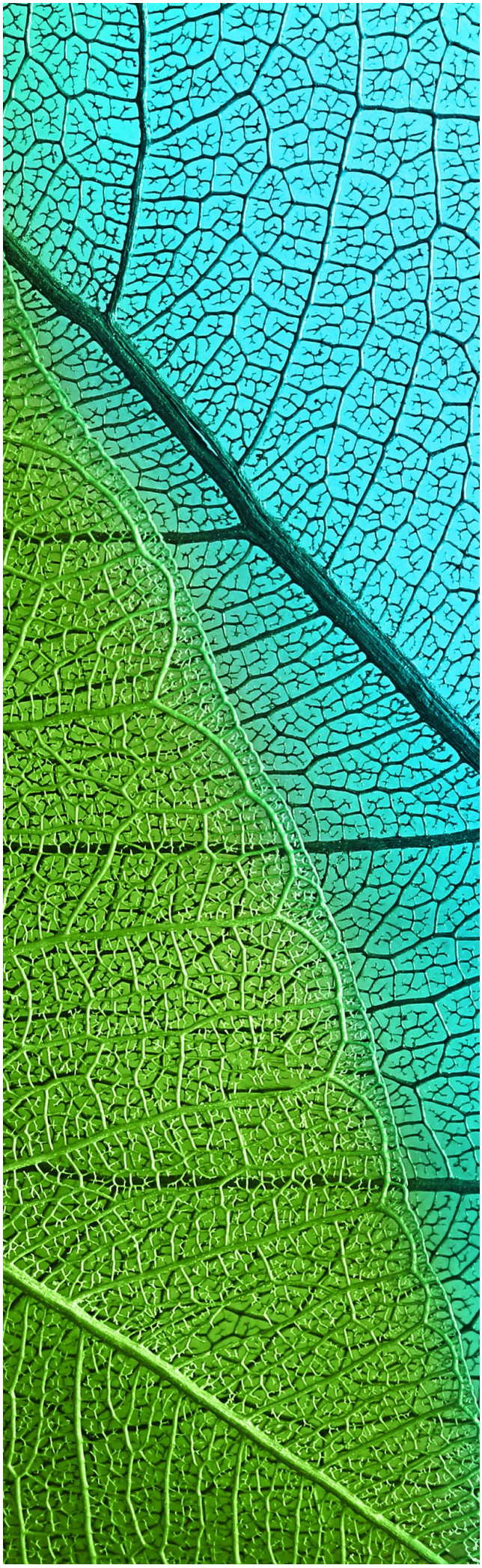

Fingerboards Mineral Sands Mine

Review of Ecological Assessment and Expert Witness Statement of Brett Lane

Prepared for East Gippsland Shire Council

2nd February 2021
Report No. 20230 (1.3)

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1. Expert witness information

1.1. Name and address

Brett Alexander Lane
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Suite 5, 61–63 Camberwell Road
Hawthorn East VIC 3123

1.2. Area of expertise

I have extensive expertise in ecology and related legislation and policies. My qualifications and experience are summarised in Appendix 1.

I have extensive experience in Victoria as an ecological consultant, specialising in biodiversity impact assessment and addressing the evolving biodiversity regulatory framework, including at Commonwealth state and local government levels.

In 2001, I established Brett Lane & Associates Pty Ltd (now Nature Advisory Pty Ltd), which has grown to become one of Victoria's leading specialist ecological consultancies. In the last 20 years, I have project managed or been project director for over a thousand ecological impact assessment projects, ranging from large, complex projects, such as large wind farms, major roads, powerlines and complex land development projects, to small single-dwelling private housing developments. My experience ranges across sectors including renewable and other energy projects, linear infrastructure (road, rail, pipelines, powerlines), extractive and mining projects, residential, commercial and tourism developments, natural resource management and biodiversity policy. Biodiversity that I have assessed has included native vegetation, threatened flora, threatened fauna and listed migratory species, as well as Ramsar Wetlands in several states.

This work has also given me deep knowledge of the application and interpretation of biodiversity legislation and planning provisions, including the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act), *Environment Effects Act 1978*, and *Planning and Environment Act 1986* (P&E Act), as well as the native vegetation and other biodiversity-related overlay and policy provisions in the Local and State Planning Policy Frameworks of Victoria's municipal planning schemes.

I have extensive experience informing Planning Panels and Advisory Committees, VCAT and Courts in several states as an expert witness on matters of ecology and development impact assessment. I have also been involved in peer reviews of the ecological impact assessments for large infrastructure projects, including the East-West Link project, and the North East Link Project. I am currently Project Director for the ecological Impact Assessment of a large sand mine project in north western Victoria.

1.3. Business relationship

Planology, on behalf of East Gippsland Shire Council, engaged me to undertake an independent review of the terrestrial & aquatic biodiversity impact assessment for the proposed Fingerboards Sand Mine. With colleagues (see below), I reviewed Environment Effects Statement (EES) Technical Appendix A005 prepared by Ecology and Heritage Partners with input from additional specialist aquatic ecologists as well as relevant related parts of the EES itself, specifically Chapters 9 (section 9.1), 10 and 11.

1.4. Instructions

The role that I had in preparing the review was to provide an independent evaluation of key technical and assessment documents and the technical data collection and analysis underpinning those. The key elements of my brief are reproduced below.

In carrying out this review, I have responded to the following points in my brief:

> 14.1 "review the technical reports and related documents prepared for the Fingerboards Minerals Sands Project Environment Effects Statement (**EES**), the proposed Works Approval and the proposed planning scheme amendment that are relevant to your expertise, including the scoping requirements for the EES; and
>
> 14.2 prepare a statement of evidence, relevant to your expertise, on:
>
> 14.1.1 the adequacy of the materials and technical reports prepared by the Proponent, noting the IAC has required the Proponent to prepare additional information;
>
> 14.1.2 the adequacy of the conclusions expressed in the EES and the other supporting documents; and
>
> 14.1.3 the adequacy of the proposed mitigation measures and whether additional mitigation measures should be considered; and
>
> 14.3 consider the Council's submission, including the SLR Technical Review and identify any areas of the review to which you disagree."

This review has considered whether the EES Technical Appendix A005 and the EES adequately address the EES Scoping Requirements and accurately and comprehensively describe the ecological values of the project area and impacts of the Project.

Other significant contributors to the Peer Review Report and their expertise is summarised in Table 1 and set out below.

Table 1: Details of other significant contributors

Name of contributor	Address	Area of Relevant Expertise	Location of summary of qualifications and expertise
Annette Cavanagh	Nature Advisory Pty Ltd Suite 5, 61-63 Camberwell Road Hawthorn East, VIC 3123	Botanist, DELWP-Accredited VQA assessor	Appendix 1
Cara Cappelletti		Zoologist,	Appendix 1

Annette Cavanagh, an experienced botanist certified by DELWP in the Victorian Vegetation Quality Assessment method and Cara Cappelletti, a Masters-qualified field zoologist, undertook an on-ground audit of the native vegetation mapping, habitat scoring, tree mapping and designation, as well as habitat mapping, characterisation in the EES Technical Appendix A005 from 11th to 15th January 2021.

I, Brett Lane, an experienced ecologist, visited key ecologically valuable and sensitive parts of the Project identified by my team on Friday 15th January 2021 to ground truth the findings of my two colleagues and

to familiarise myself with the area. With my team, I visited all parts of the project area either by vehicle (roadsides) or, in many cases, on foot, overviewed affected areas that could not be accessed and inspected the proposed railway siding site. I am satisfied that we have comprehensively reviewed the key ecological values and impacts of the project over this period.

I adopt this statement, as my written expert evidence for presentation to the Inquiry and Advisory Committee for the Project.

1.5. Declaration

I have made all the inquiries that I believe are desirable and appropriate and no matters of significance which I regard as relevant have to my knowledge been withheld from the Inquiry and Advisory Committee.

Signed:

Brett Lane

Principal Consultant and Director
Nature Advisory Pty Ltd
Suite 5, 61–63 Camberwell Road
Hawthorn East, VIC 3123

1st February 2021

2. Executive summary

Introduction

Nature Advisory Pty Ltd was engaged by Planology on behalf of East Gippsland Shire Council to undertake a review of the ecological assessment undertaken for the Environment Effects Statement (EES) for the proposed Fingerboards Mineral Sands Mine in East Gippsland, Victoria. This review is required as part of Council's submission to the Inquiry and Advisory Committee (IAC) hearing into the EES and forms the basis of this expert witness statement.

The purpose of this review was to evaluate the methodology, findings on ecological values, impact assessment and offset requirements in EES Appendix A005 (referred to hereafter as 'EES Appendix A005'). The review aimed to ascertain how comprehensive and accurate the findings were and the extent to which they met the applicable survey guidelines and planning policy and legislative requirements in relation to biodiversity.

Methods

This review was based on a thorough (seven person-day) inspection of the project area during which the findings presented in the EES Appendix A005 were independently checked. The review also compared the EES Appendix A005 and main EES Report for any discrepancies or differences in findings and conclusions.

A range of existing information sources were used for this review. On-ground field inspections were undertaken between the 12th and 15th January 2021 by a botanist, zoologist and Principal Consultant (Brett Lane). During this time, a representative sample of sites across the project area were visited. Habitat suitability for flora and fauna, as well as mapping of native vegetation and listed communities and habitat scoring were also evaluated.

Results

Desktop investigations from the EES Appendix A005, EES Report and current investigation were cross-referenced. Discrepancies with nationally and state significant flora and fauna species were found. Species returned in a VBA and PMST search in the current investigation, but not in the previous investigation were as follows:

Flora

State significance

Mealy Saltbush;

- Wallaby-bush;
- Eastern Bitter-cress;
- Forest Bitter-cress;
- Hornwort;
- Rosemary Grevillea;
- Hypsela;
- Giant Honey-myrtle;
- Forest Phebalium;
- Mountain Flat-pea;

- Woolly-head Pomaderris;
- Convex Pomaderris;
- Slender Ruddyhood;
- Soft Skullcap; and
- Mauve-tuft Sun-orchid

Fauna

National significance

- Macquarie Perch
- Shy Albatross*
- Fairy Tern*
- Grey Falcon*
- Curlew Sandpiper*
- Eastern Curlew*

State

- Plumed Egret
- Square-tailed Kite
- Lewin's Rail
- Glossy Black-cockatoo
- White-footed Dunnart
- Martin's toadlet

Migratory

- Grey Plover*
- Wood Sandpiper
- Pectoral Sandpiper
- Crested Tern*

In many cases, these species are unlikely to occur (marked with an asterisk) but for completeness, they should have been transparently ruled out. Some may occur and the implications of this are discussed in this report.

Conclusions

After current field investigations and thorough review and associated cross-referencing of the EES and EES Appendix A005, the following conclusions have been drawn:

- Native vegetation assessments, where undertaken, have been done in accordance with the *Guidelines for the removal, destruction and lopping of native vegetation* and this review found that the vegetation condition scoring was accurate where compared in a sample of localities;

- Large tree and scattered tree inventory were generally complete (see below);
- The assessment of native vegetation and fauna habitat on 2705 Bairnsdale-Dargo Road is not considered accurate due to site access constraints;
- Surveys for fauna habitat and threatened species were conducted in accordance with survey guidelines and are considered sufficient and accurate;
- Surveys for the threatened species assessed as likely to occur on the site were appropriate and involved the correct survey techniques undertaken in the best seasons for detecting them;
- The targeted flora surveys were not appropriately timed in some cases for additional species with potential to occur on the site based on an updated review of existing information;
- Discrepancies regarding the impact assessment to native vegetation and fauna habitat were found between the EES and EES Appendix A005
- Significant discrepancies were found in offsets required under the *Guidelines for the removal destruction and lopping of native vegetation* between the EES and EES Appendix A005
- A substantial deficit currently exists for some species offsets required. Although some species offsets can be met through existing credits available via brokers, many cannot be. For those that cannot be, the Offset Strategy at Attachment E to the EES nominates up to seven additional properties where offsets may be available. Although mention is made in the strategy of discussions with landholders, the likelihood that these discussions will result in the successful setting aside of offsets should be explored to ascertain if risks remain in achieving the required offsets. The current strategy does not provide a high level of confidence that the sometimes considerable offset targets can be met.

