13. Biodiversity and Habitat

A Biodiversity and Habitat Assessment was conducted between October 2010 and January 2012.

This assessment identified three species which are listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (which are also listed under the State *Flora and Fauna Guarantee Act 1988*) (Dwarf Galaxias (vulnerable), Golden Sun Moth (critically endangered) and Spiny Rice-flower (critically endangered)) and two EPBC Act listed communities (the Natural Temperate Grassland of the Victorian Volcanic Plain (critically endangered) and the Grassy Eucalypt Woodland of the Victorian Volcanic Plain (critically endangered)) that could be impacted by the Project.

The assessment also identified five additional State listed species that could be impacted by the Project:

- Golden Cowslip (Option 1);
- Emerald-lip Greenhood (Option 1);
- Yarra Gum (Option 2);
- the Brown Toadlet (Option 1 and Option 2); and
- the Brown Treecreeper (Option 1 and Option 2).

The assessment also found that the Project would intersect 10 Ecological Vegetation Classes (EVCs) of varying quality. These are:

- Plains Grassland (endangered);
- Plains Grassy Woodland (endangered);
- Alluvial Terraces Herb-rich Woodland (endangered);
- Hills Herb-rich Woodland (vulnerable);
- Heathy Dry Forest (least concern);
- Creekline Grassy Woodland (endangered);
- Grassy Woodland (endangered);
- Plains Grassy Wetland (endangered);
- Grassy Dry Forest (depleted); and
- Heathy Woodland (depleted).

During the Options Assessment process, matters of National Environmental Significance (NES) and vegetation of Very High and High conservation significance were deemed to be of highest conservation value, and priority was given to avoiding and minimising impacts on matters of NES where possible. Through alignment design changes avoidance of significant amounts of matters of NES was achieved. However, it was not possible to entirely avoid impacts on matters on NES. Therefore, it is expected that the Project would remove one Spiny Rice-flower plant; 31.56 hectares (ha) of Golden Sun Moth habitat in Option 1 and 23.8ha of Golden Sun Moth habitat in Option 2; and potentially impact on Dwarf Galaxias habitat. The Project would also remove approximately 5.25ha of Natural Temperate Grassland of the Victorian Volcanic Plain (in both Option 1 and Option 2) and approximately 11.14ha of Grassy Eucalypt Woodland of the Victorian Volcanic Plain for Option 1 and 8.65ha for Option 2.

It is not expected that the Project would have significant impacts on Spiny Rice-flower or the Dwarf Galaxias. It is however expected that the Project would have a significant impact on the Golden Sun Moth, the Natural Temperate Grassland of the Victorian Volcanic Plain and the Grassy Eucalypt Woodland of the Victorian Volcanic Plain.

The impacts on listed flora species and communities would be offset in accordance with the requirements of Draft Policy Statement 4.1: Use of environmental offsets under the EPBC Act. It is expected that VicRoads would be able to source appropriate offsets for removal of native vegetation required for this Project.

The Project would also impact upon some State listed species. These are:

- one Golden Cowslip individual (vulnerable, DSE Advisory List) (Option 1);
- 12 Emerald-lip Greenhood individuals (rare, DSE Advisory List) (Option 1);
- the Brown Toadlet (endangered, DSE Advisory List) (Option 1 and Option 2);
- the Brown Treecreeper (near threatened, DSE Advisory List) (Option 1 and Option 2); and
- 8 Yarra Gum individuals (rare, DSE Advisory List) (Option 2).

It is considered that the impacts on State listed species would be insignificant to minor.

The Project will also impact on 10 EVCs of varying quality and conservation significance. These are:

- Plains Grassland;
- Plains Grassy Woodland;
- Alluvial Terraces Herb-rich Woodland;
- Hills Herb-rich Woodland;
- Heathy Dry Forest;
- Creekline Grassy Woodland;
- Grassy Woodland;

- Plains Grassy Wetland;
- Grassy Dry Forest; and
- Heathy Woodland.

The Project would impact approximately 110ha of EVCs (equating 39.38 Habitat hectares (Habha)), of which 34.19ha are of Very High conservation significance, for Option 1 and approximately 131ha (equating to 52.98Habha), of which 38.93ha are of Very High conservation significance, for Option 2. This is considered to be a moderate impact because the loss would be less than 0.1% of the total area of EVCs in the bioregion.

Consent from the Minister for Environment and Climate Change is required for the removal of vegetation of 'Very High' conservation significance.

The Project could also result in the loss of up to 221 Large Old Trees (LOTs), 140 of which are of Very High conservation significance, in Option 1 and up to 214 LOTs, of which 109 are of Very High conservation significance, in Option 2. Mitigation measures including detailed design should reduce the number of LOTs impacted by the Project. It is expected that the actual number of LOTs impacted would be less than these totals because management measures including microalignment and construction planning would be implemented to minimise the number of LOTs impacted. It is expected that the impact on LOTs would be minor.

Further avoidance and minimisation of matters of NES and State significance would be able to be achieved through micro-realignment in the detailed design phase.

VicRoads would source appropriate offsets for matters of NES that would be impacted by the Project upon consulting with Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) on requirements.

VicRoads would be required to obtain offsets for vegetation losses in accordance with Victoria's Native Vegetation Management – A Framework for Action and the Environmental Offsets Policy – Consultation Draft under the EPBC Act. Preliminary investigations indicate that offsets are available and that VicRoads could source appropriate offsets from one or a combination of BushBroker, Trust for Nature, the VicRoads Net Gain Bank and private offset brokers.

Vegetation of Very High and High Conservation significance and Matters and NES were considered of greatest importance for conservation during alignment selection, and as such were given priority in avoiding

and minimising impacts. However, not all impacts on native vegetation and habitat are able to be avoided. Based on the level of impact to Very High and High conservation significance vegetation, Option 1 is considered to be the preferred alignment option (with an area of impact 15.4ha less than in Option 2). Option 1 however, has a greater level of impact on matters of NES (1 Spiny Rice-Flower Plant, 7.76ha more of Golden Sun Moth habitat and 2.49ha more of Natural Temperate Grassland of the Victorian Volcanic Plain) than Option 2. However, the differences in level of impact on matters of NES between the two alignment options are considered relatively small when compared with the difference in the amounts of Very High and High conservation significance vegetation impacted by the two alignment options. As such, Option 1 is considered the preferred alignment from the Biodiversity and Habitat perspective due to least impact on Very High and High conservation significance vegetation.

13.1 EES Objectives

The EES objectives relevant to biodiversity and habitat are:

"To avoid or minimise effects on flora and fauna species and ecological communities listed under the Flora and Fauna Guarantee Act 1988 (FFG Act) or the Environment Protection and Biodiversity Conservation Act 1999 and as well as comply with requirements under Victoria's Native Vegetation Management - A Framework for Action".

This chapter discusses the biodiversity and habitat values of the project area, the potential impacts from the Project on these values and the management measures to be implemented to minimise these impacts. More specifically, this chapter addresses the following EES scoping requirements:

- "Characterise the native vegetation and terrestrial and aquatic habitat located in the project area. Such characterisation should include the existence or potential existence of any species or ecological communities listed under the FFG Act and EPBC Act and any declared weeds or pathogens. The characterisation should be informed by relevant databases, literature and appropriate seasonal and targeted surveys;
- Provide evidence to demonstrate that adequate information (e.g., desktop database searches, targeted surveys and/or modelling) has been compiled on the potential and actual presence of threatened species and ecological communities, having regard to the likelihood and consequence

of impact. In the absence of positive identification, a precautionary approach should be taken for the potential existence of listed species and ecological communities, particularly for those listed under the EPBC Act;

- Identify and assess potential effects of the proposed project and relevant alternatives on existing native vegetation, habitat (quality and continuity), listed flora and fauna species and ecological communities. Potential effects to be assessed should include barriers to the movement of wildlife, fragmentation of habitat and vehicle road kills. This assessment should address the relevant Potentially Threatening Processes listed under the FFG Act;
- Assess any effect of the project on other conservation values, including areas of scientific or other special conservation significance;
- Identify and assess potential direct and indirect effects on aquatic habitat values, including on significant aquatic species, that may result from the project and, in particular any proposed waterway crossings;
- Identify potential effects of the project on the dispersion and distribution of weeds and pathogens;
- Specify any measures to avoid, minimise and mitigate biodiversity impacts, especially on threatened or other listed species;
- Outline any obligations arising from Victoria's Biodiversity Strategy and Victoria's Native Vegetation Management - A Framework for Action. In particular, the EES should address how vegetation removal has been avoided and minimised by the proposed works;
- Outline an offset strategy for unavoidable clearing of native vegetation in the context of both Victoria's Native Vegetation Management – A Framework for Action and Draft Policy Statement 4.1: Use of environmental offsets under the EPBC Act. This offset strategy should describe proposed arrangements for ongoing management of offsets, as well as details on the security of tenure and ownership of offsets;
- Identify methods of vegetation rehabilitation for both areas disturbed for construction purposes only and of any sections of existing road to be made redundant;
- Describe the proposed approach and measures for long-term management of retained native vegetation and habitat areas within and adjacent to the road reservation along the duplicated highway; and
- Describe at a level of detail proportionate to the significance of potentially affected assets, the likely residual effects of the project on biodiversity and habitat values."

This chapter is based on a Flora, Fauna and Net Gain assessment completed by Ecology and Heritage Partners Pty Ltd (EHP 2011). The detailed assessment report is included in Technical Appendix H.

