

Final Report

Matters of National Environmental Significance for the proposed Delburn Wind Farm, Gippsland, Victoria

Prepared for

Delburn Wind Farm Pty Ltd (OSMI Australia Pty Ltd)

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Ecology and Heritage Partners Pty Ltd

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GLOSSARY

Acronym	Description
AVW	Atlas of Victorian Wildlife
CaLP	<i>Catchment and Land Protection Act 1994</i>
CMA	Catchment Management Authority
DBH	Diameter at Breast Height
DELWP	Victorian Department of Environment, Land, Water and Planning
DEPI	(former) Victorian Department of Environment and Primary Industries
DoEE	Commonwealth Department of Environment and Energy
EES	Environment Effects Statement
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EVC	Ecological Vegetation Class
FFG Act	<i>Flora and Fauna Guarantee Act 1988</i>
FIS	Flora Information System
HabHa	Habitat Hectare
LT	Large Tree
NES	National Environmental Significance
NVIM Tool	Native Vegetation Information Management Tool (DELWP)
PMST	Protected Matters Search Tool (DoEE)
ST	Small Tree
TPZ	Tree Protection Zone
VBA	Victorian Biodiversity Atlas (DELWP)

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SUMMARY

Ecology and Heritage Partners Pty Ltd was commissioned by Delburn Wind Farm Pty Ltd (OSMI Australia), to prepare a report detailing the matters of National Environmental Significance (NES) which occur or are likely to occur at the proposed Delburn Wind Farm in the Strzelecki Ranges, Victoria (the study area).

The findings presented in the matters of NES will support assessment under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Matters of NES considered likely to occur

Targeted surveys were conducted for significant flora and fauna species considered likely to occur in the study area, based on the availability of suitable habitat and historical records.

Strzelecki Gum were recorded at various locations within the study area (Figure 2). The impact area will avoid all Strzelecki Gum, including the Tree Protection Zones (TPZs). The project is not considered to have a significant impact on the species.

Growling Grass Frog were recorded at three locations within the study area: Luxford Pond, Wetland Site E and Clarks Road (Figure 2). The impact area will avoid all known Growling Grass Frog habitat, with the exception of a proposed road widening at Nursery Track (south of Clarks Road). No Growling Grass Frog were recorded adjacent to the Nursery Track creek crossing, however Growling Grass Frog are likely to use the wetland habitat as they disperse north from Luxford Pond to Clarks Road (Luxford Pond was identified as supporting an important breeding population of Growling Grass Frog). The proposed road widening at Nursery Track is not considered to have a significant impact to the species.

Matted Flax-Lily *Dianella amoena* were not recorded in the study area, and therefore the proposed development is not considered to have a significant impact on Matted Flax-Lily populations.

No Southern Brown Bandicoot *Isodon obesulus obesulus* were recorded within the study area. Based on the absence of remote camera records and the scarcity of recent historical records within 10-kilometres of the study area, the proposed development is not considered to have a significant impact on Southern Brown Bandicoot populations.

A Construction Environmental Management Plan is recommended to adequately manage potential impacts to Growling Grass Frog habitat, including road widening works.

Other Matters of NES

No Greater Glider or Grey-headed Flying-fox were recorded using the study area. River Swamp Wallaby-grass is assumed to occur, due to available wetland habitat present within the study area and previous records (VBA 2003). If wetland habitat is proposed to be impacted, targeted surveys in the impact area are recommended to ensure avoidance.

Legislative and Policy Implications

Strzelecki Gum and Growling Grass Frog are nationally significant species which occur in the study area (Ecology and Heritage Partners 2019). Based on the significant impact criteria (DoE 2013), both species are not considered to be significantly impacted by the proposed development.

Delburn Wind Farm Pty Ltd (OSMI Australia) may decide to refer the project to the Commonwealth. An EPBC Act referral is for the consideration of the Minister for the Environment to make a decision on whether the project is a 'controlled action' and assessable under the EPBC Act.

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1 INTRODUCTION

1.1 Background

Ecology and Heritage Partners Pty Ltd was commissioned by Delburn Wind Farm Pty Ltd (OSMI Australia) to prepare a matters of National Environmental Significance (matters of NES) report to support an EPBC Referral for the proposed Delburn Wind Farm, Strzelecki Ranges, Victoria (the study area).

Ecology and Heritage Partners have undertaken several extensive ecological assessments associated with the proposed study between 2018 and 2019 (Ecology and Heritage Partners 2019).

The findings of this matters of NES report presented herein will support the projects' assessment under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), including the EPBC referral.

1.2 Objectives

The objectives of the matters of NES report are to:

- Provide background on the scope of the proposed wind farm and the existing ecological conditions within the study area;
- Identify any matters of NES identified or considered likely to occur within the study area in accordance with the EPBC Act;
- Include results of targeted significant flora and fauna surveys;
- Document and list the implications under the EPBC Act associated with the proposed development; and,
- Undertake significance assessments for matters of NES that are relevant to the proposed development.

Matters of NES were identified in the study area and the proposed action will be referred to the Commonwealth Environment Minister under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This will determine whether it is a 'controlled action' requiring Commonwealth approval.

1.3 Study Area

The study area comprises HVP pine and blue gum plantations, as well as remnant native vegetation, located south of Moe and the Princess Freeway and north of Boolarra-Mirboo North Rd. The proposed development site is located at the plantation land centred in the Delburn area, covering the HVP Plantations Thorpdale Tree Farm. The site is generally bounded by Hernes Oak to the north, Coalville, Narracan and Thorpdale to the west, Darlimurla to the south, and Driffield, Boolarra and Yinnar to the east. The study area is approximately 144 kilometres east of Melbourne's CBD (Figure 1) and intersects the Gippsland Plain and Strzelecki bioregions and is applicable to the West Gippsland Catchment Management Authority (CMA).

The study area is composed of a mosaic of native vegetation, pine plantations and private agricultural properties. The mapped remnant native vegetation within the study area represents seven Ecological

Vegetation Classes (EVCs) from two bioregions: Gippsland Plain and Strzelecki Ranges. Adjacent remnant native vegetation includes Sayers Trig Bushland Reserve (north), Darlimurla Forest Block (east) and Mirboo North Regional Park (west). In particular, Darlimurla Forest Block (340 hectares) supports significant ecological values and is represented by seven EVCs of the Gippsland Plain bioregion: Herb Rich Foothill Forest, Lowland Forest, Dry Valley Forest, Heathy Woodland, Riparian Forest, Swampy Riparian Complex and Swamp Scrub (Biosis 1998).

Tributaries of the Morwell River, Ten Mile Creek and associated wetlands occur within and surrounding the study area (Figure 6). Artificial waterbodies including dams also provide habitat for waterbirds and other water dependent species.

1.4 Impact Area

The proposed Delburn Wind Farm involves the installation of 35 turbines and associated infrastructure, primarily the expansion of existing roads and access tracks, throughout the study area. The 20-metre wide linear impact area, includes formed road surface, drainage, cut and fills and vegetation clearing. This will result in the removal of native vegetation and has the potential to impact significant species. Given the size of the study area, the habitat hectare assessment and targeted flora surveys were undertaken within or directly adjacent to the proposed development footprint (infrastructure layout), while a broad assessment of areas throughout the remaining study area (i.e. outside of the development footprint) was undertaken.

2 LEGISLATIVE CONTEXT

2.1 Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)

The EPBC Act is administered by the Commonwealth Department of the Environment and Energy (DoEE) and provides a national framework for the protection of heritage and the environment, and the conservation of biodiversity. The Act establishes a Commonwealth process for the assessment of proposed actions that are likely to have a significant impact on matters of National Environmental Significance (MNES), or on Commonwealth land. An action (i.e. study, development, undertaking, activity, or series of activities), requires approval from the Commonwealth Environment Minister if it is likely to have a significant impact on any MNES, including:

- World Heritage properties;
- National heritage places;
- Ramsar wetlands of international significance;
- Threatened species and ecological communities;
- Migratory and marine species;
- Commonwealth marine area;
- Nuclear actions (including uranium mining);
- Great Barrier Reef Marine Park; or,
- Water resources impacted by coal seam gas or mining development.