Recommendations

- Flora and fauna species found in desktop database searches need to be assessed for likelihood of occurrence within the project area. A review of findings and/or further targeted surveys may be warranted.
- Further investigation required to determine the extent of GRGGW and the extent of native vegetation, particularly focussed on native grassland.
- Further targeted flora surveys recommended in areas found with native vegetation not previously mapped.
- It is imperative that the property at 2705 Bairnsdale-Dargo Road is properly assessed for flora and fauna habitat suitability and other biodiversity values that may be occurring before any decision is made to remove native vegetation for any purpose. The extent and quality of native vegetation should be mapped by a qualified, DELWP-accredited botanist. It is recommended that detailed on-site habitat suitability assessments be undertaken for listed flora species and to confirm the current recommended listed fauna species surveys (see next). Recommended fauna surveys include call playback and spotlighting for listed owls and arboreal small mammals, as well as aquatic assessment and frog call playback and spotlight at the dam present on site of higher quality. Remote cameras and ultrasonic bat detectors deployed on site will aid in determining the presence of ground-dwelling mammals and bat species respectively.
- An updated impact assessment should be conducted based on the most current expected impact area for native vegetation, and fauna habitat and specific species, including, where required, survey for additional species considered likely to occur (see list earlier).

- Offset requirements must be clarified and should reflect the most up to date development footprint, as well as further details on how the current deficit in available species offsets can be met with confidence.
- Greater assurance is required that offsets can be met before any removal of the scale proposed is approved.

In consideration of Council's submission and the SLR review of the EES, I concur with their position in relation to a requirement to consider impacts of specific pollution risks to aquatic ecosystems, and their handling and containment on the site. More specific direction is needed in the Environmental Management Framework, including for fuels and lubricants mentioned in EES Technical Appendix A005.

I also concur with Council's recommendation that further consideration be given to contingency measures in the event the threatened Giant Burrowing Frog is found during mine planning and operation. This species is currently being considered for listing as endangered (cf. vulnerable) under the EPBC Act. It is listed as Critically Endangered in Victoria and on the FFG Act as a threatened species.

3. Introduction

Nature Advisory Pty Ltd was engaged by Planology on behalf of East Gippsland Shire Council to undertake a review of the ecological assessment undertaken for the Environment Effects Statement (EES) for the proposed Fingerboards Mineral Sands Mine in East Gippsland, Victoria. This review is required as part of Council's submission to the Inquiry and Advisory Committee (IAC) hearing into the EES and if has been undertaken to form the basis for this expert witness statement.

The purpose of this review was to evaluate the methodology, findings on ecological values, impact assessment and offset requirements in EES Appendix A005 A005 to the EES (referred to hereafter as 'the EES Appendix A005'). The review aimed to ascertain how comprehensive and accurate the findings were and the extent to which they met the applicable survey guidelines and planning policy and legislative requirements in relation to biodiversity.

This review was based on a thorough (seven person-day) inspection of the project area (11th to 15th January 2021) during which the findings presented in the EES Appendix A005 were independently checked. The review also compared the EES Appendix A005 and main EES Report for any discrepancies or differences in findings and conclusions.

The proposed project involves the construction and operation of a mineral sand mine and associated infrastructure based on the Fingerboards mineral sands resource. The entire project area will comprise 1,675 hectares of land in Glenaldale, Victoria. The maximum area of disturbance at any one time will be 360 hectares. Associated infrastructure will encompass an additional 31 hectares of land that will support transport access and water supply. Construction of the mine will take approximately two years and will be in commission for approximately 15 years, followed by decommission and rehabilitation of the site.

Initial ecological investigations were undertaken by Ecology and Heritage Partners Pty Ltd (EHP) who prepared the EES Appendix A005.

The purpose of this review was to determine if the ecological assessments presented in the EES (EES Appendix A005 and EES Chapter 9 section 9.1 'Terrestrial and aquatic biodiversity'):

- have been undertaken using the appropriate sources of information and field survey methods;
- adequately address the biodiversity-related EES Scoping Requirements (including that for Matters of National Environmental Significance (MNES));
- have any gaps, inaccuracies or discrepancies;

In addition, the review was to address the need for any additional investigations to fill gaps or reduce uncertainties. make recommendations for further investigations, if required.

It has been based on information available up to 29th January 2021.

This review is presented under the following headings:

Section 4 describes the scope, methods and approach to the review process.

Section 5 presents the results of the review.

Section 6 provides comment on Council's submission and the review of the EES it commissions from SLR.

This review was undertaken by a team from Nature Advisory comprising Annette Cavanagh (Botanist) Cara Cappelletti (Zoologist) and Brett Lane (Principal Ecologist and Managing Director). Curricula Vitae for the review team are provided in Appendix 1.

4. Scope of review and methods

4.1. Scope of review

This review has been undertaken to determine if the ecological assessments presented in the EES were comprehensive and accurate and adequately addressed the biodiversity elements of the Final EES Scoping Requirements. The EES Scoping Requirements relevant to biodiversity are presented below. In addition, this review determines whether the ecological assessments have adequately addressed impacts on Matters of National Environmental Significance (MNES) given that this project is a controlled action to be assessed and approved under the *Environment Protection and Biodiversity Conservation Act 1999* (EBPC Act).

- *Effects on biodiversity and ecological values within and near the site, and associated with adjacent road reserves and riparian areas, including native vegetation, listed ecological communities and species of flora and fauna under the Flora and Fauna Guarantee Act 1988 and other habitats and vulnerable and protected species.*
- *Effects on surface water and groundwater hydrology, quality, availability for other uses and the aquatic ecology of water environments*
- *The potential effects on individual environmental assets – magnitude, extent and duration of change in the values of each asset – having regard to intended avoidance and mitigation measures.*
- *The main EES report should provide a clear, well-integrated analysis of the potential effects of the proposed project, including proposed avoidance, mitigation and management measures, as well as relevant alternatives.*
- *Descriptions of the existing environment, where this is relevant to the assessment of potential effects.*
- *Appropriately detailed assessments of potential effects of the project (and relevant alternatives) on environmental assets and values, relative to the "no project" scenario, together with an estimation of likelihood and degree of uncertainty associated with predictions*
- *Intended measures for avoiding, minimising, managing and monitoring effects, including a statement of commitment to implement these measures.*
- *Predictions of residual effects of the project assuming implementation of proposed environmental management measures.*
- *Any proposed offset measures where avoidance and mitigation measures will not adequately address effects on environmental values, including the identified MNES, and discussion of how any offset package proposed meets the requirements of the EPBC Act Environmental Offsets Policy as it relates to MNES.*
- *Evaluation of the implications of the project and relevant alternatives for the implementation of applicable legislation and policy, including the principles and objectives of ecologically sustainable development and environmental protection.*
- *Proposed construction techniques and extent of areas to be disturbed during site establishment and construction, including total area expected to be cleared, particular requirements for traffic and floodwater management, dust and noise management, as well as for sensitive environmental locations.*

The delegate for the Commonwealth Minister for the Environment and Energy determined on 6 July 2017 that the project is a 'controlled action', as it is likely to have a significant effect on the following matters of national environmental significance (MNES), which are protected under Part 3 of the EPBC Act:

- *Ramsar wetlands (sections 16 and 17B).*
- *Listed threatened species and communities (sections 18 and 18A).*
- *Listed migratory species (sections 20 and 20A).*
- *Nuclear actions (sections 21 and 22A).*

- *The likely residual effects, including on relevant MNES, that are likely to occur after all proposed measures to avoid and mitigate environmental effects are implemented.*

In addition, in the Final Scoping requirements specific fauna species were flagged as requiring consideration, including:

- Regent Honeyeater
- Australian Painted Snipe
- Australasian Bittern
- New Holland Mouse
- Long-nosed Potoroo
- Growling Grass Frog
- Green and Golden Bell Frog
- Giant Burrowing Frog

Specifically, this review included:

- A review of existing information on the project and project area;
- A review of the methods employed to undertake the ecological assessments, including both the desktop assessments and the field surveys;
- An on-ground field investigation to ground-check the results of assessments documented in the EES Appendix A005.
- A review of the findings presented in the EES (Section 9.1 and Chapter 10), and their consistency with the findings presented in the EES Appendix A005 *'Detailed Ecological Investigations'* undertaken by Ecology and Heritage Partners Pty Ltd (EHP); and
- A review of the impact assessment and mitigation measures.

The purpose of this review was not to undertake a comprehensive and independent ecological assessment of the native vegetation, and flora and fauna values of the project area, but rather to provide feedback on the adequacy of the completed ecological assessments and to provide recommendations for further investigations and mitigation measures, if required. The outcomes of this review are presented in sections 5 and 6.

4.2. Methods and approach

4.2.1. Existing information

A review of existing documentation relevant to the EES and ecological assessments was undertaken. Documents reviewed included:

- EES Final Scoping Requirements;
- Relevant chapters in the EES, namely:
  - Chapter 3 – Project Description;
  - Chapter 5 – Regulatory Framework;
  - Chapter 7 – Impact Assessment Framework
  - Chapter 9 – Environmental and Socioeconomic Impact Assessment;
  - Chapter 10 – Matters of National Environmental Significance;
  - Chapter 12 – Environmental Management Framework; and
  - Chapter 13 – Conclusion;
- EES EES Appendix A005 A005: Detailed Ecological Investigations undertaken by Ecology and Heritage Partners Pty Ltd (EHP);
- EPBC Act Decision Notice (EPBC 2017/7919);
- EPBC Act Survey Standards, including:
  - Survey guidelines for Australia's threatened birds (DEWHA 2010);
  - Survey guidelines for Australia's threatened frogs (DEWHA 2010);
  - Survey guidelines for Australia's threatened mammals (SEWPaC 2011);
  - Survey guidelines for Australia's threatened fish (DSEWPC 2011);
  - Survey guidelines for Australia's threatened bats (DEWHA 2010);
  - Approved survey standards: Giant Burrowing Frog *Heleioporous australiacus* (DELWP 2011);
- Victoria's *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017);
- DELWP's Victorian Biodiversity Atlas (VBA) (DELWP 2020b);
- The Commonwealth Protected Matters Search Tool (PMST) (DAWE 2020);
- Ecological Vegetation Class (EVC) descriptions (DSE 2004a) and DELWP EVC mapping (NatureKit) (DELWP 2020a);
- Groundwater Dependent Ecosystems Atlas (BOM 2021a); and
- Victorian Wetland Inventory (Current) (DELWP administered);

A review of the methods used in the EES Appendix A005 for both the desktop assessments and field surveys was undertaken based on all available and relevant documents.

An independent assessment of the likelihood of occurrence of threatened species in the project area was undertaken and compared with the results of the likelihood of occurrence assessment presented in the EES Appendix A005.

4.2.2. Field investigations

On-ground field inspections were undertaken between the 12th and 15th January 2021. During this time, a representative sample of sites across the project area were visited. These site visits were used to inform the accuracy of the results presented in the EES report and the EES Appendix A005.

Sites visited across the project area included:

- 2705 Bairnsdale-Dargo Road;
- 2610 Bairnsdale-Dargo Road;
- 2250 Bairnsdale-Dargo Road;
- 2025 Bairnsdale-Dargo Road;
- 1375 Fernbank-Glenaladale Road;
- 1334 Fernbank-Glenaladale Road;
- 425 Chettles Road;
- 190 Cowells Lane;
- Bairnsdale-Dargo Road;
- Fernbank-Glenaladale Road;
- Chettles Road;
- Limpyers Road;
- Cowells Lane;
- Careys Road;
- Fernbank East railway siding;
- Racecourse Road; and
- Princes Highway/Lindenow-Glenaladale Road intersection.

While on site, the native vegetation present was cross-referenced with that recorded in the EES Appendix A005. This included reviewing the EVC the vegetation was assigned, the general extent and condition of vegetation, the presence or absence of listed communities, and the suitability of habitat for listed flora species. General observations were made on the recording of large trees in patches and scattered trees. Finally, any additional native vegetation that was found during the review inspections that was not recorded in the EES Appendix A005 was noted.

The current investigation for this review involved a field assessment of the project area and surrounding areas. Fauna habitat that was not previously surveyed was initially assessed via aerial imagery and updated records from the VBA were found prior to the field visit. Suitability for habitat on site was assessed at all the primary survey fauna sites, the majority of call playback and spotlighting sites and a sample of the aquatic and targeted frog species survey sites. While on site, a qualified zoologist searched for potential habitat that was not previously identified and any evidence of fauna species utilisation. The availability and quality of habitat was cross-referenced with the EES Appendix A005.