A separate summary on matters of National Environmental Significance (NES) only is provided in Chapter 20 (Matters of National Environmental Significance).

13.2 Study Area

The physical footprint of the study area extends 60m beyond the alignment options that are furthest from the existing Western Highway. The study area is show in Figure 13-1.



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Figure 13-1 Biodiversity and Habitat Study Area and Bioregion Boundaries

13.3 Methodology

The biodiversity and habitat assessment for the Project is based upon a number of assessments undertaken prior to the EES process, as well as the assessments completed as part of the EES process. A detailed description of the survey methods used and the species that were surveyed is included in Technical Appendix H.

Table 13-1 provides a summary of the surveys completed for the Project that have informed the assessment of the biodiversity and habitat values.

The assessments included the following tasks:

- Review of the following databases to obtain a list of species previously recorded or predicted to occur within 10 kilometres (km) of the study area:
 - Flora Information System (FIS)
 - Victorian Biodiversity Atlas (VBA)
 - Atlas of Victorian Wildlife (AVW)
 - Biodiversity Interactive Maps (DSE, 2010)
 - Protected Matters Search Tool (SEWPaC, 2010)
- Review of relevant existing reports.

- Preliminary visual assessment of the study area to document flora species and vegetation types and to record the overall condition of vegetation.
- Preliminary habitat and fauna survey to identify fauna species present in the study area and identify habitats.
- Aquatic fauna surveys of suitable waterways
- A preliminary Net Gain assessment of vegetation in accordance with the methodology described in the Vegetation Quality Assessment Manual (DSE, 2004).
- Targeted surveys for species of conservation significance likely to occur within the study area (based on the findings of the desktop and preliminary survey assessment). Refer to Table 13-1 for information on species targeted in survey and the timing of these surveys.

A summary of the fieldwork completed for the Project including timing is provided in Table 13-1. A map showing the location of the surveys is provided in Figure 13-2.

Activity/species	Date completed	Season
Visual assessment to document flora species and vegetation types and condition.	20-22 October 2010, 26 October 2010 and 3-5 November 2010.	Spring
Habitat and fauna survey.	20 to 22 October 2011	Spring
Targeted Faun	a surveys (Nationally listed species)	
Golden Sun Moth	16, 22, 29 December 2011 13 January 2012	Summer
Southern Brown Bandicoot	15 February 2010 to 2 March 2010	Summer
Growling Grass Frog	16 and 17 February 2011 3 March 2011	Summer
Targeted Fa	una surveys (State listed species)	
Brush-tailed Phascogale	15 February 2010 to 2 March 2010 18 April to 5 May 2011	Summer Autumn
Squirrel Glider	18 April 2011 to 5 May 2011	Autumn
Eastern Pigmy-possum	18 April 2011 to 5 May 2011	Autumn
Elegant Parrot		
Brown Treecreeper		
Grey-crowned Babbler	15 February 2011	Summer
Chestnut-rumped Heathwren	2 March 2011	Summer
Speckled Warbler	18 April 2011	Spring
Painted Honeyeater	5 May 2011	Autumn
Hooded Robin		
Diamond Firetail		

Table 13-1 Fieldwork timing summary

Activity/species	Date completed	Season
Black-chinned Honeyeater		
Barking Owl Powerful Owl	16 February 2011 (nocturnal) 2 March 2011 (nocturnal) 7 April 2011 (nocturnal)	Summer Autumn Autumn
Brown Toadlet	7 and 20 April 2011	Autumn
Targeted Flor	a surveys (Nationally listed species)	
Button Wrinklewort		
Large-headed Fireweed	14 February 2011	Summer
Langi Ghiran Grevillea	2 August 2011 29 – 31 August	Winter
Tawny Spider Orchid	8 – 11 November	Spring
Spiny Rice-flower		
Targeted Fl	ora surveys (State listed species)	
Mount Cole Grevillea	14 February 2011	Summer
Rough Wattle	2 August 2011	Winter
Yarra Gum	8 - 11 November	Spring
Emerald-lip Greenhood		
Crimson Sun-orchid		
Fitzgeralds Leek Orchid		
Fringed Sun-orchid		
Golden Cowslips		
Small Milkwort		
Woodland Leek Orchid		
Heath Spear-grass		
Half-bearded Spear-grass		
	Aquatic Fauna Surveys	
General aquatic survey	20 to 22 October 2010	Spring
Targeted aquatic survey	16 to 22 June 2011	Winter
Macroinvertebrate survey	19 and 20 January 2012	Summer
Dwarf Galaxias (Nationally listed)		
Golden Perch (State listed)	16 to 22 June 2011	Winter
River Blackfish (State listed)		

13.4 Legislation and Policy

The relevant legislation and government policies for biodiversity and habitat are outlined in Table 13-2.



Table 13-2 Relevant legislation and policy

Legislation/Policy	Description
	Commonwealth
<i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act)	The Environment Protection and Biodiversity Conservation Act, 1999 (EPBC Act) provides that certain actions – in particular, actions that are likely to have a significant impact on a Matter of National Environmental Significance (MNES) – are subject to a rigorous assessment and approval process. The MNES identified in the Act as triggers for the Commonwealth assessment and approval regime are: • World Heritage Properties • National Heritage places • Ramsar Wetlands • Threatened species and ecological communities • Migratory species • Commonwealth marine areas and Nuclear actions (including uranium mining). The Project has been designated as a controlled action under EPBC Act as there is a potential to impact on listed threatened species and communities. More detail on matters of NES can be found in Chapter 20.
	Victorian
Flora and Fauna Guarantee Act 1988 (FFG Act)	 As the Project is occurring (partially) on public land and is being undertaken by a public authority (VicRoads), the Project is required to meet the objectives of the FFG Act, which require: Demonstrating that measures have been taken to avoid impacting on FFG Act listed species and communities. Potentially threatening processes, which may impact on FFG Act listed species and communities, have been avoided or minimised. Under the FFG Act, a permit would be required from the Department of Sustainability and Environment (DSE) for the removal or disturbance of FFG Act listed flora species and flora that form part of a listed community.
Planning and Environment Act 1987	A permit would be required for the removal or disturbance of native vegetation within the study area. This is discussed further in Chapter 8 (Planning and Land Use).
Wildlife Act 1975	The inspection, removal or relocation of fauna species for the Project would require a permit under the <i>Wildlife Act 1975</i> .
Fisheries Act 1995	A permit would be required under the <i>Fisheries Act 1995</i> , if the Project is going to injure or destroy species protected under the Fisheries Act, including the Dwarf Galaxias.
<i>Catchment and Land Protection Act 1984</i> (CALP Act)	It is very likely that noxious weeds (declared under the CALP Act) would be present in the study area. Therefore, the construction and maintenance of the highway would need to comply with the provisions of the Act, which protect against spreading of these weeds.
Victoria's Native Vegetation Management – A Framework for Action	In accordance with this policy, the alignment for the highway was selected to avoid impacting on native vegetation and where this wasn't possible, the aim was to minimise the impacts on native vegetation. A preliminary net gain assessment has been completed for the Project, to calculate the offsets potentially required for the areas of native vegetation and habitat that could not be avoided, where the removal of native vegetation and habitat would be required. Appendix 4 states that clearing of 'very high' conservation significance vegetation is not permitted unless exceptional circumstances apply (i.e. impacts are an unavoidable part of a development project, and approval is obtained from the Minister for Environment and Climate Change based on considerations of environmental, social and economic values from a state wide perspective.



Figure 13-2a Ecological Values in the study area



Figure 13-2b Ecological Values in the study area





Figure 13-2c Ecological Values in the study area





Figure 13-2d Ecological Values in the study area





Figure 13-2e Ecological Values in the study area



Figure 13-2f Ecological Values in the study area

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Figure 13-2g Ecological Values in the study area





Figure 13-2h Ecological Values in the study area

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Figure 13-2i Ecological Values in the study area

13.5 Existing Conditions

Parts of the study area are considered to be of national and State conservation significance. The study area contains several vegetation types, ranging from grasslands, woodland or forest in very good condition, to open pasture with very little native vegetation remaining. Ten different Ecological Vegetation Classes (EVCs) were recorded in the study area as well as 227 flora species and 69 fauna species. An EVC is a type of native vegetation classification used in Victoria that is described through a combination of its floristic, life form and ecological attributes and through an inferred attachment to particular environmental attributes. The study area occurs within two bioregions; the Victorian Volcanic Plain and Central Victorian Uplands bioregions. The boundary of the bioregions is shown in Figure 13-2.

13.5.1 Flora

The biodiversity and habitat assessment has identified EVCs, significant communities and flora of State and national significance within the study area.

Figure 13-2 illustrates the location of EVCs, the location of significant communities and the location of flora species of State and national significance. A total of 227 plant species (151 indigenous, 76 exotic) were recorded within the study area during the assessments. A full list of these species is detailed in Technical Appendix H.

EVCs

The DSE mapping of the study area pre-1750 indicates the area between Ararat and Beaufort once supported six different EVCs. Refer to Technical Appendix H for a list of these EVCs.

The assessment of the current EVCs within the study area shows that areas of 10 different EVCs described in Table 13-3 are present in the study area. The location of these EVCs is shown in Figure 13-2.

The bioregional conservation status of EVCs is determined by DSE utilising the methodology described in Appendix 2 of 'Victoria's Native Vegetation Management: A Framework for Action (DNRE, 2002).