The proposed activity will be referred to the Commonwealth to determine whether the proposed Delburn Wind Farm is deemed a 'controlled action' and subject to assessment under the EPBC Act. The Controlling Provision under the EPBC Act include:

- 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)

2.2 Other Applicable National and State Environmental Legislation

This report specifically details any matters of NES relevant to the study area and associated implications under the EPBC Act. Other applicable National and State level legislation is addressed in a separate report (Ecology and Heritage Partners 2019) and the legislative instruments are summarised below:

- *Environment Effects Act 1978* (Victoria);
- *Planning and Environment Act 1987* (Victoria);

- Victorian Guidelines for the Removal, Destruction or Lopping of Native Vegetation (DELWP2017);
- *Flora and Fauna Guarantee Act 1988* (Victoria);
- *Catchment and Land Protection Act 1994* (Victoria);
- *Wildlife Act 1975* and Wildlife Regulations 2013 (Victoria);
- Water Act 1989 (Victoria), and;
- *Conservation, Forests and Lands Act 1987*.

3 METHODS

The following outlines the desk-based and field methods used to determine the presence and extent of ecological values across the study area, and to assess the likelihood of significant flora and fauna species occurring. Due to the large scale of the study area, ecological assessments focused on areas with native vegetation within or directly adjacent to the impact area.

3.1 Nomenclature

Common and scientific names of vascular plants follow the Victorian Biodiversity Atlas (VBA) (DELWP 2018a) and the Census of Vascular Plants of Victoria (Walsh and Stajsic 2007). Vegetation community names follow DELWP's Ecological Vegetation Classes (EVC) benchmarks (DELWP 2019c). The names of aquatic and terrestrial vertebrate and invertebrate fauna follow the VBA (DELWP 2018a).

3.2 Desktop Assessment

Relevant literature, online-resources and databases were reviewed to support a significance assessment of threatened flora and fauna values known to or likely to occur within the study area. The following data sources were reviewed:

- The DELWP NVIM Tool (DELWP 2019a) and NatureKit Map (DELWP 2019b) for:
 - Modelled data showing habitat for rare or threatened species;
 - The extent of historic and current Ecological Vegetation Classes (EVCs);
 - Previously documented flora and fauna records within the study locality
- The Commonwealth Department of the Environment and Energy (DoEE) Protected Matters Search Tool (PMST) for matters of NES protected under the EPBC Act (DoEE 2019);
- Aerial photography of the study area;
- Previous ecological assessments relevant to the study area, including:
 - An Existing Conditions Report (Ecology and Heritage Partners 2019), and;
 - A previous flora and fauna assessment of Darlimurla Forest Block (Biosis 1998).

3.3 Field Assessment

Detailed field assessments were undertaken between July 2018 and November 2019 to assess native vegetation and survey for significant flora and fauna species, considered likely to occur in the study area. Due to the scale of the study area, attention was given to areas in or adjacent to the proposed construction footprint, referred to as the impact area (Figure 2).

A survey methodology summary is provided below.

3.3.1 Flora Surveys

The following targeted surveys were undertaken for threatened ecological communities and threatened flora species listed under the EPBC Act and considered likely to occur according to the Commonwealth's MPST (DoEE 2018) and previous records.

3.3.1.1 Assessment of Ecological Communities

Where native vegetation was identified, a habitat hectare assessment was undertaken according to the Vegetation Quality Assessment Manual (DES 2004).

One nationally listed ecological community Gippsland Red Gum *Eucalyptus tereticornis* subsp. *mediana* Grassy Woodland and Associated Native Grassland is modelled to occur within the locality of the study area (DoEE 2018). The presence of this ecological community in the study area and whether it is of sufficient quality to meet the condition thresholds for the Gippsland Red Gum Grassy Woodland Community and Associated Native Grassland, was assessed according to the Policy Statement (DoEWHA 2010).

3.3.1.2 Targeted Flora Surveys

Strzelecki Gum *Eucalyptus Strzeleckii*

Strzelecki Gum is listed as Vulnerable under the EPBC Act. The species is thought to be most closely related to the Swamp Gum group, namely *Eucalyptus ovata* and *Eucalyptus brookeriana* (Rule 1992).

Strzelecki Gum is a medium to tall forest tree (approximately 30 metres high) and identifiable by the blue-grey, glaucous (waxy) appearance of new growth at the crown of the tree. The small ovoid buds and fruit that is broader than it is long, are also identifiable features. The leaves tend to be distinguishable from other similar species such as Swamp Gum, by the presence of oil glands which appear as clear dots in the leaves if held up to the light. The trunk of the tree is white to grey, with red mottling with loose, rough bark at the base (Ecology Australia 2006).

The species is endemic to the Strzelecki Ranges, including the central Gippsland region (Carter 2006). Strzelecki Gum are associated with forest foothills, slopes and riparian areas. Populations are extremely fragmented and are now mostly found in small, isolated pockets including road reserves and private properties. Known populations of Strzelecki Gum which occur within 10 kilometres of the study area include the Boolarra Rail Trail, just south of the study area.

Targeted surveys for Strzelecki Gum occurred 12 – 16 November 2018, 18 – 20 March and again 5 – 7 August 2019. All identified native vegetation within or adjacent to the impact footprint (within the study area) was assessed for the presence of Strzelecki Gum. Leaves, buds and fruits were used as identifiable features.

Matted Flax-lily *Dianella amoena*

Matted Flax-lily is listed as Endangered under the EPBC Act, threatened under the FFG Act and Endangered on the Advisory List for Threatened Flora in Victoria (DEPI 2014).

Matted Flax-lily is a perennial, tufted, mat-forming lily which can form patches of up to five metres wide. The plant can grow vegetatively, through sending underground rhizomatous roots, which rise above the ground with a tiller of several leaves, spread over a distance from the parent plant.

The leaves of the Matted Flax-lily are generally glaucous, blue in colour but may be red at the base and usually but not always having small hooks (teeth) along the margins and midrib. The leaves taper to approximately 45 centimetres long depending on site and climatic conditions and are borne on tillers with the leaves arranged alternatively, with several leaves per tiller. Matted Flax-lily generally flowers between November and February but may continue flowering with summer and autumn rains. It has pale blue to violet flowers with bright yellow stamens and berries, which are generally purple in colour. The flowers and berries are born on culms extending to typically 30 centimetres in height but this may alter depending on plant location and season (DSE 2010b).

The Matted Flax-lily generally occurs in grassland and grassy woodland habitats, on well drained to seasonally wet fertile sandy loams to heavy cracking clay soils derived from Silurian or Tertiary sediments, or from volcanic geology (DSE 2010b).

Targeted flora surveys for Matted Flax-lily were undertaken between 12 – 16 November 2018, in addition to a detailed native vegetation assessment for the entire study area (July 2018 – August 2019). The study area was systematically

traversed in areas of potential habitat at approximately five-metre linear intervals in accordance with the survey guidelines for Matted Flax-lily outlined in the *Biodiversity Precinct Structure Planning Kit* (DSE 2010a). Although the study area does not occur in a Precinct Structure Plan area to which the guidelines generally apply, they are considered ‘best practice’ guidelines for conducting Matted Flax-lily Surveys. Targeted surveys were directed to all potential habitat (i.e. native and non-native grasslands including degraded areas, and fence lines). Any Matted Flax-lily plants identified were recorded with a GPS with a five-metre accuracy.

It is recommended that the optimal time to conduct Matted Flax-lily surveys is during the flowering season which generally occurs between late spring to early summer (DSE 2010b).

For the purpose of this survey, a reference site located in Northern Melbourne was visited during the known flowering period in Spring-Summer 2018/19. Matted Flax-lily were recorded flowering at the reference site, confirming that targeted surveys were conducted at an optimal time of detection for the species.

3.3.2 Fauna Surveys

The following targeted fauna surveys were undertaken for threatened fauna species listed under the EPBC Act and considered likely to occur according to the PMST (DoEE 2018) and previous records.

The field assessment included a fauna habitat assessment of the study area. Searches were made for other signs of fauna such as nests, remains of dead animals, droppings and footprints. Habitat features including ground cover and vegetation composition and structure, and the presence of hollows and fallen ground debris were also noted.



Plate 1. Matted Flax-lily flowering at a reference site (Ecology and Heritage Partners Pty Ltd 19/02/2018).