5. Results of the review

5.1. Existing information

5.1.1. Sources used

A review of the desktop assessment and existing information used in the EES Appendix A005 was undertaken. The existing information used to inform the ecological assessment, based on pages 29 and 30 of the EES Appendix A005, included:

- DELWP's Native Vegetation Information Management system (NVIM);
- DELWP's NatureKit;
- Ecological Vegetation Class (EVC) benchmarks for descriptions of EVCs in the Gippsland Plain and East Gippsland Lowlands bioregions;
- DELWP's Victorian Biodiversity Atlas (VBA);
- Viridans' Flora Information System (FIS) and Atlas of Victorian Wildlife (AVW);
- The Commonwealth Protected Matters Search Tool (PMST);
- Relevant listings under the state *Flora and Fauna Guarantee Act 1988* (FFG Act), including the latest Threatened and Protected listings;
- Species National Recovery Plans and Action Statements under the FFG Act for species and ecological communities relevant to the project;
- DELWP's Planning Maps Online and Planning Schemes Online;
- Aerial photography of the project area;
- Previous ecological or other relevant assessments of the project area, including;
  - Environmental Baseline Report (Coffey Environments Australia Pty Ltd 2015)
  - Fingerboards Mineral Sands: Surface Water Assessment – Site Study (Water Technology 2020)
  - Fingerboards Mineral Sands: Surface Water Assessment – Regional Study (Water Technology 2020); and
  - Fingerboards Project Water Supply Options Study: Technical Groundwater Assessment (EMM 2020);
- Documents prepared by the CMAs relating to the management of environmental values within the municipality and catchment, including:
  - East Gippsland Roadside Vegetation Strategy;
  - East Gippsland Forest Management Plan;
  - East Gippsland Regional Catchment Strategy 2013-2019;
  - West Gippsland Native Vegetation Plan 2003;
  - West Gippsland Regional Catchment Strategy 2013-2019; and
  - West Gippsland Waterway Strategy.

The Groundwater Dependent Ecosystem (GDE) assessment was undertaken by Austral Research and Consulting, and is provided in Appendix 8 of the EES Appendix A005. The GDE assessment included:

- A review of previous groundwater modelling and GDE assessments for the site undertaken by EMM;
- Delineation of an anticipated impact area for GDE mapping and assessment (mounding zone);
- Mapping of GDEs within the potential impact area (applying the precautionary principle), including an assessment of the likelihood of groundwater use and level of confidence in the assessment;
- Assessment of the impact of potential mounding on mapped GDEs based on baseline depth to water and expected changes in mounded depth to water at the end of the mine's life (15 years); and
- Recommendations for further work, mitigation and monitoring.

Consultations were also had with relevant Government agencies, stakeholders, landowners and species experts.

A separate desktop ecological assessment was undertaken in the EES Appendix A005 for the property located at 2705 Bairnsdale-Dargo Road. This was due to the inability to access this property during the field surveys. The existing information used to undertake this desktop assessment, based on page 2 of Appendix 9 of the EES Appendix A005, included:

- DELWP's NatureKit;
- The VBA;
- EVC benchmarks;
- The PMST; and
- Aerial photography and photos taken from adjoining properties.

The existing information used in the EES Appendix A005 is comprehensive, as it includes information that is current and relevant to the ecological characteristics and processes in the project area. While largely complete, the list of existing information used does not include the EPBC Act Threatened Ecological Communities listing advices or the FFG Act Characteristics of Threatened Communities. Given both EPBC Act and FFG Act listed communities are addressed in the EES Appendix A005, this may be an issue. The implications are considered again when the field mapping is reviewed later in this section (see Section 4.2.2.

5.1.2. VBA and PMST searches

The search of the VBA undertaken in the EES Appendix A005 found that six nationally significant flora species and 78 state significant flora species had been recorded previously within 10 kilometres of the project area. An additional eight nationally significant flora species were nominated by a search of the EPBC Act PMST. This is contrary to what is reported in the EES which stated that only seven additional nationally significant species were returned by the PMST, with the species Swamp Fireweed excluded from this list. This may be a consequence of choosing a slightly different search area from the one used for this review that excluded areas modelled as potentially supporting this species.

The desktop assessment undertaken as part of this review did not return any additional nationally listed flora species not assessed in the EES Appendix A005.

An additional 15 state significant flora species were returned. The additional state flora species that were not assessed in the EES Appendix A005 were:

- Convex Pomaderris;
- Eastern Bitter-cress;
- Forest Bitter-cress;
- Forest Phebalium;
- Giant Honey-myrtle;
- Hornwort;
- Hypsela;
- Mauve-tuft Sun-orchid;
- Mealy Saltbush;
- Mountain Flat-pea;
- Rosemary Grevillea;
- Slender Ruddyhood;
- Soft Skullcap;
- Wallaby-bush; and
- Woolly-head Pomaderris.

Although they are not required to be addressed for the purposes of documenting native vegetation removal under the Victorian planning controls, the EES Scoping Guidelines (Section 4.2, p. 15) explicitly require impacts on FFG Act listed species to be described. The likelihood of occurrence of these additional species being in the study area should be investigated and, if necessary, targeted surveys undertaken and seasonally appropriate times and a complete impact assessment done. This field work was not done as part of this review.

The desktop search of the PMST undertaken in the EES Appendix A005 found that three EPBC Act threatened ecological communities had the potential to occur in the project area. These were:

- Gippsland Red Gum Grassy Woodland and Associated Native Grassland;
- Seasonal Herbaceous Wetlands of the Temperate Lowland Plains; and
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Grassland.

The independent desktop assessment for EPBC Act threatened communities (the PMST) undertaken for this review generated the same results.

The desktop investigation undertaken in the EES Appendix A005 involved a Victorian Biodiversity Atlas search for fauna records in the project area and up to 10km in the surrounding region, as well as a search of the PMST. The EES Appendix A005 noted that records from 17 nationally significant fauna species were found within 10km of the project area and an additional four species may occur in the region based on the potential presence of suitable habitat. The desktop assessment conducted as part of this review found six additional species of national significance including:

- Macquarie Perch
- Shy Albatross
- Fairy Tern

- Grey Falcon
- Curlew Sandpiper
- Eastern Curlew

It is considered that these species would not occur in the affected area or nearby as they are either marine of desert species for which there are local records in the VBA.

The EES Appendix A005 indicated that the VBA search found 34 state significance species, 33 with records from the search region. The investigation for this review found six additional species, as follows:

- Plumed Egret
- Square-tailed Kite
- Lewin's Rail
- Glossy Black-cockatoo
- White-footed Dunnart
- Martin's toadlet

There is potential for some of these species to occur in the region and possibly on and near the affected area and the suitability of habitats on the site should be further investigated and impacts of the project on them assessed.

Thirty migratory species were identified as potentially occurring within the search region as presented in the EES Appendix A005. Species found during the current desktop review not included in the EES Appendix A005 comprise:

- Grey Plover
- Wood Sandpiper
- Pectoral Sandpiper
- Crested Tern

Given that these species are either marine of occur in shallow freshwater wetlands and there are no such habitats in the affected area, this gap is not considered material to the impact assessment.

The approach to reviewing existing information and the sources used to ascertain the potential for occurrence of threatened species and communities on and near the affected area were appropriate and comparable to those uses in similar large, complex environmental impact assessments in Victoria. Some of the missing species are due to updated listings in the time elapsed since the desktop assessment was undertaken or possibly slight differences in the location and extent of the PMST and VBA search regions between the search done for the EES Appendix A005 and that done for this review.

5.2. Field surveys

Field surveys undertaken to assess biodiversity values and inform the EES Appendix A005 occurred from 2016 to 2019. These included native vegetation surveys, terrestrial fauna surveys, targeted threatened flora and fauna surveys, aquatic ecology assessments, GDE modelling and risk assessments, and offset site assessments. These are discussed separately below. Field surveys were concentrated in areas that supported remnant vegetation and fauna habitat. Cleared paddocks and highly disturbed areas were not surveyed as intensively. Field surveys were not conducted at 2705 Bairnsdale-Dargo Road.

5.2.1. Native vegetation surveys

Native vegetation surveys to inform the EES Appendix A005 were undertaken over the following time periods by two qualified Botanists:

- 6-10 June 2016;
- 19-21 March 2018;
- 10-14 October 2018;
- 11 January 2019; and
- 5-6 September 2019.

During these survey periods, the project area was assessed on foot and/or by vehicle and all vascular flora species were recorded, with any significant species mapped. Native vegetation was mapped and classified following the Victorian *Guidelines for the removal, destruction or lopping of native vegetation* (the Guidelines; DELWP 2017). Habitat hectare assessments were undertaken in accordance with the Vegetation Quality Assessment (VQA) manual (DSE 2004b), and EVCs were determined using DELWP EVC mapping and descriptions.

During the on-ground field investigations undertaken as part of this review (12th to 15th January 2021), it was determined that the field survey methods employed in the EES Appendix A005 to undertake the native vegetation surveys were appropriate for the project and project area. Patches of remnant vegetation and scattered trees were mapped comprehensively and accurately, with the possible exception of on 2705 Bairnsdale-Dargo Road, where site access was not possible so ground-truthing could not be undertaken (for the EES and for this review). The use of the VQA manual for habitat hectare scoring is also the current and correct method for determining the condition of patches of native vegetation. Using a combination of EVC mapping and EVC descriptions is best practice for determining EVCs present on-ground. Given the size of the project area, it is common to assess the area by vehicle, with areas of remnant native vegetation and scattered trees assessed on foot. Checks of the habitat score of a selection of patches found that the scoring in the EES Appendix A005 was accurate.

The methods employed to undertake the native vegetation surveys in the EES Appendix A005 are adequate.

5.2.2. Threatened Communities

EPBC Act Threatened Ecological Communities were assessed based on conservation advice under the EPBC Act, including the condition thresholds therein. The approach to assessing these communities is documented in the results section of EES Appendix A005 (section 5.2.1, p.70). The source used and the assessment approach is considered appropriate although issues are discussed in the section 4.3.1 of this review. Some 14.06 hectares of Gippsland Red Gum Grassy Woodland and associated Native Grassland was mapped as occurring in the affected area.

The finding that neither Seasonal Herbaceous Wetland (Freshwater) of the Temperate Lowland Plains nor White Box, Yellow Box, Blakely's Red Gum Grassy Woodland and Derived Grassland communities occur in the affected area is justified given the usual range, setting and characteristics of these communities and the vegetation communities and wetland habitats mapped on the site and confirmed in the field for this review.

Two FFG Act listed Threatened Communities were modelled as occurring in the area in NatureKit: Forest Red Gum Grassy Woodland and Central Gippsland Plains Grassland. Field investigations documented in

EES Appendix A005 indicate that the former community occurs in the affected area, with a total of 47.05 hectares mapped. As the condition threshold for the EPBC Act listed version of this community is set at a higher indigenous cover level, this area is greater than that for the EPBC Act listed version (14.06 hectares).

5.2.3. Targeted flora surveys

Targeted flora surveys undertaken as part of the EES Appendix A005 were undertaken by two qualified Botanists over the following time periods:

- 24-28 October 2016;
- 7-11 November 2016;
- 10-14 October 2018;
- 11 January 2019 (undertaken at Racecourse Road and the proposed Bairnsdale rail siding); and
- June 2016 and March 2018 (for four state significant species that would be detectable during this time and not during spring).

Targeted flora surveys were undertaken for both nationally significant and state significant flora species that were considered to have the potential to occur within the project area. A precautionary approach was used to assign the likelihood of occurrence of each species. Species targeted in the targeted flora surveys were:

- Nationally Significant:
  - Dwarf Kerrawang
  - Gaping Leek-orchid
  - Swamp Everlasting
- State Significant:
  - Austral Moonwort
  - Avon Tussock-grass
  - Blue Mat-rush
  - Broad Shield-fern
  - Bushy Hedgehog-grass
  - Cobra Greenhood
  - Delicate New Holland Daisy
  - Dissected New Holland Daisy
  - Heath Platysace
  - Long-flower Beard-heath
  - Macromitrium
  - Native Verbena
  - Open Marshwort

- Prostrate Cone-bush
- Purple Diuris
- Red-tip Greenhood
- Rough Maidenhair
- Rough-grain Love-grass
- Sandfly Zieria
- Shiny Leionema
- Short-awned Wheat-grass
- Shy Sun-orchid
- Silky Kidney-weed
- Slender Tick-trefoil
- Slender Violet-bush
- Slender Wire-lily
- Small-leaf Bush-pea
- Southern Bristle-sedge
- Stalked Adder's-tongue
- Stalked Brooklime
- Tall Wasp Orchid
- Tangled Pseudanthus
- Upright Panic
- Variable Bossiaea
- Veined Spear-grass
- Water Pimpernel
- Woolly Waterlily
- Wrinkle-nut Lignum
- Yellow Burr-daisy
- Yellow-wood

Transects were undertaken at five metre intervals across all areas of remnant vegetation in the project area. Targeted surveys for the nationally significant flora species were conducted in areas where there was potentially suitable habitat. Specifically, targeted surveys for Dwarf Kerrawang and Swamp Everlasting were conducted in areas of Plains Aquatic Herbland, Grassy Wetland and Sedge Wetland, while targeted surveys for the nationally significant Gaping Leek-orchid were conducted in woodland and forest habitat that supported a higher quality of understorey vegetation. These surveys were undertaken during spring when these species would be flowering and have the highest detectability.