EVC number	EVC name	Description	Location in study area	Status in Bioregion
132_61	Plains Grassland (parts of which correlate to the EPBC listed ecological community Natural Temperate Grassland of the Victorian Volcanic Plain)	Treeless vegetation mostly less than 1m tall dominated by largely graminoid and herb life forms (DSE, 2004).	Between the road and rail reserve in the western end of the study area and around the Eurambeen- Streatham Road intersection.	Endangered (Victorian Volcanic Plain bioregion)
125	Plains Grassy Wetland	Vegetation dominated by grasses and small sedges and herbs, with typically species-rich outer verges and species-poor vegetation in the wetter central areas (DSE, 2004).	Two small patches (in poor condition), along drainage lines.	Endangered (Victorian Volcanic Plain bioregion)
55	Plains Grassy Woodland (parts of which correlate to the EPBC listed ecological community Grassy Eucalypt Woodland of the Victoria Volcanic Plain)	Open, eucalypt woodland to 15m tall, containing a sparse shrub layer over a species-rich grassy and herbaceous ground layer (DSE, 2004).	Both moderate condition to highly modified patches occur at many locations throughout the study area.	Endangered (Victorian Volcanic Plain bioregion)
68	Creekline Grassy Woodland	Eucalypt-dominated woodland to 15m tall with an occasional scattered shrub layer over a mostly grassy/sedgy to herbaceous ground-layer (DSE, 2004).	Along major waterways and associated tributaries, including Hopkins River, Billy Billy Creek and Middle Creek.	Endangered (Victorian Volcanic Plain bioregion and Central Victorian Uplands)
67	Alluvial Terraces Herb-rich Woodland	Open woodland to 15m tall on broad alluvial plains and along ephermeral drainage lines containing few, if any, shrubs and a highly diverse ground layer (DSE, 2004).	Remnant patches of moderate to good condition were recorded at several locations throughout the study area.	Endangered (Victorian Volcanic Plain bioregion and Central Victorian Uplands bioregion)
71	Hills Herb-rich Woodland	Dry, open eucalypt woodland to 15m tall with a sparse shrub layer and an understorey dominated by a carpet of herbs and grasses (DSE, 2004).	Generally moderate to very good condition remnant vegetation consisting of this EVC was recorded at several locations	Vulnerable (Central Victorian Uplands bioregion)

Table 13-3 EVCs in the study area



EVC number	EVC name	Description	Location in study area	Status in Bioregion
			throughout the study area	
22	Grassy Dry Forest	Overstorey dominated by a low to medium height forest of eucalypts up to 20m tall, sometimes resembling and open woodland and an understorey characterised by a high diversity of drought-tolerant grasses and herbs (DSE, 2004).	Remnant patches in moderate to good condition were recorded within the study area.	Depleted (Central Victorian Uplands bioregion)
20	Heathy Dry Forest	Low, open eucalypt forest to 20m tall with an understorey dominated by a low, sparse to dense layer of ericoid-leaved shrubs including heaths and peas with a relatively low cover of graminoids and grasses.	Occurs within a small area west of Bunagor, near Hillside Road at Langi Ghiran crossing end, generally in good to very good condition.	Least concern (Central Victorian Uplands bioregion)
48	Heathy Woodland	Eucalypt-dominated low woodland to 10m tall, lacking a secondary tree layer and supporting a diverse array of heathy scrubs and fairly sparse ground cover (DSE, 2004).	Heathy woodland of moderate to very good condition was present south of the Western Highway, opposite Langi Ghiran State Park.	Depleted (Central Victorian Uplands bioregion)
175	Grassy Woodland	Variable open eucalypt woodland to 15m tall or occasionally Sheoak woodland to 10m tall over a divers ground layer of grasses and herbs, with a sparse shrub layer (DSE, 2004).	Located in isolated areas within the Central Victorian Uplands bioregion.	Endangered (Central Victorian Uplands)

Nationally Significant Communities

There are three nationally significant vegetation communities (listed under the EPBC Act) which have been identified (from the Protected Matters Search Tool (PMST) as potentially occurring within the study area. Refer to Technical Appendix H for a list of these communities.

Natural Temperate Grassland of the Victorian Volcanic Plain and Grassy Eucalypt Woodland of the Victorian Volcanic Plain were both identified within the study area during the surveys for the Project. These communities are both listed as critically endangered under the EPBC Act. The location of these communities is shown in Figure 13-2.

State Significant Communities

There are two State listed communities in the study area. These communities are known as:

 The Victorian Temperate Woodland Bird Community (FFG Act listed/threatened fauna community). Western (Basalt) Plains Grassland (Endangered in Victoria) which is listed as threatened under the FFG Act and is also known as Natural Temperate Grassland of the Victorian Volcanic Plain under the EPBC Act.

Flora Species of National Significance

Eighteen nationally significant flora species (listed under the EPBC Act) have previously been documented or predicted to occur within 10km of the study area. Refer to Technical Appendix H for a list of these species.

Two flora species of national significance were identified in the study area during the surveys for the Project, the Spiny Rice-flower and the Button Wrinklewort, which are listed as critically endangered and endangered respectively under the EPBC Act.

More details of each of these species are provided in Table 13-4. The location of these species within the study area is shown in Figure 13-2.



Table 13-4 Flora Species of National significance found during surveys for the Project

Species	Description	Status
Spiny Rice-flower (<i>Pimelea spinescens</i> subsp. s <i>pinescens</i>)	The Spiny Rice-flower was identified within the Plains Grassland EVC, with over 500 plants recorded in the study area.	Critically endangered (EPBC Act) Listed (FFG Act) Endangered (DSE Adviisory List)
Button Wrinklewort (Rutidosis leptorhynchoides)	Over 80 plants were identified in the study area. Most, were recorded within the Alluvial Terraces Herb-rich Woodland EVC.	Endangered (EPBC Act) Listed (FFG Act). Endangered (DSE Advisory List)

Flora Species of State Significance

Three State significant flora species on the DSE Advisory List; Yarra Gum, Golden Cowslips and Emerald-lip Greenhood, which are listed as rare, vulnerable and rare respectively, were recorded within the study area in the assessments completed for the Project. More details on these species are provided in Table 13-5. The location of these species within the study area is shown in Figure 13-2.

	Table 13-5	Flora Species o	f State Significance	found during	surveys for	the Project
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Species	Description	Status
Yarra Gum (Eucalyptus yarraensis)	21 individuals recorded within the study area. 14 individuals were identified in the Hills Herb-rich Woodland (HZ3) and seven individuals were identified in the Grassy Dry Forest (HZ4).	Rare (DSE Advisory List)
Golden Cowslips (<i>Diuris behrii</i>)	One record within the Hills Herb-rich Woodland EVC (HZ7) (refer to Figure 13-2 for the location of this individual).	Vulnerable (DSE Advisory List)
Emerald-lip Greenhood (Pterostylis smaragdyna)	Approximately 280 individuals were recorded within the study area. These individuals were recorded in habitat zones HW1, HW3 and GDF1 (refer to Figure 13-2 for the locations of habitat zones).	Rare (DSE Advisory List)

13.5.2 Fauna

The biodiversity and habitat assessment has identified areas of fauna habitat, wildlife corridors, and fauna species that are of national and State significance within the study area. A total of 69 fauna species were recorded within the study area. This total was comprised of six mammals (three native, three introduced), 56 birds (52 native, four introduced), five native frogs, five fish (two native, three introduced) and two reptile species.

Fauna Habitat

There are five major habitat types within the study area. These include:

- Woodlands
- Farm dams and drainage lines
- Native grasslands
- Scattered trees

Introduced pasture.

The condition of these habitat types within the study area ranges from low to high. The criteria for defining habitat quality included:

- Degree of intactness
- Species richness and diversity
- Level of foraging and breeding activity
- Levels of disturbance and/or threatening processes
- Degree of contribution to a wildlife corridor
- Known or likely habitat for one or more rare or threatened species.

A summary of these habitat types is provided in Table 13-6. The location of these habitat areas is shown in Figure 13-2.

Fauna habitat	Corresponding EVC	Description
Woodland	Grassy Dry Forest, Heathy Dry Forest, Grassy Woodland, Heathy Woodland, Plains Grassy Woodland, Alluvial Terraces Herb-rich Woodland, Hills Herb-rich Woodland	Areas of remnant woodland occur as roadside vegetation as well as remnant patches. Remnant woodlands provide an important habitat for a range of fauna, particularly within the study area where woodland has been mostly cleared for agricultural purposes.
Farm dams and drainage lines	Creekline Grassy Woodland	There are a number of creeks and waterways within the study area, which are considered to be of moderate to high habitat value for fauna. Drainage lines are likely to provide habitat for a range of aquatic and semi-aquatic fauna. Farm dams provide habitat to wetland birds, however these are generally frequented by cattle, which cause a high level of disturbance.
Native grassland	Plains Grassland	The western end of the study area and around Eurambeen- Streatham Road has scattered patches of grasslands, which support a number of native flora species as well as fauna. Grasslands provide an important habitat in which for fauna to forage, breed and seek refuge. Native grasslands support a range of native species, such as the nationally significant Golden Sun Moth.
Scattered trees	N/A	There are large numbers of scattered trees within the study area, ranging from small trees to large, mature trees. These trees provide an important habitat for bird species.
Introduced pasture	N/A	Introduced pasture is the predominant habitat type within the study area, where remnant vegetation has been removed. This habitat type is of low value for native fauna.

