20. Matters of National Environmental Significance

The Biodiversity and Habitat Assessment identified one EPBC listed flora species (Trailing Hop-bush, Vulnerable) and one EPBC listed fauna species (Golden Sun Moth, Critically Endangered) that would be impacted by the Project.

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 significance. Priority was given to avoiding and minimising impacts on matters of NES where possible. However, it was not possible to entirely avoid impacts on matters on NES. It is expected that the Project would impact up to 21 Trailing Hop-bush plants and up to 29.92 hectares (ha) of confirmed and 99.94ha of potential Golden Sun Moth habitat.

In accordance with SEWPaC guidelines, the Project would have a significant impact on Golden Sun Moth habitat and Trailing Hop-bush. However, for Golden Sun Moth the impact, as rated for the project area, was considered to be moderate as the Project would result in removal of greater than 1% of the project area population but less than 1% of the regional area population.

For Trailing Hop-Bush the impact, as rated for the project area, was considered to be minor as the Project would result in removal of less than 1% of the project area population.

The impacts on the Golden Sun Moth habitat would be offset in accordance with the EPBC Act Environmental Offsets Policy. Offsets would be determined through negotiations with the Department of Sustainability, Environment, Water, Populations and Communities.

Trailing Hop-bush is listed as Vulnerable under the EPBC Act and as such there are not likely to be any offsets required for impacts to this species. However, individuals that are impacted would be required to be salvaged and translocated in accordance with an approved Salvage and Conservation Management Plan, with translocated individuals managed and secured in perpetuity.

The 21 Trailing Hop-bush plants are located in the road reserve of existing highway between London Road and Robson Road.

The existing highway is proposed to be utilised as a service road in this location. Through detailed design the extent of works required to the remaining existing highway would be defined and is expected to be minimal. It is likely that impacts to the of Trailing Hop-bush plants located in the road reserve on the western side of the existing highway could be avoided.

All Trailing Hop-bush plants to be avoided would be fenced with a high-visibility component to indicate the sensitivity of the area.

It is expected that VicRoads would be able to source appropriate offsets required for this Project.

20.1 Introduction

This Chapter provides a summary of the predicted risks and impacts from the Project on matters of National Environmental Significance (NES) as defined in the *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act).

An EPBC Act Referral was submitted for the Project and it was determined by the Commonwealth Environment Minister that the Project would be a controlled action on 20 December 2010, due to the presence of listed threatened species and communities (under Sections 18 and 18A of the EPBC Act).

The Project is being assessed in accordance with the bilateral agreement that exists between the Commonwealth and the State of Victoria relating to Environmental Impact Assessment. This means that the Victorian Environment Effects Statement (EES) process will be used for assessment of the Project under the EPBC Act.

Information on the biodiversity and habitat values (in addition to matters of NES) is outlined in Chapter 13 (Biodiversity and Habitat). Information on the Options Assessment is outlined in Chapter 5 (Project Alternatives).

This Chapter is based on the Biodiversity and Habitat Assessment Report completed by Ecology and Heritage Partners Pty Ltd (EHP, 2012) which is included in Technical Appendix H.

20.2 Scoping Requirements

The Victorian Minister for Planning's Final Scoping Requirements state: *"The EES should also include a separate summary assessment addressing effects on, and avoidance, mitigation and management measures for, matters of national environmental significance. This summary must include, but not be limited to, information on the following species and ecological communities listed as threatened under the EPBC Act:*

- *Southern Brown Bandicoot, Golden Sun Moth, Striped Legless Lizard, Murray Cod, Australian Grayling and Eastern Dwarf Galaxias; and*
- *Button Wrinklewort, Spiny Rice-flower, Pomonal Leek-orchid, Tawny Spider-orchid and Large-fruit Fireweed and Trailing Hop-bush."*

20.3 Study Area

The study area, for the matters of NES assessment is equivalent to the project area as it is the area of direct impact where native vegetation and habitat would be removed. The study area encompasses a corridor extending approximately 1500 metres (m) either side of the edge of the road reserve, except around Great Western where it extends up to 1800m (encompassing the extent of new alignment possibilities either side of the town) (Refer to Figure 20-1).