The methods employed in the EES Appendix A005 were reviewed against the *Survey Guidelines for Australia's threatened orchids: Guidelines for detecting orchids listed as 'threatened' EPBC Act 1999* (DoEE 2013) to determine their appropriateness for detecting significant flora. This review found that the targeted surveys followed appropriate methods and were undertaken during the species' optimal flowering periods.

As noted in the EES Appendix A005, given disturbance from recent bushfire, along with the general limitation of targeted surveys, which includes the cryptic nature of some flora specie, it is possible that species would not be detected even when they were present. As such, a precautionary approach was adopted in the EES Appendix A005 when considering the presence of significant flora. This is considered appropriate.

Although targeted surveys were undertaken in across the majority of the project area, they were not undertaken at the Fernbank East rail siding and along Cowells Lane when this area was surveyed on the 5-6 September 2019. This area was assessed as having high-quality native vegetation in the EES Appendix A005. Consequently, this area should be subject to targeted surveys for significant flora species.

In addition, there were seven state significant flora species that were assessed in the EES Appendix A005 as having a high likelihood of occurrence in the project area that were not surveyed for. These species were:

- Billygoat Daisy-bush;
- Fisch's Greenhood;
- Fringed Helmet-orchid;
- Pale Swamp Everlasting;
- Spurred Helmet-orchid;
- Sticky Bertya; and
- Wavy Swamp Wallaby-grass.

The flowering times and optimal detectability of these species is mostly outside of spring and were therefore less likely to be identified during the targeted surveys. These species should be surveyed for in suitable potential habitat in the project area during the appropriate season.

5.2.4. Fauna surveys

Fauna surveys were undertaken across multiple seasons from 2016-2019 throughout the project area and surrounding region. Surveys for common and listed fauna included habitat assessments, diurnal bird surveys, herpetofauna (reptile and frog) surveys, spotlighting for nocturnal mammals and birds, stag watching, nocturnal call playback, AnaBat (ultrasonic bat call detector) recording, remote camera surveys (for ground fauna) and nocturnal frog call census surveys. The survey periods are listed below:

- 24-28 October 2016
- 19-21 March 2018
- 10-14 October 2018
- 27-30 November 2018
- 6-8 June 2016 (Aquatic ecologist)
- 26-29 August 2019

These methods were reviewed against the guidelines outlined in Section 4.2.1 of this report. Additional resources used for this investigation included:

- Approved survey standards: Powerful Owl, *Ninox strenua* (DELWP 2011)
- Approved survey standards: Greater Glider, *Petauroides Volans* (DELWP 2011)
- Approved survey standards: Masked Owl, *Tyto novaehollandiae* (DELWP 2011)
- Approved survey standards: Sooty Owl, *Tyto tenebricosa* (DELWP 2011)

Habitat assessments

Fauna habitat assessments were undertaken by vehicle and on foot throughout the project area, focussing on detailed assessments of 13 primary survey sites shown in the EES Appendix A005. The total time spent on fauna surveys was 90-person days.

Aquatic habitat was assessed by a qualified aquatic ecologist. An initial desktop investigation was completed, and then subsequent field surveys were undertaken within areas that could be accessed. The surveys were completed at 33 sites in winter 2016. It was noted the tributaries and guiles were mostly dry at the time.

Fauna habitat quality was assessed based on characteristics such as degree of intactness, species richness and diversity, predicted utilisation for foraging and breeding, connectivity, level of disturbance and likelihood of occurrence of threatened fauna species.

Given the size of the project area and availability of potential fauna habitat, the methodology for fauna habitat assessment is considered accurate and sufficient to identify important potential habitats for later surveying and to understand the extent of potential occurrence of fauna species in the affected area.

Primary fauna survey sites

Diurnal bird surveys

Diurnal bird surveys involved 3 replicates of a 30-minute survey at each primary fauna survey site, except those within plantation or pasture (nine sites surveyed). The surveys were undertaken at varying times of the day and across multiple seasons in 2018 and 2019 to optimise detectability. The primary fauna survey sites were considered to represent available habitat for threatened birds that were identified as having the potential to occur in the project area. This review has found that site selection across habitat types and survey effort for birds was adequate to characterise birds in the affected area.

In addition, all incidental observations were recorded during the survey periods, comprising hundreds of survey hours, further adding to survey effort. The survey effort for threatened birds was conducted in accordance with the applicable survey guidelines, and therefore, is considered adequate and accurate.

Frog surveys

Listed frog species were targeted during herpetofauna surveys, spotlighting and nocturnal call playback surveys. Herpetofauna surveys were conducted at each primary site excluding those within plantation or pasture. Eleven replicates of 30-minute active searching surveys were undertaken for frog species flagged in the EES Appendix A005 as having the potential to occur within the project area. An additional 3 sites with suitable aquatic were surveyed using spotlighting and nocturnal call playback for the target species including, Giant Burrowing Frog, Growling Grass Frog and Green and Golden Bell Frog.

It was noted that the surveys were undertaken after it had recently rained, in accordance with the survey standards. The survey effort effectively covered all areas of suitable habitat for these species and, in conjunction with the above methodology, it can be concluded that survey methods and sites were

adequate to characterise frog activity in the affected area and to detect threatened species if a significant population were present.

Reptile surveys

Two state significant, and no nationally significant, reptile species were identified as having the potential to occur within the project area, Glossy Grass Skink and Lace Goanna. General surveys which included these species involved spotlighting and herpetofauna surveys. In conjunction with frog surveys, active searching for reptiles took place at the primary fauna survey sites for 11 x 30 minutes at each site. Habitat for reptile species was sub-optimal throughout the project area.

Given this, the timing and survey effort for listed reptiles was adequate to characterise the reptile communities in the affected area and to detect possible threatened species.

Bat surveys

Bat and microbat surveys were undertaken via AnaBat recording devices deployed at each primary fauna survey site (excluding plantation and pasture) for four nights (36 detector nights). Bat calls were analysed by a specialist in attempt to identify species detected. This survey effort is in line with the survey guidelines and is considered adequate and accurate sampling.

Owl and arboreal mammal surveys

Call playback for listed owl species identified as having the potential to occur within the project area was conducted at 23 sites in areas of woodland. In conjunction, spotlighting surveys were undertaken for listed owl species and arboreal mammals. Treed habitat was lacking mature growth and hollow-bearing trees, and therefore, was sub-optimal for threatened owls and small mammals. Each spotlighting and call playback event lasted for 30 minutes to one hour. Surveys for owls and arboreal mammals were considered comprehensive, covering all potential habitat within the project area. The survey effort for these species is considered adequate and accurate.

The exception being the small area of habitat located at 2705 Bairnsdale road, the property in which access was restricted. On the property, mature trees supporting hollows were present. This type of habitat is optimal for the target species. The close vicinity to Limpyers State Forest increases the potential that listed owls and arboreal mammals, such as the Southern Greater Glider may be occurring.

Ground-dwelling mammal surveys

Small mammals found to have the potential to occur within the study area included but not limited too New Holland Mouse, Long-nosed Potoroo and Southern Brown Bandicoot. Remote camera surveys were undertaken in order to target these species and others that may be occurring. Systematic sampling was used to deploy remote cameras at 25 sites, including the 13 primary survey sites for a minimum of 15 nights.

According to the survey guidelines remote camera traps should always be used in conjunction with another survey method for small ground-dwelling mammals. It was noted that active searching was also conducted for small mammals coinciding with other fauna surveys.

The above methodology is considered sufficient and accurate in order to obtain a comprehensive and representative sampling of potential listed fauna species within the project area. The survey effort for each species identified in the scoping requirements is outlined in the EES Appendix A005 and comprises of the methods outlined above.

Conclusion

The survey effort and methods were considered adequate to gather information on the possible status of each species listed in the EES Scoping requirements, as well as a range of other species found to have a high or moderate likelihood of occurrence in the affected area.

5.2.1. GDEs

Groundwater dependent ecosystems were initially assessed through desktop investigation using the National Atlas of GDEs (Bureau of Meteorology). Subsequently, identified potential GDEs were assessed during a field survey. GDEs within the project area were mapped after being evaluated for the likelihood of groundwater dependence.

The impact of groundwater mounding was assessed based on modelling and predictions of a specialist groundwater engineer (EMM). This review cannot comment on the veracity of this modelling but it is noted that it has been subject to a peer review.

5.3. Description of ecological values

5.3.1. Native vegetation

In EES Appendix A005, the project area was described as being highly modified, supporting pasture grasses and weeds. Remnant native vegetation was described as being largely confined to roadsides and dissecting gullies. A total of 245.59 hectares of native vegetation in patches was recorded across the project area, along with 1401 large trees in patches and scattered trees. The EES Appendix A005 recorded 11 EVCs across the project area, with descriptions of these EVCs on pages 59 to 68 of EES Appendix A005. A total of 34.1 hectares of DELWP mapped Current Wetlands were recorded. The area of each EVC recorded across the project area is summarised in Table 2.

The results presented in the EES largely repeated the above information that was presented in EES Appendix A005, however, it differed in the following:

- The total area of native vegetation in patches was recorded as being 300.97 hectares; and
- The large tree count was recorded as being 1485 large trees.

The area of each EVC recorded across the project area as presented in the EES is shown in Table 2.

The field investigations undertaken as part of this review generally concurred with the descriptions of native vegetation recorded in the EES Appendix A005. For the most part, the mapping of remnant patches and their assignment to a particular EVC was found to match EVC descriptions and/or EVC modelling. The habitat hectare scoring given to remnant patches was also found to be accurate, taking into consideration seasonal variations and the subjective nature of the assessment method. Most large trees in patches and scattered trees across the project area were accurately recorded. This review concurred with the area of DELWP mapped Current Wetlands recorded in EES Appendix A005.

However, there were some discrepancies between the native vegetation recorded in the EES Appendix A005 and that observed in the field investigations undertaken as part of this review.

There were large expanses of native vegetation across the project area that were not recorded in the EES Appendix A005. These were areas of native grassland that was present in historically-cleared paddocks, as well as in the understorey of both some remnant patches and areas of regrowth. The perennials Kangaroo Grass and Weeping Grass had a high cover across these areas, with Spear grasses and Wallaby grasses also being present. These expanses of native grasslands would qualify as modified Plains Grassy Woodland (EVC 55) or Plains Grassy Forest (EVC 151) based on EVC modelling.