Table 13-6 Fauna habitat type descriptions

Wildlife Corridors

The remnant vegetation along the roadsides (particularly the Western Highway) as well as creeks, act as wildlife corridors. Wildlife corridors allow species to move throughout the landscape and this:

- Provides shelter for a range of fauna that either live within the corridors or are moving through the landscape.
- Provides for the immigration of animals to supplement declining populations, reducing the likelihood of local extinction of a species.
- Provides for connectivity to maintain the demographics of a population of a species.
- Allows fauna to move through modified landscapes to find better quality habitat.

Wildlife corridors in the project area include the riparian zones along creeks and the area between Langi Ghiran State Park and the vegetation south of the highway. Refer to Technical Appendix H for more information on wildlife corridors.

BioSites

A BioSite is an area of land or water identified on the DSE database containing biological assets with particular attributes, such as the presence of rare or threatened flora, fauna or habitat required for their survival and/or rare or threatened vegetation communities. There are numerous BioSites of national, State, regional and local significance within and adjacent to the study area. Refer to Technical Appendix H for a list of these BioSites.

Refer to Figure 13-2 for the location of BioSites for the BioSites within the study area.

Fauna Species of National Significance

Seven nationally significant fauna species (listed under the EPBC Act) have previously been recorded or predicted to occur within the study area. Refer to Technical Appendix H for a list of these species.

Two fauna species of national significance were recorded within the study area, the Dwarf Galaxias fish and the Golden Sun Moth. The Dwarf Galaxias is listed as vulnerable under the EPBC Act and the Golden Sun Moth is listed as critically endangered under the EPBC Act. There is high quality habitat for the Dwarf Galaxias within Billy Billy Creek and a large number of individuals were recorded during the surveys. This indicates that Billy Billy Creek is of national conservation significance for this species. Golden Sun Moth habitat was recorded at numerous sites spread between Buangor-Ben Nevis Road and Langi Ghiran Picnic Ground Road, with numerous individuals recorded in paddocks to the east and west of Pope Road.

More details of each of these species is provided in Table 13-7. The location of these species within the study area is shown in Figure 13-2.

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Table 13-7 Fauna Species of National Significance found during surveys for the Project

Species	Description	Status
Dwarf Galaxias (<i>Galaxiella pusilla</i>)	Dwarf Galaxias is a small fish, with females growing up to 40 millimetres (mm) and males 35mm long. It is a slightly stocky fish, with a deepened trunk at the belly and a small head with a blunt snout. The Dwarf Galaxias is generally a transparent olive-amber on the dorsal surface, with three black stripes and a silvery white underside. Males also have an orange stripe. Dwarf Galaxias breed in spring. Pairs spawn eggs onto aquatic plants, where they hatch 2-3 weeks later. They have a life expectancy of one year, only allowing for one spawning per individual. Dwarf Galaxias live their entire life cycle in freshwater and are mostly found in still or slow-flowing waterways, with overgrown aquatic plants. They can occur within permanent water pools, but are also often found in pools that are occasionally dry (ephemeral). 156 Dwarf Galaxias were recorded within Billy Billy Creek during the aquatic surveys completed for this project.	Endangered (EPBC Act) FFG Act listed Near Threatened (DSE Advisory List)
Golden Sun Moth (<i>Synemon plana</i>)	The Golden Sun Moth is a medium sized, day-flying moth. The wingspan of females and males in about 3.1 centimetres (cm) and 3.4cm respectively. The upper-side of the forewing is dark grey with patterns of paler grey scales on female moths, and the hindwing is golden yellow with black spots along the edges of the wings. In the male, the upper size of the forewing is dark brown with patterns of pale grey scales and the hindwing in bronze/brown with dark brown patches. The underside of both wings is ale grey with dark brown spots. Both males and females have clubbed antennae. Adult moths survive between one and four days after pupal emergence. Males spend their adult life patrolling approximately 1m above the grass in search of females for breeding. Females have reduced hindwings so will only fly when disturbed. The Golden Sun Moth typically occurs in native grassland, grassy woodland, dominated by greater than 40% cover of wallaby-grass <i>Austrodanthodia</i> spp., but is also known to inhabit areas dominated by Kangaroo Grass and introduced species such as Chilean Needle Grass.	Critically Endangered (EPBC Act) FFG Act listed Critically Endangered (DSE Advisory List).

Fauna Species of State Significance

31 fauna species of State significance have previously been recorded within 10km of the study area. Refer to Technical Appendix H for a list of these species.

Two of these State significant fauna species were identified during the assessment for this project in

the study area, the Brown Toadlet, which is listed under the FFG Act and the Brown Treecreeper bird, which is listed on the DSE Advisory List.

More details on these species are provided in Table 13-8. The location where these species were found within the study area is shown in Figure 13-2.

Table 13-8	State significant fauna	species found	l during surveys f	or the Project
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Species	Description	Status
Brown Treecreeper (<i>Climacteris picumnus</i> <i>victoriae</i>)	This species climbs up the trunks and branches of trees in search of insects and their larvae, while some feeding also takes place on the ground, particularly on fallen logs. This species is one of a number of woodland birds known to have declined throughout many parts of Victoria. It requires large consolidated areas, often hundreds of hectares of remnant vegetation, to persist. A number of the larger remnants that contain high quantities of coarse woody debris on the ground are likely to be important for the long term persistence of this species in the local area.	Near Threatened (DSE Advisory List)
Brown Toadlet (<i>Pseudophryne bibronii</i>)	The Brown Toadlet is a small brownish coloured toadlet endemic to south-eastern Australia including Tasmania and is found in a variety of habitats not necessarily associated with permanent water. In Victoria, the Brown Toadlet is distributed from the north-east through to central and western Victoria with scattered records in Gippsland. In the South West region of Victoria it is recorded from all bioregions except the Otway Ranges bioregions, although most records are grouped on the Volcanic Plains bioregion north of Werribee, the Greater Grampians bioregion and the Lowan Mallee bioregion in the Little Desert.	FFG Act listed Endangered (DSE Advisory List).



13.6 Avoidance and Minimisation of Impact

The Project alignment Options Assessment and selection of the two final alignment options are described in Chapter 5 (Project Alternatives). The impacts on biodiversity and habitat values for all alignments considered are outlined in both Technical Appendix B (Options Assessment Report) and Technical Appendix H (Biodiversity and Habitat Assessment Report). In the EES process, alignments were designed taking into consideration safety, cost, potential social impacts, potential impacts on amenity and potential ecological impacts. Avoiding and minimising impacts on native vegetation and habitat was a key factor considered in selecting the alignments for the Project. As outlined in Chapter 5 (Project Alternatives), some of the key evaluation objectives were:

"To avoid or minimise effects on species and ecological communities listed under the Environment Protection and Biodiversity Conservation Act 1999 and Flora and Fauna Guarantee Act 1988." "To comply with requirements and best meet the objectives of 'Victoria's Native Vegetation Management – A Framework for Action' and to minimise impacts on wildlife corridors".

Due to the size of the Project and its linear nature, some impacts on native vegetation and habitat were unavoidable. As such, priority was given to avoiding impacts on native vegetation and fauna habitat that are EPBC Act listed or of Very High conservation significance (refer to Table 13-9); however it was still considered important to reduce impacts on as many ecological values as possible within the study area.

The Options Assessment process (refer to Chapter 5) sought to minimise the impacts to significant flora, fauna and ecological communities via a process of elimination, progressively excluding potential alignment options that support areas of high ecological value. The process of avoidance and minimisation of impacts is on-going with fine-scale micro-siting of the alignment expected to occur during the detailed design phase of the Project.

The locations at which the final two alignment options were refined to further minimise impacts during the options assessment process are outlined in Table 13-9.

Option	Location Description	Biodiversity and habitat value avoided	Conservation Significance of Vegetation	Status of species
Option 1 and Option 2	Just west of Martins Lane to approximately. 300m west of Centre Road.	Realignment of both carriageways to the north to reduce impacts on Grassy Dry Forest (GDF) adjacent to the existing Western Highway to west of Beaufort.	• High	-
	Approximately 200m west of Centre Road to just east of the present intersection of the Western Highway and Eurambeen-Streatham Road.	Alignment of carriageways and service roads to minimise impacts on GDF adjacent to the current highway.	• High	-
	Beginning just west of Ferntree Gully Rd/Goulds Lane and extending to approx. 200m west of Woodnaggerak Road.	Centre median was narrowed to minimise impacts on LOTs near the existing Western Highway.	 High 	-
	From approximately 200m west of Woodnaggerak Road to approximately 600m east of Andersons Road.	Location of new carriageway and service roads selected to minimise impacts on Plains Grassy Woodland (PGW) (Grassy Eucalypt Woodland of the Victorian Volcanic Plain) adjacent to the existing Western Highway.	 Very High 	-
	Approximately 900m east of the Hopkins River	Carriageway moved further south during the functional design process to avoid Spiny Rice-flower.	-	 Critically endangered (EPBC Act) Listed (FFG Act) Endangered (DSE Advisory List)
	Approximately 200m east of Warrayatkin road	Carriageway moved further south during the functional design process to avoid Button Wrinklewort.	-	 Endangered (EPBC Act) Listed (FFG Act). Endangered (DSE Advisory List)