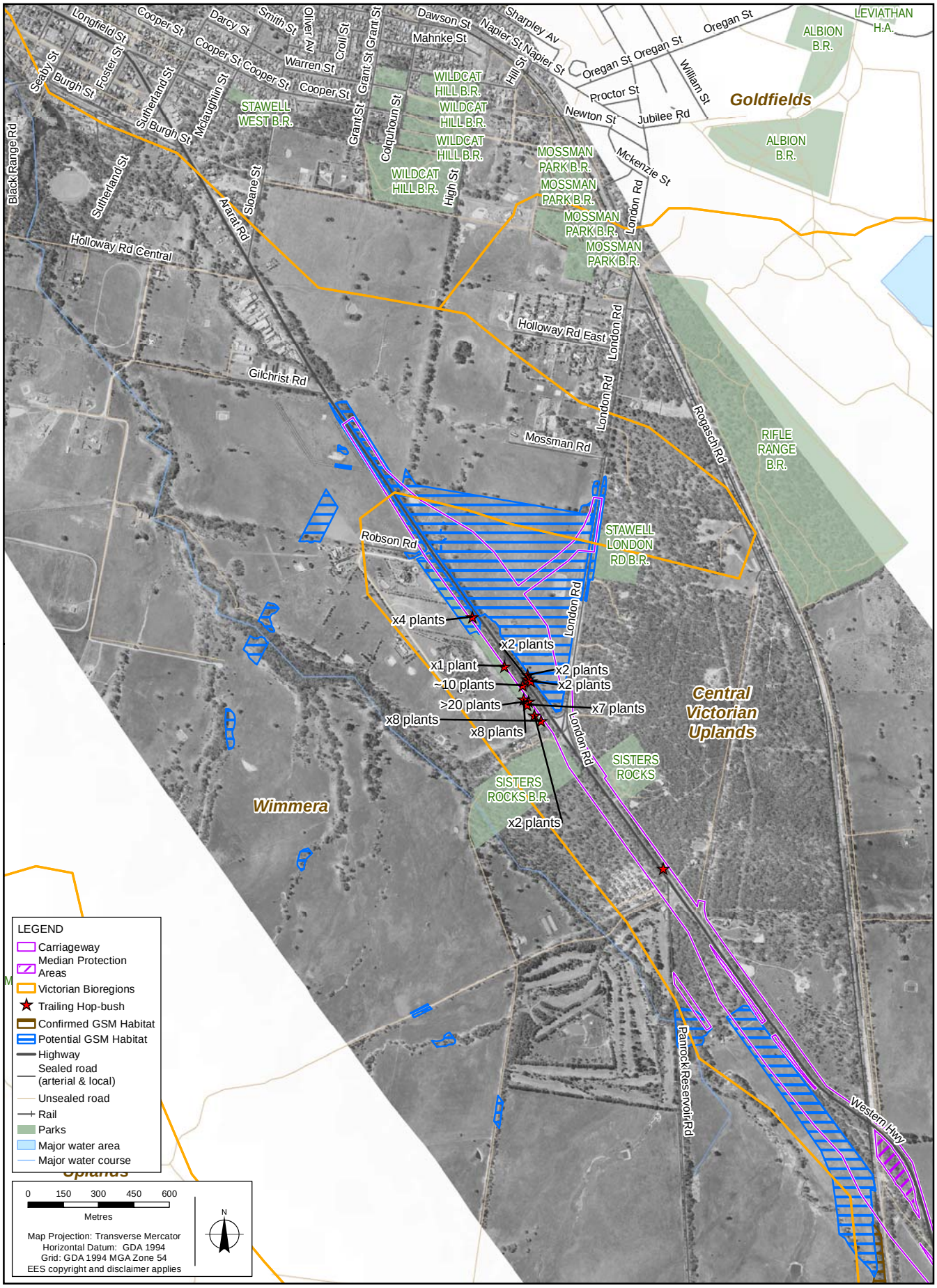

Figure 20-1a MNES and Study Area

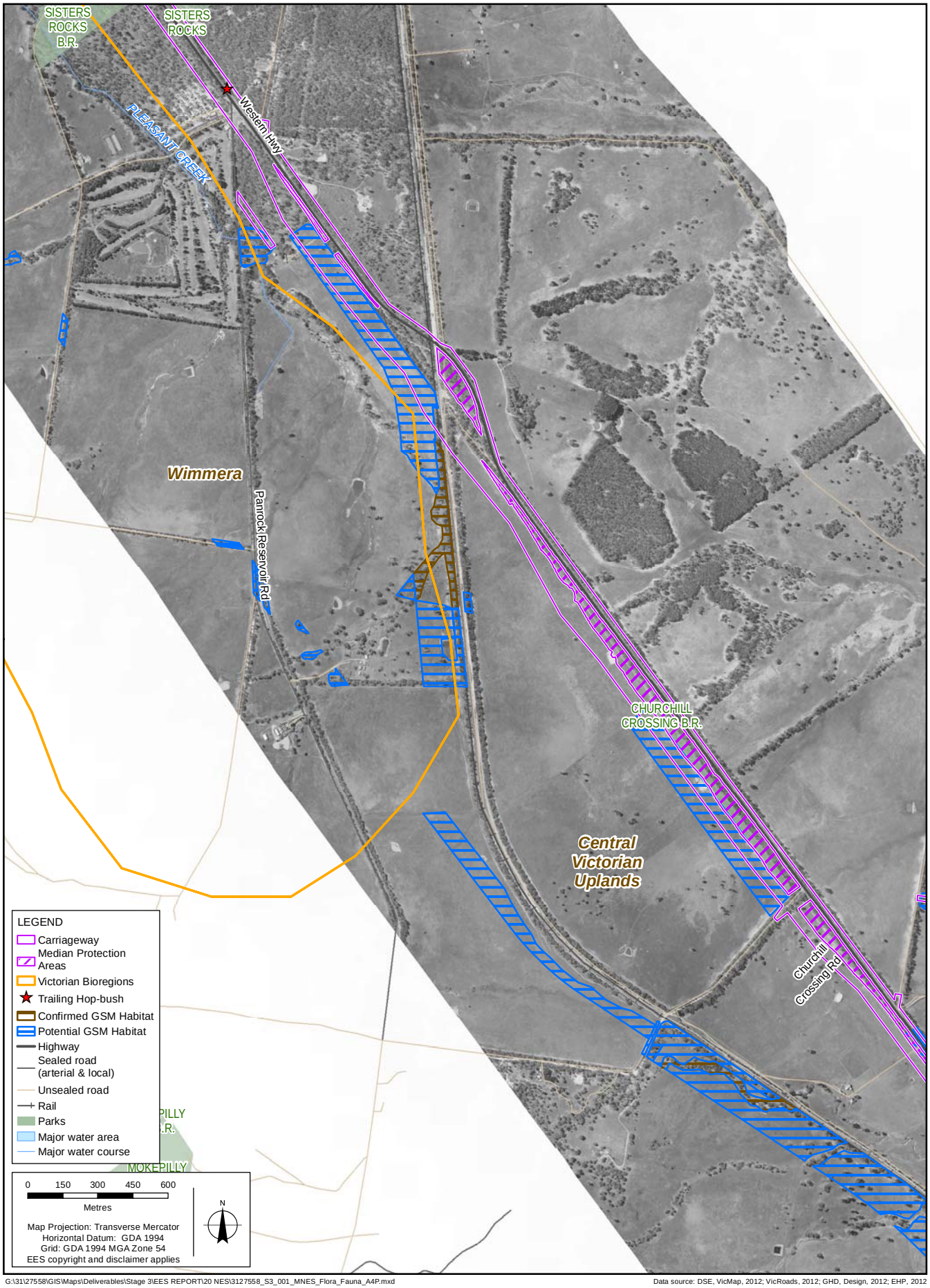

Figure 20-1b MNES and Study Area

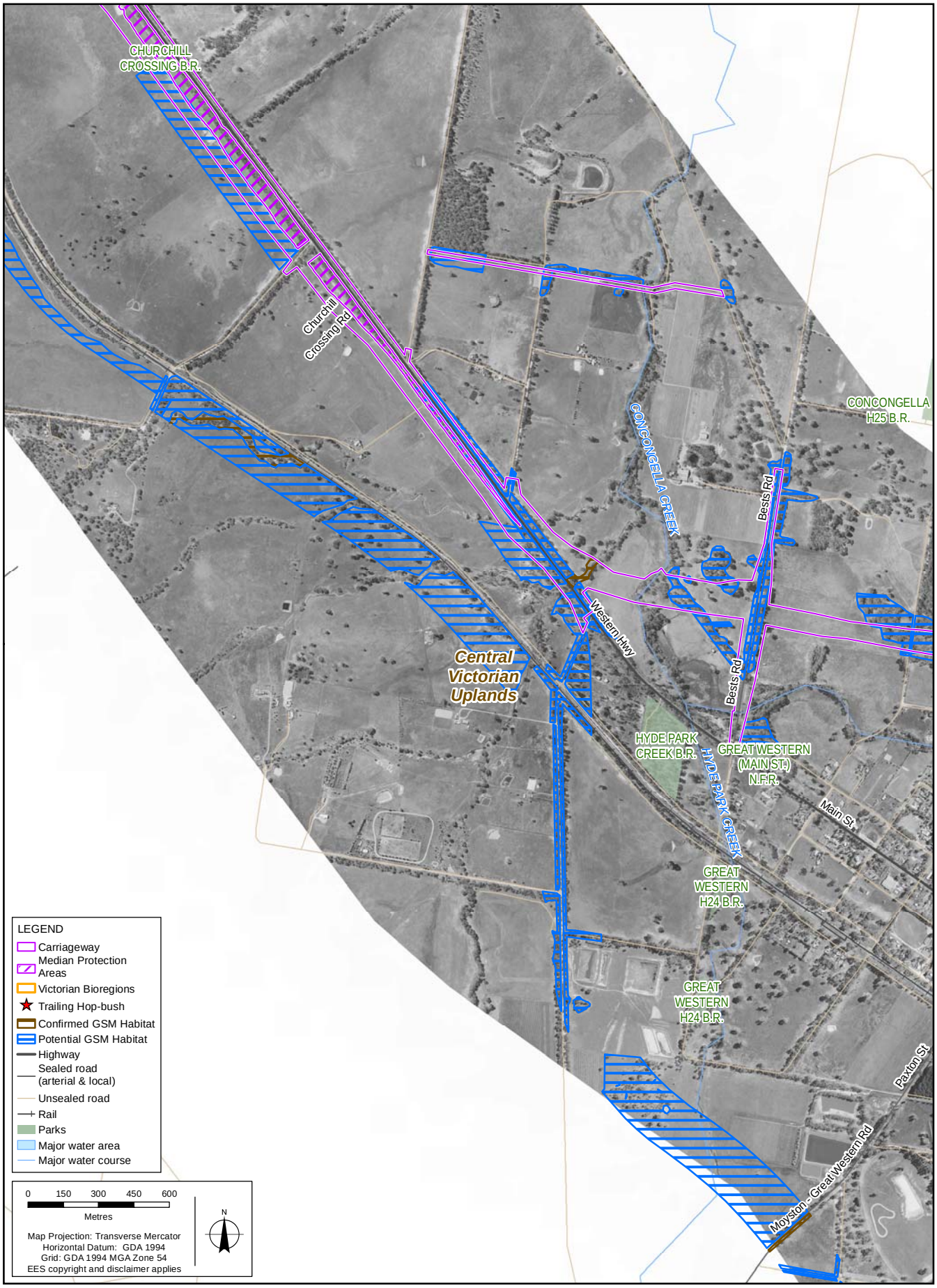

Figure 20-1c MNES and Study Area

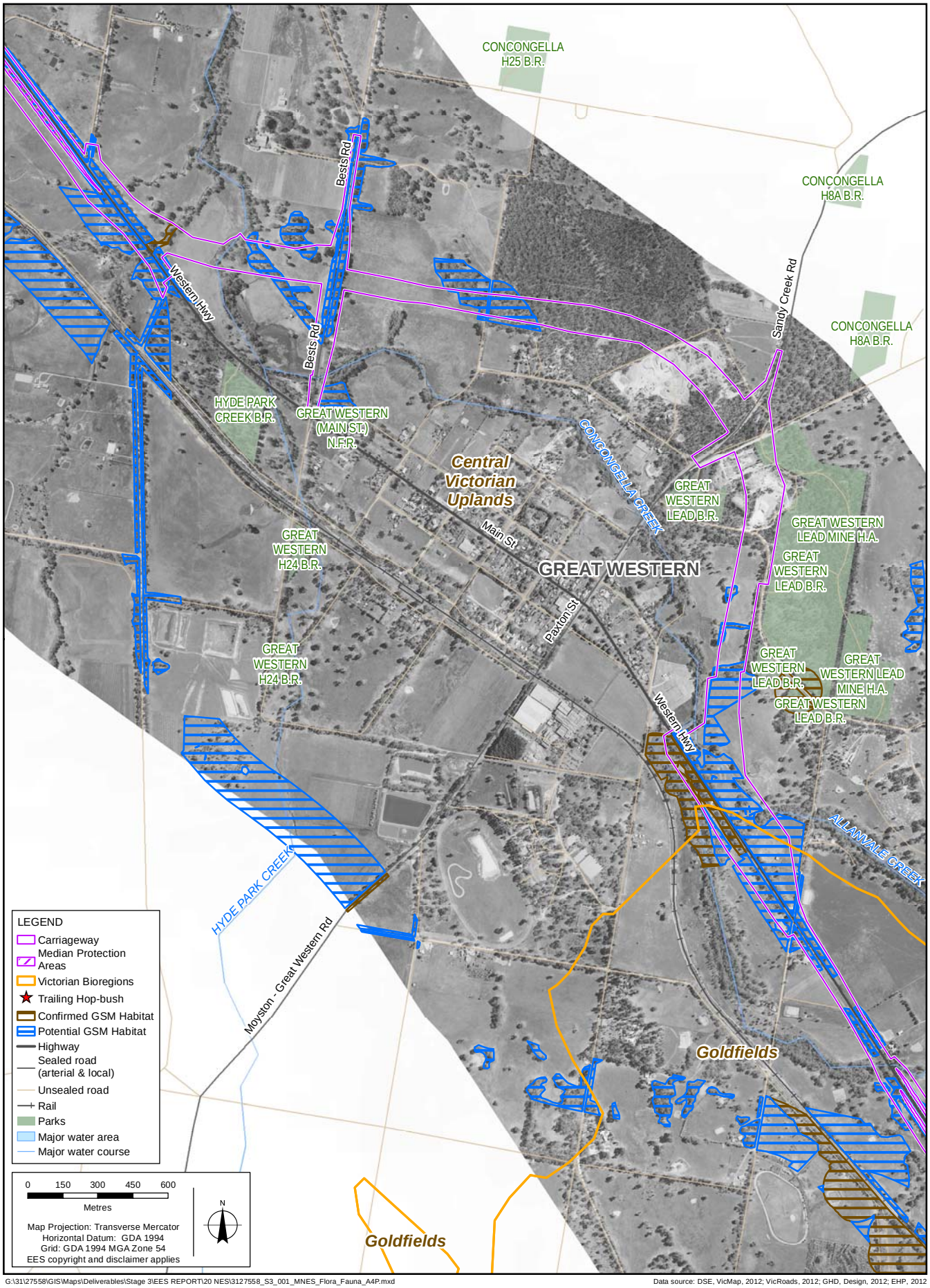

Figure 20-1d MNES and Study Area

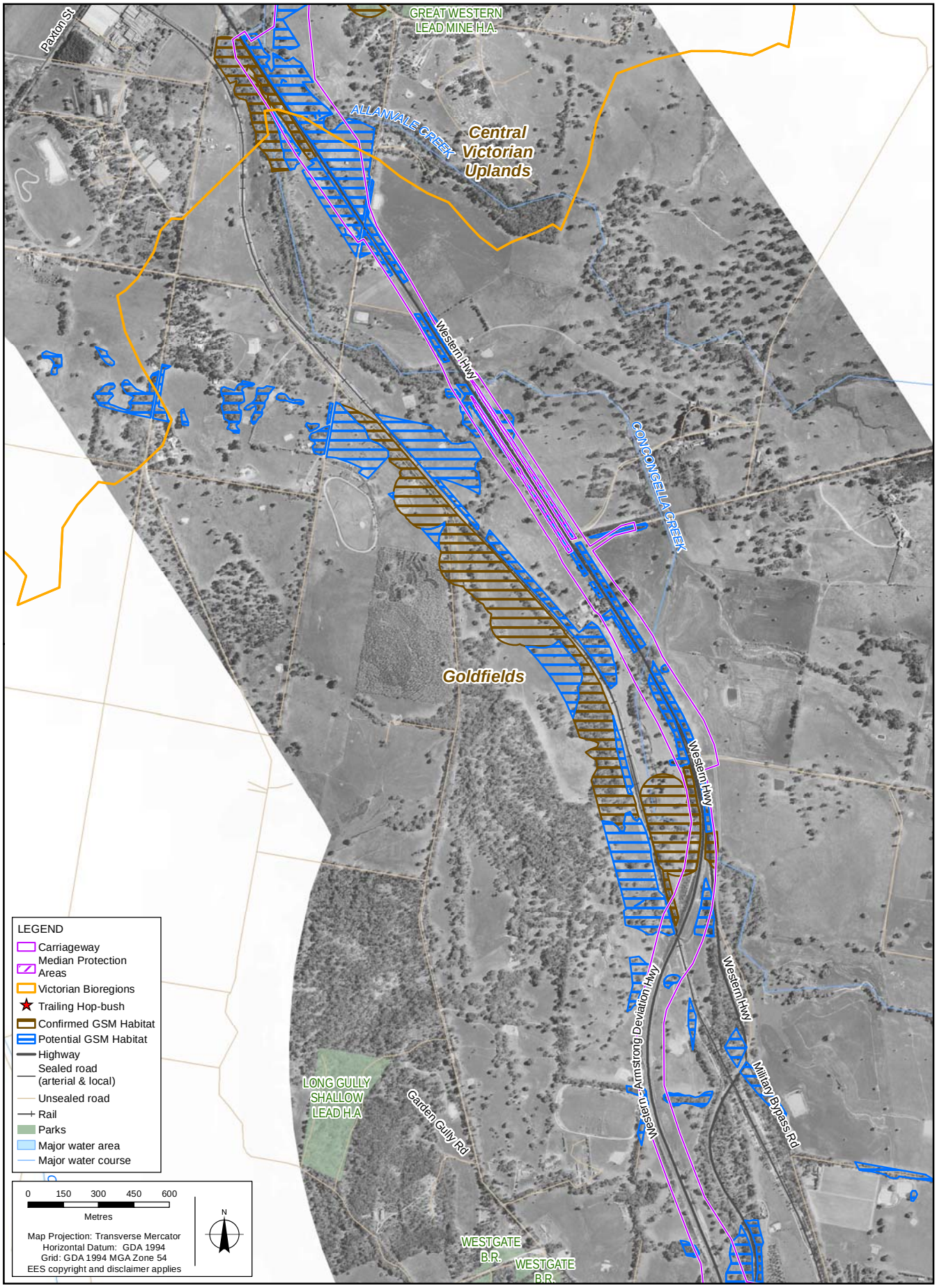

Figure 20-1e MNES and Study Area

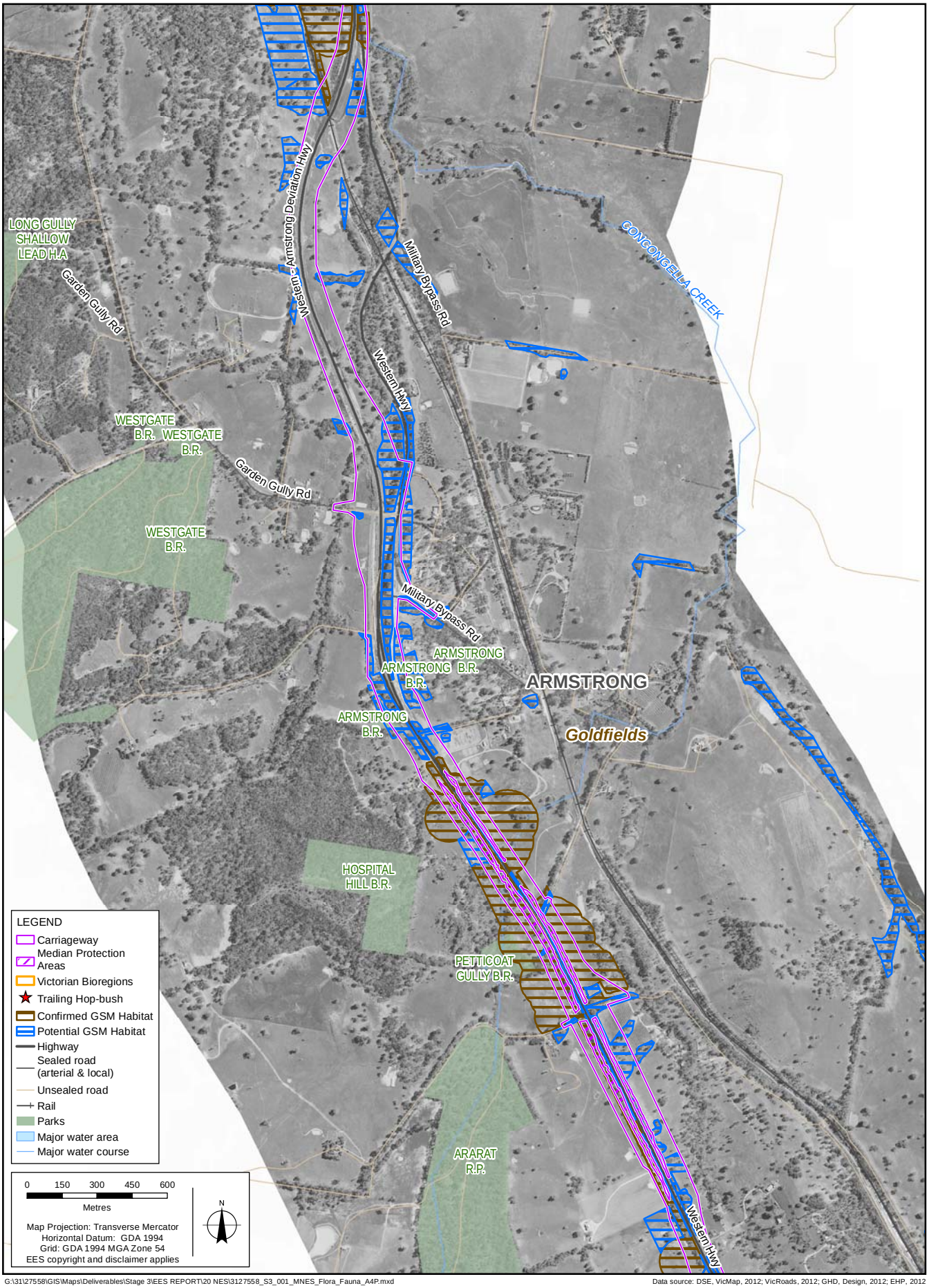

Figure 20-1f MNES and Study Area

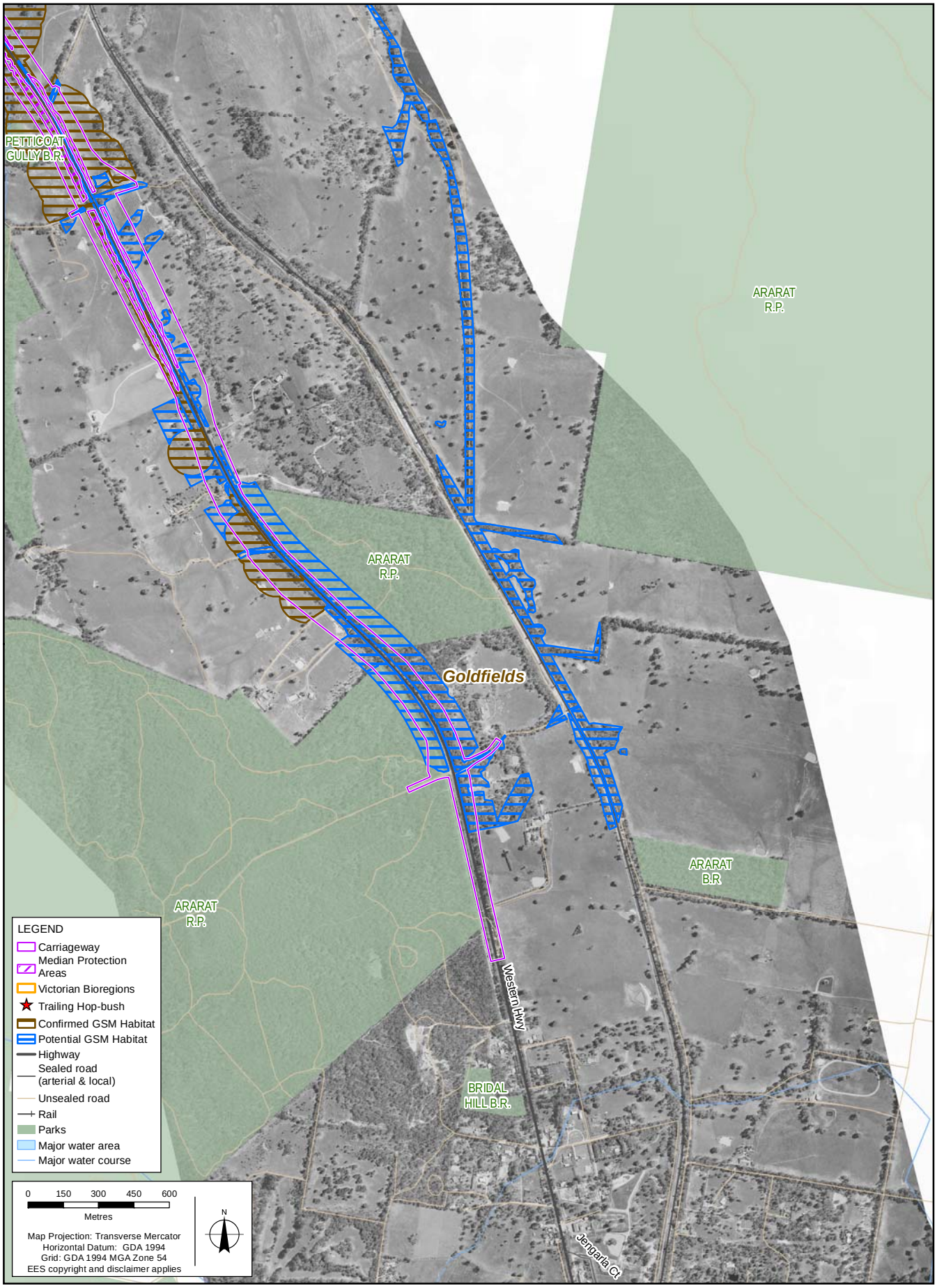

Figure 20-1g MNES and Study Area

20.4 Matters of National Environmental Significance

There are eight matters of NES protected under the EPBC Act. These matters of NES are listed in Table 20-1, together with an explanation as to the relevance of each matter to this Project.

Table 20-1 Matters of NES

Matter of NES	Relevance to the Project
World heritage properties	There are no World heritage properties that would be impacted by the Project.
National heritage places	There are no National heritage places that would be impacted by the Project.
Wetlands of international importance	Lake Albacutya is a Ramsar wetland, located over 160 kilometres (km) north west of the study area. The study area is not within the catchment for this Ramsar wetland, therefore it would not be impacted by the Project.