These native grasslands were likely to have been undetectable during the surveys undertaken in the EES

Table 2: Area of each EVC recorded across the project area in the EES Appendix A005 and the EES

EVC	BCS	Extent in Gippsland Plain Bioregion (ha)*	Estimated extent in the East Gippsland Lowlands Bioregion (ha)*	Extent in the project area (ha)		To be removed (ha)		To be retained (ha)
				EES Appendix A005	EES	EES Appendix A005	EES	EES
Aquatic Herbland (EVC 653)	Endangered	83.00		1.03	1.03	0.93	0.93	0.10
Dry Valley Forest (EVC 169)	Endangered	67.00	1,978.00	0.86	0.86	0	0	0.86
Plains Grassy Wetland (EVC 125)	Endangered	56.00		0.31	0.31	0.28	0.28	0.03
Plains Grassy Woodland (EVC 55)	Endangered	4,850.00	71.00	**47.05**	**29.63**	**14.54**	**11.57**	18.06
Riparian Shrubland (EVC 19)	Endangered	90.00	12.00	1.15	1.15	0	0	1.15
Box Ironbark Forest (EVC 61)	Vulnerable	64.00		7.51	7.51	7.51	7.51	0.00
Lowland Forest (EVC 16)	Vulnerable	36,998.00	275,138.00	**22.24**	**12.19**	5.01	5.01	7.18
Plains Grassy Forest (EVC 151)	Vulnerable	18,159.00	418.00	**60.93**	**110.02**	**42.51**	**73.68**	36.34
Sedge Wetland (EVC 136)	Vulnerable	1,050.00		**3.03**	**2.99**	0	0	2.99
Valley Grassy Forest (EVC 47)	Vulnerable	111.00	4,343.00	87.68	87.68	74.81	74.81	12.87
Lowland Herb-rich Forest (EVC 877)	Depleted	75.00	12,532.00	13.80	13.81	8.61	8.61	5.20
DELWP mapped 'current wetland'	-	46,030.14	9,364.62	**34.10**	**33.78**	6.1	6.1	27.68
Total		61,603.00		**279.69**	**300.96**	**160.3**	**188.5**	112.46

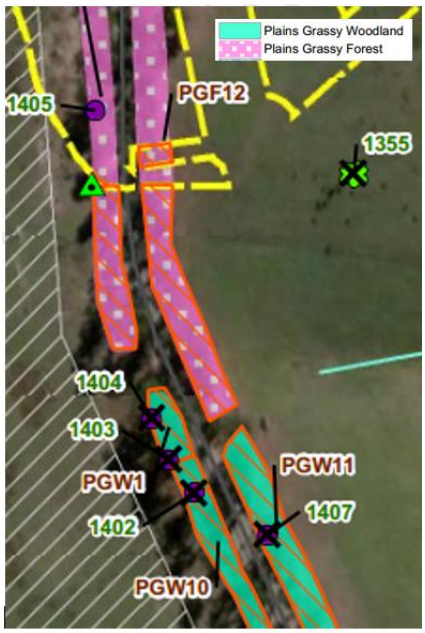
*sourced from Spatial Vision, 4 August 2004 (revised 28 September 2004)

Numbers in **bold** indicate discrepancies between the EES Appendix A005 and the EES

Appendix A005 due to reduced rainfall in the East Gippsland area from 2017 to 2019 (BOM 2021b). An increase in rainfall during 2020 is likely to have promoted the growth of these native grasslands and hence improved their detectability. Seasonal and year to year variations in climate conditions that impact the detectability and quality of native vegetation is a limitation of all native vegetation surveys. Still, it is recommended that additional surveys are undertaken to assess the extent and quality of this additional native vegetation across the project area.

There was some ambiguity between how the EVCs occurring along the Bairnsdale-Dargo Road and adjacent properties in the central portion of the project area were determined. In many cases, Plains Grassy Forest (EVC 151) and Plains Grassy Woodland (EVC 55) were mapped in EES Appendix A005 as abutting or close to each other (Figure 1). The field investigations undertaken as part of this review found that there were no apparent differences between the typical characteristics differentiating the two EVCs, such as the dominant canopy tree species present, tree height or the density of understorey life forms. The canopy was dominated by Gippsland Red-gum in this area, suggesting that Plains Grassy Woodland (EVC 55) expanded into areas that were mapped as Plains Grassy Forest (EVC 151). It is noteworthy that DELWP's EVC modelling and mapping indicates that Plains Grassy Woodland (EVC 55) occurred in this area. As Plains Grassy Forest (EVC 151) has a Biodiversity Conservation Status (BCS) of Vulnerable, whereas Plains Grassy Woodland (EVC 55) has a BCS of Endangered, this affects the understanding of the significance of the losses of native vegetation from the project. Reassessment of these two EVCs should be undertaken to finalise the extent of Endangered EVC affected by the project and information provided on a consistent and clear way in which the two EVCs were distinguished.

Figure 1. Example of the two EVCs mapped close to one another in EES Appendix A005



Areas noted in this review from aerial imagery as supporting native vegetation were not mapped as native vegetation in the EES Appendix A005. Inspections of some of these areas in the field investigations undertaken as part of this review found that these areas were predominantly regrowth, consisting of Burgan and Wattles, and were therefore not mapped due to regrowth being exempt as native vegetation under Clause 52.17 of the Victorian Planning Schemes. However, given the extent of perennial native grasses visible at the time of the current field investigations, these areas should be classified and mapped as native vegetation. It is recommended that these areas are reassessed.

Aerial photography and field investigations for this review revealed that some areas of native vegetation near the boundary of the project area were not mapped in the EES Appendix A005. These areas were outside of the impact area and close to the project boundary so may not have been mapped due to uncertainty of the project area boundary while undertaking the field surveys. However, as the impact area has changed between production of the EES Appendix A005 and the EES, the extent of the native vegetation assessment should be revisited to ensure all areas affected by the revised project footprint have been appropriately surveyed and assessed for the likelihood of occurrence of threatened species.

Finally, some large trees were incidentally found in patches of native vegetation across the project area that were not recorded in EES Appendix A005. Some scattered trees were also observed that were not recorded.

Given the discrepancies found between the EES Appendix A005 and the field investigations undertaken as part of this review, it is recommended that further surveys are carried out to determine the additional extent of native vegetation in the project area. The inconsistencies between the extent of native vegetation to be removed documented in the EES compared with EES Appendix A005 (see Table 2) need to be resolved.

2705 Bairnsdale-Dargo Road

The EES Appendix A005 did not include a field survey on this property; instead, a desktop ecological assessment was undertaken and is presented in Appendix 9 of EES Appendix A005. This desktop assessment concluded that approximately 49.925 hectares of the project area within this property would qualify as a patch of native vegetation under the Guidelines. This was assessed as likely to comprise the two EVCs Plains Grassy Forest (EVC 151) and Plains Grassy Woodland (EVC 55). A total of 132 large trees in patches were estimated to occur, along with 48 scattered trees. A conservative approach was adopted and scattered trees were assessed as large trees. No DELWP mapped Current Wetlands exist on the property.

The field investigations undertaken as part of this review included an overview from adjacent properties of 2705 Bairnsdale-Dargo Road. During these investigations, it was found that a large extent of the property supported native vegetation. This was in the form of both remnant native vegetation in patches and scattered trees, as well as perennial native grassland. Remnant vegetation included old-growth treed areas that were likely to qualify as moderate to high quality Plains Grassy Forest (EVC 151) based on the dominant canopy species present (Red Box and Yellow Stringybark), as well as native grassland. These native grasslands comprised a dense cover of Kangaroo Grass, Weeping Grass and Spear grasses, and would qualify as a modified form of either Plains Grassy Woodland (EVC 55) or Plains Grassy Forest (EVC 151) based on EVC modelling. Several large trees in patches and scattered trees were observed to occur across the property.

The field investigation for this review suggests that a larger area of native vegetation occurs on this property than was determined in the desktop assessment undertaken for EES Appendix A005. This is due to the areas of native grassland that were not deemed to be native vegetation in the desktop assessment. Further investigations are required at this property.

5.3.2. Listed communities

The results in the EES Appendix A005 determined that one EPBC Act-listed community was present or had the potential to be present in the project area. This was the Gippsland Red Gum Grassy Woodland and Associated Native Grassland (GRGGW) community. An area of 14.06 hectares of GRGGW was found in the project area and was mapped as occurring along several portions of the roadsides. Further, a total of 47.05 hectares of the FFG Act-listed community Forest Red Gum Grassy Woodland (FRGGW) was recorded in the project area.

The results presented in the EES state that 7.38 hectares of the GRGGW community and 29.63 hectares of the FRGGW community is present in the project area. It is unclear why these differences between the EES Appendix A005 and the EES occur.

Considering seasonal variations and the subjective nature of native vegetation assessments, the field investigations undertaken as part of this review found that the EPBC Act listed GRGGW community was present in the areas mapped as such in EES Appendix A005. These areas were dominated by a canopy tree layer of Gippsland Red-gum with a cover of 50% or more of native perennial ground layer vegetation, thus meeting the key diagnostic characteristics for this community (TSSC 2009).

It was noted in the field investigations undertaken as part of this review that some areas of Plains Grassy Woodland (EVC 55) that had a tree canopy dominated by Gippsland Red-gum, also had a perennial native understorey of 50% or more cover, but were not classified as the GRGGW community. Again, this may be due to the native grass species present in the understorey being undetectable during the drier than average years (BOM 2021b) during which the EES Appendix A005 surveys took place. Therefore, it is likely that the extent of the GRGGW community across the project area is greater than initially recorded. It is recommended that reassessments of these areas are undertaken.

The expanses of native grassland found across the project area may qualify as modified versions of Plains Grassy Woodland (EVC 55) and may meet the condition thresholds for the grassland form of the EPBC Act listed GRGGW community. Assessment of the cover of native plants present in these areas will establish whether the condition thresholds for this form of the community are met.

As the state FFG Act listed FRGGW community has less stringent diagnostic characteristics, the presence of higher cover native understorey is unlikely to increase the extent of this community across the project area.

The results of field investigations undertaken as part of this review agree with the EES Appendix A005 that the other two listed communities in the PMST, Seasonal Herbaceous Wetlands of the Temperate Lowland Plains and White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Grasslands, were not likely to occur in the project area.

2705 Bairnsdale-Dargo Road

The desktop assessment undertaken for the EES Appendix A005 suggested that the GRGGW community was unlikely to occur in this property given the likely high weediness of the area. It was suggested that the FRGGW community would be present.

The field investigations undertaken as part of this review indicated that EPBC Act listed GRGGW was unlikely to occur in this property given the lack of the characteristic canopy species Gippsland Red-gum. The extent of native grassland across the property, however, may qualify as the grassland form of this community. A thorough study of this property is required. The presence of the FFG Act listed FRGGW on this property may be more extensive than originally assessed.

5.3.3. Listed flora species

The EES Appendix A005 stated that no nationally significant flora species were found in the native vegetation surveys and targeted flora surveys undertaken, despite three species (Swamp Everlasting, Dwarf Kerrawang and Gaping Leek-orchid) having been considered to have a moderate to high likelihood of occurrence in the project area in the desktop assessment. Based on these field surveys, it was concluded in EES Appendix A005 that there was a lack of suitable habitat for these species across the project area and that it was unlikely that populations exist in the impact area and, if so, that they would be only small populations. By contrast, it was stated in EES Appendix A005 that communication with

DELWP confirmed the presence of Gaping Leek-orchid in the vicinity of the proposed Fernbank East rail siding.

A population of the Swamp Everlasting occurs at Saplings Morass, south of the project area based on records in the Victorian Biodiversity Atlas (DELWP 2021). Cowells Road passes close to this wetland. It is understood that mine-related vehicle traffic will not be permitted to use this road thereby avoiding impacts on this population. This assumes that no road upgrade works are required so no change in drainage patterns will occur around the morass and that the type and volume of traffic using the road will not significantly change in a way that affects water quality or flows off the road.

EES Appendix A005 found four state significant flora species in the project area. These were all listed on the Victorian Advisory list and not listed as Threatened under the FFG Act. These species were:

- Slender Wire-lily (33 plants);
- Blue Mat-rush (three plants);
- Slender Tick-trefoil (one plant); and
- Sandfly Zieria (ten plants).

Despite a further 16 state significant species considered to have a high potential to occur and a further 36 state significant species considered to have a moderate potential to occur in the project area, none of these species were detected in the field surveys. Therefore, it is stated in the EES Appendix A005 that these species are only likely to occur in very few numbers if they are at all to occur in the project area.

Targeted surveys were not undertaken for significant flora species as part of this review. However, a review of the likelihood of occurrence tables produced in the EES Appendix A005 alongside the desktop searches and field investigations undertaken for this review, concluded that the likelihood of occurrence assigned to national and state significant flora species was accurate.

2705 Bairnsdale-Dargo Road

Targeted flora surveys were not undertaken in the property at 2705 Bairnsdale-Dargo Road. The likelihood of occurrence of national and state significant species in this property are presented on pages 3 to 7 in Appendix 9 of the EES Appendix A005.

The inspection of this property from the boundaries undertaken for this review, indicated that a large area of the property supported native vegetation, including old-growth and relatively intact woodland/forest areas. While some areas of the property have been historically cleared, there was still an abundance of native vegetation in the form of perennial native grasses and herbs. It is likely that a thorough native vegetation survey on this property would determine some areas of vegetation to have moderate to high likelihood of supporting threatened flora species. Targeted flora surveys should be undertaken on this property for the species assessed in EES Appendix A005 as having a high and moderate likelihood of occurrence in the project area during optimal flowering periods for these species'.