Table 13-9 Locations where biodiversity and habitat values have been avoided



Option	Location Description	Biodiversity and habitat value avoided	Conservation Significance of Vegetation	Status of species
	Between Buangor Ben-Nevis Road and Billy Billy Creek	Carriageway moved further south during functional design process to avoid Golden Sun Moth Habitat and PGW (GEWVVP)	 High/Very High 	 Critically endangered (EPBC Act) Listed (FFG Act) Critically Endangered (DSE Advisory List)
	Approximately 400m east of Buangor-Ben Nevis Road extending to just west of Buangor-Ben Nevis Road.	Location of new road selected to avoid impacts on Alluvial Terraces Herb-rich Woodland (ATHRW) which is present north of the proposed alignment.	 Very High 	-
	Approximately 500m west of Gravel Route Road to just west of Pope Road.	Location of new carriageway and service roads have been selected to minimise impacts on PGW (GEWVVP) and ATHRW adjacent to the existing Western Highway.	HighVery High	-
Option 1	From just west of Pope Road to approximately 1.1km east of Langi Ghiran Picnic Ground Road.	Location of proposed alignment has been selected to avoid impacts on extensive areas of GDF, Hills Herb-rich Woodland (HHRW), Heathy Woodland (HW) and also Emerald-lip Greenhood and Yarra Gum individuals adjacent to the existing Western Highway and Langi Ghiran State Park. The median has also been narrowed in this location to minimise impacts on Golden Sun Moth habitat.	HighVery HighHigh	 Emerald-Lip Greenhood: Rare (DSE Advisory List) Yarra Gum: Rare (DSE Advisory Listed)
Option 2	Approximately 800m east of Buangor-Ben Nevis Road and extending to Buangor-Ben Nevis Road.	Location of the new road has been selected to avoid impacts on PGW (GEWVVP) and ATHRW which is located south of the proposed alignment.	Very HighVery High	-
	Approximately 200m west of the intersection of the Western Highway and Hillside Road to 1km west of the intersection of the Western Highway and Hillside Road.	Location of the new carriageway has been designed with a wide median to minimise impacts on Yarra Gums adjacent to the existing highway.	-	Rare (DSE Advisory List)
	Approximately 1km west of the intersection of the Western Highway and Hillside Road extending to 1.6km east of Langi Ghiran Picnic Ground Road.	Location of the new carriageway with a wide median to minimise impacts on HW, GDF and Emerald- lip Greenhood adjacent to existing highway.	 Medium – Very High High 	Rare (DSE Advisory List)
	Approximately 1.6km east of Langi Ghiran Picnic Ground Road (opposite an unnamed road) extending to just east of Dobie Road.	Location of new carriageway has been designed with wide median to minimise impact on PGW (GEWVPP) and Large Old Trees adjacent to the existing highway.	High – Very HighHigh	-
Option 1 and Option 2	Approximately 300m west of Warrayatkin Road to approximately 200m west of Airport Access Road.	Location of new carriageway to almost totally avoid impacts on Spiny Rice-flower, Button Wrinklewort and Plains Grassland (NTGVVP) alongside existing highway.	• High	 Spiny Rice-flower: Critically Endangered (EPBC Act) Listed (FFG Act), Endangered (DSE Advisory List) Button Wrinklewort: Endangered (EPBC Act) Listed (FFG Act) Endangered (DSE Advisory List)

13.7 Net Gain Assessment

Net Gain is an overall outcome where native vegetation and habitat gains are greater than vegetation and habitat losses. Victoria's Native Vegetation Management – A Framework for Action (the Framework) has defined a three step approach for applying Net Gain to protection and clearance decisions. Emphasis is placed on the first two steps, and only after these two steps have been taken should offsets (actions undertaken to achieve commensurate gains) be considered (NRE, 2002). The three step approach is:

- 1. To avoid adverse impacts, particularly through vegetation clearance.
- 2. If impacts cannot be avoided, to minimise impacts through appropriate consideration in

planning processes and expert input to project design or management.

3. Identify appropriate offset options.

A preliminary Net Gain Assessment has been conducted at sites proposed to be disturbed, based on the final two alignment options. A final Net Gain Assessment would be conducted once a final alignment has been adopted and a more detailed design has been completed.

13.7.1 Preliminary Net Gain Assessment Results

A summary of the estimated losses and Net Gain targets is outlined in Table 13-10. A detailed breakdown of estimated vegetation losses by EVC is available in Technical Appendix H.

Alignment	Conservation	Vegetation losses		Large Old Trees			
	Significance	Total Losses (Ha)	Total Losses (HabHa)	Net Gain Target (HabHa)	LOT Total Losses	LOT Total to be protected as offset	LOT to be Recruited as offset
1	Very High	34.19	15.38	30.76	140	1120	5600
	High	66.51	21.53	32.31	71	284	1420
	Medium	6.52	1.57	1.57	5	10	50
	Low	3.55	0.9	0.9	5	0	0
Total		110.77	39.38	65.54	221	1414	7070
2	Very High	38.93	19.31	38.62	109	872	4360
	High	77.17	29.36	44.05	93	372	1860
	Medium	12.63	3.21	3.21	5	10	50
	Low	3.13	1.1	1.1	7	0	0
Total		131.86	52.98	86.98	214	1254	6270

Table 13-10 Summary of estimated vegetation losses and Net Gain targets within each alignment option

13.7.2 Potential strategies to achieve Net Gain

A strategy to achieve Net Gain is provided in Technical Appendix H. VicRoads will undertake the following steps to achieve Net Gain:

- 1. A final alignment would be adopted in order for all vegetation losses to be identified.
- 2. The vegetation offset requirements would be calculated.
- 3. Project timeframes and timing of vegetation removal would be estimated.
- 4. Secure offsets.

VicRoads could source offsets from the following sources:

The VicRoads Net Gain Bank which currently has
 6.42 Habitat hectares (Habha) of Very-High
 Conservation Significance Plains Grassland in the

Victoria Volcanic Plain bioregion and 1.63Habha of Very High Conservation Significance Grassy Dry Forest in the Central Victorian Upland bioregion.

- BushBroker has significant quantities of offsets on its register of landowners willing to sell offset credits. The offset credits potentially available from BushBroker for the Project are outlined in Table 13-11.
- Trust For Nature currently have 13Habha available within the Victorian Volcanic Plains bioregion and 3Habha available within the Central Victorian Uplands bioregion. They also have approximately 500 offset sites within both bioregions and across many different EVCs which can be investigated further once the final offset requirements for the Project are determined.

Bioregion	Very High (Habha)	High (Habha)	Medium (Habha)	Low (Habha)
Central Victorian Uplands	37.82	6.07	6.61	1.43
Goldfields	20.57	28.14	9.72	2.42
Victorian Volcanic Plain	190.31	98.23	3.2	0.16

Table 13-11 Available offset credits from BushBroker as of June 2012

- Acquisition of adjacent land VicRoads could secure suitable offsets through acquisition of land adjacent to or close by the Project alignment. This potentially includes areas of road reserve along the Western Highway where offsets involving long term management of vegetation may be negotiated between DSE and VicRoads via the Recognition of Roadside Vegetation Memorandum of Understanding. VicRoads would not *compulsorily* acquire land for the purpose of native vegetation offsets.
- Private Offset Brokers VicRoads could engage private offset brokers in order to locate offsets. VicRoads would require that any potential offset sources were secured with a Section 69 agreement under the *Conservation Forest and Land Act 1987* or a Trust for Nature Covenant under the *Victorian Conservation Trust Act 1972.*
- Local Councils VicRoads could local seek availability of offsets from councils.

In summary, the required Net Gain offsets for the Project would be achievable through a combination of the aforementioned offset sources.

13.8 Impact Assessment

13.8.1 Impact Pathways

The impact assessment was conducted on the final two alignment options (known as Option 1 and Option 2).

Key issues

Losses of ecological values should be viewed in the context of overall ongoing loss, fragmentation and deterioration in the quality of remnant vegetation within the study area and surrounding landscape.

One of the main impacts on ecological values would arise from the removal of remnant native vegetation, including the threatened flora populations that have been recorded in the study area.

Potential impacts to significant fauna would arise from the removal of remnant native vegetation resulting in the direct loss of significant fauna, of habitat supporting significant fauna and of corridors and 'stepping stones' that facilitate the movement of significant fauna.

Removal of remnant native vegetation

Construction of the Project would result in the removal of native vegetation including parts of EVCs of varying quality. These are:

- Plains Grassland (endangered);
- Plains Grassy Woodland (endangered);
- Alluvial Terraces Herb-rich Woodland (endangered);
- Hills Herb-rich Woodland (vulnerable);
- Heathy Dry Forest (least concern);
- Creekline Grassy Woodland (endangered);
- Grassy Woodland (endangered);
- Plains Grassy Wetland (endangered);
- Grassy Dry Forest (depleted); and
- Heathy Woodland (depleted).

Refer to Table 13-13 for the conservation status of these EVCs and to Figure 13-2 for boundary of the bioregions and for location of the EVCs.

The two alternative alignment options have been selected as they minimise impacts on EVCs, however the Project would still impact approximately 110ha of EVCs (equating to 39.38Habha) for Option 1 (of which 34.19ha are of Very High conservation significance) and approximately 131ha of EVCs (equating to 52.98Habha) for Option 2 (of which 38.93ha are of Very High conservation significance). With the application of management measures including micro-alignment during the detailed design phase and revegetation with species appropriate to the local area. It is expected that this would be a moderate overall impact on EVCs based on the consequence guidelines developed for this EES (refer to Technical Appendix H) because the loss would be less than 0.1% of the total area of EVCs in the bioregion.