Listed threatened species and ecological communities	One EPBC Act-listed flora species (Trailing Hop-Bush, Vulnerable) and one EPBC Act-listed fauna species (Golden Sun Moth, Critically Endangered) were identified in the proposed alignment footprint. No threatened ecological communities are located within the study area for Section 3 of the Project and hence no threatened ecological community would be impacted by the Project. A summary of this impact on this matter of NES is provided in this Chapter.
Migratory species	It is unlikely that listed migratory species would be significantly impacted by the Project as it is likely that the study area only provides transitory habitat for listed species.
Commonwealth marine areas	The Project would not impact upon any Commonwealth Marine areas.
The Great Barrier Reef Marine Park	The Project would not impact upon the Great Barrier Reef Marine Park.
Nuclear actions	The Project is not a nuclear action.

20.4.1 Surveys for Matters of NES

A detailed description of the survey methods used and species that were targeted during survey are included in Technical Appendix H (Biodiversity and Habitat Impact Assessment). Table 20-2 provides a summary of the surveys completed for matters of NES for the Project.

Table 20-2 Survey undertaken for matters of NES

Survey	Survey area	Date(s) completed	Season(s)
Preliminary flora assessment	The study area	15 – 12 June 2010 and 28 – 30 June 2010.	Winter
Preliminary fauna assessment	The study area	15 and 17 June 2010	Winter
Targeted flora surveys for: ▪ Spiny Rice-flower* ▪ Trailing Hop-bush ▪ Tawny Spider Orchid ▪ Pomonal Leek-orchid ▪ Button Wrinklewort ▪ Large-fruit Fireweed	The study area	2 and 3 September 2010, 18 and 19 October 2010, 19 and 21 January 2011	Spring Summer