The following fauna survey methods, relevant to nationally significant species, were completed during the survey period July 2018 – November 2019:

- Targeted Growling Grass Frog Surveys
- Targeted Southern Brown Bandicoot Surveys
- Arboreal Mammal Spotlighting Surveys
- Bird Utilisation Surveys

3.3.2.1 Targeted Fauna Surveys

Growling Grass Frog *Litoria raniformis*

Growling Grass Frog is listed as endangered in Victoria (DELWP 2013) and vulnerable nationally (Tyler 1997). It is also listed as a threatened taxon under the EPBC Act and the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act). Overall the species is of national conservation significance.

Although formerly widely distributed across southern eastern Australia, including Tasmania (Littlejohn 1963, 1982; Hero *et al.* 1991), the species has declined markedly across much of its former range. This has been most evident over the past two decades and in many areas, particularly in south and central Victoria, populations have experienced apparent declines and local extinctions (Mahony 1999; Organ pers. obs.).



Plate 2. Growling Grass Frog (Source: Ecology and Heritage Partners Pty Ltd)

The species is largely associated with permanent or semi-

permanent still or slow flowing waterbodies (i.e. streams, lagoons, farm dams and old quarry sites), supporting an extensive cover of emergent, submerged and floating vegetation (Robertson *et al.* 2002; Organ 2003). This species is also known to inhabit temporarily inundated waterbodies for breeding purposes providing they contain water over the breeding season (Organ 2003).

There is suitable habitat for this species at wetlands and connected creek lines within the study area, including Luxford Pond (Figure 2). Targeted surveys were undertaken within the breeding/calling season from 12 – 16 November 2018 and 30 October – 1 November and 11 – 13 November 2019.

Southern Brown Bandicoot *Isodon obesulus obesulus*

Southern Brown Bandicoot are listed as Endangered under the EPBC Act. The geographically distinct sub-species *Isodon obesulus obesulus* occurs in New South Wales, Victoria and South Australia.

The Southern Brown Bandicoot is a small, compact mammal with a tapering snout. It is mainly distinguished from the non-threatened Long-nosed Bandicoot *Perameles nasuta* by its rounded ears (the Long-nosed Bandicoot has relatively pointed ears). Presence of the species is often found by observing conical shaped diggings in sandy soil. The species' distribution in Victoria is mostly in coastal regions, however populations occur inland, in the Dandenong Ranges and central western Victoria (Menkhorst and Seebeck 1990).

The species are known to inhabit heathland, shrubland and heathy open forest, usually associated with dense undergrowth and sandy, infertile, well-drained soil (Coates *et al.* 2008; Menkhorst and Seebeck 1990).

Twelve motion-detecting cameras with bait traps, loaded with oats and honey, were deployed (2 – 4 October 2019) for a minimum of 28 days (DSEWPC 2011) at various forest fragments throughout the study area to target the Southern Brown Bandicoot.

3.3.2.2 *Arboreal Mammal Spotlighting Surveys*

Spotlighting surveys were conducted as road transects throughout the study area, from:

- 12-16 November 2018, and;
- 30 October - 01 November, 11-13 November 2019

Survey methodology followed the Survey Guidelines for Threatened Mammals (DSEWPC 2011) and targeted threatened species such as the Greater Glider *Petauroides volans*, which may occur in the study area (DSE 2011).

Greater Glider are listed as Vulnerable under the EPBC Act. The Greater Glider is Australia's largest gliding marsupial. It inhabits forested areas of eastern Victoria, including the Strzelecki Ranges. Greater Gliders are dependent on forested habitat where they forage on eucalypt leaves, with large trees that provide hollows for shelter and nesting (Lindenmayer *et al.* 1990). Spotlighting survey transects (200 metres) were undertaken in November 2018 and October-November 2019 within remnant native vegetation in the study area, for a total of eight nights (DSE 2011).

3.3.2.3 *Bird Utilisation Surveys*

Bird utilisation surveys were conducted to generate quantitative data on bird diversity, abundance and behaviour at the proposed Delburn Wind Farm. This data is used to assess potential impacts to bird species from the wind turbines, including bird strike from the rotor blades.

The methods employed for the bird utilisation surveys were designed to comply with the guidelines described in *AusWEA – Wind Farms and Birds: Interim Standards for Risk Assessment (2005)*. Bird utilisation surveys were conducted in Winter 2019 (June) and Spring (October – November) 2019 at eight different locations throughout or adjacent to the study area, for a total of 15 survey days. Fixed-point 20-minute counts were employed. For each Winter or Spring survey bout, each point-count location was surveyed eight times and no more than twice a day (e.g. AM and PM) (Figure 5).

The nationally significant Swift Parrot and Grey-headed Flying-fox were also surveyed during bird utilisation surveys. Bird utilisation surveys targeting Swift Parrot, were conducted over six days in Winter (June 2019), with 64 surveys across eight point-count locations within or adjacent to the study area (DSEWHA 2010).

Swift Parrot are listed as Critically Endangered under the EPBC Act. They migrate from breeding grounds in Tasmania to forage on flowering eucalypts on the mainland over Winter. They generally arrive in Victoria between February – March and are a widespread species, occurring in Victoria, New South Wales and south-east Queensland (DSWHA 2010). On the mainland, Swift Parrot tend to inhabit mostly dry sclerophyll forest.

Grey-headed Flying-fox are listed as Vulnerable under the EPBC Act. The species forages widely (up to 50 kilometres) in search of food which includes native and introduced fruit and nectar from flowering eucalypts.

3.3.3 *Assessment Qualifications and Limitations*

Data and information held within the ecological databases and mapping programs reviewed in the desktop

assessment (e.g. VBA, PMST, Biodiversity Interactive Maps etc.) are unlikely to represent all flora and fauna observations within, and surrounding, the study area. It is therefore important to acknowledge that a lack of documented records does not necessarily indicate that a species or community is absent.

Due to the large scale of the study area, only native vegetation and habitat within or adjacent to the impact area was surveyed. Therefore, if the impact area is adjusted additional vegetation surveys, and if required, targeted significant species surveys will be undertaken.

Flora and fauna surveys were undertaken during the optimal flowering/breeding period for all targeted species to maximise the probability of detecting each species. Given that all areas of suitable habitat for significant flora and fauna species were extensively surveyed over multiple years, it is considered that sufficient effort has been employed to determine the likelihood of each target species occurring onsite, and to accurately characterise the flora and fauna values that occur on-site.

The motion detecting cameras were deployed for four consecutive nights in November 2018. This was to gather baseline, supplementary data on ground dwelling mammal species present in or adjacent to the impact area. The purpose of deploying cameras was to gather baseline data, with the intention of further targeted surveys. Targeted camera surveys are scheduled for Winter 2019 and will be deployed for a minimum of 14 nights of detection according to the Survey Guidelines for Australia's threatened mammals (DoSEWPC 2011).

Bird utilisation surveys were undertaken at eight point-count locations (sites); six sites at the study area and two sites within two kilometres of the study area boundary. Sites were chosen to be representative of the habitat types present in the study area, as well as the wider locality. To account for the limited number of survey locations, each site was surveyed eight times to increase the likelihood of counting and identifying the majority of bird species that use or fly-over the study area.

Ecological features identified on site were recorded using a hand-held GPS or tablet with an accuracy of +/- 5 metres. This level of accuracy is considered adequate to provide an accurate assessment of the ecological features present within the study area.

Fauna surveys were conducted under the Ecology and Heritage Partners Pty Ltd research permit (10008283) issued by DELWP under the *Wildlife Act 1975*.

Overall it is considered that the terrestrial flora and fauna data collected during the field assessment, habitat assessments, and information obtained from relevant sources (e.g. biological databases and relevant literature) provides an accurate assessment of the fauna species and habitat values within the study area. However, due to the cryptic nature of many of the target species surveyed for, the precautionary principle has been applied when determining the likelihood of occurrence.

4 RESULTS

4.1 Matters of National Environmental Significance

Significant impact assessments were completed for listed species and ecological communities recorded or considered likely to occur within the study area and this is based on a combination of desktop analysis on previously documented species data and detailed on site assessments. The assessments were completed in accordance with the significant impact criteria specified in the *Matters of National Environmental Significance, Significant Impact Guidelines 1.1* (DoE 2013).

Under the significant impact guidelines, an important population is defined as:

- Populations identified as such within a recovery plan;
- A key source population either for breeding or dispersal;
- Populations that are necessary for maintaining genetic diversity; and/or,
- Populations that are near the limit of the species range.

The results of the significant impact assessment for each matter of NES are described in the following sections.

