to retained native vegetation and fauna habitats	Biodiversity & Habitat	1200.07	Implementation of a Construction EMP detailing air quality control measures and strict monitoring procedures.	Insignificant	Possible	Negligible	Implement methods and management systems consistent with EPA Best Practice Environmental Management: 'Environmental Guidelines for Major Construction Sites' (EPA, 1996). Minimise land disturbance by using phased approach, rehabilitate cleared areas promptly. Keep vehicles to well-defined haul roads, limit vehicle speed and seal haul roads and other exposed areas by means of concrete or paving where necessary. Employ dust suppression methods such as watering down the ROW.	Insignificant	Possible	Negligible
Biodiversity and Habitat	FF20	Creation of pollutants (including smoke, dust, petrochemicals, litter etc.) during construction and operation.	Impact to retained native vegetation and fauna habitats.	Biodiversity & Habitat	1200.07	As for FF11.	Insignificant	Possible	Negligible	-	Insignificant	Possible	Negligible
Soils and Geology	G1	Presence of contaminated soil and rock along alignment.	Construction workers exposure through dermal, ingestion and inhalation of potential contaminants of concern in soil or rock. This risk could occur at any location along the alignment but the more likely locations are within the vicinity of agriculture land, waste disposal (controlled and uncontrolled), commercial and industrial activity and rail corridors due to the use of herbicides and other related rail uses, and where asbestos bearing rocks exist. The following areas may be of concern including: - Railway line intersections (Ch. 7600 and 20600) - Farm shed (Ch. 11500) - Quarry (Ch. 13600 to 14000) - Deenicull Schist (Ch. 2800 to 10000) Generation of surplus soils and rock during construction may require treatment and appropriate handling or disposal.	Groundwater Social Economic Biodiversity & Habitat Planning & Land Use Surface Water	1200.09	1) The discovery of contaminated material on the site during construction works shall be managed in accordance with VicRoads and EPA Guidelines. 2) Where putrescible waste material is encountered, the Superintendent and EPA shall be notified. Construction works along the affected area shall stop until a mitigation plan is established and agreed between the relevant project stakeholders. 3) The Contractor shall undertake a visual assessment of the Site for contaminated soils and uncontrolled waste during construction works.	Moderate	Possible	Medium	The Construction Environmental Management Plan (CEMP) is to provide details on appropriate methods for managing contaminated soils and rock. An in-situ investigation in accordance with EPA Industrial Waste Resource Guideline (IWRG) 702 would be completed along the proposed alignment to establish if contaminated soils are present. If contaminated soils or rocks are present, the results of the investigation would assist to provide appropriate soil and rock management advice including disposal recommendations.	Moderate	Rare	Low
Soils and Geology	G2	Uncontained spill or leak during construction.	Groundwater, soil and/or surface water contamination. Impacts on water resources, flora, fauna, and human health. This risk could occur at any location along the alignment but the more sensitive locations are within the vicinity of waterways, including: - Concongella Creek (Ch. 1600, 8350, 9100, 12300 & 15950) - Allanvale Creek (Ch. 12125) - Donald Creek (Ch. 15700) - Robinsons Creek (Ch. 16200).	Biodiversity & Habitat Groundwater Surface Water	1200.10 1200.11	Contaminated Soils and Waste Materials 1) The discovery of contaminated soils along the alignment during construction works shall be managed in accordance with VicRoads and EPA Guidelines. 2) Where putrescible waste material is encountered the Superintendent and EPA shall be notified and a management strategy established to mitigate any potential risks to immediate. 3) The Contractor shall undertake a visual assessment of the construction areas for contaminated soils and waste materials. Fuels and Chemicals 1) Environmental Management Plan (EMP) shall include specific procedures to minimise spillage of any fuels or chemicals and mitigate the effect in the event that leakages and spillages occur. 2) Fuel, chemical and equipment storage areas shall be visually monitored at intervals of not more than 7 days to mitigate contamination in a timely manner.	Moderate	Rare	Low	Additional measures would be required depending on the CEMP which would include: - Appropriate procedures for containing spills and leaks should be contained - Appropriate methods for cleaning up spills and leaks where safe to do so. If an uncontained spill or leak occurs during construction resulting in soil contamination, refer to management controls detailed in G1.	Insignificant	Rare	Negligible
Soils and Geology	G3	Runoff transports road contaminants offsite during operation.	Contamination of waterways with hydrocarbons or heavy metals. Impacts on water resources, flora, fauna, and human health, including: - Maintenance workers - General Public - Local Flora and Fauna The following potential areas may be affected: - Ch. 12050 - Ch. 12850 - Ch. 15950 - Ch. 16200.	Biodiversity & Habitat Groundwater Surface Water	1200.11 and 1200.08	Water Sensitive Road Design measures would be evaluated for inclusion in the detailed design phase, as described in VicRoads Integrated Water Management Guidelines (August 2011).	Insignificant	Possible	Negligible	Road construction should include design features to mitigate runoff of spills into waterways.	Insignificant	Unlikely	Negligible
Soils and Geology	G4	Excavation encounters unstable geological units (which may include units altered by faults or tectonic activity) or erosion prone areas. Geological units of Cambrian origin may be more prone to erosional processes on exposure. The following potential areas may be affected: - Ch. 800 (rill erosion noted) - Ch. 2800 to 3600 (minor slumping noted) - Ch. 4200 (minor slumping in Cambrian exposed cutting) - Ch. 4600 to 5200 (Weathered Cambrian bedrock, residual product displaying dispersive tendencies).	Instability exacerbates erosion or mass wasting impacts on safety, land and water resources. This risk may occur within areas subject to cuts, or steepening / excessive loading of existing slopes. Areas near watercourse may also be of concern. Materials demonstrating dispersive behaviour were observed along the alignment. Changes in prevailing topography / site geometry or exposure may result in accelerated soil loss due to loss of fines.	Soils & Geology	1200.08	Geotechnical investigations would be conducted prior to construction to assess nature of soils encountered along the alignment. Implement Erosion and Sediment Control Measures through a CEMP, including but not limited to: minimising the amount of exposed erodible surfaces, installation of erosion and sedimentation control, prompt covering of exposed surfaces, progressive revegetation of the site, management of stockpiles and co-ordination to avoid works near watercourses.	Moderate	Possible	Medium	Detailed design cuts and final batter slopes to appropriately reflect the local geological and geotechnical conditions. Improved surface drainage measures in the management of Erosion and Sediment Control. Ensure Erosion and Sediment Control Measures as part of CEMP makes allowance for the control of wind borne dust that may be produced as consequence of excavation of materials of sedimentary origin.	Minor	Possible	Low

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Soils and Geology	G5	Soft or compressible soils are present along proposed alignment. The following locations predominantly associated with alluvial sediments are highlighted: - Ch. 7800 to 9000 - Ch. 10200 to 12600 - Ch. 14600 to 17000 - Ch. 20200 to 21000.	Construction of fill embankments or drawdown of groundwater induces ground settlement. This risk could occur at locations along the alignment characterised by soft fluvial sediments, being areas dominated by Quaternary age sediments. The more sensitive locations are within the vicinity of waterways, including: - Concongella Creek (Ch. 4400, 4500, 8250, 10550, 12150, 15400, 15950) - Allanvale Creek (Ch. 12050) - Robinsons Creek (Ch. 16200) - Donald Creek (Ch. 16500) - Pleasant Creek (Ch. 21700) - Any of the more significant unnamed tributaries along the alignment.	Soils & Geology	1200.08	Geotechnical investigations would be conducted prior to construction to identify and assess the nature of soft or compressible, together with recommendations for construction, which may include a staged construction approach or treatment of existing subgrade soils.	Moderate	Possible	Medium	Project to implement a staged construction approach in the construction of fill embankments, allowing for dissipation of excess pore water pressures where soft soils are expected or known to exist. Subgrade treatment or improvement may be required in instances to control settlement of fills. Consider the identification of soft or compressible soils by using the proof roll of prepared subgrades to receive fill, together with in-situ density and bearing capacity tests, at an appropriate interval for the section of road being constructed.	Minor	Possible	Low
Soils and Geology	G6	Imbalance in the volume of suitable fill and the volume of excavated material. Areas requiring more significant volumes of cut and fill are identified in the following locations: - Ch. 20200 to 21000.	Imbalance of suitable cut-to-fill material during construction results in unplanned disposal of cut material off site, or sourcing of suitable additional material.	Soils & Geology		Earthworks are expected to be dominated by the need for fill above the natural surface to achieve drainage and greater flood control or grade separation. Fill material would be sourced from surplus materials from site, and additional sources including local quarries, borrow pits under arrangement between Contractors and local land owners. Road pavement materials would be sourced from appropriately licenced facilities. 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 stockpile site for future use; 2. Transfer to an alternative VicRoads approved site for re-use on concurrent private/local government project; or 3. Disposal at an accredited materials recycling or waste disposal facility.	Minor	Possible	Low	Assess likely earthworks volumes during design to optimise design solution (balance cut and fill where possible). Ground investigations and slope stability assessments should assist in assigning final earthworks batters to achieve a closer cut to fill balance. 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 stockpile site for future use; 2. Transfer to an alternative VicRoads approved site for re-use on concurrent private/local government project; or 3. Disposal at an accredited materials recycling or waste disposal facility.	Minor	Possible	Low