The Project has been estimated to also result in the removal of 221 LOTs in Option 1 (140 of which are of Very High conservation significance) and 214 LOTs in Option 2 (of which 109 are of Very High conservation significance). Mitigation measures including alignment refinements during detailed design should reduce the number of LOTs impacted by the Project, however it would not be possible to avoid all LOTs. With the application of management measures including micro-alignment and construction planning to minimise the number of



The losses of native vegetation would be offset in accordance with Victoria's Native Vegetation Management – A Framework for Action. The details of this framework are outlined in Section 13.1.

Removal of native vegetation during construction may also result in the death or injury of fauna species where habitat is impacted, including:

- The Golden Sun Moth (Critically endangered EPBC Act, FFG Act Listed, Critically endangered – DSE Advisory List) (Option 1 and Option 2)
- The Dwarf Galaxias (endangered EPBC Act, FFG Act Listed, near threatened– DSE Advisory List) (Option 1 and Option 2).
- The Brown Toadlet (FFG Act Listed, endangered, DSE Advisory List); and
- Brown Treecreeper (near threatened, DSE Advisory List) (Option 1 and Option 2).

A reduction in the areas of native vegetation removed is likely to be achieved through detailed design and construction planning. Detailed design coupled with mitigation measures such as preclearing of fauna species in areas to be impacted would reduce the impacts on EVCs and areas of habitat.



Listed Fauna Species

The Dwarf Galaxias (EPBC listed) has been recorded in Billy Billy Creek. The Project would involve construction of bridges that span Billy Billy Creek. Mitigation measures such as not placing any bridge structures within the waterway and constructing outside the species breeding period would be implemented to reduce the risk of impacts to the Dwarf Galaxias. Due to the implementation of these mitigation measures and other construction management measures to minimise sediment entering the waterway, it is not expected that there would be any detrimental impacts on this species. Both Option 1 and Option 2 intersect Billy Billy Creek and it is expected that the species could be impacted by the Project. However due to the proposed design and management measures it is expected that any impacts would be minor.

The Golden Sun Moth has been found at various locations between Buangor-Ben Nevis Road and Langi Ghiran Picnic Ground Road (refer to Figure 13-2). Removal of habitat within these areas may result in the death or injury to individuals of this species. Both Option 1 and Option 2 intersect habitat for this species and it is expected that the Project would have a significant impact on the species due to the area of habitat that would be removed (31.56ha in Option 1 and 23.80ha in Option 2). Detailed design and construction planning to avoid impacts at known habitat locations is expected to reduce this impact slightly.

The Brown Toadlet has been identified as being widespread within the study area, especially in areas including drainage lines and culverts. Both Option 1 and Option 2 intersect habitat for this species and it is expected that the species would be impacted upon. However, any impacts on this species are expected to be minor.

The Brown Treecreeper has been identified as being widespread within the study area mostly within riparian habitats that support hollow-bearing River Red Gum and Yellow Box trees. Both Option 1 and Option 2 intersect habitat of the Brown Treecreeper and it is expected that the Project would have an impact on this species, although it is expected that any impacts on this species would be minor.

There is also the possibility that construction could encounter unexpected fauna species that were not identified in the targeted surveys. However, with the application of proposed mitigation measures, such a pre-clearance survey of construction areas, the impacts of this are expected to be minor.

Barriers to fauna movement

The Project could result in the increase in the amount and frequency of hostile habitats for native fauna (including construction zones, the highway itself, bridges and roadside culverts). These elements of the Project could act as barriers for the movement of both terrestrial and aquatic fauna species. Any impacts from this are expected to be minor.

Impacts on the movement of the Dwarf Galaxias from bridge structures would be minimised by designing the bridge that crosses Billy Billy Creek to span the waterway so that no piers would be placed within the regular flow waterway within this creek. The impacts on this species are expected to be minor. Any impacts (including death) of fauna species within the construction footprint would be recorded and provided to the Department of Sustainability and Environment.

Road Kill

The Project could result in an increase in fauna species killed by vehicles using the highway as the Project would provide an extra carriageway, and therefore a greater distance for fauna species to cross the highway, increasing the risk of being hit by a vehicle. The risk of road kill would be increased the most where the new carriageway pass through heavily vegetated areas away from the existing highway, including near Langi Ghiran State Park and Woodnaggerak flora and fauna reserve. The impacts from road kill are expected to be minor.

Waterway crossings and bridge structures

Waterway crossings at Billy Billy Creek and the Hopkins Rover could result in local destabilisation of waterway banks and channel profile, degradation of river health values and a reduction of key aquatic and associated terrestrial habitat within the study area.

It is expected that with mitigation measures including spanning Billy Billy Creek and the Hopkins River the impacts of this would be minor.

Sediment discharge to waterways

Construction could result in the discharge of sediment from soil erosion and earthworks to waterways. This could result in short term negative impacts to local aquatic ecosystems both within and downstream from the study area. It is expected that management measures including the installation of sediment fencing would mean the impacts of this would be minor.

Noise and Vibration

Noise from construction and operation (traffic) could result in stress and ultimately displacement of native

Light disturbance

There is a possibility that additional lighting during operation, for example street lights at intersections, could impact on native fauna species causing stress and ultimately the displacement of native fauna species from affected habitat areas. However, it is expected that any impacts from lighting would be minor due to the limited areas affected.

Construction dust and pollutants

Dust arising from construction activities has the potential to have short term negative impacts on native flora, fauna and local aquatic ecosystems.

Similarly, pollutants including smoke, dust, petrochemicals and litter emitted during operation of the Project could negatively impact native fauna, flora and aquatic ecosystems. Management measures including dust suppression methods, regular maintenance and best practice stormwater management would manage this risk and the impacts from this risk are expected to be minor.

13.9 Risk Assessment

An environmental risk assessment was undertaken on the preferred project options to identify key environmental issues associated with the construction and operation of the Project. The methodology for this risk assessment has been described in Chapter 21 (Environmental Management Framework). A risk assessment report that explains the process in detail and contains the complete project risk register is included in Technical Appendix Q. Table 13-12 outlines the impact pathways related to Biodiversity and Habitat and the consequence descriptions that were determined during the risk assessment process.

Risk No.	Impact Pathway	Consequence Description
FF1	Potential removal of individuals of a known population of the EPBC listed flora	Spiny Rice-flower are present at one location: • Between Warrayatkin Rd and Green Hill Lake Rd
FF2	Potential removal of individuals of a known population of the DSE advisory listed flora Golden Cowslip which are present within Options 1 and 2.	Golden Cowslip are present within Options 1 and 2. See targeted flora map for exact locations.
FF3a	Approved removal of individuals of a known population of the DSE advisory listed flora Emerald- lip Greenhood which are present within Option 1 and 2.	Emerald-lip Greenhood is present within Options 1 and 2. See targeted flora map for exact locations.
FF3b	Approved removal of individuals of a known population of the DSE advisory listed flora Yarra Gum which are present within Option 2.	Yarra Gum is present within Option 2. See targeted flora map for exact locations.
FF4	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

Table 13-12 Risk Assessment



Risk No.	Impact Pathway	Consequence Description
FF5	Construction encounters EPBC Act listed Dwarf Galaxias from known habitats (Billy Billy Creek).	Removal of fauna habitat, possible injury/death to listed fauna species individuals during construction.
FF6	Construction encounters EPBC Act listed Golden Sun Moth (GSM) (Pope Road).	Removal of fauna habitat, possible injury/death to listed fauna species individuals during construction.
FF7	Construction encounters FFG Act listed Brown Toadlet and Brown Treecreeper	Removal of fauna habitat, possible injury/death to listed fauna species individuals during construction.
FF8	Construction encounters DSE Advisory listed Brown Toadlet and Brown Treecreeper	Removal of fauna habitat, possible injury/death to listed fauna species individuals during construction.
FF9	Construction encounters FFG listed Victorian Temperate Woodland Bird Community - located along entire alignment	Removal of fauna habitat, possible injury/death to listed fauna species individuals during construction.
FF10	The duplication removes or disrupts wildlife corridors or fauna habitat - located along entire alignment	Impacts on habitat or wildlife corridors may affect Golden Sun Moth, Brown Toadlet and Brown Treecreeper, numerous locally common fauna species and to a lesser extent potential habitat for Southern Brown Bandicoot and Brush-tailed Phascogale. Particularly true for areas around Langi Ghiran State Park, as well as vegetation just north of Beaufort.
FF11	Construction encounters unexpected listed fauna species (species not known to be present from targeted survey).	Removal/disturbance to small number an unknown number of national and State listed fauna species during pre-clearance / clearance work
FF12	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.	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 including Brown Toadlet, Brown Treecreeper, Growling Grass Frog, Southern Brown Bandicoot and Brush-tailed Phascogale. 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.
FF13	Construction encounters Ecological Vegetation Communities (EVCs) (Native vegetation and fauna habitat) - located along entire alignment.	Removal of EVCs of high and very high conservation significance including: Alluvial Terraces Herb-rich Woodland, Grassy Dry Forest, Grassy Woodland, Plains Grassy Wetland, Creekline Grassy Woodland, Plains Grassy Woodland, Plains Grassland, Heathy Dry Forest, Hill Herb-rich Woodland, Heathy Woodland.
FF14a	Construction encounters the EPBC listed community, Grassy Eucalypt Woodland of the Victorian Volcanic plain, located along entire alignment.	Removal of the EPBC Act-listed community.
FF14b	Construction encounters the EPBC listed community, Natural Temperate Grassland of the Victorian Volcanic Plain.	Removal of the EPBC Act-listed community.
FF15	Construction encounters the following FFG listed community - Western (Basalt) Plains Grasslands - located along entire alignment	Removal of the FFG Act-listed community.
FF16	Construction encounters Large and Very Large Scattered Trees/Hollow-bearing trees/fauna habitat - located along entire alignment	Removal of scattered trees.
FF17	Construction of waterway crossings at Billy Billy Creek and Hopkins River.	Local destabilisation of waterway banks and channel profile. Degraded river health values, reduction of key aquatic and associated terrestrial habitat (EPBC Act listed Dwarf Galaxias).
FF18	Placement of bridge structures within a minor waterway (e.g.culverts).	Degraded river health values, reduction of key aquatic and associated terrestrial habitat including potential habitat for EPBC Act listed Dwarf Galaxias. Construction creates temporary barrier to movement of aquatic fauna.
FF19	Realignment of Charliecombe Creek	This is unlikely to have a significant impact on any flora or fauna species of significance, nor are vegetation losses likely to change significantly. However, the primary impacts will be related to sedimentation and turbidity downstream of the impact site as a result of erosion