4.1.1 Threatened Ecological Communities

One nationally listed ecological community is predicted to occur within 10-kilometres of the study area (DoEE 2018): Gippsland Red Gum *Eucalyptus tereticornis* subsp. *mediana* Grassy Woodland and Associated Native Grassland.

Due to the absence of Gippsland Red Gum and other key indicator species, as well as a moderate-high weed cover, the native vegetation within and adjacent to the impact area did not meet the condition thresholds that define this community. This listed ecological community does not occur within the study area.

4.1.2 Threatened Flora Species

Strzelecki Gum were recorded during targeted surveys in the impact area. No other nationally significant flora species were recorded.

The VBA contains records of four nationally significant flora species previously recorded within 10-kilometres of the study area (DELWP 2018) (Appendix 1; Table 1; Figure 3):

- Strzelecki Gum *Strzelecki Gum*;
- Matted Flax-lily *Dianella amoena*;
- Dwarf Cypress Pine *Callitris oblonga* subsp. *oblonga*, and;
- River-swamp Wallaby-grass *Amphibromus fluitans*.

The PMST (DoEE 2019) nominated an additional five nationally significant species which have not been previously recorded but have the potential to occur within the study locality, albeit a low likelihood (Appendix 1).

A summary of nationally significant species which were recorded in the impact area, or which have a moderate-high likelihood of occurring in the impact area are provided in Table 1. A complete list of significant flora species predicted to occur within 10-kilometres of the impact area is provided in Appendix 1.

Table 1 Significant species with a high-moderate likelihood of occurring in the impact area.

Species	Suitable habitat within the impact area	Survey Timing	Closest known records
Strzelecki Gum <i>Eucalyptus strzeleckii</i>	Targeted surveys recorded the species along watercourses and wetter areas of Swampy Woodland and Herb-rich Foothill Forest (Ecology and Heritage Partners 2019). A large number of records are located along roadsides and watercourses in the centre of the study area (Figure 2). The impact area has avoided areas containing Strzelecki Gum.	All Year	Recorded within study area during targeted surveys (Ecology and Heritage Partners 2019)
Matted Flax-lily <i>Dianella amoena</i>	This species is considered to have a moderate likelihood of occurring in the impact area, due to recent VBA records located to the east within 10 kilometres (VBA). However, the species inhabits native grassland areas, which are mostly available beyond the Strzelecki Ranges (study area), in the low-lying grassland plains. Targeted surveys within or adjacent to the impact area (Ecology and	November – January	Not recorded in the study area during targeted surveys. Records exist to the east of the study area (VBA 2012)
River Swamp Wallaby-grass <i>Amphibromus fluitans</i>	This species is considered to have a moderate likelihood of occurring in the impact area and recent records exist within the study area (VBA). The species is associated with wetland, swampy habitat. Where the final impact area intersects a watercourse or is adjacent to a wetland, targeted surveys may be required at key areas to ensure avoidance (e.g. Luxford Pond and tributaries).	November – March	Not recorded during native vegetation surveys 2018 – 2019 (Ecology and Heritage Partners 2019). Previously recorded in the study area (VBA 2003).

4.1.2.1 Strzelecki Gum

Strzelecki Gum was recorded in multiple locations throughout the study area (Figure 2h, 2j, 2l, 2m). All records were associated with Herb-rich Foothill Forest (EVC 23 of the Strzelecki bioregion) and/or riparian areas.

Efforts have been made during the design phase of the study, to avoid all areas with records of Strzelecki Gum. This has been achieved by altering the impact area to avoid Strzelecki Gum records and their Tree Protection Zones (TPZs). The impact area has been designed to as a conservative estimate of the likely impact and will likely be reduced at a later stage of the study.

A significant impact assessment to determine whether the proposed development will have a significant impact on Strzelecki Gum has been provided in Table 2.

Table 2 Significant impact assessment for the Strzelecki Gum according to significant impact criteria for a Vulnerable species under the EPBC Act.

Criterion	Assessment	Likelihood of significant impact
Strzelecki Gum		
Lead to a long-term decrease in the size of an important population of a species	The impact footprint will avoid all Strzelecki Gum records and TPZs, therefore there will be no direct impact on the species' population.	Unlikely
Reduce the area of occupancy of an important population	The impact footprint will avoid all Strzelecki Gum records and TPZs.	Unlikely
Fragment an existing important population into two or more populations	The study area is already highly fragmented with a mosaic of pine plantations, logging roads and remnant vegetation. The proposed development is unlikely to result in further fragment the Strzelecki Gum populations.	Unlikely
Adversely affect habitat critical to the survival of a species	Native vegetation removal has been minimised where possible. All Strzelecki Gum records and TPZs have been avoided.	Unlikely
Disrupt the breeding cycle of an important population	The impact footprint will avoid all Strzelecki Gum records and TPZs, so the breeding cycle will not be disrupted.	Unlikely
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The impact footprint will avoid all Strzelecki Gum records and TPZs and therefore it will not modify, destroy, remove, isolate or decrease the availability of quality of habitat. Impacts to surrounding native vegetation have been minimised during the design phase.	Unlikely
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The impact footprint will avoid all Strzelecki Gum records and TPZs, so the introduction of invasive species is considered a low impact. Heavy machinery and equipment which may transport weeds, should be maintained a minimum distance from Strzelecki Gum records, as per the Construction Environmental Management Plan.	Low
Introduce disease that may cause the species to decline	The impact footprint will avoid all Strzelecki Gum records and TPZs, so the introduction of invasive species is considered a low impact. Heavy machinery and equipment which may transport or introduce disease, should be maintained a minimum distance from Strzelecki Gum records, as per the Construction Environmental Management Plan.	Low
Interfere substantially with the recovery of the species	The impact footprint will avoid all Strzelecki Gum records and TPZs, and therefore will unlikely interfere with the species recovery.	Unlikely

Table 3 provides an assessment of important habitat for the Strzelecki Gum observed in the study area. This information was considered in relation to the significance assessment for the species (Table 2).

While there is important habitat for Strzelecki Gum within the study area, all impacts to Strzelecki Gum will be avoided and therefore the project is not considered to have a significant impact to the Strzelecki Gum population.

Table 3 Assessment of important habitat for Strzelecki Gum.

Criteria for assessing important habitat	Assessment
Habitat where the species has been identified during a survey	Effort was expended searching for this species within forested areas and the entirety of the impact area was surveyed for Strzelecki Gum and associated habitat. However, there were limitations within the study area, including areas that could not be accessed due to terrain or roads on private land. The species was associated with mapped Herb-rich foothill forest of the Strzelecki Ranges bioregion. Due to the fragmented nature of remnant Strzelecki Gum, these records represent important habitat for the species.
Near the limit of the species' known range	The species is found in the centre of its known range in the Strzelecki Ranges, Victoria. Although the current distribution of Strzelecki Gum is further restricted by clearing for agriculture, logging and fragmentation. Strzelecki Gum stands are now mostly confined to road reserves and paddocks on private property.
Large patches of contiguous, 'suitable habitat' and viable landscape corridors (necessary for the purposes of breeding, dispersal or maintaining the genetic diversity of the species over successive generations)	The Strzelecki Gum recorded within the study area is relatively fragmented and confined to road reserves or forest edges. The largest recorded stand is in a patch of Herb-rich Foothill Forest (Figure 2h).
A habitat type where the species is identified during a survey, but which was previously thought not to support the species	Not applicable to the study area.

4.1.3 Threatened Fauna Species

Growling Grass Frog were recorded at multiple wetland locations, during targeted surveys and via incidental observations, within the study area. No other nationally significant fauna species were recorded.

The VBA contains records of six nationally significant fauna species previously recorded within 10-kilometres of the study area (DELWP 2018) (Appendix 2; Table 3; Figure 4):

- Australian Grayling *Prototroctes maraena*;
- Dwarf Galaxias *Galaxiella pusilla*;
- Greater Glider *Petauroides Volans*;
- Growling Grass Frog *Litoria raniformis*;
- Southern Brown Bandicoot *Isoodon obesulus obesulus*, and;
- Swift Parrot *Lathamus discolor*

The PMST (DoEE 2019) nominated an additional 11 nationally significant species, which have not been previously recorded but have the potential to occur within the study locality (Appendix 2).

A summary of nationally significant species with a high likelihood of occurring in the impact area are provided in Table 4. A complete list of significant flora species predicted to occur within 10-kilometres of the impact area is provided in Appendix 2.