Soils and Geology	G7	Construction intersects Acid Sulfate Soils or pyritic rocks, potential disturbance and exposure to air.	The Project alignment option is not considered to be in a Potential Acid Sulfate Soil risk area. There is a potential the in some rocks that make up the Saint Arnaud Group are pyritic. The following potential areas may be affected: - Ch. 0 to 3 200 - Ch. 7 600 to 8 100 - Ch. 9 000 to 9 400 Sulphuric acid, iron, aluminium and heavy metal contamination. Potential impacts to ecology, human health, crops, infrastructure and property (through corrosion, iron precipitates, and/or subsidence).	Groundwater Social Economic Biodiversity & Habitat Planning & Land Use Surface Water	1200.09		Moderate	Rare	Low	Soils suspected of being acid sulfate soils (ASS) are to be sampled and analysed to assess the ASS potential. In the event ASS are discovered an ASS Management Plan would be prepared. Rocks suspected of being pyritic are to be sampled and analysed to assess the potential to produce acid when oxidised. In the event pyritic rocks are discovered a Management Plan would be prepared.	Insignificant	Rare	Negligible
Soils and Geology	G8	Presence of an operational or former transfer station/landfill along the alignment.	Exposure of construction workers to uncontrolled municipal and potentially prescribed waste, leachate and contaminated soils and groundwater. This risk occurs along the alignment at the following location: - Former Great Western landfill (Ch. 1 3000 to 13 400).	Groundwater Planning & Land Use			Major	Almost Certain	Extreme	The uncovering of municipal rubbish and potentially prescribed waste along this particular alignment location during the construction phase would require: 1. Preliminary planning ahead of the construction phase to mitigate this risk appropriately 2. Seek agreement with the relevant Authorities with regards to works approvals and other approvals required to address this risk appropriately. 3. Potential relocation of part or all of the landfill 4. Construction of a new cell in accordance with EPA publication 788.1, Best Practice environment management: siting, design, operation and rehabilitation of landfills (BPEM, 2010) 5. Analytical validation of soils from beneath original landfill location. If soil contamination is identified, refer to management controls detailed in G1.	Major	Unlikely	Medium
Soils and Geology	G9	Construction intersects historic gold mining works, including deep lead and shallow workings.	Construction on areas of shallow working may result in soil instability and ground subsidence. Construction near historic deep lead workings and shafts may result in ground subsidence or instability.	Soils & Geology	1200.08	Geotechnical investigations and Desktop Studies would be conducted prior to design and construction to identify the extent and nature of the historic mine workings.	Moderate	Possible	Medium	Project to implement a ground improvement programme for areas identified as having shallow workings. The control measures for mine shafts and deep lead mining would depend on numerous factors such as the depths and reinstatement methods adopted after the completion of the mining works.	Minor	Possible	Low
Groundwater	GW1	Cuts below water table along alignment, requiring dewatering.	Construction dewatering results in unacceptable impact to other groundwater users, e.g. existing irrigators, stock and domestic users. (construction and/or operation). Ch. 4,850 – 5,000 m, 5,400 – 5,550 m, 13,100 – 14,000 m and 14,150 – 14,550 m are areas where this risk may be relevant.		1200.05	Implementation of a Groundwater Management Plan and Monitoring Program. Implementation of sediment control measures, and water disposal options.	Insignificant	Rare	Negligible		Insignificant	Rare	Negligible
Groundwater	GW2	Cuts below water table along alignment, requiring dewatering.	Management of the recovered groundwater - erosion or water quality degrades receiving surface waterways (construction and/or operation). Ch. 4,850 – 5,000 m, 5,400 – 5,550 m, 13,100 – 14,000 m and 14,150 – 14,550 m are areas where this risk may be relevant.		1200.05 1200.08	Implementation of a Groundwater Management Plan and Monitoring Program. Implementation of sediment control measures, and water disposal options.	Insignificant	Rare	Negligible		Insignificant	Rare	Negligible

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Discipline	Risk No.	Impact pathway (how the Project interacts with assets, values, uses and location (state chainage)	Description of consequences (and describe whether it is design, construction or operation)	Linkages	Contract Shell DC1 Reference	Planned Controls to Manage Risk (as per Project Description, and VicRoads *Contract Shell DC1: Design & Construct*, (April 2012)).	Initial Risks			Additional Controls Recommended to Reduce Risk	Residual Risks		
							Consequence	Likelihood	Risk Rating		Consequence	Likelihood	Risk Rating
Groundwater	GW3	Cuts below water table along alignment, requiring dewatering.	Dewatering / depressurisation consolidates compressible materials causing settlement and land instability. (construction and/or operation). Few built structures are in those areas that are below the grade. Ch. 4,850 – 5,000 m, 5,400 – 5,550 m, 13,100 – 14,000 m and 14,150 – 14,550 m are areas where this risk may be relevant.	Soils & Geology		Implementation of a Groundwater Management Plan and Monitoring Program.	Minor	Unlikely	Low		Minor	Unlikely	Low
Groundwater	GW4	Cuts below water table along alignment, requiring dewatering.	Temporary construction dewatering adversely affects groundwater flow to Groundwater Dependent Ecosystems (GDEs). Cuts below grade that permanently result in change in groundwater flow regime. (construction and/or operation). Ch. 4,850 – 5,000 m, 5,400 – 5,550 m, 13,100 – 14,000 m and 14,150 – 14,550 m are areas where this risk may be relevant.	Surface Water, Biodiversity & Habitat	1200.05	Implementation of a Groundwater Management Plan and Monitoring Program.	Minor	Rare	Negligible		Minor	Rare	Negligible
Groundwater	GW5	Cuts below water table along alignment, requiring dewatering.	Dewatering alters hydraulic gradients resulting in existing groundwater contamination plumes potentially being dislocated / moved. Interruption of existing groundwater remediation efforts. Ch. 4,850 – 5,000 m, 5,400 – 5,550 m, 13,100 – 14,000 m and 14,150 – 14,550 m (specifically the former Great Western landfill 13,200 – 13,400 m) are areas where this risk may be relevant.	Soils and Geology	1200.05 1200.09	A Groundwater Management Plan and Monitoring Program would be implemented. Management of Contaminated Soils and Materials: 1) The discovery of contaminated material on the site during works shall be managed in accordance with VicRoads and EPA Guidelines. 2) Where putrescible waste material is encountered the Superintendent and EPA shall be notified. 3) The Contractor shall undertake a visual assessment of the Site for contaminated soils and materials.	Minor	Rare	Negligible		Minor	Rare	Negligible
Groundwater	GW6	Cuts below water table along alignment, requiring dewatering.	Potential generation of acid plumes / mobilisation of heavy metals / aggressive groundwater, leading to attack on submerged steel / concrete structures (piles, services).	Soils & Geology Planning & Land Use	1200.08	Management of construction dewatering (as per above). DSE Victorian Best Practice Guidelines for Assessing and Managing Coastal Acid Sulphate Soils.	Moderate	Rare	Low		Moderate	Rare	Low
Groundwater	GW7	Contamination of groundwater from construction activities, e.g. spillage, use of 'contaminated' fill material, construction waste management, hazardous materials handling.	Impact to groundwater quality/ breach of SEPP (Groundwater of Victoria). Potential to breach SEPP (Waters of Victoria). Impact to worker safety during construction. This could occur anywhere along with the Project area.	Soils & Geology Surface Water	1200.09 1200.11	Contaminated Soils and Materials 1) The discovery of contaminated material on the site during works shall be managed in accordance with VicRoads and EPA Guidelines 2) Where putrescible waste material is encountered the Superintendent and EPA shall be notified. 3) The Contractor shall undertake a visual assessment of the Site for contaminated soils and materials. Fuels and Chemicals 1) EMP to include specific procedures to minimise leakage or spillage of any fuels or chemicals, mitigate the effect. 2) Fuel and chemical storages and equipment fill areas shall be monitored at intervals of not more than 7 days.	Minor	Rare	Negligible		Minor	Rare	Negligible
Groundwater	GW8	Contamination of groundwater from operational activities (road runoff, traffic accidents, stormwater, spillage).	Impact to groundwater quality/ breach of SEPP (Groundwater of Victoria). This could occur anywhere along with the Project Area.	Soils & Geology Surface Water	1200.05	Standard procedures for State Emergency Response, Country Fire Authority and Environment Protection Authority.	Minor	Rare	Negligible		Minor	Rare	Negligible
Groundwater	GW9	Ponding and retention of water associated with highway drainage (operation).	New or increased groundwater accessions, altered groundwater flow patterns, new or exacerbated waterlogging and salinity impacts. This could occur anywhere along with the Project Area.	Soils & Geology Surface Water Economic		Water Sensitive Road Design measures would be evaluated for inclusion in the detailed design phase, as described in VicRoads Integrated Water Management Guidelines (August 2011).	Moderate	Rare	Low		Moderate	Rare	Low
Groundwater	GW10	Construction earthworks removing impervious layers (across site, floodplains, river crossings and embankments).	Site recharge enhanced increasing groundwater levels (water logging, groundwater displacement) and or introducing contaminants. This could occur anywhere along with the Project Area.		1200.05	Implementation of a groundwater management plan. River crossings duplicated consistent with CMA requirements.	Minor	Rare	Negligible	Earthwork surface finish / rehabilitation specifications to mitigate enhanced accessions.	Minor	Rare	Negligible
Groundwater	GW11	Construction works create impervious ground surface layers.	Reduced recharge to groundwater system. This could occur anywhere along with the Project Area.		1200.05	A Groundwater Management Plan and Monitoring Program would be implemented.	Minor	Possible	Low		Minor	Possible	Low