Targeted fauna surveys for Striped Legless Lizard.	Three sites within the study area that were identified as potentially suitable habitat.	Tile grids established on 2 September 2010. Tile grids monitored on 25 November and 14 and 21 December 2010, 5 January and 5 April 2011.	Spring Summer Autumn
Targeted fauna surveys for Golden Sun Moth**	26 sites within the study area and immediate surrounds.	13, 14, 22 and 23 December 2010 and 5, 6 and 20 January 2011.	Summer

Survey	Survey area	Date(s) completed	Season(s)
Targeted fauna surveys for Southern Brown Bandicoot	Sites within the study area that support potentially suitable habitat.	25 November to 21 December 2010	Spring Summer
Targeted fauna surveys for Dwarf Galaxias***	All significant waterways in the study area that would be intersected by the proposed alignment.	September 2010	Spring

* An initial flora assessment was undertaken during the optimum time for Spiny Rice-flower surveys. While targeted surveys were undertaken in early September (just outside the suggested period), remnants of the Spiny Rice-flower flowers are still visible and easily distinguishable from other similar species at this time.

** A precautionary approach has been taken with regard to Golden Sun Moth habitat. Within the study area Golden Sun Moth habitat was mapped as either 'confirmed' or 'potential'. Details of how 'confirmed' and 'potential' Golden Sun Moth habitat was calculated is provided Section 20.6.