Table 4 Significant species with a high-moderate likelihood of occurring in the impact area.

Species	Suitable habitat within the impact area	Closest known records (VBA)
Growling Grass Frog <i>Litoria raniformis</i>	The species was recorded at two locations adjacent to Clarks Road in the study area (Figure 2j, 2l) in 2018-19. A breeding population was recorded at Luxford Pond (Figure 2l) and Growling Grass Frog were recorded as far north as Clarks Road. A separate population was recorded at a wetland Site E in the study area in 2019 (Figure 2o). Growling Grass Frog were known to previously occur in the locality (DELWP 2018) (Figure 4).	Recorded within study area during 2018-19 targeted surveys (Ecology and Heritage Partners 2019)
Greater Glider <i>Petauroides volans</i>	The species was previously recorded directly adjacent to the study area (2007) along the eastern boundary. Greater Glider were also observed in 1998 at the Darlimurla Forest Block (Biosis 1998). However, the species is not common within the Gippsland Plain and requires large hollows to nest and den (Menkhorst 1995). While stands of large trees with hollows are present throughout the study area, most are part of road reserves and therefore do not provide large patches of undisturbed habitat for the species. Spotlighting surveys conducted in 2018 and 2019 by Ecology and Heritage Partners (2019) did not detect Greater Glider within the study area.	Previously recorded in Mirboo North Regional Park and Darlimurla Forest Block within 10-kilometres of study area.

Species	Suitable habitat within the impact area	Closest known records (VBA)
Grey-headed Flying-fox <i>Pteropus poliocephalus</i>	<p>The species was formerly an autumn-winter visitor to areas throughout Victoria; however, it has now established permanent and seasonal colonies throughout the state. The species is capable of nightly flights of up to 50 kilometres from roost sites to forage on the nectar and pollen of native and introduced plant species.</p> <p>Owing to the large foraging range and nomadic nature of this species, individuals are likely to use foraging resources within the study area on an occasional basis. However, the forested habitat within the study area is not considered to be significant to the</p>	<p>Not recorded within 10-kilometres of the study area. Recorded within 20-kilometres of the study area (VBA 1982).</p>
Southern Brown Bandicoot <i>Isodon obesulus obesulus</i>	<p>This species is considered to have a moderate-low likelihood of occurring in the impact area due to the absence of recent records within 10-kilometres (VBA, Atlas of Living Australia) and limited known distribution in the Strzelecki Ranges. However, there is potentially suitable habitat within the study area including dense understorey and sandy soils. Targeted surveys using 12 remote, motion-detecting cameras placed in suitable habitat, over a 28-day period (October-November 2019) did not record the species.</p>	<p>Not recorded within 10-kilometres of the study area. Recorded within 20-kilometres of the study area (VBA 1978).</p>

With the exception of Growling Grass Frog, the extent of potential habitat for the EPBC Act-listed fauna species noted above within the study area represents a small proportion of similar and higher quality habitat in the study locality and region. The likelihood of other nationally significant species (not listed in Table 4) occurring within the study area is considered low due to the absence of suitable habitat and/or lack of records in local area and/or region (Appendix 2).

4.1.3.1 Other significant species

Significant species with a low likelihood of occurrence in the study area, based on proximity of historical records and suitability of habitat are:

- Swift Parrot *Lathamus discolor* (Critically Endangered) (low likelihood, although infrequent visitor) – The VBA indicates that this species has been recorded on two occasions within 10-kilometres of the study area in 1977 and one record within 20-kilometres of the study area in 1980. Bird utilisation surveys over 2x three-day periods (six days total) in June 2019, did not record the species using the study area (Ecogoy and Heritage Partners 2019). This species breeds in Tasmania from September to April and then migrates to the mainland during April. On mainland Australia, Swift Parrots largely inhabit dry open Eucalypt forests and woodlands, especially box-ironbark forests. Swift Parrot is regularly recorded in urban and rural areas during late autumn and over the winter months feeding on flowering trees (and lerp), particularly Eucalypts such as Grey Box *Eucalyptus microcarpa*, Red Ironbark *Eucalyptus tricarpa*, Mugga Ironbark *Eucalyptus sideroxylon*, Yellow Gum *Eucalyptus leucoxylon*, White Box *Eucalyptus albens* and Red Gum *Eucalyptus camaldulensis* (DoEE 2017b). This species may visit the native vegetation within the study area on occasions during the over-wintering period, foraging for lerps and within the winter-flowering eucalypts, particularly at times of high eucalyptus flowering (e.g. Ironbarks and other species). However, due to the absence of recent records and lack of sightings during Winter 2019 bird utilization surveys, the study area is not considered significant over-wintering habitat for the species. The proposed development is therefore not considered to have a significant impact to Swift Parrot over-wintering populations.

4.1.3.2 Growling Grass Frog

The Growling Grass Frog was recorded in multiple locations throughout the study area (Figure 2). All records were within wetland habitat, primarily at Luxford Pond and connecting tributaries, including near Clarks Road within the study area (Figure 2l). A separate population of Growling Grass Frog were also heard calling at a wetland Site E, east of Ten Mile Creek Road (Figure 2o).

Efforts have been made during the design phase of the study, to avoid all known Growling Grass Frog habitat, as well as likely habitat, in the study area. This has been achieved by altering the design footprint to avoid road crossings that are in close proximity to Growling Grass Frog habitat. Initially, the design footprint proposed to expand an existing dirt road which intersects the northern reaches of Luxford Pond at one of three potential locations; Clarks Road, Nursery Track or the unnamed existing road in between these two roads (Figure 2l). At the time of this report, the Nursery Track was selected as the preferred crossing, as it avoids all Strzelecki Gum. Although, Nursery Track crosses the creek and the northern reaches of the Luxford Pond wetland which is confirmed Growling Grass Frog habitat, the expansion of the existing dirt road is not considered to have a significant impact to the population. Any potential impacts to Growling Grass Frog habitat during construction, will be managed as per a Construction Environmental Management Plan (CEMP).

A significant impact assessment to determine the likelihood of the proposed development having a significant impact on Growling Grass Frog has been considered in Table 5 and 6.

The proposed development is not considered to have a significant impact to Growling Grass Frog populations within the study area, based on the below assessment.

Table 5 Significant impact assessment for the Growling Grass Frog according to significant impact criteria for a Vulnerable species under the EPBC Act.

Criterion	Assessment	Likelihood of significant impact
Growling Grass Frog		
Lead to a long-term decrease in the size of an important population of a species	The impact area will avoid all Growling Grass Frog habitat, with the exception of the road widening at Nursery Track (Figure 2l). Where the impact area is near known Growling Grass Frog habitat, management and mitigation measures will be implemented to reduce potential impacts.	<p>Unlikely that the proposed development will result in a long-term decrease in the size of an important population of the species.</p> <p>Luxford Pond (Figure 2l) and the wetland south of the Strzelecki Highway (Figure 2o) are the only two locations which support known breeding populations of the species. These two locations will not be directly impacted by the proposed development. However, road widening will occur within 200 metres of the wetland (Figure 2o) and management measures must be in place to reduce impacts such as sedimentation, nutrients which may compromise water quality.</p> <p>Growling Grass Frog at Clarks Road recorded <10 individuals on all occasions and likely dispersed north from the important population at Luxford Pond. No individuals were recorded at Nursery Track, however the species is likely to use this habitat to disperse north to Clarks Road. The proposed development will involve widening the Nursery Track crossing (Figure 2l). Any impacts will be managed in accordance with a Construction Environmental Management Plan.</p>
Reduce the area of occupancy of an important population	The impact area will avoid all Growling Grass Frog habitat, with the exception of the road widening at Nursery Track (Figure 2l).	<p>Unlikely that the proposed development will reduce the area of occupancy of important populations, as a result of the road widening at Nursery Track, due to the small scale of works, the existing presence of a creek crossing and the implementation of appropriate management measures during construction.</p> <p>The important breeding populations identified at Luxford Pond and the wetland south of the Strzelecki Highway (Site E) within the study area will not be directly impacted.</p>