Groundwater	GW12	Project pipelines or service conduits constructed in saturated materials alter groundwater flow.	Buried services within the alignment located below the water table may create preferential groundwater seepage paths, and alter seepage migration routes. In shallow groundwater environments the resulting impact can be significant. Furthermore groundwaters (e.g. saline groundwater) may be aggressive to buried services.		1200.05	A Groundwater Management Plan and Monitoring Program would be implemented.	Insignificant	Possible	Negligible	Apply standard pipeline construction measures (trench cut offs- or breakers) that mitigate risk process.	Insignificant	Possible	Negligible
Groundwater	GW13	Alignment of road passes through existing groundwater bore location (or farm dam) or severs access for stock or irrigation infrastructure.	Requirement to compensate groundwater user, install replacement bore (observation, stock, irrigation etc.) or replacement dam. Temporary loss of production.	Economic Social		Negotiation with asset owner.	Insignificant	Rare	Negligible	Confirmation of bore locations (and operational status) within construction corridor / landholder consultation.	Insignificant	Rare	Negligible
Groundwater	GW14	Use of groundwater for construction water supply.	Adverse impact to existing groundwater users, environment.			Grampians Wimmera Mallee Water extraction licensing process.	Insignificant	Rare	Negligible		Insignificant	Rare	Negligible

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							Consequence	Likelihood	Risk Rating		Consequence	Likelihood	Risk Rating
Groundwater	GW15	Shallow groundwater or rising water tables.	Rising water and/or precipitation of salts can damage road pavements.	Road Design		Adequate road (under) drainage. Understanding of conditions of existing road i.e. correlations from existing behaviour.	Insignificant	Rare	Negligible		Insignificant	Rare	Negligible
Planning and Land Use	PLU1	Potential for short term impacts from the Project associated with existing infrastructure, utility services, including fibre optic cables, overhead electricity lines, underground water pipelines, and the Melbourne-Adelaide Railway line	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.	Social Socio-Economic	1140.02 1140.03	Relocation of the assets would be undertaken in accordance with provider requirements consistent with 1140.02 and 1140.03 of VicRoads Contract Shell. Preference is to keep assets within the road reserve. Easements would be sought in private property as necessary.	Minor	Almost Certain	Medium		Minor	Almost Certain	Medium
Planning and Land Use	PLU2	Potential for long term impact on short term and longer term use of land for farming / agricultural purposes, activities resulting from acquisition and potential for land use change	Acquisition would be limited to the edge of property boundaries except for the bypass of Great Western. Properties that would have short term impacts include 2533 (olive grove), 2546 & 25550 (vines), 2590 (trotting track to be relocated), 2710 (vines), 2888 & 2889 (Quarry and former landfill), 2894 & 2895 (quarry), 2899, 2900, 2903, 2904, 2923 & 2928 (vineyard), 3024, 3001 and 3002. In each of these instances, part of the property would be impacted and arrangements may need to be made to address ongoing land use.	Economic Social			Moderate	Almost Certain	High	Alteration of access arrangements, where appropriate. Compensation for the loss of land where necessary. Consolidation of allotments where possible.	Minor	Almost Certain	Medium
Planning and Land Use	PLU3	Potential for inconsistency with planning policies and schemes including the Ararat & Northern Grampians Planning Schemes	The Project would result in severance of some land parcels smaller than the minimum lot sizes and loss of native vegetation, including habitat corridors. The importance of the Western Highway is recognised as a major freight / arterial route through both the Ararat & Northern Grampians Councils. Accordingly, access and connectivity along the highway should be maintained. The Bypass of Great Western has the potential to improve amenity of the town and attract future growth.	Economic Social		Clause 22.02 of the Northern Grampians Planning Scheme seeks to protect the ongoing use of the Western Highway and to minimise potential effects on Great Western township.	Minor	Likely	Medium	Where the small size of the allotment left following acquisition affects the agricultural viability of the land, or the ability to develop a dwelling on the lot consistent with the zoning or Council policy, consider consolidation with adjoining lots. Any necessary compensation can be managed via the *Land Acquisition and Compensation Act 1986*.	Insignificant	Likely	Low
Noise and Vibration	N1	Daytime construction of Western Highway at an individual sensitive receptor. Normal working hours under EPA Publication 1254 - Guidelines for Noise Control (2008) are: * 7 am -6 pm Monday to Friday * 7 am -1 pm Saturdays.	Noise disturbance at a dwelling or other sensitive receptor. There are no limiting noise criteria for the daytime period, however there is still a duty to minimise noise impacts on the surrounding environment.	Biodiversity & Habitat Economic Social	1150.01 (Timing) 1200.12 (Noise)	* Limit noise production through use of noise reduction technology 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 6 pm or sunset, whichever is the earlier.	Insignificant	Rare	Negligible	Contractor to 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 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 - Guidelines for Noise Control (2008), as well as, referring to 'Typical Construction Plant and Equipment Noise Attenuation Over Distance' table, contained in the EES Noise Impact Assessment report (GHD Pty Ltd, 2011).	Insignificant	Rare	Negligible
Noise and Vibration	N2	Daytime construction of Western Highway near sensitive receptors (i.e. more than one receptor) in a local area (community) such as: *Gilchrist Road - Commercial Properties, Stawell (Ch. 24,800) *Robson Road Community, Stawell (Ch. 23,200 - 24,200) *Stawell Park Caravan Park, Monaghan Road, Stawell (Ch. 22,200) *Great Western Community, Great Western (Ch. 11,000 - 16,600) *Garden Gully Road Community, Armstrong (Ch. 4,200 – 8,200) *Morella/Kennel Road Community, Ararat (Ch. 0 - Ararat township).	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.	Biodiversity & Habitat Economic Social	1150.01 (Timing) 1200.12 (Noise)	As for Risk N1.	Insignificant	Rare	Negligible	As for Risk N1.	Insignificant	Rare	Negligible

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Discipline	Risk No.	Impact pathway (how the Project interacts with assets, values, uses and location (state chainage)	Description of consequences (and describe whether it is design, construction or operation)	Linkages	Contract Shell DC1 Reference	Planned Controls to Manage Risk (as per Project Description, and VicRoads *Contract Shell DC1: Design & Construct*, (April 2012)).	Initial Risks			Additional Controls Recommended to Reduce Risk	Residual Risks		
							Consequence	Likelihood	Risk Rating		Consequence	Likelihood	Risk Rating
Noise and Vibration	N3	Evening construction of Western Highway Evening hours as laid out in the EPA Publication 1254 are as follows: * 6 pm -10 pm Monday to Friday * 1 pm -10 pm Saturdays * 7 am - 10 pm Sundays and public holidays.	Noise disturbance within the local community, dwellings or other sensitive receptors, including individual receptors. If evening works are required EPA Publication 1254 - Guidelines for Noise Control (2008) will apply.	Biodiversity & Habitat Economic Social	1150.01 (Timing) 1200.12 (Noise)	* Limit noise production through use of noise reduction technology 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 6 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. In the event that it becomes apparent that the working hours are to be exceeded by more than 30 minutes, or work is required out of hours in an emergency, the Contractor shall have a process in place that will immediately: • notify and obtain approval from the Superintendent; • where required by the Superintendent, notify the Environment Protection Authority; and • advise surrounding property owners/occupiers that will be disturbed by any activity.	Moderate	Possible	Medium	Contractor to 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 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 - Guidelines for Noise Control (2008), as well as, referring to 'Typical Construction Plant and Equipment Noise Attenuation Over Distance' table, contained in the EES Noise Impact Assessment report (GHD Pty Ltd, 2011). Should 'Unavoidable Works' be required for evening or night time work, then where possible section 5.2.2 (b) & (c) of the Vic Roads Noise Guidelines - Construction and Maintenance Works 2007 should be adhered to.	Moderate	Rare	Low
Noise and Vibration	N4	Night time construction of Western Highway The night period as laid out in the EPA Publication 1254 is as follows: * 10 pm -7 am Monday to Sunday.	Noise disturbance within the local community, dwellings or other sensitive receptors, including individual receptors. If night time works are required EPA Publication 1254 - Guidelines for Noise Control (2008) will apply.	Biodiversity & Habitat Economic Social	1150.01 (Timing) 1200.12 (Noise)	* Limit noise production through use of noise reduction technology 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 6 pm or sunset, whichever is the earlier. Night works are not expected to be required for the Project. The contractor(s) need approval from VicRoads, and all relevant stakeholders will be consulted including nearby residents. In the event that it becomes apparent that the working hours are to be exceeded by more than 30 minutes, or work is required out of hours in an emergency, the Contractor shall have a process in place that will immediately: • notify and obtain approval from the Superintendent; • where required by the Superintendent, notify the Environment Protection Authority; and • advise surrounding property owners/occupiers that will be disturbed by any activity.	Moderate	Unlikely	Medium	As for Risk N3.	Moderate	Rare	Low