Risk No.	Impact Pathway	Consequence Description
		issues with disturbance of the creek alignment.
FF20	Construction activities occur outside of agreed construction zone.	Potential loss or modification of native vegetation and/or fauna habitat that was intended to retained
FF21	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 <i>Phytophthora cinnamomi,</i> Bovine Johne's Disease <i>Mycobacterium paratuberculosis,</i> Grape phylloxera <i>Daktulosphaira vitifoliae,</i> Potato Cyst Nematode <i>Globodera rostochiensis</i> and Amphibian Chytrid Fungus <i>Batrachochytrium dendrobatidis.</i>
FF22	Sediment discharge to waterways resulting from soil erosion or spoil earthworks	Impacts to aquatic ecosystems including impacts to aquatic habitat for the EPBC Act listed Dwarf Galaxias, Platypus and other aquatic fauna, at the site and downstream of the site.
FF23	Construction modifies hydrological/surface water flows	Impact to retained native vegetation and fauna habitats
FF24	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.
FF25	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.
FF26	Construction creates dust impacting on native fauna, native flora and surface water ecosystems	Impact to retained native vegetation and fauna habitats
FF27	Creation of pollutants (including smoke, dust, petrochemicals, litter etc.) during construction and operation.	Impact to retained native vegetation and fauna habitats.

13.9.1 Residual risk

As outlined in Table 13-13, the majority of the residual risk ratings are rated as negligible or low. There are however, two risks (FF14 and FF15) with a residual risk rating of high and eight risks with a residual risk rating of medium (refer to Table 13-13). All 10 of these risks had an initial risk rating of high, however through the application of mitigation measures outlined in Table 13-13, most of these risks are able to be reduced.

The residual consequence rating of eight of these risks is minor, however as these risks are likely to occur the residual risk rating remains medium. The residual consequence rating of two of the risks (FF14 and FF15) is moderate, however as these risks are likely to occur the residual risk rating remains high.

As outlined in Section 13.6, efforts have been made to avoid and minimise both matters of NES and other ecological values, however not all impacts are able to be avoided. During the detailed design phase the areas of impact are expected to be reduced. However, it is not considered possible to reduce the residual risk of these 10 risks further. Refer Table 13-13 for the management measures that would be applied to manage risks.

13.10 Environmental Management Measures

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VicRoads has a standard set of environmental management measures which are typically incorporated into its construction contracts for road works and bridge works. These measures have been used as the starting point for the assessment of construction related risks and are described in detail in Chapter 21 (Environmental Management Framework). In some instances, such as for Biodiversity and Habitat, additional project specific environmental management measures have been proposed to reduce environmental risks.

Management measures specific to each identified Biodiversity and Habitat risk, and the residual risk rating after these environmental management measures have been applied are outlined in Table 13-13.

Table 13-13 Environmental Management Measures

Risk No.	Environmental Management Measures	Residual Risk Rating
FF1	Comply with section 1200.13 Flora and Fauna of the VicRoads contract specification. 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). Prepare and implement a Conservation Management Plan (CMP), including a Salvage and Translocation Plan. Collect seed and implement salvage and translocation 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. To protect populations during construction, protective fencing would be supplemented with a high-visibility component to indicate the sensitivity of the area.	Low
FF2	As per Risk FF1. Translocation to be in accordance with a formal translocation plan approved by DSE, which would include post-translocation monitoring.	Negligible
FF3a	As per Risk FF1. Translocation to be in accordance with a formal translocation plan approved by DSE, which would include post-translocation monitoring.	Low
FF3b	Comply with section 1200.13 Flora and Fauna of the VicRoads contract specification. 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). Prepare and implement a CMP including collecting seed and implementing salvage program. To protect populations during construction, protective fencing would be supplemented with a high-visibility component to indicate the sensitivity of the area.	Medium
FF4	Comply with section 1200.13 Flora and Fauna of the VicRoads contract specification. Avoid impacts if possible, by altering the construction area. Otherwise where applicable, implement a translocation plan for these individuals.	Low
FF5	Comply with section 1200.13 Flora and Fauna of the VicRoads contract specification. Implement a Construction EMP detailing erosion and sediment controls. Development of a Conservation Management Plan for Dwarf Galaxias prior to project approval. Construction around and in watercourse to occur outside breeding period/dispersal period (May to October). Monitor weather for rainfall events within the catchment and postpone work near Billy Billy Creek during expected elevated flows. Bridge to span waterway, no structures to be installed in low-flow channel. Bridge structures to be at least 5m from the regular flow bank to allow for fauna movement under the bridge. All waterway crossings within known and potential habitats to be designed to allow for unimpeded Dwarf Galaxias dispersal under flood conditions. Conduct pre-clearance fauna surveys and then attempt relocation where possible.	Low
FF6	Comply with section 1200.13 Flora and Fauna of the VicRoads contract specification. Potential for detailed design or construction planning to avoid impact at known locations/habitats (e.g. micro alignment change to construction corridor). Revegetate Right of Way (ROW) with grassland species favoured as a food source by GSM (e.g. Austrodanthonia sp.) where GSM populations are known to be present.	Medium
FF7	Comply with section 1200.13 Flora and Fauna of the VicRoads contract specification. 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 CMP, including 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. To protect populations during construction, protective fencing would be supplemented with a high-visibility component to indicate the sensitivity of the area.	Medium

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Risk No.	Environmental Management Measures	Residual Risk Rating
FF8	Comply with section 1200.13 Flora and Fauna of the VicRoads contract specification. 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 CMP, including 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. To protect populations during construction, protective fencing would be supplemented with a high-visibility component to indicate the sensitivity of the area.	Medium
FF9	Comply with section 1200.13 Flora and Fauna of the VicRoads contract specification. 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 CMP, including 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.	Medium
FF10	 Comply with section 1200.13 Flora and Fauna of the VicRoads contract specification. 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. Use the results of the above study to determine whether additional crossing structures should be installed. 	Medium
FF11	As per Risk FF4. Prepare and implement a CMP, including 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.	Low
FF12	 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. 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. Use the results of the above study to determine whether additional crossing structures should be installed. 	Low
FF13	Comply with section 1200.13 Flora and Fauna of the VicRoads contract specification. 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. Where possible retain appropriate habitat features/structure within the construction alignment. Shrubs and other understorey species would be retained or re-established (to the allowable height limit) post-construction. Logs and any felled trees would be left in the area to provide additional fauna habitat. Trees would be lopped or trimmed rather than removed where possible. All contractors would be aware of areas of ecological value through a site induction by a qualified botanist (see figures attached for locations of remnant native vegetation) to minimise the likelihood for damage to areas scheduled to be retained and include EVC polygons (areas of sensitivity) on detailed surveying drawings and check for accuracy. The study area would be rehabilitated and revegetated in accordance with Section 9 of Technical Appendix H.	Medium
FF14a	Comply with section 1200.13 Flora and Fauna of the VicRoads contract specification. Detailed design and construction planning to minimise native vegetation loss as far as possible.	High
FF14b	Comply with section 1200.13 Flora and Fauna of the VicRoads contract specification. Detailed design and construction planning to minimise native vegetation loss as far as possible.	High