Criterion	Assessment	Likelihood of significant impact
Fragment an existing important population into two or more populations	<p>The study area is already highly fragmented with a mosaic of pine plantations, logging roads and remnant vegetation.</p> <p>The impact area also involves widening an existing road crossing at Nursery Track, north of Luxford Pond (Figure 2l). This location is not considered to support an important population, as the wetland habitat is connected to Luxford Pond to the south.</p> <p>Habitat degradation will be minimal and any potential impacts will be managed in accordance with a Construction Environmental Management Plan (CEMP).</p>	Unlikely. The proposed development is unlikely to result in further fragment the Growling Grass Frog populations, since most works involve widening existing roads.
Adversely affect habitat critical to the survival of a species	The impact area will avoid all Growling Grass Frog habitat, with the exception of the road widening at Nursery Track (Figure 2l).	Unlikely that the proposed development will adversely affect habitat critical to the survival of the species. Important populations where Growling Grass Frog were heard calling in high numbers at Luxford Pond (Figure 2l) and the wetland Site E (Figure 2o) will not be directly impacted.
Disrupt the breeding cycle of an important population	The impact area will avoid all Growling Grass Frog habitat, with the exception of the road widening at Nursery Track (Figure 2l). Only Luxford Pond (Figure 2l) and the wetland Site E (Figure 2o) are identified as important populations.	Unlikely that the proposed development will disrupt the breeding cycle of an important population as it avoids directly impacting Luxford Pond and the wetland Site E (Figure 2l; Figure 2o).
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The impact area will avoid all Growling Grass Frog habitat, with the exception of the road widening at Nursery Track (Figure 2l). The widening of Nursery Track will likely result in some minimal modification of Growling Grass Frog Habitat.	Unlikely, due to the small scale it will not destroy, remove, isolate or decrease the availability of quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	<p>The impact area will avoid all Growling Grass Frog habitat, with the exception of the road widening at Nursery Track (Figure 2l).</p> <p>Construction must abide by the Construction Environmental Management Plan.</p>	Low likelihood. To minimise the risk of spreading disease or introducing predatory fish, strict measures will be implemented during construction, including disinfecting equipment between sites (to avoid the spread of diseases such as Chytrid Fungus, harmful to amphibians).

Criterion	Assessment	Likelihood of significant impact
Introduce disease that may cause the species to decline	The impact area will avoid all Growling Grass Frog habitat, with the exception of the road widening at Nursery Track (Figure 2l). Heavy machinery and equipment which may transport or introduce disease, should be cleaned and disinfected between sites to spread disease harmful to amphibians such as Chytrid Fungus. Construction must abide by the Construction Environmental Management Plan.	Low likelihood if CEMP is implemented.
Interfere substantially with the recovery of the species	The impact area will avoid all Growling Grass Frog habitat, with the exception of the road widening at Nursery Track	Unlikely to interfere with the species' recovery.

Table 6 provides an assessment of important habitat for the Growling Grass Frog observed in the study area. This information should be considered in relation to the significance assessment for the species (Table 5).

Potential impacts to Growling Grass Frog habitat will be limited to the modification of wetland habitat near Nursery Track (Figure 2l) for the proposed road widening within the study area.

Table 6 Assessment of important habitat for Growling Grass Frog

Criteria for assessing important habitat	Assessment
Habitat where the species has been identified during a survey	Growling Grass Frog were identified in three locations. Luxford Pond: Identified as important habitat for Growling Grass Frog, which supports a breeding population of 50-100 individuals. Wetland (Figure 5 Site E): Identified as important habitat for Growling Grass Frog, which supports a breeding population of 20-30 individuals. Ponds along Clarks Road: Identified as habitat for Growling Grass Frog, which supports calling individuals (<10 recorded at any one time). No Growling Grass Frog were observed or recorded calling at the wetland adjacent to Nursery Track, however the species is likely to use this study area to disperse north from Luxford Pond.
Near the limit of the species' known range	The species is not found at the limit of its range.
Large patches of contiguous, 'suitable habitat' and viable landscape corridors (necessary for the purposes of breeding, dispersal or maintaining the genetic diversity of the species over successive generations)	Luxford Pond and the Wetland (Figure 5 Site E) provide contiguous suitable habitat for Growling Grass Frog. Native vegetation surrounds Luxford Pond (Figure 2l) and the wetland site (Figure 2o).

Criteria for assessing important habitat	Assessment
A habitat type where the species is identified during a survey, but which was previously thought not to support the species	Not applicable to the study area.

4.1.4 Other Matters of NES

The surveyed sections of the study area do not support any other values corresponding with matters of NES protected under the EPBC Act (e.g. World or National Heritage Areas).

4.1.4.1 Ramsar Wetlands of international significance

Ramsar wetlands are recognised as internationally important wetlands under the Ramsar Convention 1971 and are recognised as matters of NES under the EPBC Act (Section 2). They are known to support migratory shorebirds, which rely on these intertidal wetlands in Australia as non-breeding stopovers. Migratory shorebirds must build sufficient energy reserves, in order to travel long distances back to breeding grounds often in the northern hemisphere.

The nearest Ramsar wetland from the study area is the Gippsland Lakes system, located approximately 50 – 100 kilometres upstream to the east of the study area (DoEE 2019). Corner Inlet, on the south Victorian coast and Western Port are also Ramsar Wetlands within 100 kilometres of the study area.

Due to the distance from the study area, the proposed development is considered unlikely to have a significant impact to these Ramsar wetlands.

4.1.4.2 Migratory Species

Migratory species listed under the EPBC Act are those protected under international agreements to which Australia is a signatory. These include the Japan Australia Migratory Bird Agreement (JAMBA), the China Australia Migratory Bird Agreement (CAMBA), the Republic of Korea Migratory Bird Agreement (ROKAMBA), and the Bonn Convention on the Conservation of Migratory Species of Wild Animals.

Migratory species are considered matters of NES under the EPBC Act.

Several EPBC Act-listed migratory species have previously been recorded (e.g. VBA) within a 20-kilometre radius of the study area. Suitable habitat within the study area for EPBC Act migratory species is limited to small low-lying areas (drainage lines, creeks and wetlands) that would be inundated periodically. Primary species that would use these habitats include Latham's Snipe *Gallinago hardwickii*, while the main areas of suitable habitat for migratory species are outside the study area (i.e. in intertidal areas along the coast and throughout the Gippsland Lakes Ramsar site or along Western Port Bay). Inland wetland areas also occur within 20-kilometres of the study area and provide habitat for threatened wetland associated species like Australian Painted Snipe *Rostratula australis* and migratory species, such as Latham's Snipe and/or Sharp-tailed Sandpiper *Calidris acuminata*.

Seven EPBC Act-listed migratory and/or marine species have been recorded within 10-kilometres of the study area and an additional seven species are not recorded from the study area although are predicted as having potential to occur (i.e. under the PMST) (Table 8).

While migratory bird species may periodically utilise the study area and study locality for foraging purposes, the study area does not constitute 'important habitat' as defined under the *EPBC Act Matters of National*

Environmental Significance Significant impact guidelines 1.1 (DoE 2013), in that it does not contain:

- Habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species;
- Habitat utilised by a migratory species which is at the limit of the species range; or,
- Habitat within an area where the species is declining.

In addition, as outlined in DoEE (2017):

‘Important habitats in Australia for migratory shorebirds under the EPBC Act include those recognised as nationally or internationally important. The widely accepted and applied approach to identifying internationally important shorebird habitat throughout the world has been through the use of criteria adopted under the Ramsar Convention on Wetlands. According to this approach, wetland habitat should be considered internationally important if it regularly supports:

- *1 per cent of the individuals in a population of one species or subspecies of waterbird OR*
- *a total abundance of at least 20 000 waterbirds.*

Nationally important habitat for migratory shorebirds can be defined using a similar approach to these international criteria (excluding Latham’s snipe), i.e. if it regularly supports:

- *0.1 per cent of the flyway population of a single species of migratory shorebird OR*
- *2000 migratory shorebirds OR*
- *15 migratory shorebird species’.*

Based on the criteria outlined above no habitat within or adjacent to the study area constitute important habitat for migratory species.

Sharp-tailed Sandpiper regularly occur in flocks, however they are one of the most common migratory shorebirds with broad habitat requirements, including intertidal mudflats and inland floodplain areas. The wetlands within the study area do not support recent records, and therefore do not meet the criteria of at least 0.1 per cent of the species’ population or 15 individuals. Based on the above criteria, it is unlikely that the wetland habitat is important habitat for migratory shorebirds (DoEE 2017).