Noise and Vibration	N5	Site compounds and laydown areas during construction.	Noise disturbance within the local community, dwellings or other sensitive receptors, including individual 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. If evening weekend or night time works are required EPA Publication 1254 - Guidelines for Noise Control (2008) will apply.	Biodiversity & Habitat Economic Social	1150.01 (Timing) 1200.12 (Noise)	* Limit noise production through use of noise reduction technology 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 6 pm or sunset, whichever is the earlier. Contractor to locate site 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. Should working hours be exceeded by more than 30 minutes, or work is required out of hours in an emergency, the Contractor(s) shall • notify and obtain approval from the Superintendent; • where required by the Superintendent, notify the Environment Protection Authority; and • advise surrounding property owners/occupiers that will be disturbed by any activity.	Moderate	Possible	Medium	As for Risk N3.	Moderate	Rare	Low

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							Consequence	Likelihood	Risk Rating		Consequence	Likelihood	Risk Rating
Noise and Vibration	N6	Vibration caused by construction of Western Highway.	Vibration 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 DIN 4150-3 criteria. No significant vibration impacts are expected, however vibration may be just perceptible at residences within 50 m for construction activities involving rolling and compacting. The vibration from rolling and compacting activities would be considered intermittent and short-term. Potentially affected residences include: ID_021 (VR_2527) Ch. 850; ID_023 (VR_2545) Ch. 2,600; ID_026 (VR_1672) Ch. 4,500; ID_027 (VR_2676) Ch. 4,900; ID_028 (VR_2684) Ch. 5,300; ID_029 (VR_2616) Ch. 5,800; ID_030 (VR_2776) Ch. 9,400; ID_040 Ch. 22,050; ID_041 (VR_3024) Ch. 22,150; ID_159 (VR_2746) Ch. 10,550; ID_061 (VR_2806) Ch. 11,100; ID_084 (VR_2966) Ch. 21,850; ID_102 (VR_2613) Ch. 5,450; ID_103 (VR_22613) Ch. 5,500	Biodiversity & Habitat Economic Social	1150.01 (Timing) 1200.12 (Noise)	The Contractor(s) shall employ construction methods that minimise ground vibrations near existing buildings, structures, rail infrastructure and overhead and underground services. Ground particle velocities shall be measured by the Contractor immediately adjacent to any building, structure, rail infrastructure or utility service which might be damaged by vibrations. The Contractor(s) shall bear all costs associated with any claim for damages resulting from the effects of ground vibration attributable to the Contractor's construction methods or work.	Moderate	Possible	Medium	If construction works causing vibration are required within 50 m of a sensitive receptor (building) a construction vibration assessment should be undertaken prior to works being carried out and appropriate methods of construction employed to minimise impacts. Timing of the works to be conducted during the recommended operational hours, to reduce vibration levels to residential properties. Residents to be made aware of the construction times and the duration they will likely be affected, through letterbox drops, personal meetings and community meetings. Residents to be pre-warned of high vibration events (e.g. piling operations), and any operations being undertaken outside recommended hours. Public notification should be given a minimum of 72 hours prior to planned works. As a precaution the contractor should undertake a dilapidation survey for any buildings, structures or utilities located within 50 m of construction works. Equipment operators to be made aware of potential vibration issues problems and of techniques to minimise vibration effects during construction works.	Moderate	Rare	Low
Noise and Vibration	N7	Operation of the Western Highway generates noise emissions from vehicular traffic Areas where the VicRoad Traffic Noise Reduction Policy 2005 Applies.	Noise disturbance within the local community, dwellings or other sensitive receptors, including individual receptors. Locations Where Policy Applies: Sections where both eastbound and westbound carriageways are located outside the existing road reserve include: Ch. 11,700 to 16,200 (bypass of Great Western township 400 m northwest of Delahoy Road through to 45 m northwest of Robinsons Creek near St George Road); Ch. 23,100 to 23,900 (160 m northwest of London Road through to adjacent Robson Road).	Biodiversity & Habitat Economic Social	VicRoads Traffic Noise Reduction Policy 2005	Limit potential noise production during design stage through the use of alignment shifts, pavement materials, speed limits and other such items as required. VicRoads Traffic Noise Reduction Policy 2005 Noise attenuation would be considered for sensitive receptors that exceed 63 dB(A) (and the Policy is found to apply) Consideration for retrofitting (e.g. double glazed windows, barriers) would be given where noise levels at sensitive receptors exceed 68 dB(A) (and the Policy is found to apply).	Insignificant	Almost Certain	Low	Where a "new alignment" as described in the VicRoads Traffic Noise Reduction Policy (2005) is constructed (and the Policy is found to apply), noise monitoring to ensure compliance with the policy noise level objectives for Category A and B sensitive receptors would be carried out. Where the noise criteria outlined in the Traffic Noise Reduction Policy (2005) are exceeded, mitigation works as outlined in the policy would be carried out as required.	Insignificant	Rare	Negligible
Noise and Vibration	N8	Operation of the Western Highway generates noise emissions from vehicular traffic. Areas where the VicRoads Traffic Noise Reduction Policy 2005 Does Not Apply.	Noise disturbance within the local community, dwellings or other sensitive receptors, including individual receptors. Locations Where Policy Does Not Apply: Sections where either one or both eastbound and westbound carriageways are located inside the existing road reserve include all areas not identified in N7.	Biodiversity & Habitat Economic Social		Limit potential noise production during design stage through the use of alignment shifts, pavement materials, speed limits and other such items as required.	Insignificant	Almost Certain	Low	Should complaints be received, VicRoads would carry out noise monitoring as required to confirm noise levels are below the noise level objective.	Insignificant	Rare	Negligible
Social	S1	The Project may lead to changes to the existing social and community conditions by creating pressures for the settlement pattern to change.	Travel time changes from Stawell and Ararat, which may make it seem a more desirable location for residential development. If there is increased development pressure, this may have flow-on effects in the delivery of infrastructure and community services.	Land use		This is controlled by the planning scheme.	Insignificant	Almost Certain	Low	No additional control is necessary for VicRoads.	Insignificant	Almost Certain	Low
Social	S2	The Project may lead to changes to the existing social and community conditions by changing the distribution of residents in the vicinity of the Highway.	As per S1: there are several rural properties around Great Western which would be cut up by the Project. If the land between the new alignment and the existing township was re-zoned for rural residential or township purposes, this may increase the population in the vicinity of the project. Along the balance of Section Three the alignment is relatively close to the existing highway: this is likely to minimise the number of new households living in close proximity to the road.	Land use		This is controlled by the planning scheme.	Insignificant	Almost Certain	Low	No additional control is necessary for VicRoads.	Insignificant	Almost Certain	Low
Social	S3	The Project may change the existing social and community conditions by creating change processes which affect the demographic characteristics of the Study Area.	S1 and S2 may lead to long-term changes to the demographic character of Great Western. It is unlikely that the balance of Section Three would create any major demographic change processes.	Planning		This is controlled by the local planning scheme.	Insignificant	Possible	Negligible	This is controlled by the local planning scheme.	Insignificant	Possible	Negligible
Social	S4	The Project and changes to access arrangements may lead to changes to the existing social and community conditions by changing patterns of community interaction and use of social foci.	The major locations for social interaction within the study area are: - The Sisters Rocks - Stawell - The Grange Golf Club - Stawell - Great Western Mechanics Institute Hall – Great Western - Eric F. H. Thomson Sports Reserve – Great Western - Christ Church Anglican Church – Great Western. While access to all of these facilities would be changed by the Project, this is unlikely to significantly affect patterns of community interaction. There would be no major severance of access, and for this reason it is likely that existing patterns will continue.	Indigenous heritage		Consultation with Council and the local community has been undertaken during the planning for this project to determine access requirements. Access arranges will change, however it will be maintained to significant locations such as the Sisters Rocks.	Insignificant	Possible	Negligible	There is significant concern from the Grange Golf Club management regarding the effects of the Project on accessibility to the Golf Club. VicRoads could continue liaison with the management of the Grange Golf Club to ensure that the best design for access to this facility is selected.	Insignificant	Possible	Negligible

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Social	S5	The Project may affect local residents and communities during the construction stage.	The potential social impacts of construction include: - Disruption from the presence of the construction workforce – most likely to be caused by their 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. Locations along the project route where this may occur are those where construction activities are carried out in close proximity to dwellings, or where they disrupt access. The sites of highest sensitivity are around Armstrong, Great Western and Monaghan Road, Stawell (near the caravan park and golf course).	Social Noise Air Visual	1200.07 and 1200.12 and 1150.01, 1210.01	Construction Management controls described in VicRoads Contract Shell DC1 document. This includes relevant Air Quality, Geology (Contamination), Noise, and Traffic controls described in Risks A1, G1, G2, N3, T1. The CEMP will have protocols for liaising with adjacent land owners, to keep them fully informed about construction activities in their area, and any potential disruption to their access and amenity.	Minor	Likely	Medium	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 and Transport Impact Assessment Reports. In addition, the construction contractor should be required to locate site office and lay-down areas away from sensitive locations.	Minor	Likely	Medium