*** The EPBC publication Survey Guidelines for Australia's Threatened Fish (2011) states that "December through to April are the best months for sampling fishes in Victoria as water flows are lower." However, waterways between Ararat and Stawell are completely dry throughout the summer months and thus surveys were required to be undertaken outside the preferred survey period.

20.5 Threatened Flora Species

Thirteen (13) nationally significant flora species have previously been documented in the local area (within 10 kilometres of the study area) or predicted to occur in the study area by the EPBC Act Protected Matters Search Tool (PMST). These species are listed in Technical Appendix H. A preliminary survey of the study area was undertaken to determine the likelihood of these species or habitat for these species being present in the study area. From this preliminary assessment it was determined that targeted surveys should only be undertaken for some of these 13 species. These species were:

- Trailing Hop-bush (*Dodonaea procumbens)* (Vulnerable);
- Button Wrinklewort (*Rutidosis leptorrhynchoides*) (Endangered);
- Spiny Rice Flower (*Pimelea spinescens subsp. spinescens*) (Critically Endangered);
- Large-fruit Fireweed (*Senecio macrocarpus*) (Vulnerable);
- Tawny Spider Orchid (*Caladenia fulva*) (Endangered); and
- Pomonal Leek-orchid (*Prasophyllum subbisectum*) (Endangered);

The results of these targeted surveys are outlined below. The locations of identified species are shown in Figure 20-1.