Latham’s Snipe does not commonly aggregate in large flocks or use the same habitats as many other migratory shorebird species. Consequently, habitat important to this species is not regularly identified by applying the criteria outlined above, and different criteria are applied (DoEE 2017).

As outlined in DoEE (2017):

‘important habitat for Latham’s Snipe is described as areas that have previously been identified as internationally important for the species, or areas that support at least 18 individuals of the species.

It is unlikely that the study area will support more than 18 individuals at any given time and therefore the study area is not likely to contain an ecological important population of this species as defined under the EPBC Act (DoEE 2017).

An assessment of potential impacts to migratory species against the ‘*Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species*’ (EPBC Act Policy Statement 3.21) (DoEE 2017) is provided below (Appendix 3).

The database searches identified seven bird species listed as migratory under the EPBC Act that have been previously recorded or are predicted to occur within 10-20 kilometres of the study area (Table 8; Appendix 2).

Table 8. Migratory species listed under the EPBC Act recorded or predicted to occur within 10-20 kilometres of the study area. Common Greenshank is the only additional species within 20-kilometres of the study area.

Species Name	Common Name	Suitable Habitat and Likelihood of Occurrence
<i>Apus pacificus</i>	Fork-tailed Swift	Species or species habitat likely to occur within study area. Previous records within 10-20 kilometres of the study area.
<i>Actitis hypoleucos</i>	Common Sandpiper	Unlikely to occur due to unsuitable habitat (i.e. no intertidal coastal habitat).
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	Likely to occur within study area at inundated wetlands. Previous records within 10-20 kilometres of the study area.
<i>Calidris ferruginea</i>	Curlew Sandpiper (Critically Endangered)	Unlikely to occur due to unsuitable habitat (i.e. no intertidal coastal habitat).
<i>Calidris melanotos</i>	Pectoral Sandpiper	Unlikely to occur due to unsuitable habitat (i.e. no intertidal coastal habitat).
<i>Gallinago hardwickii</i>	Latham's Snipe	Likely to occur within area. Previous VBA records within 10-20 kilometres of the study area.
<i>Hirundapus caudacutus</i>	White-throated Needle-tail (Vulnerable)	May occur based on previous VBA records within 10-20 kilometres of study area.
<i>Motacilla flava</i>	Yellow Wagtail	Low likelihood of occurrence within study area, due to no previous records exist within 10-20 kilometres.
<i>Monarcha melanopsis</i>	Black-faced Monarch	Likely to occur within study area. Previous VBA records within 10 kilometres of the study area.
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	Likely to occur within study area. Previous VBA records within 10 kilometres of the study area.
<i>Numenius madagascariensis</i>	Eastern Curlew (Critically Endangered)	Unlikely to occur due to unsuitable habitat (i.e. no intertidal coastal habitat).
<i>Pandion haliaetus</i>	Osprey	Low likelihood of occurrence within study area, due to no previous records exist within 10-20 kilometres.
<i>Rhipidura rififrons</i>	Rufous Fantail	Likely to occur within study area. Previous VBA records within 10 kilometres of the study area.
<i>Tringa nebularia</i>	Common Greenshank	Unlikely to occur due to unsuitable habitat (i.e. no intertidal coastal habitat).

A significant impact assessment to determine the likelihood of the proposed development having a significant impact on migratory species has been considered in Tables 9 and 10.

Table 9. Significant impact assessment for migratory species (DoE 2013).

Criterion	Assessment	Likelihood of significant impact
Migratory species		
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	<p>The impact area of the proposed development will not substantially modify, destroy or isolate any areas of important habitat for migratory species.</p> <p>Development is constrained to expansion of existing roads (for transporting turbines and underground cabling) and installation of wind turbines which will result in native vegetation loss.</p> <p>There will be little if any wetland modification for the road widening at Nursery Track and near the wetland E (Figure 2l, 2o). Luxford Pond (Figure 2l) provides the most wetland habitat in the study area and will not be impacted.</p>	Unlikely that the proposed development will significantly impact important habitat for migratory species.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	All machinery will be washed down/disinfected between sites to avoid the risk of disease, especially near wetland areas.	Unlikely that the proposed development will result in the introduction of invasive species in an area known as important habitat for migratory species.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	While there is wetland habitat within the study area which is likely to support migratory bird populations. The available habitat is not considered to support an ecologically significant proportion of any migratory species' population. In addition, the impact area does not directly impact any important habitat for migratory species.	Unlikely that the proposed development will seriously disrupt the lifecycle of an ecologically significant proportion of the population of a migratory species.

Table 10 Assessment of important habitat for migratory species (DoE 2013)

Criteria for assessing important habitat	Assessment
Habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species	The wetland habitat available within the study area is not considered to support an ecologically significant proportion of a species' population, including Sharp-tailed Sandpiper and Latham's Snipe (as per Table 8).
Near the limit of the species' known range	The habitat available is not near the limit of the species' known range, with the exception of the Black-faced Monarch, which tends to occur along the coast of south-east Australia.

Habitat that is of critical importance to the species at particular life-cycle stages	The habitat is not of critical importance to the species at particular life-cycle stages. The wetland habitat available is considered to be suitable habitat en-route for brief stopovers, but not significant habitat used for breeding or feeding.
Habitat within an area where the species is declining	Species listed as likely to occur (Table 8) are not known to be declining within the study area, or habitat within 10-20 kilometres of the study area.

4.1.5 Assessment of Significance

An assessment of significance has been completed for the potential impact to habitat supporting Strzelecki Gum and Growling Grass Frog, which are known to occur in the study area and most likely to be impacted. In addition, a significance assessment was prepared for migratory species. The impact area will avoid all Strzelecki Gum and the majority of Growling Grass Frog habitat. The widening of Nursery Track (Figure 1) currently allows for a 20- metre wide area, including formed road surface, drainage, cut and fills and vegetation clearing. However, this is a conservative estimate and the impact area width will likely be reduced to further avoid any Growling Grass Frog habitat. The proposed development is not considered to have a significant impact to the Growling Grass Frog population, as the impact involves widening an existing road and avoids the important breeding populations at Luxford Pond (Figure 2l) and the wetland Site E (Figure 2o). Any indirect impacts, such as sedimentation or alteration of water quality, will be managed via a Construction Environmental Management Plan.

In summary, the construction and operation of the proposed Delburn Wind Farm is considered to *not* result in a significant impact to Strzelecki Gum or Growling Grass Frog.

4.1.6 Implications

The proposed action is unlikely to have a significant impact on any matter of NES. However, Delburn Wind Farm Pty Ltd (OSMI Australia) may choose to refer the project under the EPBC Act for project certainty or legal clarity. An EPBC Act referral enables the Environment Minister to decide whether the project is a 'controlled action' and assessable by the Commonwealth.

5 SUMMARY AND FURTHER REQUIREMENTS

The proposed development footprint (turbine and infrastructure layout) and adjacent areas support a range of native flora and fauna species, and ecological communities (seven EVCs of the Strzelecki Ranges bioregion).

Two nationally significant species (Strzelecki Gum, Growling Grass Frog) were recorded within the study area during the current surveys. Where habitat for significant species has been identified, the impact area has been adjusted to avoid those areas. In addition, efforts have been made to avoid and minimise native vegetation loss, including the reduction of the number of wind turbines from 53 to 35 turbines. This has reduced the extent of access roads required and the cumulative impact footprint.

The purpose of this report on National Environmental Significant matters is to support an EPBC referral to the Commonwealth. Based on the desktop assessment, field investigations and identification of significant species within the study area, we consider the proposed development to be *not* a 'controlled action'. Based on a significance assessment, we believe the proposed Delburn Wind Farm does not pose a significant impact to Strzelecki Gum or Growling Grass Frog populations and all indirect impacts can be managed.

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FIGURES

APPENDICES

APPENDIX 1 - FLORA

5.1 Appendix 1.1 – Nationally Significant Flora Species

Table A1.1 Significant flora recorded within 10 kilometres of the study area and the likelihood of occurrence within the impact area.