Social	S6	The Project may lead to effects on places with particular cultural, recreational or aesthetic values, particularly with regard to significant regional locations.	Access to sites in Great Western may be slightly changed for people coming into the town, but there would be minimal difference within the town. Access to Seppelt's Winery and Best's Winery would be changed, as travellers would need to make a conscious decision to leave the new road and enter Great Western. This may affect casual visitation to these facilities. Access to other sites within Great Western would only be minimally changed. Access to the Sisters Rocks, the Stawell Park Caravan Park and Grange Golf Club would be changed, but there would be no effect on the actual facilities. It is unlikely that there would be any decrease in the use of these sites as a result of the Project, as these are all destination sites. A minor change in access arrangements is unlikely to affect travel intentions.	Social Indigenous Heritage	1210	Consultation with Council, local community and indigenous community has been undertaken during the planning for this project to idenitify significant places and how to reduce potential impacts. Community interactions such as community liaison, publicity and community issue resolution would be in accordance with Section 1210 of the VicRoads DC1 contract specification.	Insignificant	Possible	Negligible	The Northern Grampians Shire Council may wish to undertake a management plan for the Sisters Rocks. 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.	Insignificant	Possible	Negligible
Social	S7	The Project may create a risk of dislocation for individuals and communities	The dwelling on Property No. 2776 will be acquired.	Social			Minor	Unlikely	Low	Note that mitigating amenity impacts (S9) may lead to dwelling acquisition in a few instances.	Insignificant	Unlikely	Negligible
Social	S8	The Project may create a risk of severance and accessibility changes for individuals and communities	Most existing access ways would be changed by the Project, particularly at some future time when the Highway would be upgraded to Freeway standard (AMP1). Under the Freeway standard, existing access points from properties on to the Highway would be removed. Some side roads may have restricted access and egress. Access into and around Great Western will be changed. The effects of the changes will be both positive and negative: many residents will experience slightly longer travel times, but will have safer and easier access to their properties and side roads. There will be minimal severance resulting from the Project. Accessibility in Great Western may improve as traffic volumes will decrease.	Traffic		Service roads have been identified and included in the concept design developed for the project. Refer to the Traffic and Transport Impact Assessment Report	Minor	Almost Certain	Medium	The mitigation measures recommended to minimise the impact of construction are detailed in the Traffic and Transport Impact Assessment Report. These measures address the expected potential social impacts of construction. VicRoads should continue to liaise with landowners regarding access arrangements, to ensure that driveways and access points are located appropriately. Council could consider working with the local community to update to the Great Western Community Plan, which could include planning new walking and cycling routes around the town to take advantage of the changed traffic conditions.	Minor	Likely	Medium
Social	S9	The Project may create risks of reduction of amenity (in relation to visual amenity, noise other changes to the character of the area) to individuals and communities.	Houses left close to the ROW are located at Ch. 4500 (south), 4900 (south), 5300 (south), 5800 (north), 10600, 21900 (north). The proximity varies. Some of these dwellings are extremely close to the Project alignment and there would be significant amenity impacts. Refer to Section 6.3.3 of the SIA for a detailed discussion of amenity impacts.	Landscape Noise		To mitigate visual amenity impacts, VicRoads will develop a landscape plan to vegetate 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. The number of houses which would have a high increase in noise levels (5+ db (A)) is 28, or 11.7% of the total number of houses in the study area. This is a high negative impact.	Moderate	Likely	High	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.	Minor	Unlikely	Low
Surface Water	SW1A	Construction activities on Significant crossing of Concongella Creek (Ch. 8200, WB 323) resulting in disturbance of channel planform, geometry and river health values.	Destruction of >100 m of waterway banks, channel profile and pools. Reduction in aquatic and terrestrial habitat value in the vicinity of the crossing location.	Biodiversity & Habitat		Reinstatement of waterway in accordance with WCMA requirements (channel profile, floodplain revegetation).	Moderate	Likely	High	Realignment of waterway to follow eastern boundary of old highway, including bed control structures, bank stabilisation using a combination of rock, vegetation and erosion matting, creation of meanders, reintroduction of large woody debris, synthesis of existing pool and riffles, relocation of old highway bridge and construction of a new bridge on the new carriageway.	Minor	Possible	Low
Surface Water	SW1B	Construction activities for new or extended Significant crossings on Allanvale Creek (Ch.12000, WB326), Concongella Creek (Ch. 16000, WB329), and Robinsons Creek (Ch. 16200, WB 331) resulting in disturbance of channel planform, geometry and river health values.	Local destabilisation of >100 m of waterway banks, channel profile and pools. Reduction in aquatic and terrestrial habitat value in the vicinity of the crossing location.	Biodiversity & Habitat		Reinstatement of waterway in accordance with WCMA requirements (channel profile, floodplain revegetation); avoid unnecessary work in channel.	Moderate	Likely	High	Partial realignment of waterway to limit the length of waterway beneath carriageways or construction of longer bridge spans to protect the existing waterway bed and banks.	Minor	Possible	Low
Surface Water	SW1C	Construction activities on other Significant crossings of Concongella Creek and tributaries (Ch. 4400, WB 312), (Ch 6450, WB 320), (Ch 6750, WC 321), (Ch. 9100, WB 324), (Ch. 10550, WB325) and Donald Creek (Ch. 16500, WB 331) resulting in disturbance of channel planform, geometry and river health values.	Local destabilisation of waterway banks, channel profile and pools. Reduction in aquatic and terrestrial habitat value in the vicinity of the crossing location.	Biodiversity & Habitat		Reinstatement of waterway in accordance with WCMA requirements (channel profile, floodplain revegetation); avoid unnecessary work in channel.	Minor	Likely	Medium	Construction of bed control and/or bank protection works to protect vulnerable areas within or adjacent to the work area.	Insignificant	Likely	Low

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Surface Water	SW1D	Construction activities on side roads at (SR6100, WC 319), Concongella Creek (SR12150, WB327), (SR15400, WB328) and Pleasant Creek (SR21700, WB339) resulting in disturbance of channel planform, geometry and/or river health values.	Local disturbance to waterway banks (minor change to existing structure), channel profile and pools. Reduction in aquatic and terrestrial habitat value in the vicinity of the crossing location.	Biodiversity & Habitat		Reinstatement of waterway in accordance with WCMA requirements (channel profile, floodplain revegetation); avoid unnecessary work in channel.	Insignificant	Possible	Negligible		Insignificant	Possible	Negligible
Surface Water	SW1E	Construction activities on all other Minor waterways resulting in disturbance of channel planform, geometry and/or river health values.	Local disturbance or destabilisation of waterway banks and channel profile. Reduction in aquatic and terrestrial habitat value in the vicinity of the crossing location.	Biodiversity & Habitat		Reinstatement of waterway in accordance with WCMA and GHCMA requirements (channel profile, floodplain revegetation); avoid unnecessary work in channel.	Insignificant	Possible	Negligible		Insignificant	Possible	Negligible
Surface Water	SW2A	Construction of the Western Highway at new crossing locations results in the change in the hydraulic conditions and geomorphologic response at crossing locations.	Increased erosion potential downstream/increase sedimentation upstream due to the constriction 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).	Moderate	Possible	Medium	Construction of oversized culvert crossings and/or limit disturbance to existing creek bed (i.e. impose bridge span crossing to minimise change to the existing waterway).	Minor	Possible	Low
Surface Water	SW2B	Construction of the Western Highway at existing crossing locations results in the change in the hydraulic conditions and geomorphologic response at crossing locations.	Some increased erosion potential downstream/increase sedimentation upstream due to the constriction of flow through a culvert or beneath a bridge (limited impact given existing crossing) .	Biodiversity & Habitat		Appropriate design standards (e.g. adequately sized culverts, rock protection to stabilise waterway bed and banks at the crossing location if required).	Minor	Possible	Low		Minor	Possible	Low
Surface Water	SW3A	Construction of the Western Highway at new crossing locations results in fragmentation of river health values at crossing locations.	Restrictions to aquatic and terrestrial fauna movement, impediments to future waterway and catchment rehabilitation efforts.	Biodiversity & Habitat		Appropriate design standards (e.g. culvert sized appropriately and set at bed level of waterway or span bridge where required,	Moderate	Possible	Medium	Include additional design control features such as adequate light penetration to encourage fish passage or impose construction of longer bridge spans to protect the existing waterway.	Minor	Possible	Low
Surface Water	SW3B	Construction of the Western Highway at existing crossing locations results in fragmentation of river health values at crossing locations.	Restrictions to aquatic and terrestrial fauna movement, impediments to future waterway and catchment rehabilitation efforts (limited impact given existing crossing).	Biodiversity & Habitat		Appropriate design standards (e.g. culvert sized appropriately and set at bed level of waterway or span bridge where required	Minor	Possible	Low		Minor	Possible	Low