5.3.4. Fauna habitats

Terrestrial

Terrestrial fauna habitat comprised five types, including Lowland Forest (EVC 877, EVC 16), Dry Forest (EVC 47), Plains Grassy Woodland and Plains Woodland (EVC 151, EVC 55), Wetland (EVC 653, EVC 125) and modified land (plantations and pasture). The bushfire in 2014 was extensive and destroyed an extensive amount of habitat for fauna species. Regrowth in the project area is very prevalent and sub-optimal for some listed fauna species. Very few trees throughout the project area were hollow-bearing and of mature growth. Much of the land had been subject to long-term pastoral land-use. The vegetation

structure of treed vegetation areas was often not complex, commonly lacking a mid-storey or dense understorey. Based on the field assessments undertaken for this review, the finding in EES Appendix A005 that areas of woodland on site were moderate to low quality habitat for fauna was found to be correct.

Aquatic habitat

Aquatic habitat for fauna was present on site within farm dams, gullies, tributaries and creeks. An aquatic fauna assessment was undertaken. More than 33 aquatic sites were surveyed for EES Appendix A005. No additional areas of habitat were found during the field investigation for this review. The habitat assessment is considered comprehensive and accurate.

2705 Bairnsdale-Dargo Road

At 2705 Bairnsdale-Dargo Road, access was not granted during the previous investigations. Old growth, hollow-bearing trees were present in the northeast portion of the property and scattered throughout. Moderately dense understorey was present in some areas. Two dams were found on site, one of particularly high quality with emergent vegetation.

This review considers this property to be an exception to the overall finding that fauna habitat on the site is of moderate or low quality. Areas of this property may be of high quality and more detailed assessment is warranted.

5.3.5. Fauna species

In conjunction with the desktop assessment undertaken using the VBA and PMST, the field visit was used to determine the likelihood of occurrence for listed fauna species. Factors taken into consideration included geographic distribution, existing records in the region and habitat suitability and availability. The EES Appendix A005 recorded two nationally significant fauna species during their field surveys:

- Grey-headed Flying-fox
- Australian Grayling

It also found that the following nationally significant species have a moderate to high likelihood of occurrence within the project area:

- Swift Parrot
- Painted Honeyeater
- Giant Burrowing Frog
- Dwarf Galaxias

The field investigations also recorded species of state significance during the field assessment including:

- Eastern Bent-wing Bat
- Yellow-bellied Sheathtail Bat

EES Appendix A005 concluded that additional state significant species had a moderate to high likelihood of occurring at the project area including the following:

- Baillon's Crake *(Porzana pusilla palustris)*
- Black Falcon *(Falco subniger)*
- Brown Treecreeper (southeastern ssp.) *(Climacteris picumnus victoriae)*
- Chestnut-rumped heathwren *(Calamanthus pyrrhopygius)*

- Diamond Firetail *(Stagonopleura guttata)*
- Eastern Great Egret *(Ardea modesta)*
- Grey Goshawk *(Accipiter novaehollandiae novaehollandiae)*
- Hardhead (Aythya australis)
- Hooded Robin *(Melanodryas cucullata cucullata)*
- Lace Goanna (Varanus varius)
- Masked Owl *(Tyto novaehollandiae novaehollandiae)*
- Powerful Owl *(Ninox strenua)*
- Southern Toadlet (*Pseudophryne semimarmorata)*
- Speckled Warbler (*Chthonicola sagittatus)*
- White-bellied Sea-eagle *(Haliaeetus leucogaster)*
- White-throated Needletail *(Hirundapus caudacutus)*
- Southern Toadlet *(Psedophryne semimarmorate)*
- Lace Goanna *(Varanus varius)*

An additional ten species were found to have records or habitat in the project area in the VBA and PMST, these species are listed below:

- Nankeen Night Heron *(Nycticorax caledonicus hillii)*
- Royal Spoonbill (Platalea regia)
- Azure Kingfisher *(Alcedo azurea)*
- Spotted Quail-thrush *(Cinclosoma punctatum)*
- Eastern Pygmy-possum *(Cercartetus nanus)*
- Dendy's Toadlet *(Pseudophryne dendyi)*

These additional species found in the VBA and PMST searches need to be assessed for their likelihood of occurrence within the study area. Targeted surveys should be undertaken for the additional species found to have potential to occur.

Except for the missing species, this review concurs with the assessment of likelihood of occurrence outlined in the EES Appendix A005. The assessment criteria and conservative approach taken is appropriate and accurate.

5.3.6. Groundwater dependent ecosystems

A review of the Groundwater Dependent Ecosystems Atlas of the Bureau of Meteorology shows that there is the potential for Terrestrial GDEs in the project area. Aquatic GDEs have a low to high potential of occurring in the project area.

The EPBC Act listed Seasonal Herbaceous Wetland community is not considered a GDE and does not occur on or near the project area.

The EPBC Act listed GRGGW community is identified as a class 2 GDE. The GDE impact assessment in EES Appendix A005 concluded that the project will have a low to negligible risk to this terrestrial GDE because of predicted groundwater mounding.

5.4. Impact assessment

An impact assessment was documented in EES Appendix A005 for native vegetation and listed threatened flora and fauna species and communities.

It used the significant impact guidelines for Matters of National Significance (MNES) administered by the Department of Agriculture, Water and the Environment. In addition, the EES Appendix A005 assesses impacts to state and regionally significant species and communities.

The current investigation for this review cross-referenced the previous impact assessment that was undertaken against the following documents:

- Matters of National Environmental Significance: Significant impact guidelines (DoE 2014).
- Significant impact guidelines for the vulnerable Growling Grass Frog *Litoria raniformis*
- National Recovery Plan for the Australian Grayling *Prototroctes maraena*
- National Recovery Plan for the Dwarf Kerrawang *Rulingia prostrata*.
- National Recovery Plan for the Swift Parrot *Lathamus discolor*.
- Action Statement No. 57: Gaping Leek-orchid *Prasophyllum correctum*.
- Action Statement No. 61: Giant Burrowing Frog *Heleioporus australiacus*.
- Action Statement No. 92: Powerful Owl *Ninox strenua*
- Action Statement No. 124: Masked Owl *Tyto novaehollandiae novaehollandiae*.
- Action Statement No. 169: Swift Parrot *Lathamus discolor*.
- Action Statement No. 229: Swamp Everlasting *Xerochrysum palustre*

5.4.1. Native vegetation

The impacts to native vegetation in the project area as outlined in the EES Appendix A005 are the removal of:

- 160.30 hectares of remnant native vegetation in patches (excluding native vegetation at 2705 Bairnsdale-Dargo Road, consisting of:
  - 24.53 hectares of low-quality vegetation;
  - 114.71 hectares of moderate-quality vegetation; and
  - 21.08 hectares of high-quality vegetation.
- 373 large trees in patches;
- 461 scattered trees (331 scattered large trees and 130 scattered small trees); and
- 6.10 hectares of DELWP mapped Current Wetlands.

A break-down of the impact area by EVC is provided in Table 1.

It was found in this review that the impact results presented in the EES were inconsistent with those presented in the EES Appendix A005. The direct impacts to occur to native vegetation as recorded in the EES are the removal of:

- 188.50 hectares of remnant native vegetation in patches;
- 763 large trees (in patches and scattered trees);
- 130 small, scattered trees; and
- 6.10 hectares of DELWP mapped Current Wetlands.

These results are in increase in 28.2 hectares of native vegetation in patches and an increase in 59 large trees compared with the impacts presented in the EES Appendix A005. A break-down of the impacts presented in the EES is also provided in Table 2.

This discrepancy in direct impacts to native vegetation between the EES Appendix A005 and the EES is likely to be due to the difference in the impact area between these two reports. It is not uncommon for impact areas to change as a project progresses; it should be clarified if indeed this difference is due to an alteration in the impact area.

The extent of native vegetation to be removed compared to the known extent of native vegetation in the region is stated to be small. This review found that there will be a loss of 0.2% of the known extent of native vegetation in the Gippsland Plain bioregion due to this project, based on that reported in the EES (Table 2). There will be a loss of 62% of the extent of native vegetation in the project area (Table 2).

The EES Appendix A005 predicted that direct impacts to native vegetation at 2705 Bairnsdale-Dargo Road would be 31.471 hectares of native vegetation in patches, approximately 100 large trees in patches and 41 large scattered trees. By contrast, the EES states that 84 large trees are estimated to be impacted in this property. These differences need to be resolved and the correct impact determined and a final native Vegetation Removal Report prepared so that the required offsets can be correctly calculated.

The field investigations undertaken as part of this review found that a greater extent of native vegetation, large trees in patches and scattered trees are likely to occur across the project area than that recorded in the EES Appendix A005 and in the EES. Additionally, a greater extent of Plains Grassy Woodland (EVC 55), with a conservation status of Endangered, may occur across the project area. Therefore, the impacts to native vegetation for this project are likely to be greater than those presented in EES Appendix 005.

5.4.1. Listed communities

The impacts to occur to listed communities as outlined in the EES Appendix A005 are the removal of:

- 1.74 hectares of the nationally significant GRGGW community; and
- 14.54 hectares of the state significant FRGGW community.

The area of removal of the GRGGW community presented in the EES concurs with the EES Appendix A005, however, the EES states that there will be the removal of 11.57 hectares of the FRGGW community in the project area.

Given that the field investigations undertaken for this review found that the GRGGW community extent is likely to be larger than that determined in the EES Appendix A005, the residual impacts to this listed community are likely to be greater.

5.4.2. Listed flora species

Impacts on significant flora species outlined in EES Appendix A005 are the removal of:

- 33 Slender Wire-lily plants;
- 3 Blue Mat-rush plants; and
- 10 Sandfly Zieria plants.

Additionally, the EES states that there is potential habitat for 53 state significant flora species that have a moderate to high likelihood of occurring in the project area will be removed.

As further targeted surveys have been recommended in this review, there is potential that impacts on national and state significant flora will be greater than indicated in the EES Appendix 005.

5.4.3. Fauna habitats and species

The EES Appendix A005 included an impact assessment of the project on listed fauna species potentially occurring within the project area. The results of the impact assessment for key species are summarised below.

General direct impacts to fauna

Direct impacts to fauna species as outlined in the EES Appendix A005 included habitat loss through native vegetation removal, heavy disturbance and direct clearing, the loss of hollow-bearing trees and the loss and degradation to aquatic habitat.

General indirect impacts to fauna

The EES Appendix A005 outlined indirect impacts to fauna from the proposed development including habitat fragmentation and edge effects, proliferation of weeds and pest species, as well as disturbance from noise, dust and light pollution.

Species specific impacts

Grey-headed Flying-fox, Swift Parrot, Regent Honeyeater and Painted Honeyeater

It is noted that these species are highly mobile and nomadic. The project will result in the removal of potential foraging habitat; however, these species are not expected to occur more than rarely.

Giant Burrowing Frog

This species is not very adaptable and very susceptible to a change in environmental conditions. The likelihood of occurrence throughout the project area is very low and habitat availability is limited.

Migratory species

The proposed removal of remnant vegetation may impact migratory, including Latham's Snipe and Eastern Great Egret, on a local scale. All identified migratory species are highly nomadic and not expected to be impacted by development.

Yellow-bellied Sheathtail Bat and Eastern Bent-wing Bat

These species are highly dispersive and can easily move to areas outside the project area.

Other species

Other species are classified as having a low likelihood of occurrence and are not expected to be impacted by development. Regionally significant species are known to occur within higher quality habitat outside the project area and not predicted to be impacted by the proposed project. The proposed removal of scattered trees and native vegetation involved habitat that does not qualify as important habitat for listed fauna species or populations.

The current investigation for this review found the conclusions of the impact assessment to be adequate and accurate.

Discrepancies in impacts to fauna species were found in the EES Appendix A005 and EES Report. Impacts to native vegetation differed between the EES Appendix A005 and EES Report in which impacts to fauna habitat calculations is dependent upon. An example of this is below:

Species impacted	Impacts outlined in EES Appendix A005	Impacts outlined in EES
Yellow-bellied Sheathtail	Removal of 461 scattered trees and 160.30 ha of native vegetation	Removal of hollow-bearing trees and 188.50 ha of native vegetation

Impacts to listed fauna species should be clearly outlined in the EES report and be consistent with findings in the EES Appendix A005. If the development footprint has since been updated, a short summary of changes documenting the previous versus current layout is required and a final impact assessment should be completed.