20.5.1 Trailing Hop-bush (*Dodonaea procumbens)* (Vulnerable)

Approximately 67 Trailing Hop-bush plants were recorded within the study area during the targeted surveys. These species were recorded in the existing road reserve south of London Road on the west and east side of the existing Western Highway (refer to Figure 20-1g). It is estimated that up to 21 of the 67 identified individuals would be impacted by the Project.

Trailing Hop-bush (EHP 2012)

20.5.2 Button Wrinklewort (*Rutidosis leptorrhynchoides*) (Endangered)

No Button Wrinklewort plants were recorded within the study area during the targeted surveys. It is considered unlikely that this species is present within the proposed alignment, therefore it is not expected that this species would be impacted by the Project.

20.5.3 Spiny Rice Flower (Pimelea *spinescens subsp. spinescens*) (Critically Endangered)

No Spiny Rice-flower plants were recorded within the study area during the targeted surveys. It is considered unlikely that this species is present within the proposed alignment, therefore it is not expected that this species would be impacted by the Project.

20.5.4 Large-fruit Fireweed (*Senecio macrocarpus*) (Vulnerable)

No Large-fruit Fireweed plants were recorded within the study area during the targeted surveys. It is considered unlikely that this species is present with the proposed alignment, therefore it is not expected that this species would be impacted by the Project.

20.5.5 Tawny Spider Orchid (*Caladenia fulva*) (Endangered)

No Tawny Spider Orchid plants were recorded within the study area during the targeted surveys. It is considered unlikely that this species is present with the proposed alignment, therefore it is not expected that this species would be impacted by the Project.

20.5.6 Pomonal Leek-orchid (*Prasophyllum subbisectum*) (Endangered)

No Pomonal Leek-orchid plants were recorded within the study area during the targeted surveys. It is considered unlikely that this species is present with the proposed alignment, therefore it is not expected that this species would be impacted by the Project.

20.6 Targeted Fauna Species

There are 13 nationally significant fauna species that have been previously recorded or are predicted by the PMST to occur in the local area of the Project. These species are listed in Technical Appendix H. A preliminary survey of the study area was undertaken to determine the likelihood of these species or habitat for these species being present in the study area. From this preliminary assessment it was determined that targeted surveys should only be undertaken for some of these 13 species. These species are:

- Golden Sun Moth (*Synemon plana)* (Critically Endangered);
- Striped Legless Lizard (*Delma Impar*) (Vulnerable);
- Southern Brown Bandicoot *(Isoodon obesulus obesulus*) (Endangered); and
- Eastern Dwarf Galaxias *(Galaxiella pusilla)* (Vulnerable).

The results of these targeted surveys are outlined below. The locations of identified species are shown in Figure 20-1.

20.6.1 Golden Sun Moth (*Synemon plana)* (Critically Endangered)

Golden Sun Moth habitat was identified at numerous sites within the study area, with a high number recorded between St. Ethels Road and The Majors Road (refer to Figure 20-1). The proposed alignment would impact up to 29.92ha of confirmed Golden Sun Moth habitat and 99.94ha of potential habitat.

Confirmed habitat was calculated based on the following:

- Where a Golden Sun moth record fell inside a native vegetation patch, the entire patch was considered to be 'confirmed' habitat.
- Where are Golden Sun Moth Record fell outside areas considered to be a native vegetation patch, a 100 metre buffer was established around each record, with areas inside the buffer considered to be 'confirmed' habitat.
- Where the buffer intersected vegetation mapped as a patch, that patch was also mapped as confirmed.

Potential habitat was calculated based on all areas that provided suitable habitat for Golden Sun Moth, regardless of whether the species was recorded in those locations during targeted surveys.

Golden Sun Moth (EHP 2012)

20.6.2 Striped Legless Lizard (*Delma Impar*) (Vulnerable).

No Striped Legless Lizards were recorded within the study area. It is considered unlikely that this species is present within the proposed alignment, therefore it is not expected that this species would be impacted by the Project.

20.6.3 Southern Brown Bandicoot *(Isoodon obesulus obesulus*) (Endangered)

The Southern Brown Bandicoot was not detected during the targeted surveys undertaken within the study area, however, due to the highly cryptic nature of the species and the presence of suitable habitat there is potential (albeit a low likelihood) that this species is present within the Project area. Due to the low likelihood of presence it is expected that the impacts of the Project on this species would be low.

20.6.4 Dwarf Galaxias (*Galaxiella pusilla*) (Vulnerable)

Targeted aquatic surveys did not detect Dwarf Galaxias within the study area. It is considered unlikely that the Dwarf Galaxias is present within the study area. Due to the low likelihood of presence it is expected that the impacts of the Project on this species would be low.

20.6.5 Other fauna species considered

The following EPBC Act listed species were also considered as part of the biodiversity and habitat assessment due to either the PMST results indicating that the species may be present in or near the study

area, or to address the EES Scoping Requirements (refer to Section 20.2):

- Murray Cod (*Maccullochella peelii*) (Vulnerable);
- Australian Grayling (*Prototroctes maraena*) (Vulnerable);
- Growling Grass Frog (*Litoria raniformis*) (Vulnerable);
- Swift Parrot (*Lathamus discolor*) (Endangered);
- Regent Honeyeater (*Anthochaera Phrygia*) (Endangered); and
- Plains Wanderer (*Pedionomus torquatus*) (Vulnerable).
- Australian Painted Snipe *(Rostratula australis)* (Vulnerable)
- Heath Mouse *(Pseudomys shortridgei)* (Vulnerable)
- Spotted Tail Quoll *(Dasyurus machulatus)* (Endangered)

The PMST predicts that there could be suitable habitat for the Australian Grayling and the Murray Cod in the study area. However, as there are no previous records of these species in the study area and no individuals were identified in the targeted surveys it is considered unlikely that these species would be present within the study area.

There are five previous records of Growling Grass Frog from the local area, the most recent of these was 1963. All drainage lines within the study area were dry at the time of assessment, and local residents indicate they rarely flow. In addition, the majority of farm dams within the study area supported little or no vegetation. Given the lack of previous records and suitable habitat within the study area there is a low likelihood that the Growling Grass Frog is present within the study area.

The study area supports habitat that may on occasion be utilised by the Regent Honeyeater and the Swift Parrot.

There are two previous records of Plains Wanderer being present in the local area, however the most recent of these was in 1975. Some paddocks and crops within the study area may provide superficial habitat for the Plains Wanderer however, the species is generally confined the north-central Victoria and New South Wales. As such, it is considered unlikely that the species would be present in the study area and it is not expected that Project would impact on this species.

The PMST predicts that the Australian Painted Snipe, the Heath Mouse and the Spotted Tail Quoll could occur in the study area. However, there are no previous records of these species in the study area and during the assessment no suitable habitat for any of these species was identified.

20.7 Threatened Ecological Communities

Three nationally listed ecological communities were predicted by the PMST as potentially occurring within 10 kilometres of the study area. These are:

- Grassy Eucalypt Woodland of the Victorian Volcanic Plain (Critically Endangered);
- Natural Temperate Grassland of the Victorian Volcanic Plain (Critically Endangered); and
- Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grassland of South-Eastern Australia (Endangered).