Surface Water	SW4A	Construction activities result in increased sediment and contaminant loadings to all Significant waterways.	Degradation of water quality in receiving waterways, impact on aquatic ecosystems.	Biodiversity & Habitat	1200.08	Implement Erosion and Sediment Control Measures and SEPP requirements for receiving waterways through an EMP, including but not limited to: minimising the amount of exposed erodible surfaces, installation of erosion and sedimentation control, prompt covering of exposed surfaces, progressive revegetation of the site, management of stockpiles and co-ordination to avoid works near watercourses.	Minor	Possible	Low		Minor	Possible	Low
Surface Water	SW4B	Construction activities result in increased sediment and contaminant loadings to all other (Minor) waterways.	Degradation of water quality in receiving waterways, impact on aquatic ecosystems.	Biodiversity & Habitat	1200.08	Implement Erosion and Sediment Control Measures and SEPP requirements for receiving waterways through an EMP, including but not limited to: minimising the amount of exposed erodible surfaces, installation of erosion and sedimentation control, prompt covering of exposed surfaces, progressive revegetation of the site, management of stockpiles and co-ordination to avoid works near watercourses.	Insignificant	Possible	Negligible		Insignificant	Possible	Negligible
Surface Water	SW5A	Operation of the Western Highway road surface results in increased stormwater, sediment and contaminant loadings to all Significant waterways.	Increase in quantity of stormwater runoff compared to the existing flow regime. Degradation of water quality in receiving waterways, impact on aquatic ecosystems.	Biodiversity & Habitat		Water Sensitive Road Design measures would be evaluated for inclusion in the detailed design phase, as described in VicRoads Integrated Water Management Guidelines (August 2011), and at a minimum best practice pollution reduction targets would be achieved for the additional road surface compared to the existing road surface footprint.	Minor	Possible	Low		Minor	Possible	Low
Surface Water	SW5B	Operation of the Western Highway road surface results in increased stormwater, sediment and contaminant loadings to all other waterways.	Increase in quantity of stormwater runoff compared to the existing flow regime. Degradation of water quality in receiving waterways, impact on aquatic ecosystems.	Biodiversity & Habitat		Water Sensitive Road Design measures would be evaluated for inclusion in the detailed design phase, as described in VicRoads Integrated Water Management Guidelines (August 2011), and at a minimum best practice pollution reduction targets would be achieved for the additional road surface compared to the existing road surface footprint.	Insignificant	Possible	Negligible		Insignificant	Possible	Negligible
Surface Water	SW6A	Construction of the Western Highway results in changes to the floodplain characteristics and flooding characteristics in the township of Great Western from Concongella Creek and tributaries.	Increased afflux and extent of upstream flooding and/or redistribution of flows results in medium increase in flooding at a township scale.	Social		Appropriate design standards to achieve highway flood risk requirements (e.g. adequately sized culverts or bridge spans where required).	Major	Possible	High	Further hydraulic modelling would need to be undertaken during the detailed design phase to minimise the risk of increased flooding, and to demonstrate that the flood risk has been satisfactorily mitigated.	Moderate	Possible	Medium
Surface Water	SW6B-1	Construction of the Western Highway results in changes to the floodplain characteristics for Concongella Creek and tributaries where rural properties are impacted.	Increased afflux and extent of upstream flooding and/or redistribution of flows or local drainage results in a medium increase in flooding at a rural scale.	Social		Appropriate design standards to achieve highway flood risk requirements (e.g. adequately sized culverts or bridge spans where required).	Moderate	Possible	Medium	Further hydraulic modelling would need to be undertaken during the detailed design phase to minimise the risk of increased flooding. Note: meeting requirements for individual crossings may have implications for SW6A.	Minor	Unlikely	Low
Surface Water	SW6B-2	Construction of the Western Highway results in changes to the floodplain characteristics for Concongella Creek and tributaries (where no rural properties are impacted).	Increased afflux and extent of upstream flooding and/or redistribution of flows or local drainage results in a slight increase in flooding at a rural scale.	Social		Appropriate design standards to achieve highway flood risk requirements (e.g. adequately sized culverts or bridge spans where required).	Minor	Possible	Low	Further hydraulic modelling would need to be undertaken during the detailed design phase to minimise the risk of increased flooding. Note: meeting requirements for individual crossings may have implications for SW6A.	Insignificant	Unlikely	Negligible
Surface Water	SW6C	Construction of the Western Highway results in changes to the floodplain characteristics for all other waterways.	Increased afflux and extent of upstream flooding and/or redistribution of flows or local drainage results in a slight increase in flooding at a rural scale.	Social		Appropriate design standards to achieve highway flood risk requirements (e.g. adequately sized culverts or bridge spans where required).	Insignificant	Unlikely	Negligible		Insignificant	Unlikely	Negligible

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Traffic and Transport	T1	Changed road environment during construction results in general reduction to road safety. Examples of road environment changes include heavy vehicles entering/exiting construction accesses, additional or closer roadside hazards, variable speed limits, unfamiliar conditions. Impacted road users include private vehicles, public transport, school buses, cyclists and pedestrians.	Increased incidence of accidents that one or more incident may result in a fatality.	Social	1160 1180	Traffic Management Plans (TMPs) would need to be prepared to identify, assess and appropriately eliminate, reduce or mitigate road safety hazards and to be reviewed by VicRoads prior to implementation. TMPs to comply with standard VicRoads practices, the Traffic Management Code of Practice and the *Road Management Act 2004*. Examples include: speed reduction where appropriate, worksite safety barriers, advance warning signage, hazard visibility, etc. Road Safety Audits (RSAs) to be undertaken on TMPs. Project Description stipulates that construction vehicles would not typically use local roads.	Catastrophic	Unlikely	High	Haulage routes for construction traffic and heavy vehicles to be appropriately designated and managed as part of TMPs, with consideration for safety. Implement a communication strategy with the key stakeholders to manage impacts, and inform road users and the community.	Catastrophic	Rare	Medium
Traffic and Transport	T2	Changed road environment during construction results in general reduction to performance and efficiency of travel modes. Examples of road environment changes include speed reductions, works resulting in temporary road or lane closures or cumulative impacts of the potential simultaneous construction of three sections of the Western Highway. Impacted users can include private vehicles, public transport, school buses, emergency services, cyclists, pedestrians and rail.	Increased disruption or displacement of road users, and increased travel time and/or distance.	Social Economic Planning & Land Use	1160 1180	TMPs prepared to identify, assess and appropriately minimise likely impacts on road operations. These would comply with standard VicRoads practices, the Traffic Management Code of Practice to the *Road Management Act 2004*. Road Safety Audits (RSAs) to be undertaken on TMPs. Buses would be provided for rail users in the event that rail operations are temporarily suspended (in consultation with PTV, bus and rail operators).	Moderate	Likely	High	Construction to be staged to allow one carriageway to be operational at all times and traffic flow not to be stopped for any extended period of time. Consideration of non-motorised road users (ensuring connectivity is not removed), public transport, school buses, emergency services and rail interfaces. This would include: * Local community, Department of Transport and other relevant stakeholders (such as transport operators) consulted and informed of likely disruption due to construction, including impacts to public transport and school bus services. * Haulage routes for construction traffic and heavy vehicles appropriately designated and managed as part of TMPs, with consideration for road operations. * Impact on travel times as a result of TMP implementation to be analysed prior to, and assessed during, construction. Implementation of alternative TMP measures to be considered during construction if impacts on operations are determined to be unacceptable. * Where possible schedule construction works to minimise the impacts at public holidays, school holidays or other times when the Western Highway would reasonably be expected to experience higher levels of demand and to minimise impacts on key user groups. * Communication between construction teams from each section and integration of Traffic Management Strategies.	Minor	Likely	Medium
Traffic and Transport	T3	The duplication disrupts/severs local access routes including cyclist connectivity post-construction (interim and ultimate operation).	Economic and social disruption through increased travel times and reduced accessibility. Vehicle traffic, public transport, school buses, emergency services, cyclists, pedestrians, rail crossings and private accesses affected.	Social Economic		Although local access travel distances and times may be longer, the design generally maintains access to side roads and properties during the interim and ultimate solutions. Access in the interim is via wide median treatments and 'left-in' and 'left-out access.	Minor	Likely	Medium	Local community and stakeholders to be engaged and informed of positive project outcomes as part of broader community consultation process to address perceptions of localised adverse impacts. Ensure signage and design permits cyclists to continue to use the shoulder of the Highway such that it meets the Road Rule 95(2) requirements. Possible compensation through the *Land Acquisition and Compensation Act*.	Minor	Possible	Low