Risk No.	Environmental Management Measures	Residual Risk Rating
FF15	As per Risk FF14.	High
FF16	Comply with section 1200.13 Flora and Fauna of the VicRoads contract specification. Detailed design and construction planning to minimise loss of trees, particularly Medium Old Trees, Large Old Trees and Very Large Old Trees and those which are hollow bearing, with the advice of an arborist.	Medium
FF17	 Implementation of a Construction EMP detailing: Erosion and sediment control measures. Fuel and chemical management procedures. No structures within the stream, and consistent with CMA requirements. Fish sensitive design of structures to provide safe fish passage. Schedule construction to no-flow or low-flow periods. Establish a water quality monitoring regime to assess and limit any construction impacts. This would include a before/after sampling design, including several upstream and downstream sites. Establish a set of site specific criteria that would trigger intervention of works in the event of a noticeable deterioration in habitat, water quality or observed direct death or injury of aquatic fauna (particularly Dwarf Galaxias in Billy Billy Creek). Establish appropriate response actions in case of such an event based on these site specific criteria. Sedimentation and pollution control measures are to be implemented at all times, in accordance with EPA guidelines, to prevent impacts to waterways and wetlands. All waterways disturbed during project construction are to be revegetated and restored (to a condition equal to or better than pre-construction) after completion of construction. Any snags and/or logs that are removed from any waterways to be replaced in similar locations after completion of construction (particularly Billy Billy Creek as these features provide habitat for Dwarf Galaxias). The storage of fuel and chemicals (including the refuelling of vehicles and machinery) at a minimum of 50 metres away from all waterways; Site toilets to be a minimum of 50 metres away from all waterways; and, Schedule construction to no-flow or low-flow periods. 	Low
FF18	 Implementation of a Construction EMP detailing: Erosion and sediment control measures. Fuel and chemical management procedures. Implement fish sensitive design of structures to provide for safe fish passage. Schedule construction to no-flow or low-flow periods. 	Low
FF19	Undertake creek realignment during the dry season (summer-autumn) to reduce the likelihood of large water flows through the waterway when the soils are most unstable. Line creek banks with rock material or Geofab to increase bank stability and reduce erosion. Revegetate creek banks as soon as possible after realignment to increase bank stability (using plant species consistent with the local creekline EVC) Replace any in-stream habitats (e.g. rocks, branches, other snags, etc.). Charliecombe Creek is an ephemeral waterway, however sitting water pools are likely to provide habitat to locally common aquatic fauna species. An assessment of the water table should be completed to ensure that sitting pools are retained. Pool, riffle, run morphological features should be retained to their current lengths and depths. Pre, during and post ecological monitoring (including water quality and macroinvertebrates) should be implemented. Soil testing should be conducted to ensure the soil type is appropriate for the new creek alignment.	Low
FF20	Existing vegetation and native fauna habitat identified in the Contract to be retained, would 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. In areas of known, or possible, habitat for listed threatened flora and fauna species, protective fencing should be supplemented with a high-visibility component to indicate the sensitivity of the area. Plant, equipment, material or debris not to be placed or stored within the limit of the root zone of vegetation to be retained.	Low

Risk No.	Environmental Management Measures	Residual Risk Rating
FF21	The Contractor would develop a procedure to prevent the spread of declared weeds, pests and diseases within the Site and off-site. A weed management and control program would be prepared prior to construction and would be implemented for a period of no less than two years after the completion of the project. Weed management procedures are detailed in Section 9 of Technical Appendix H Pre-construction mapping of weeds and soil pathogens, as other soil pathogens (in addition to cinnamon fungus) may exist in the area. Pathogen management procedures as outlined in Section 9 of Technical Appendix H	Low
FF22	Implementation of a Construction EMP detailing erosion and sediment control measures. Installation of sediment fencing adjacent to waterways. Routine maintenance of sediment fences, particularly after large rain events. Maintain as much of the natural vegetation filter strip as possible.	Low
FF23	 Implementation of a Construction EMP detailing: Erosion and sediment control measures. Fuel and chemical management procedures. Installation of appropriate drainage systems. Schedule construction to no-flow or low-flow periods 	Low
FF24	Traffic noise levels would not exceed the objectives specified in VicRoads Traffic Noise Reduction Policy for new and improved roads within and outside of the limit of works.	Low
FF25	Risk is low and therefore there are no mitigation measures recommended to manage the risk.	Low
FF26	Implementation of a Construction EMP detailing air quality control measures and strict monitoring procedures 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	Negligible
FF27	As per Risk FF25. Implementation of a Construction EMP detailing: • Erosion and sediment control measures. Fuel and chemical management procedures	Negligible

13.11 Conclusion

Parts of the study area are considered to be of both national and State conservation significance.

Matters of NES were considered to be of highest conservation value during the Options Assessment process and priority was given to avoiding matters of NES where possible. Efforts were also made to avoid and minimise impacts on State and regionally significant flora and fauna values. However, due to the long linear nature of the Project, it would not be possible to avoid all impacts on flora and fauna values.

The Project would impact upon one Spiny Riceflower plant (critically endangered), which was unable to be avoided during the design of the Project. This is considered to be a minor impact.

During targeted surveys in 2011 Dwarf Galaxias (vulnerable) were found to be present in Billy Billy Creek, and the Project has the potential to impact upon this species. However, due to the measures proposed to manage impacts on the Dwarf Galaxias at Billy Billy Creek, which include spanning the waterway with no bridge piers within the regular flow waterway and constructing the required bridge during periods of no-flow or low flow, it is expected that the impacts to this species would be minor.

The Project would require the removal of 31.56ha of Golden Sun Moth (critically endangered) habitat in Option 1 and 23.80ha in Option 2. It would therefore result in a significant impact to this species according to SEWPaC guidelines. It is expected that the area of impact could be reduced slightly through the detailed design phase of the Project, however even with the application of management measures the impact would still be considered significant.

The Project would also remove approximately 5.25ha of Natural Temperate Grassland of the Victorian Volcanic Plain (critically endangered), in both Option 1 and Option 2, and approximately 11.14ha of Grassy Eucalypt Woodland of the Victorian Volcanic Plain (critically endangered) for Option 1 and 8.65ha for Option 2. This is considered to be a significant impact as defined by the

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Significant Impact Guidelines 1.1 developed by SEWPaC. Areas of these communities were avoided where possible, however it is not considered possible to avoid all areas of these communities. It is expected that further avoidance and minimisation of matters of NES would be able to be achieved through micro-alignment in the detailed design phase. The impacts on listed flora species and communities would be offset in accordance with the requirements of Draft Policy Statement 4.1: Use of environmental offsets under the *Environment Protection and Biodiversity Conservation Act 1999*. It is expected that VicRoads would be able to source appropriate offsets for the removal of native vegetation required for this project.

The Project would also impact the following State listed species:

- Removal of one Golden Cowslip individual (vulnerable) (Option 1)
- Removal of 12 Emerald-lip Greenhood individuals (rare) (Option 1)
- The Brown Toadlet (endangered) through the removal of fauna habitat (Option 1 and Option 2)
- The Brown Treecreeper (near threatened) through the removal of fauna habitat (Option 1 and Option 2)
- Removal of 8 Yarra Gum individuals (rare) (Option 2).

It is considered that the impacts on State listed species would be insignificant to minor.

The Project would intersect 10 EVCs of varying quality and conservation significance. These are:

- Plains Grassland (endangered);
- Plains Grassy Woodland (endangered);
- Alluvial Terraces Herb-rich Woodland (endangered);
- Hills Herb-rich Woodland (vulnerable);
- Heathy Dry Forest (least concern);
- Creekline Grassy Woodland (endangered);
- Grassy Woodland (endangered);
- Plains Grassy Wetland (endangered);
- Grassy Dry Forest (depleted); and
- Heathy Woodland (depleted).

The two final alignment options have been selected for detailed assessment in this EES as they minimise impacts on EVCs, however the Project would still impact approximately 110ha of EVCs (equating to 39.38Habha) for Option 1, of which 34.19Ha are of Very High conservation significance and approximately 131ha (equating to 52.98Habha) for Option 2, of which 38.93Ha are of Very High conservation significance. This is considered to be a moderate impact based upon the consequence guidelines developed for this EES because the loss would be less than 0.1% of the total are of the EVCs in the relevant bioregion. Consent from the Minister for Environment and Climate Change is required for the removal of vegetation of 'Very High' conservation significance.

The Project could also result in the loss of up to 221 LOTs in Option 1, 140 of which are of Very High conservation significance and up to 214 LOTs in Option 2, of which 109 are of Very High conservation significance. Mitigation measures including detailed design should reduce the number of LOTs impacted by the Project, however it would not be possible to avoid all LOTs. It is expected that the actual number of LOTs impacted would be less than these totals. It is expected that the impact on LOTs would be moderate, based on upon the consequence guidelines developed for this EES.

It is expected that further avoidance and minimisation of matters of NES and State and regional significance would be able to be achieved through micro-alignment in the detailed design phase.

VicRoads would source appropriate offsets for matters of NES that would be impacted by the Project upon consulting with SEWPaC on requirements. VicRoads would be required to obtain offsets for vegetation losses in accordance with Victoria's Native Vegetation Management – A Framework for Action and the Environmental Offsets Policy – Consultation draft under the EPBC Act. Preliminary investigations indicate that adequate offsets are available and VicRoads could source appropriate offsets from one or a combination of BushBroker, Trust for Nature, the VicRoads Net Gain Bank and private offset brokers.

Vegetation of Very High and High Conservation significance and Matters and NES were considered of greatest importance for conservation during alignment selection, and as such were given priority in avoiding and minimising impacts. However, not all impacts on native vegetation and habitat are able to be avoided. Based on the level of impact to Very High and High conservation significance vegetation, Option 1 is considered to be the preferred alignment option (with an area of impact 15.4Ha less than in Option 2). Option 1 however, has a greater level of impact on matters of NES (1 Spiny Rice-Flower Plant, 7.76Ha more of Golden Sun Moth habitat and 2.49Ha more of Natural Temperate Grassland of the Victorian Volcanic Plain) than Option 2. However, the differences in level of impact on matters of NES between the two alignment options are considered relatively small when compared with the difference in the amounts of Very High and High conservation significance vegetation impacted by the two alignment options. As such, Option 1 is considered the preferred alignment from the Biodiversity and Habitat perspective due to least impact on Very High and High conservation significance vegetation.