No nationally listed ecological communities were recorded within the study area. As the study area does not cross into the Victorian Volcanic Plain bioregion it is considered unlikely that any significant communities from that bioregion (including Grassy Eucalypt Woodland of the Victorian Volcanic Plain and Natural Temperate Grassland of the Victorian Volcanic Plain) would be present within the construction footprint. In addition, there was no vegetation identified in the study area that met the condition thresholds for the Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grassland of South-Eastern Australia ecological community. As such, it is not expected that any nationally listed ecological communities would be impacted by the Project.

20.8 Avoidance and minimisation of impacts on matters of NES

As outlined in Chapter 5 (Project Alternatives) one of the key evaluation objectives in selecting the proposed alignment for the Project was *"To avoid or minimise effects on species and ecological communities listed under the Environment Protection and Biodiversity Conservation Act 1999".*

The Options Assessment process (refer to Chapter 5, Project Alternatives) 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 alignment refinements to occur during the detailed design phase of the Project.

During the Options Assessment process matters of NES and State listed vegetation of Very High and High conservation significance were considered to be of the highest ecological value. As such, priority was given to avoiding and minimising impacts on matters of NES and Very High and High conservation significance vegetation. Impacts on State listed ecological values are outlined in Chapter 13 (Biodiversity and Habitat). Due to the size and the linear nature of the Project, it was not possible to avoid all impacts to EPBC Act listed species. Once the proposed alignment was selected, various

refinements were made to further minimise impacts to ecological values. For example, for approximately 1.1km north-west of the current intersection with London Road the entire new highway and new intersection have been sited on cleared land to the north of the existing highway and the existing highway would be utilised as a service road in order to avoid impacts on all the Trailing Hop-bush plants in this locality (refer to Figure 20-1).

20.9 Nationally Significant Flora and Fauna within the Final Alignment

The study area supports areas of good quality remnant vegetation with some areas considered to be of national conservation significance due to the presence of nationally significant flora and fauna species listed under the EPBC Act.

The proposed alignment intersects:

- Up to 21 Trailing Hop-bush plants; and
- Up to 29.92 ha of confirmed Golden Sun Moth habitat and 99.94ha of potential Golden Sun Moth habitat.

20.10 Proposed Offset Strategy

One of the main impacts of the Project would be the loss of up to 29.92 ha of confirmed Golden Sun Moth habitat and 99.94ha of potential Golden Sun Moth habitat.

The impacts on the Trailing Hop-bush and Golden Sun Moth habitat would be offset in accordance with the EPBC Act Environmental Offsets Policy. Offsets would be determined through negotiations with the Department of Sustainability, Environment, Water, Populations and Communities. Golden Sun Moth is listed as Critically Endangered under the EPBC Act. As such any habitat removed as part of the Project would need to be offset. While there are no formal offset ratios defined under the EPBC Act, based on previous decisions by SEWPaC there is likely to be an offset ratio of approximately 4:1 (i.e. 4ha offset or every 1ha removed.)

Trailing Hop-bush is listed as Vulnerable under the EPBC Act and as such there are not likely to be any offsets required for impacts to this species. However, individuals that are impacted would be required to be salvaged and translocated in accordance with an approved Salvage and Conservation Management Plan, with translocated individuals managed and secured in perpetuity.

Refer to Section 13.7 of Chapter 13 (Biodiversity and Habitat) for information on the proposed offset strategy for the Project.

20.11 Impact Assessment

20.11.1 Key issues

A summary of the impacts on matters of NES is provided in the following sections.

The key issues for matters of NES are:

- Impact of up to 21 Trailing Hop-bush plants; and
- Removal of up to 29.92 ha of confirmed Golden Sun Moth habitat and 99.94ha of potential habitat.

These issues are discussed in detail in the following sections.

20.11.2 Construction

A summary of the impacts considered for the construction of the Project are outlined in the following Sections.

20.11.2.1 Removal of EPBC listed flora species

There is the potential for the Project to impact up to 21 Trailing Hop-bush plants south of Stawell (refer to Figure 20-1 for the location of these individuals).

The 21 Trailing Hop-bush plants are located in the road reserve on the western side of the existing highway between London Road and Robson Road.

The proposed alignment and intersection at London Road have been sited on cleared land to the east of the existing highway. This was to avoid the crown land that is managed by DSE on the western side of the existing highway which also contains the Trailing Hop-bush.

The existing highway is proposed to be utilised as a service road in this location. Through detailed design the extent of works required to the remaining existing highway would be defined and is expected to be minimal. It is likely that impacts to the of Trailing Hop-bush plants located in the road reserve on the western side of the existing highway could be avoided.

All Trailing Hop-bush plants to be avoided would be fenced with a high-visibility component to indicate the sensitivity of the area.

If all 21 Trailing Hop-bush plants were to be removed the impact of the Project would be significant according to SEWPaC guidelines. However, the impact, as rated for the project area, is considered to be minor as the Project would result in removal of less than 1% of the project area population.

20.11.2.2 Unexpected encounter of EPBC Act listed flora species

There is a small chance that construction may encounter and impact upon unexpected flora species that have not been identified in the targeted surveys. This may result in the removal of small numbers of individuals of:

- Button Wrinklewort;
- Large-fruit Fireweed;
- Spiny Rice-flower;
- Pomonal Leek-orchid; or
- Tawny Leek-orchid.

Mitigation measures including altering constructions areas, where possible, if any of these species are unexpectedly identified, and implementing a translocation plan for individual plants discovered would reduce the chance of this impact occurring. The impact of this occurring is expected to be negligible to low due to the fact that targeted surveys have been carried out at optimum times for all of these species, so it is expected that if any of these species are unexpectedly identified they would be found only in very small numbers.

20.11.2.3 Removal of habitat and death or injury of EPBC Act listed fauna species

Construction would remove up to 29.92 ha of confirmed Golden Sun Moth habitat and 99.94ha of potential Golden Sun Moth habitat. This could result in possible injury or death to Golden Sun Moth individuals during construction of the Project. Impacts on the Golden Sun Moth would be reduced through micro-alignment changes and revegetation of areas where the Golden Sun Moth is known to be present.

In accordance with SEWPaC guidelines the Project would have a significant impact on Golden Sun Moth habitat. However, the impact, as rated for the project area, was considered to be moderate as the Project would result in removal of greater than 1% of the project area population but less than 1% of the regional area population.

20.11.2.4 Unexpected encounter of EPBC listed fauna species

There is a small chance that construction may encounter unexpected EPBC Act listed fauna species that were not identified in the targeted surveys. This may result in the removal or disturbance to a small number of species including a loss of potential habitat for Southern Brown Bandicoot.

Pre-clearance surveys and translocation of individuals immediately prior to construction activities would reduce the risk of this impact from occurring. Due to the application of these management measures and the expectation that any EPBC Act listed fauna species would be found in very low numbers, the impacts from this occurring are minor.

Given the lack of recent records and suitable habitat there is a low likelihood that the Growling Grass Frog would be present in the study area. However, given the transient nature of this species, it would be prudent to apply the precautionary principle when undertaking work around certain waterways. Where construction works are likely to impact areas within 20 metres of Robinsons Creek or Donald Creek a pre-construction survey would be undertaken. If Growling Grass Frog are identified, a salvage and translocation plan would be prepared and implemented.

20.11.2.5 Fragmentation

Golden Sun Moth habitat could be fragmented by the construction of the Project, which could result in the populations becoming isolated in some instances. It is considered that this impact would be significant.