Traffic and Transport	T4	Potential for some aspects of road safety, during (interim) operation of the new road to be degraded. For example: * Increased crossing distance for wildlife exacerbates frequency of accidents. * Increased distance for farm machinery to be travelling along the road. * Changes in atmospheric conditions, i.e. fog, sunglare, due to the changes in alignment orientation. * Movements at intersections and property accesses that are retained.	Increased incidence of accidents that one or more incident may result in a fatality.	Biodiversity & Habitat Social Economic	1180	Road safety audit completed for the design.	Catastrophic	Possible	High	Assess wildlife corridors and identify mitigation measures (such as culverts) to reduce the requirement for wildlife to cross the Western Highway. Assessment of atmospheric conditions within the Project Area, during detailed design.	Catastrophic	Rare	Medium
Traffic and Transport	T5	Potential for some aspects of road safety, during (ultimate) operation of the new road to be degraded. For example: * Increased crossing distance for wildlife exacerbates frequency of accidents. * Increased distance for farm machinery to be travelling along the road. * Changes in atmospheric conditions, i.e. fog, sunglare, due to changes in alignment orientation.	Increased incidence of accidents that one or more incident may result in a fatality.	Biodiversity & Habitat Social Economic	1180	Road safety audit completed for the design.	Catastrophic	Unlikely	High	Assess wildlife corridors and identify mitigation measures (such as culverts) to reduce the requirement for wildlife to cross the Western Highway. Assessment of atmospheric conditions within the Project Area, during detailed design.	Catastrophic	Rare	Medium
Traffic and Transport	T6	Potential for some aspects of road safety to be degraded through design, including horizontal and vertical geometry, sight distance at all intersections and merge locations (ramps and service road entry/exit).	Increased incidence of accidents that one or more incident may result in a fatality.			Appropriate standards are applied to the design. Road safety audit completed for the design.	Catastrophic	Rare	Medium	No additional controls.	Catastrophic	Rare	Medium

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Traffic and Transport	T7	Traffic volumes significantly increase due to induced demand and cause congestion (for the interim and ultimate solutions).	Increased travel time for road users.	Economic		Risk is negligible due to adequate capacity and no other parallel routes of the same standard road, therefore no planned controls to manage risk.	Insignificant	Rare	Negligible	Risk is negligible therefore no additional controls to manage risks.	Insignificant	Rare	Negligible
Visual and Landscape	LV1A	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, 17000-17200 and 21400-22200)	Approximately 24 dwellings and those located within the caravan park would be located adjacent to the duplication and would receive a moderate or minor visual change upon their views.	Social	3060.3 Technical Bulletin No 36 AustRoads Part 6B	Provide planting within the duplication ROW.	Insignificant	Likely	Low	Non-standard treatments to reduce impact: - Retention of existing roadside vegetation where possible (protective fencing treatments may be required); - Establishment of tree and shrub planting of similar character to existing roadside vegetation in close proximity to the road edge (protective fencing treatments may be required); - Establishment of screening vegetation within the ROW for views from affected dwellings; and - Use of grasses upon fill embankments consistent with surrounding rural land.	Insignificant	Possible	Negligible
Visual and Landscape	LV1B	Construction and operation of a new overpass along the current Western Highway alignment would visually impact upon adjacent dwellings. (Ch. 5300-6500)	8 dwellings would be located adjacent to the Garden Gully Overpass and would receive a major visual change upon their views.	Social	3060.3 Technical Bulletin No 36 AustRoads Part 6B	Provide planting within the duplication ROW.	Moderate	Almost Certain	High	Non-standard treatments to reduce impact: - Retention of existing roadside vegetation where possible (protective fencing treatments may be required); - Establishment of tree and shrub planting of similar character to existing roadside vegetation in close proximity to the road edge (protective fencing treatments may be required). - Establishment of screening vegetation within the ROW for views from affected dwellings; and - Sensitively designed fill embankments.	Minor	Almost Certain	Medium
Visual and Landscape	LV1C	Construction and operation of the duplication along a new highway alignment including overpasses would visually impact upon adjacent dwellings. (Ch. 11500-12600)	Approximately 4 dwellings would be located adjacent to Great Western Bypass and Southbound Overpass and would receive a major visual change upon their views.	Social	3060.3 Technical Bulletin No 36 AustRoads Part 6B	Provide planting within the duplication ROW.	Minor	Almost Certain	Medium	Non-standard treatments to reduce impact: - Establishment of tree and shrub screening planting to effectively screen the duplication and maintain a vegetated edge to the township. Vegetation should be established in clumps and not in linear banding that contrasts with the existing landscape character. - Tree planting along the base and shrub planting along embankments to screen the overpass. - Possible screen planting within private properties along the interface of the overpass; - Design of embankments to be complimentary to the surrounding topography; and - Enhance existing roadside vegetation and develop strong gateway planting upon the entrances to Great Western.	Insignificant	Almost Certain	Low
Visual and Landscape	LV1D	Construction and operation of the duplication along a new highway alignment including overpasses would visually impact upon adjacent dwellings. (Ch. 14400-16500)	Approximately 10 dwellings would be located adjacent to Great Western Bypass and Bests Road Overpass and would receive a moderate visual change upon their views.	Social	3060.3 Technical Bulletin No 36 AustRoads Part 6B	Provide planting within the duplication ROW.	Minor	Almost Certain	Medium	Non-standard treatments to reduce impact: - Establishment of tree and shrub screening planting to effectively screen the duplication and maintain a vegetated edge to the township. Vegetation should be established in clumps and not in linear banding that contrasts with the existing landscape character. - Tree planting along the base and shrub planting along embankments to screen the overpass. - Possible screen planting within private properties along the interface of the overpass; - Design of embankments to be complimentary to the surrounding topography; and - Enhance existing roadside vegetation and develop strong gateway planting upon the entrances to Great Western.	Insignificant	Almost Certain	Low
Visual and Landscape	LV1E	Construction and operation of a new overpass along the existing Western Highway alignment would visually impact upon adjacent dwellings. (Ch. 20200-21000)	1 dwelling would be located adjacent to the Rail Overpass and would receive a major visual change upon their views.	Social	3060.3 Technical Bulletin No 36 AustRoads Part 6B	Provide planting within the duplication ROW.	Minor	Almost Certain	Medium	Non-standard treatments to reduce impact include: - Retention of existing roadside vegetation where possible (protective fencing treatments may be required); - Establishment of screening vegetation against views for the affected dwellings; - Sensitively designed fill embankments; and - Roadside avenue tree planting opposite retained roadside vegetation.	Insignificant	Almost Certain	Low
Visual and Landscape	LV1F	Construction and operation of a new overpass along the existing Western Highway alignment would visually impact upon adjacent dwellings. (Ch. 23000-242000)	Approximately 16 dwellings would be located adjacent to the London Duplication Road Overpass and would receive a major visual change upon their views.	Social	3060.3 Technical Bulletin No 36 AustRoads Part 6B	Provide planting within the duplication ROW.	Moderate	Almost Certain	High	Non-standard treatments to reduce impact include: - Retention of existing roadside vegetation where possible (protective fencing treatments may be required); - Establishment of tree and shrub planting of similar character to existing roadside vegetation in close proximity to the road edge (protective fencing treatments may be required). - Establishment of screening vegetation against eastern views for the affected dwelling; and - Sensitively designed fill embankment.	Minor	Almost Certain	Medium
Visual and Landscape	LV2A	Construction and operation of the duplication would visually impact upon the Ararat Regional Park. (Ch. 1000-2400)	It is not anticipated that the duplication would be visible from the Ararat Regional Park and would receive an insignificant visual change.	Social	3060.3 Technical Bulletin No 36 AustRoads Part 6B	Provide planting within the duplication ROW.	Insignificant	Unlikely	Negligible	None required.	Insignificant	Unlikely	Negligible

Discipline	Risk No.	Impact pathway (how the Project interacts with assets, values, uses and location (state chainage)	Description of consequences (and describe whether it is design, construction or operation)	Linkages	Contract Shell DC1 Reference	Planned Controls to Manage Risk (as per Project Description, and VicRoads *Contract Shell DC1: Design & Construct*, (April 2012)).	Initial Risks			Additional Controls Recommended to Reduce Risk	Residual Risks		
							Consequence	Likelihood	Risk Rating		Consequence	Likelihood	Risk Rating
Visual and Landscape	LV2B	Construction and operation of the duplication would visually impact upon Grampians Estate Wines. (Ch. 11000)	The duplication would be visible from Grampians Estate Wines and receive an insignificant visual change.	Social	3060.3 Technical Bulletin No 36 AustRoads Part 6B	Provide planting within the duplication ROW.	Insignificant	Almost Certain	Low	None required.	Insignificant	Almost Certain	Low
Visual and Landscape	LV2C	Construction and operation of the duplication would visually impact upon the Great Western Town Centre.	It is not anticipated that the duplication would be visible from the Great Western Town Centre and would receive an insignificant visual change.	Social	3060.3 Technical Bulletin No 36 AustRoads Part 6B	Provide planting within the duplication ROW.	Insignificant	Unlikely	Negligible	None required.	Insignificant	Unlikely	Negligible