5.5. Avoidance and mitigation measures

Avoidance

Avoidance measures have been considered during the planning process. Though being of moderate-low quality, patches of native vegetation have been avoided where possible.

Mitigation measures in response to impacts

Detailed mitigation measures addressing expected impacts from development are summarised from the EES Appendix A005 and presented in Table 3.

Table 3: Mitigation measures for ecological values.

Impacts	Summary of mitigation measures (from EES Appendix A005)
Direct impacts	
Vegetation removal and habitat loss	Environmental Management Plan required with associated sub-plans to protect native vegetation and fauna habitat
	Vegetation removal not prohibited until relevant approval is obtained
	Nest boxes installed to replace hollow-bearing trees
	Fulfill offset requirements
	Extent of native vegetation impact area to be defined with identified no-go areas and buffers
	Reduce disturbance caused by access tacks by clearing marking tracks and using existing road infrastructure
	Parking, stockpiles, etc must be in areas negligible of ecological value
	All large trees to be retained must be clearly marked with Tree Retention Zones
	Comprehensive Rehabilitation Plan is required
Direct fauna morality	Staff/contractor environmental inductions required
	Sensitive fauna habitat must be cleared of fauna prior to construction activities
	Any disturbed animals must be relocated
	Sides of trenches must be graded for animal escape
Loss of hollow-bearing trees	Hollow-bearing trees retained where possible
	Pre-clearance inspections by a zoologist are required before any removal of a hollow-bearing tree
	Artificial hollows must replace each hollow-bearing tree to be removed
Loss and degradation of aquatic habitat	Regular water quality testing is required
	Appropriate erosion and sediment controls implemented
	No-go zones established around waterbodies

Impacts	Summary of mitigation measures (from EES Appendix A005)
	Regular maintenance of plant and equipment required
	Re-fuelling and lubrication must not be undertaken within 50m of a waterbody
	Detailed measures to prevent and protect in the event of a hazardous spill
Indirect	
Habitat fragmentation	Biodiversity Management Plan must include fauna salvage/translocation protocols
	Slow speed limits through areas of high ecological value
	Consideration of reduction to fragmentation during planning phase
	Remaining areas of ecological value to be maintained and, where possible, enhanced
	Fauna escape features and refuges must be provided where appropriate
Proliferation of weeds and pest species	Environmental Management Plan required with associated sub-plans to control weeds and pest species
	High threat weeds mapped and removed prior to construction
	Appropriate hygiene controls implemented to prevent spread of weeds, including consultation and cooperation of landowners
	Infestations reported to relevant authority immediately
Noise, dust and light pollution	Access tracks clearly marked, large trees retained with Tree Retention Zones, heavy machinery to be controlled on high wind days, operations emitting excessive noise or vibration to be located away from areas with ecological values

These measures are considered appropriate, although the level of detail provided in EES Technical Appendix A005 and EES Chapter 11 (the Environmental Management Framework) is considered inadequate.

The Environmental Management Framework (Chapter 11 of the EES) provides information on how such measures will be implemented but does not provide further detail on specific mitigation measures listed in EES Appendix A005 (see Table 3). An example relates to the potential for pollution of aquatic ecosystems. Little detail is available in EES Chapter 11 on the site- and project-specific pollutants that will be on site or the measures proposed to reduce the risk of pollution from these sources (apart from fuel and lubricants).

To provide assurance to a decision-maker that the risks and impacts have been adequately explored and documented, and that the mitigation measures have been comprehensively developed, represent best-practice and will be effective, more detail is required.

A contingency plan should be developed in the event that Giant Burrowing Frog is found on site. The plan should include mitigation measures and detailed management strategies, including translocation protocols.

5.6. Offsets

Commonwealth offset requirements for listed flora and fauna were consistent in the EES Appendix A005 and EES Report. It was stated that once an offset site was secured, a detailed assessment will be undertaken to ensure requirements are fulfilled.

The *Guidelines for the removal, destruction or lopping of native vegetation* have been used correctly to determine offset requirements at the state level.

Discrepancies in the state offset requirements were found between the EES Appendix A005 and the EES Reports. These discrepancies are shown in Table 4 below.

Table 4: Discrepancies of state offset requirements between the EES Appendix A005 and the EES

State Offset Requirements		
Species	EES Appendix A005	EES
Bushy Hedgehog-grass	102.384	139.554
Rough-grain Love-grass	98.544	135.464
Slender Violet-bush	66.713	103.744
Limestone Blue Wattle	87.71	123.21
Thin-leaf Daisy-bush	56.891	91.897
Forest Red-box	94.13	131.05

Review of the Offset Strategy at Attachment E of the EES indicates that a significant deficit currently exists for some species offsets required under the *Guidelines for the removal destruction and lopping of native vegetation*. Although some species offsets can be met through existing credits available via brokers, many cannot. It is of concern that the offset target in this strategy is based on the numbers in EES Appendix A005 and, as indicated above (Table 4), the offset target in the EES is higher for a number of species.

For those offset targets that cannot be met currently, the Offset Strategy nominates up to seven additional properties where offsets may be available. If the target in the EES applied, then more of these properties would be needed. For example, in the case of the Forest Red-box offset, all offsets on the Native Vegetation Credit Register (as at March 2020), those on the confirmed offset site (Melwood) and all seven potential properties would not quite meet the target. Although mention is made of discussions with landholders, the likelihood that these discussions will result in the successful setting aside of offsets should be explored to ascertain if risks remain in achieving the required offsets.

In conclusion, the current offset strategy does not provide a high level of confidence that the offset targets can be met.

6. Other documents

The brief asked me to consider two additional documents: Council's Submission and the SLR Technical Review of the EES prepared for Council. Ecological aspects of these two documents are discussed separately below.

6.1. Council's Submission

Council's submission includes consideration of impacts on aquatic ecosystems discussed in the sub-section below.

In addition, Council considered that Giant Burrowing Frog were not adequately accounted for particularly given the possibility of the current surveys having not detected them. Contingencies for avoiding and minimising impacts in the event that the species was found during works have not been adequately considered or described. Although surveys documented in EES Appendix A005 were considered adequate, being a cryptic species and given its proposed endangered status under the EPBC Act (DAWE 2020), species-specific contingencies should be considered in the event that it is detected as the project is developed.

6.2. SLR Technical Review

The SLR recommended a more comprehensive consideration of the risks to aquatic ecosystems (e.g. Mitchell and Perry Rivers) of spillage of chemicals that may contaminate these ecosystems. EES Technical Appendix A005 discusses mitigation measures for reducing the risk of fuel spills (Table 25, line 4, p. 108) but not other chemicals and waste. The Environmental Management Framework (Chapter 1 of the EES) does not specifically address each potential source of chemical and its risk to the environment or provide detail on possible source-specific measures to manage the risk of spillage. I concur with the finding of SLR on this matter – more detail is required to inform a decision around this particular risk.

In terms of impacts on the Gippsland Lakes Ramsar site, EES Technical Appendix A005 relies on the findings of the surface water and groundwater impact assessments. I cannot comment on the efficacy of these but assuming they are correct the impacts on the Mitchell and Perry Rivers appear to be within the bounds of natural variability and therefore are highly unlikely to create water quality (e.g. turbidity/sedimentation) and flow (e.g. water extraction) changes of consequence for these ecosystems and ultimately the Gippsland Lakes Ramsar site.

7. References

BOM 2021a, *Groundwater Dependent Ecosystems Atlas*, Bureau of Meteorology, Australian Government, Canberra.

BOM 2021b, *Climate Data Online*, Bureau of Meteorology, Australian Government, Canberra.

DAWE 2020, *EPBC Act Protected Matters Search Tool*, Department of the Environment and Energy, Canberra, viewed 26th August 2020, https://www.environment.gov.au/epbc/pmst/index.html.

DAWE 2020. Consultation Document on Listing Eligibility and Conservation Actions *Heleioporus australiacus* (Giant Burrowing Frog). Department of Agriculture Water and Environment, Canberra.

DELWP 2011. *Approved survey standards: Giant Burrowing Frog Heleioporous australiacus.* Department of Environment, Land, Water and Planning, East Melbourne.

DELWP 2017, *Guidelines for the removal, destruction or lopping of native vegetation* (dated December 2017), Department of Environment, Land, Water and Planning, East Melbourne.

DELWP 2017b, *Flora and Fauna Guarantee Act 1988 - Protected Flora List, June 2017*, Department of Environment, Land, Water and Planning, East Melbourne.

DELWP 2018a, *Assessor's Handbook – Applications to remove, destroy or lop native vegetation* (Version 1.1, dated October 2018), Department of Environment, Land, Water and Planning, East Melbourne.

DELWP 2018b, *Flora and Fauna Guarantee Act 1988 – Threatened List, April 2018*, Department of Environment, Land, Water and Planning, East Melbourne.

DELWP 2020a, *NatureKit*, Department of Environment, Land, Water and Planning, East Melbourne, Victoria, viewed January 2021, https://www.environment.vic.gov.au/biodiversity/naturekit.

DELWP 2020b, *Victorian Biodiversity Atlas 3.2.5*, Department of Environment, Land, Water and Planning, East Melbourne, Victoria, viewed January 2021, https://vba.dse.vic.gov.au.

DEPI 2014. *Advisory list of rare and threatened plants in Victoria – 2014.* Department of Environment and Primary Industries, Melbourne.

DEWHA 2009. *Significant impact guidelines for the vulnerable Growling Grass Frog* (Litoria raniformis*), Nationally threatened species and ecological communities EPBC Act policy statement 3.14*, Department of the Environment, Water, Heritage & the Arts, Australian Government, Canberra.

DEWHA 2010a. *Survey guidelines for Australia's threatened birds listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999.* Department of Environment, Water, Heritage and the Arts, Canberra.

DEWHA 2010b. *Survey guidelines for Australia's threatened mammals listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999.* Department of Environment, Water, Heritage and the Arts, Canberra.

DEWHA 2010c. *Survey guidelines for Australia's threatened fish listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999.* Department of Environment, Water, Heritage and the Arts, Canberra.

DEWHA 2010d. *Survey guidelines for Australia's threatened bats listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999.* Department of Environment, Water, Heritage and the Arts, Canberra.

DoE 2014, *Matters of National Environmental Significance - Significant impact guidelines 1.1,* Department of the Environment and Energy, Canberra

DoE 2015 *EPBC Act Policy Statement 3.21—Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species.* Department of the Environment and Energy, Canberra

DoEE 2013. *Survey guidelines for Australia's Threatened Orchids: Guidelines for detecting orchids listed as 'threatened' under the Environment Protection and Biodiversity Conservation Act 1999*. Australian Government Department of the Environment and Energy, Canberra.

DSE 2004a, *Ecological Vegetation Class (EVC) Benchmarks by Bioregion*, Department of Environment, Land, Water and Planning, East Melbourne.

DSE 2004b, *Native Vegetation: sustaining a living landscape, Vegetation Quality Assessment Manual – guidelines for applying the Habitat Hectare scoring method (Version 1.3)*, Department of Environment, Land, Water and Planning, East Melbourne.

DSE 2010 *Biodiversity Precinct Structure Planning Kit.* Victorian Government, Melbourne.

DSE 2013. *Advisory list of threatened vertebrate fauna in Victoria - 2013.* Department of Sustainability and Environment, Melbourne.

DSEWPaC 2011a, *Survey guidelines for Australia's threatened fish Guidelines for detecting fish listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999*, Department of Sustainability, Environment, Water, Population and Communities, Canberra.

DSEWPAC 2012. *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy.* Department of Sustainability, Environment, Water, Population and Communities, Canberra

DSEWPaC. 2011b. *Isoodon obesulus obesulus* in Species Profile and Threats Database, Department of Sustainability, Environment, Water, Population and Communities, Canberra. Available from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=68050 Accessed 10 July 2018

TSSC 2009, *Commonwealth Listing Advice on Gippsland Red Gum* (Eucalyptus tereticornis subsp. mediana*) Grassy Woodland and Associated Native Grassland*. Threatened Species Scientific Committee, Department of the Environment, Water, Heritage and the Arts. Available from http://www.environment.gov.au/biodiversity/threatened/communities/pubs/73-listing-advice.pdf.