20.11.2.6 Noise and Vibration

There is the potential for noise and vibration from construction activities to impact on native fauna, causing stress and ultimately, displacement of fauna from affected habitats. It is not expected that the Golden Sun Moth would be impacted by noise and vibration as they have been found adjacent to the existing Western Highway, indicating that they are not sensitive to moderate levels of noise and vibration.

20.11.3 Operation

A summary of the impacts considered for the operation of the Project are outlined in the following Sections.

20.11.3.1 Road Kill

There is the potential for Golden Sun Moth and the Southern Brown Bandicoot to be killed or injured by vehicles using the highway. Due to there only being a small chance of the Southern Brown Bandicoot being present in the study area it is expected that the impact of road kill on this species would be negligible to low. As the alignment has been designed to avoid fragmenting existing habitat, the impact of potential road kill on the Golden Sun Moth is also considered to be minor.

20.11.3.2 Noise and Vibration (operation)

Noise and vibration are not expected to impact on the Golden Sun Moth as they have been found to be present in areas along the existing highway indicating that they are not adversely impacted by traffic noise. Similarly, the Southern Brown Bandicoot is not expected to be impacted by the operational noise of the Project as there is only a small chance of it being present in the study area.

20.11.3.3 Lighting

There is a chance that light from artificial sources including street lights could impact on native fauna species. However, it is expected that any impact from lighting would be minor.

20.12 Risk Assessment

An environmental risk assessment was undertaken on the proposed alignment for the Project to identify key risks for both the construction and operation of the Project. The methodology for this risk assessment is outlined in Chapter 4 (EES

Assessment Framework and Approach to Investigation). A risk assessment report that explains the process in detail and contains the complete project risk register has been included in Technical Appendix Q.

20.12.1 Residual risk

As outlined in Table 20-3, the majority of the risks associated with matters of NES are considered to be low, with the exception of one risk pathway that has a residual risk rating of medium and one risk pathway which has a residual risk rating of high. The risk pathway with a high residual risk rating relates to the removal of Golden Sun Moth habitat. The risk pathway with a medium residual risk rating relates to removal of individuals of population of Trailing Hop-bush.

Table 20-3 Risk Table

Risk No.	Impact Pathway	Consequence Description
FF1	Potential removal of individuals of a known population of EPBC listed flora - South of Stawell (Ch. 22900-23600).	A population of Trailing Hop-bush is present south of Stawell. 21 plants intercept the proposed alignment.
FF3	Construction encounters unexpected listed flora species (species not known to be present from targeted survey).	Removal of small number of unknown listed flora species during pre-clearance / clearance work
FF4	Construction encounters EPBC listed Golden Sun Moth from known habitats. (Recorded locations at Ch. 1800-2800, 3700-5000).	Removal of fauna habitat, possible injury/death to listed fauna species individuals during construction.
FF6	Construction encounters unexpected listed fauna species (species not known to be present from targeted survey).	Removal/disturbance to small number an unknown number of listed fauna species during pre-clearance / clearance work
FF8	Increased road kill and injury rates to arboreal native fauna from traffic on additional / new carriageway, particularly where the carriageway passes through wooded areas away from the existing road (e.g. quarry area north of Great Western).	The proposed carriageway would create an additional barrier to the movement of aquatic and terrestrial fauna. This would result in a reduction of fauna populations due to increased mortality, particularly for predatory birds, reptiles, amphibians, and mammals. It is likely that fauna are more susceptible to vehicle collision during the dusk and dawn period, where the highway intercepts wildlife corridors (e.g. near and along key waterways) and in areas away from existing roads where fauna are unaccustomed to road traffic hazards.
FF13	Construction activities occur outside of agreed construction zone.	Potential loss or modification of native vegetation and/or fauna habitat that was intended to retained
FF17	Noise or vibration disturbance to native fauna during construction (daytime) and operation (traffic).	Potential for stress, and ultimately displacement of native fauna from affected habitats.
FF18	Light disturbance to native fauna (e.g., artificial light sources from street construction lights).	Potential for stress, and ultimately displacement of native fauna from affected habitats.

20.13 Environmental Management Measures

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 matters of NES, additional Project specific environmental management measures have been proposed to reduce environmental risks. Management measures specific to each identified matters of NES risk, and the residual risk rating after these environmental management measures have been applied are outlined in Table 20-4.

Table 20-4 Environmental Management Framework

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, including a Salvage and Translocation Plan, approved by the Department of Sustainability, Environment, Water, Populations and Communities (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.	Medium
FF3	Comply with section 1200.13 Flora and Fauna of the VicRoads contract specification. Avoid impacts if possible, by altering the construction area. Otherwise, prepare and implement a Conservation Management Plan, including a Salvage and Translocation Plan (where applicable), approved by the Department of Sustainability and Environment (DSE), which would include post-translocation monitoring.	Low
FF4	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.	High
FF6	As per Risk FF3.	Low
FF8	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.	Low
FF13	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
FF17	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
FF18	Risk is low and therefore there are no mitigation measures recommended to manage the risk.	Low

20.14 Conclusion

Parts of the study area are considered to be of National conservation significance.

Matters of NES and vegetation of Very High and High conservation significance were considered to be of highest conservation value during the Options Assessment process and priority was given to avoiding matters of NES where possible. However, it was not possible to avoid all impacts on matters of NES.

The Project would impact up to 21 Trailing Hop-bush plants (Vulnerable), which were unable to be avoided during the design of the Project. In accordance with SEWPaC guidelines the Project would have a significant impact on Trailing Hop-bush. However, the impact, as rated for the project area, was considered to be minor as the Project would result in removal of less than 1% of the project area population.

The Project would also require the removal of up to 29.92ha of confirmed Golden Sun Moth (Critically Endangered) habitat and 99.94ha of potential habitat). 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 including micro-realignment alterations, however even with the application of management measures, the impact would still be considered significant as defined under in the SEWPaC Significant Impact Guidelines 1.1. The impact, as rated for the project area, was considered to be moderate as the Project would result in removal of greater than 1% of the project area population but less than 1% of the regional area population.

The impacts on the Golden Sun Moth habitat would be offset in accordance with the EPBC Act Environmental Offsets Policy. Offsets would be determined through negotiations with the Department of Sustainability, Environment, Water, Populations and Communities.

Golden Sun Moth is listed as Critically Endangered under the EPBC Act. As such any habitat removed as part of the Project would need to be offset. While there are no formal offset ratios defined under the EPBC Act, based on previous decisions by SEWPaC there is likely to be an offset ratio of approximately 4:1 (i.e. 4ha offset or every 1ha removed.)

In the case of Trailing Hop-bush individuals that are impacted would be salvaged and translocated in accordance with an approved Salvage and Conservation Management Plan, with translocated individuals managed and secured in perpetuity.

The 21 Trailing Hop-bush plants are located in the road reserve on the western side of the existing highway between London Road and Robson Road.

The existing highway is proposed to be utilised as a service road in this location. Through detailed design the extent of works required to the remaining existing highway would be defined and is expected to be minimal. It is likely that impacts to the of Trailing Hop-bush plants located in the road reserve on the western side of the existing highway could be avoided.

All Trailing Hop-bush plants to be avoided would be fenced with a high-visibility component to indicate the sensitivity of the area.