Visual and Landscape	LV2D	Construction and operation of the duplication would visually impact upon Outer Great Western. (Ch. 11200-16400)	The duplication would be visible from Outer Great Western and receive a moderate visual change.	Social	3060.3 Technical Bulletin No 36 AustRoads Part 6B	Provide planting within the duplication ROW.	Minor	Almost Certain	Medium	Non-standard treatments to reduce impact: - Establishment of tree and shrub screening planting to effectively screen the duplication and maintain a vegetated edge to the township. Vegetation should be established in clumps and not in linear banding that contrasts with the existing landscape character. - Tree planting along the base and shrub planting along embankments to screen the overpass. - Possible screen planting within private properties along the interface of the overpass; - Design of embankments to be complimentary to the surrounding topography; and - Enhance existing roadside vegetation and develop strong gateway planting upon the entrances to Great Western.	Insignificant	Almost Certain	Low
Visual and Landscape	LV2E	Construction and operation of the duplication would visually impact upon the Great Western Primary School. (Ch. 14600)	It is not anticipated that the duplication would be visible from the Great Western Primary School and would receive an insignificant visual change.	Social	3060.3 Technical Bulletin No 36 AustRoads Part 6B	Provide planting within the duplication ROW.	Insignificant	Unlikely	Negligible	None required.	Insignificant	Unlikely	Negligible
Visual and Landscape	LV2F	Construction and operation of the duplication would visually impact upon the Great Western Bushland Reserve. (Ch. 12400-13000)	It is not anticipated that the duplication would be visible from the Great Western Bushland Reserve and would receive an insignificant visual change.	Social	3060.3 Technical Bulletin No 36 AustRoads Part 6B	Provide planting within the duplication ROW.	Insignificant	Unlikely	Negligible	None required.	Insignificant	Unlikely	Negligible
Visual and Landscape	LV2G	Construction and operation of the duplication would visually impact upon Bests Winery. (Ch. 15800)	The duplication would be visible from Bests Winery and receive a minor visual change.	Social	3060.3 Technical Bulletin No 36 AustRoads Part 6B	Provide planting within the duplication ROW.	Insignificant	Almost Certain	Low	None required.	Insignificant	Almost Certain	Low
Visual and Landscape	LV2H	Construction and operation of the duplication would visually impact upon Seppelt Winery. (Ch. 12200)	The duplication would be visible from Seppelt Winery and receive a minor visual change.	Social	3060.3 Technical Bulletin No 36 AustRoads Part 6B	Provide planting within the duplication ROW.	Insignificant	Almost Certain	Low	None required.	Insignificant	Almost Certain	Low
Visual and Landscape	LV2I	Construction and operation of the duplication would visually impact upon Sisters Rocks. (Ch. 22000-22400)	The duplication would be visible from Sisters Rocks and receive a moderate visual change.	Social	3060.3 Technical Bulletin No 36 AustRoads Part 6B	Provide planting within the duplication ROW.	Moderate	Almost Certain	High	Non-standard treatments to reduce impact: - Retention of existing roadside vegetation where possible (protective fencing treatments may be required); - Establishment of tree and shrub planting of similar character to existing roadside vegetation in close proximity to the road edge (protective fencing treatments may be required); and - Establish dense screening vegetation along the interface of the duplication to Sisters Rocks, within the ROW and within the informal Sisters Rocks car park.	Minor	Almost Certain	Medium
Visual and Landscape	LV2J	Construction and operation of the duplication would visually impact upon the Sisters Rocks Bushland Reserve. (Ch. 22800-23000)	It is not anticipated that the duplication would be visible from the Sisters Rocks Bushland Reserve and would receive an insignificant visual change.	Social	3060.3 Technical Bulletin No 36 AustRoads Part 6B	Provide planting within the duplication ROW.	Insignificant	Unlikely	Negligible	None required.	Insignificant	Unlikely	Negligible
Visual and Landscape	LV2K	Construction and operation of the duplication would visually impact upon the Grange Golf Course. (Ch. 22000)	It is not anticipated that the duplication would be visible from the Grange Golf Course and would receive an insignificant visual change.	Social	3060.3 Technical Bulletin No 36 AustRoads Part 6B	Provide planting within the duplication ROW.	Insignificant	Unlikely	Negligible	None required.	Insignificant	Unlikely	Negligible
Visual and Landscape	LV2L	Construction and operation of the duplication would visually impact upon the Stawell Park Caravan Park. (Ch. 22000-22400)	The duplication would be visible from the Stawell Park Caravan Park and receive a minor visual change.	Social	3060.3 Technical Bulletin No 36 AustRoads Part 6B	Provide planting within the duplication ROW.	Insignificant	Almost Certain	Low	Non-standard treatments to reduce impact: - Retention of existing roadside vegetation where possible (protective fencing treatments may be required); and - Establishment of tree and shrub planting of similar character to existing roadside vegetation in close proximity to the road edge (protective fencing treatments may be required).	Insignificant	Almost Certain	Low

Discipline	Risk No.	Impact pathway (how the Project interacts with assets, values, uses and location (state chainage)	Description of consequences (and describe whether it is design, construction or operation)	Linkages	Contract Shell DC1 Reference	Planned Controls to Manage Risk (as per Project Description, and VicRoads *Contract Shell DC1: Design & Construct*, (April 2012)).	Initial Risks			Additional Controls Recommended to Reduce Risk	Residual Risks		
							Consequence	Likelihood	Risk Rating		Consequence	Likelihood	Risk Rating
Visual and Landscape	LV3A	Construction and operation of the duplication would visually impact upon landscape character types of high landscape sensitivity. (Ch. 14000-14800)	The duplication would result in a minor visual change upon the Bushland landscape character type through the removal of existing tree vegetation.	Social	3060.3 Technical Bulletin No 36 AustRoads Part 6B	Provide planting within the duplication ROW.	Minor	Almost Certain	Medium	None required.	Minor	Almost Certain	Medium
Visual and Landscape	LV3B	Construction and operation of the duplication would visually impact upon landscape character types of medium-high landscape sensitivity. (Ch. 5600-6400, 11600-12900, 14700-16400)	The duplication would result in a major visual change upon the Vegetated Rural landscape character type through the construction of the duplication, overpasses and removal of existing tree vegetation.	Social	3060.3 Technical Bulletin No 36 AustRoads Part 6B	Provide planting within the duplication ROW.	Moderate	Almost Certain	High	Non-standard treatments to reduce impact: - Establishment of tree and shrub screening planting to effectively screen the duplication and maintain a vegetated edge to the township. Vegetation should be established in clumps and not in linear banding that contrasts with the existing landscape character. - Tree planting along the base and shrub planting along embankments to screen the overpass. - Possible screen planting within private properties along the interface of the overpass; and - Design of embankments to be complimentary to the surrounding topography.	Minor	Almost Certain	Medium
Visual and Landscape	LV3C	Construction and operation of the duplication would visually impact upon landscape character types of medium landscape sensitivity. (Ch. 23000-24000)	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.	Social	3060.3 Technical Bulletin No 36 AustRoads Part 6B	Provide planting within the duplication ROW.	Moderate	Almost Certain	High	Non-standard treatments to reduce impact include: - Retention of existing roadside vegetation where possible (protective fencing treatments may be required); - Establishment of tree and shrub planting of similar character to existing roadside vegetation in close proximity to the road edge (protective fencing treatments may be required). Sensitively designed fill embankment.	Minor	Almost Certain	Medium
Visual and Landscape	LV3D	Construction and operation of the duplication would visually impact upon landscape character types of medium landscape sensitivity. (Ch. 20200-21000)	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.	Social	3060.3 Technical Bulletin No 36 AustRoads Part 6B	Provide planting within the duplication ROW.	Minor	Almost Certain	Medium	Non-standard treatments to reduce impact: - Establishment of tree and shrub screening planting to effectively screen the duplication and maintain a vegetated edge to the township. Vegetation should be established in clumps and not in linear banding that contrasts with the existing landscape character. - Tree planting along the base and shrub planting along embankments to screen the overpass. - Possible screen planting within private properties along the interface of the overpass; and - Design of embankments to be complimentary to the surrounding topography.	Insignificant	Almost Certain	Low
Visual and Landscape	LV3E	Construction and operation of the duplication would visually impact upon landscape character types of low landscape sensitivity. (Ch. 0-5500, 8300-11200, 21000-24500)	The duplication would result in a major visual change upon the Vegetated Highway landscape character type through the removal of existing tree vegetation.	Social	3060.3 Technical Bulletin No 36 AustRoads Part 6B	Provide planting within the duplication ROW.	Minor	Almost Certain	Medium	Non-standard treatments to reduce impact: - Retention of existing roadside vegetation where possible (protective fencing treatments may be required); and - Establishment of tree and shrub planting of similar character to existing roadside vegetation in close proximity to the road edge (protective fencing treatments may be required).	Insignificant	Almost Certain	Low
Visual and Landscape	LV3F	Construction and operation of the duplication would visually impact upon landscape character types of low landscape sensitivity. (Ch. 16600-21000)	The duplication would result in a moderate visual change upon the Vegetated Highway landscape character type through the removal of existing tree vegetation.	Social	3060.3 Technical Bulletin No 36 AustRoads Part 6B	Provide planting within the duplication ROW.	Insignificant	Almost Certain	Low	Non-standard treatments to reduce impact: - Retention of existing roadside vegetation where possible (protective fencing treatments may be required); and - Establishment of tree and shrub planting of similar character to existing roadside vegetation in close proximity to the road edge (protective fencing treatments may be required).	Insignificant	Almost Certain	Low

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