Appendix 1: Curricula Vitae for review team members

Brett Lane

Managing Director

Profile

Brett Lane has over 40 years' experience in ecological research and management. Specialising in birds, wind farms, wetlands and coastal ecosystems, and development impact assessment, he has over 30 years' experience as an ecological consultant to industry, government and private clients. He has worked on projects ranging from large metropolitan road projects, broadacre property development and wind farms to powerlines and small private subdivisions. He understands the legislation and planning policies that developers must respond to for successful projects and has facilitated development assessments for hundreds of projects. He has extensive experience as an expert witness in courts, tribunals and planning panels.

He has been principal consultant and sole director of the former Brett Lane & Associates Pty Ltd, now Nature Advisory Pty Ltd. His technical and personal leadership, combined with the hard work of those around him, has built one of the country's leading ecological consulting teams. This team brings a refreshing approach to development assessment that combines a commitment to good scientific investigations that reliably inform decision-makers while understanding the commercial and compliance concerns of clients.

Biography

Brett's 40 years of experience started studying Orange-bellied Parrots between study years at university, followed by work for the predecessor of Birdlife Australia for seven years, coordinating a citizen-science project to gather information on the numbers and distribution of shorebirds in Australia. This culminated in the publication of the book *Shorebirds in Australia*. This was followed by work in his own consulting practice throughout eastern Australia in the 1980's. After this, he worked for the predecessor to Wetlands International - Asia Pacific in Kuala Lumpur as Assistant Director for East Asia, building a multi-country wetland conservation program that worked with local communities to conserve wetlands. On return to Australia in 1993, he held positions as principal ecological consultant with consultancies in Brisbane and Melbourne before establishing Brett Lane & Associates Pty Ltd in January 2001. In 2019, this became Nature Advisory and he continues to lead the company's technical, professional and commercial development.

Qualifications

B.A (Zoology & Physical Geography), Monash University

Key skills

- Technical team leadership
- Ecological Impact Assessment
- Ecological Monitoring

- Specialist threatened species investigations
- Bird and bat studies for wind farm impact assessment
- Biodiversity regulations
- Wetland and coastal ecology
- Marine birds
- Shorebirds
- Aerial wildlife surveys
- Expert Witness work

Project examples

Renewable Energy

Golden Plains Wind Farm, Victoria - Project director for a major 800MW wind farm project west of Geelong in Victoria, involving initial advice on regulatory requirements and strategy, preparation of detailed biodiversity assessment and Brolga Impact Assessment in accordance with government guidelines for an Environment Effects Statement then preparation of post-approval, pre-construction compliance plans.

Capital Wind Farm, NSW - Prepared the operational phase bird and bat adaptive management plan for this large wind farm in the southern highlands of NSW, then implemented the plan. This involved over 4 years' of work including designing the bird and bat impact monitoring program, approval of this by NSW Office of Environment and Heritage (OEH), implementation of monitoring and periodic reporting to OEH. Contingency plans and responses for potential for significant impacts, including on Eastern Bentwing Bat and Wedge-tailed Eagle.

Property Development

Modeina, Burnside, Victoria - Coordinated ecological assessments and approvals for a greenfields property development in Melbourne's west that faced complex and challenging ecological issues. This involved high level advice on issues and risks for the project, permits for native vegetation removal, Commonwealth Environment Protection and Biodiversity Conservation Act Referrals Assessment and Approval, and post-approval planning and compliance.

Eynesbury Town Development, Victoria - Advised on and coordinated biodiversity assessments and approvals for an extensive staged greenfields property development west of Melbourne, including preparing and tendering the implementation of management plans for over 300 hectares of protected environmental reserves. The project won an award for environmental excellence from the Urban Development Institute of Australia and a commendation in the environment section of the Planning Institute of Australia awards.

Infrastructure

Port Phillip Bay channel-deepening project - Assessed the impacts of a major capital dredging project on coastal ecosystems and marine birds for a Victorian Environment Effects Statement, including detailed mapping and assessment of coastal vegetation and fauna habitats, assessment of impacts on listed rare and threatened coastal birds, and specific assessment of impacts on marine birds that use Port Phillip Bay. Subsequent work included reviewing implementation of the environmental management plan for the project, including updating regular risk assessments based on the periodic findings of the impact monitoring program.

Nagambie ByPass Flora and Fauna Assessment - This work involved coordinating a team of specialists to assess native vegetation and threatened flora and fauna along a number of route options for the Nagambie ByPass. A report on impacts on native vegetation, consistent with the requirements of the planning scheme enabled the project to avoid and minimise impacts on native vegetation and to obtain approval for the removal of a reduced, residual area of impacted native vegetation.

Outer Metropolitan Ring Road - Strategic Assessment - Undertook detailed collation of existing native vegetation and threatened flora and fauna mapping along alternative routes for this 72-kilometre outer metropolitan freeway to Melbourne's west and north. This resulted in a report that accompanied the impact assessment for the EPBC Act Melbourne Strategic Assessment, which included Melbourne's growth areas, the Regional Rail Link and this project.

Ecosystem Monitoring and Management

Wind Farm bird and bat impact monitoring - Brett has provided technical leadership and regulator liaison for the design, implementation and reporting of wind farm bird and bat impact studies. This has involved working with statisticians to develop robust sampling designs for caracss searches, and scavenger and observer efficiency trials, collating and analysing the results to estimate bird and bat mortality rates at wind farms, and reporting the findings to the regulator. Occasionally, impact events trigger a contingency response and Brett has coordinated such responses and liaised with the regulator to keep them informed and, with project owners, proposed solutions to problems as they arose.

River Red-gum condition monitoring - In response to an urgent need for objective data on the condition of riparian vegetation in the lower Murray River, Brett developed a rapid assessment method and sampling design to monitor River Red-gum condition in areas subject to long term drought due to water diversion. This laid a foundation for subsequent monitoring programs and lead to the establishment of regular environmental watering programs along the lower Murray River. Since this time, the scale and scope of monitoring and environmental watering has improved substantially.

Annette Cavanagh

Botanist

Profile

Annette began her career as a botanist at Nature Advisory in early 2019. Her role involves conducting native vegetation and targeted flora surveys, habitat hectare assessments and offset site assessments in various regions across Victoria. Annette also prepares both weed management and bushfire management plans.

Since working at Nature Advisory, Annette has developed strong field-based botanical skills, has become Habitat Hectare accredited by the Department of Environment, Land, Water and Planning (DELWP) and has gained a thorough understanding of local, state and federal environmental legislation.

Biography

Annette has a Bachelor of Environmental Science and a Bachelor of Wildlife and Conservation Biology, and completed her Honours in Botany in 2018. Her honours research focused on seed dispersal and burial of native grass species. This has given her a fondness for grasses and grassland ecosystems. Annette enjoyed the many field-based subjects she took while studying and values the practical experience that these provided. During her studies, Annette also undertook industry internships with the Arthur Rylah Institute and CSIRO giving her experience working in professional environmental research organisations.

An avid volunteer with a passion for community driven conservation, Annette has a strong involvement with Landcare and understands the importance of achieving the best outcome for both the environment and the community. She has also volunteered with various other environmental organisations locally, interstate and overseas which have included revegetation work, flora surveys, animal trapping and education.

Her experience has given her excellent field skills in plant and vegetation community (EVC) identification. Working under the supervision and training of the experienced Nature Advisory botany team she has further diversified her knowledge of Victoria's flora and has successfully become a DELWP-certified native vegetation assessor.

Annette holds a Construction Industry White Card and a Rail Industry Worker Card, is certified in Level 2 First Aid, and has completed an intermediate 4WD course.

Key skills

- Extensive field-work experience
- Strong plant identification skills
- Competent with vegetation mapping
- Efficient at data entry and analysis

- Excellent report writing and editing ability
- Understanding of environmental legislation
- Habitat Hectare accredited

Project examples

Property Development

Atherstone, Melton South – surveyed native vegetation proposed to be removed and outlined the legislative procedures and offset obligations required to be undertaken by the developer for its removal.

Patullos Road, Lara – assessed the native vegetation impacts of a proposed development and provided alternative options for development to avoid and minimise native vegetation removal.

Hume Highway, Craigieburn – provided an overview assessment of the biodiversity values of the site and made recommendations to inform future development plans.

Botania Estate, Fraser Rise – undertook an assessment of weed presence and abundance, and provided a Weed Management Plan for the control and prevention of weeds at the site before, during and after development.

Mickleham Road, Greenvale – developed a Land Management Plan describing best practice for protection and enhancement of a designated conservation area within a new development.

Renewable energy

Golden Plains Windfarm, Rokewood – undertook preliminary assessments on native vegetation in the area to assist with the positioning and design of the wind farm.

Berrybank Windfarm, Berrybank – conducted a native vegetation assessment for micro-siting the final locations of turbines and access tracks. Assisted developer with locating optimal positions to minimise impacts to native vegetation and threatened species.

Stockyard Hill Windfarm, Beaufort – audited vegetation removal for the site, undertaking an assessment of impacts to native vegetation due to road widening, transmission lines and turbine construction.

Crookwell Windfarm, Crookwell – assessed the success of revegetation and landscape screening that was required to be undertaken after wind farm construction.

Threatened Species

Kingsfield Estate, Sunbury – targeted surveys for the EPBC Act listed species Spiny Rice-flower.

Broadcast Australia, Delahey – targeted surveys for the EPBC Act listed species Golden Sun Moth.

Offset Planning

Eynesbury Township – surveyed vegetation to identify sites suitable to offset development and established a first party offset site.

Warrambeen Estate, Rokewood – undertook vegetation monitoring for a long-standing offset site and provided recommendations for management to maintain and improve native vegetation quality.

Cara Cappelletti

Zoologist

Profile

Cara started working at Nature Advisory in early 2019 as a technical officer and quickly moved into the position of Zoologist. She undertakes and assists with field work. She is passionate about Australian legislation policies and processes, and the iconic biodiversity it encompasses. Cara also is continuing to grow her GIS capabilities, interpersonal skills and general IT proficiency.

Biography

Cara received her bachelor's degree in Ecology and Evolutionary Biology at the University of Colorado-Boulder, in the United States. Throughout her degree, she was frequently in the field learning about research methods and ecological physiology. After finishing her undergraduate degree, she moved to Australia to continue her studies at University of Wollongong. It was there where she obtained her master's degree in Environmental Biology. Cara conducted research on the activity patterns small Australian mammals, which resulted in a publication.

Since starting at Nature advisory, Cara has been quick to learn about many aspects of environmental consulting. Her work is incredibly varied and ever-evolving. Occasionally undertaking zoology field work, Cara has been involved in Striped Legless Lizard, Golden Sun Moth, Growling Grass Frog, Powerful Owl, Southern Greater Glider, Southern Brown Bandicoot and other threatened fauna surveys. She has experience in various survey methods including tile grids, camera trapping, and fauna habitat assessments. Cara also assists project managers with a range of tasks including administering registrations under the *Melbourne Strategic Assessment.* She is dedicated to staying up to date with relevant legislation and environmental policies in order to better assist our clients. In addition, Cara regularly acts as GIS support with mapping and other tasks, as well as manages our marketing strategy and website maintenance.

Key skills

- Report writing and editing (EPBC referrals, kangaroo management plans)
- Fauna habitat assessments
- Targeted surveys for fauna species
- Project management of MSA registrations
- Habitat overview assessment
- GIS mapping and processes
- Database searches
- Data entry and analysis
- Science communication (social media, maintenance of website)

Project examples

Property Development

Eynesbury, Tarneit, Sunbury, Rockbank, Melton– Survey for Eastern Grey Kangaroo and create EGK Management Plan

Sydenham, Little Rock – Targeted surveys for Stripped Legless Lizard

Donnybrook – Undertook Growling Grass Frog surveys and assisted with EPBC referral

Sydenham, Gisborne, Sunbury, Harkness – Targeted surveys for Golden Sun Moth and report on findings

Donnybrook, Truganina, Tarneit, Diggers Rest – facilitated registrations with DELWP under the *Melbourne Strategic Assessment*

East Gippsland, Tallangatta – Surveys for Southern Greater Glider and report on findings

Wind Energy

Star of the South Offshore Wind Farm – Onshore transmission line – Conducted habitat assessment for threatened fauna species. Undertook surveys for Southern Brown Bandicoot, Swamp Antechinus and New Holland Mouse using hair tubes and camera traps. Also, assisted with targeted surveys for Southern Toadlet, Southern Greater Glider, Powerful Owl, Masked Owl, Barking Owl, and Swamp Skink. Drafted reports on findings.

Extractive industries

Sandy Creek Quarry – undertook targeted survey for Southern Greater Glider and assisted with submission of EPBC referral