Key:

EPBC *Environment Protection and Biodiversity Conservation Act 1999* (EPBCAct)

EX	Extinct	X	Extinct
CR	Critically endangered	e	Endangered
EN	Endangered	v	Vulnerable
VU	Vulnerable	r	Rare
K	Poorly Known (Briggs and Leigh 1996)	k	Poorly Known
#	Records identified from EPBC Act Protected Matters Search Tool.	L	Listed
*	Records identified from the FIS		

1	Known occurrence	Recorded within the impact area recently (i.e. within ten years)
2	High Likelihood	Previous records of the species in the local vicinity; and/or, The impact area contains areas of high-quality habitat.
3	Moderate Likelihood	Limited previous records of the species in the local vicinity; and/or, The impact area contains poor or limited habitat.
4	Low Likelihood	Poor or limited habitat for the species however other evidence (such as a lack of records or environmental factors) indicates there is a very low likelihood of presence.
5	Unlikely	No suitable habitat and/or outside the species range.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	Likely occurrence in impact area
<i>Amphibromus fluitans</i>	River Swamp Wallaby-grass	6	2003	VU	3: This species is considered to have a moderate likelihood of occurring in the impact area and recent records exist within 10-kilometres (VBA). The species is associated with wetland, swampy habitat. Where the final impact area intersects a watercourse or is adjacent to a wetland, targeted surveys may be required to ensure avoidance. No River Swamp Wallaby-grass were recorded during the native vegetation assessments.
<i>Caladenia tessellate</i> #	Thick-lip Spider-orchid	-	-	VU	4: Orchid species are considered to have a low likelihood of occurrence in the impact area, due to the absence of recent VBA records and limited suitable (undisturbed) habitat.
<i>Callitris oblonga</i> subsp. <i>oblonga</i>	Dwarf Cypress-pine	2	1998	EN	3: This species is considered to have a moderate likelihood of occurring in the impact area.
<i>Dianella amoena</i>	Matted Flax-lily	22	2012	EN	3: This species is considered to have a moderate likelihood of occurring in the impact area, due to recent VBA records located to the east within 10-kilometres (VBA). However, the species inhabits native grassland areas, which are mostly available beyond the Strzelecki Ranges (study area), in the low-lying grassland plains. Targeted surveys within or adjacent to the impact area (Ecology and Heritage Partners 2018) did not record Matted-Flax Lily.
<i>Prasophyllum frenchii</i> #	Maroon Leek-orchid	-	-	EN	4: This species is considered to have a low likelihood of occurrence in the impact area, due to the absence of recent VBA records and lack of suitable habitat.
<i>Eucalyptus strzeleckii</i>	Strzelecki Gum	75	2012	VU	1: This species has been recorded in the study area (Ecology and Heritage Partners 2019). The impact area will avoid all Strzelecki Gum.
<i>Glycine latrobeana</i> #	Clover Glycine	-	-	VU	4: Orchid species are considered to have a low likelihood of occurrence in the impact area, due to the absence of recent VBA records and limited suitable (undisturbed) habitat.



Scientific name	Common name	Total # of documented records	Last documented record	EPBC	Likely occurrence in impact area
<i>Pterostylis chlorogramma</i> #	Green-striped Greenhood	-	-	VU	4: Orchid species are considered to have a low likelihood of occurrence in the impact area, due to the absence of recent VBA records and limited suitable (undisturbed) habitat.
<i>Xerochrysum palustre</i> #	Swamp Everlasting	-	-	VU	4: This species is considered to have a low likelihood of occurrence in the impact area, due to the absence of recent VBA records and limited suitable habitat.

Data source: Victorian Biodiversity Atlas (DELWP 2018); Protected Matters Search Tool (DoE 2015). Taxonomic order Alphabetical.

APPENDIX 2 – FAUNA

5.2 Appendix 2.1 – Nationally Significant Fauna Species

Table A2.1. Significant fauna within 10 kilometres of the study area and the likelihood of occurrence within the impact area (see Table 8 for non-threatened migratory species).

Habitat characteristics of significant fauna species previously recorded within 10 kilometres of the study area, or that may potentially occur within the study area were assessed to determine their likelihood of occurrence. The likelihood of occurrence rankings for each of the threatened species are:

1	High Likelihood	<ul style="list-style-type: none"> • Known resident in the impact area based on site observations, database records, or expert advice; and/or, • Recent records (i.e. within five years) of the species in the local area (VBA 2011); and/or, • The impact area contains the species' preferred habitat.
2	Moderate Likelihood	<ul style="list-style-type: none"> • The species is likely to visit the impact area regularly (i.e. at least seasonally); and/or, • Previous records of the species in the local area (DSE 2011b); and/or, • The impact area contains some characteristics of the species' preferred habitat.
3	Low Likelihood	<ul style="list-style-type: none"> • The species is likely to visit the impact area occasionally or opportunistically whilst en-route to more suitable sites; and/or, • There are only limited or historical records of the species in the local area (i.e. more than 20 yearsold); and/or, • The impact area contains few or no characteristics of the species' preferred habitat.
4	Unlikely	<ul style="list-style-type: none"> • No previous records of the species in the local area; and/or, • The species may fly over the impact area when moving between areas of more suitable habitat; and/or, • Out of the species' range; and/or, • No suitable habitat present.

EPBC *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)

EX	Extinct	NT	Near threatened
RX	Regionally extinct	CD	Conservation dependent
CR	Critically endangered	LC	Least concern
EN	Endangered	#	Listed on the Protected Matters Search Tool
VU	Vulnerable	*	Additional information from the Victorian Fauna Database
RA	Rare		

Scientific Name	Common Name	Last Documented Record (VBA)	# Records (VBA)	EPBC Act	Likely occurrence in impact area
<i>Botaurus poiciloptilus</i> #	Australasian Bittern	-	-	EN	2-3: This species is considered to have a moderate-low likelihood of occurring in the impact area due to the absence of records within 10-kilometres (VBA, Atlas of Living Australia). Luxford Pond, in south-west of study area contains potentially suitable habitat (i.e. <i>Typha</i> spp., <i>Phragmites australis</i>). The impact area which intersects the northern reaches of Luxford Pond are unlikely to have a significant impact on the species, should they occur, as these works are limited to expanding existing roads.
<i>Prototroctes maraena</i>	Australian Grayling	1981	2	VU	3: This species is considered to have a low likelihood of occurring in the impact area due to the absence of recent records within 10-kilometres (VBA, Atlas of Living Australia). The species is known to occur in rivers and streams with a preference for cool, clear waters and a gravel substrate (Berra 1982). However, due to the species' distribution and presence of rivers and streams in the region, it may occur in the broader study area. The proposed development is unlikely to have a significant impact on the species, as works are limited to expanding existing roads and a Construction Environmental Management Plan will be in place to reduce run off and sedimentation and minimise impacts to water quality.
<i>Rostratula australis</i> #	Australian Painted Snipe	-	-	VU	2-3: This species is considered to have a moderate-low likelihood of occurring in the impact area due to the absence of records within 10-kilometres (VBA, Atlas of Living Australia). Luxford Pond, in south-west of study area contains potentially suitable habitat (i.e. <i>Typha</i> spp., <i>Phragmites australis</i>). The impact area which intersects the northern reaches of Luxford Pond are unlikely to have a significant impact on the species, should they occur, as these works are limited to expanding existing roads.
<i>Mastacomys fuscus mordicus</i> #	Broad-toothed Rat	-	-	VU	3: This species is considered to have a low likelihood of occurring in the impact area due to the absence of records within 10-kilometres (VBA, Atlas of Living Australia). The species inhabits high rainfall areas containing a dense understorey of grasses, sedges and herbs. While this habitat is present in the study area, it is highly fragmented with surrounding disturbed areas (e.g. pine plantations, logging roads). The proposed development is unlikely to have a significant impact on the species, if present, due to the already disturbed nature of remnant vegetation.
<i>Calidris ferruginea</i> #	Curlew Sandpiper	-	-	CR	4: This migratory species is considered unlikely to occur in the impact area due to the absence of records within 10-kilometres (VBA, Atlas of Living Australia). There is also more suitable coastal wetland habitat for the species, which inhabits intertidal mud flats; east of the study area at Gippsland Lakes or west at Western Port Bay.
<i>Galaxiella pusilla</i>	Dwarf Galaxias	2012	7	VU	3: This species is considered to have a low likelihood of occurring in the impact area due to the absence of recent records within 10-kilometres (VBA, Atlas of Living Australia). The species is known to occur in rivers and streams with a preference for shallow, slow-flowing water (Backhouse and Vanner 1978). However, due to the species' distribution and presence of streams and wetlands in the region, it may

Scientific Name	Common Name	Last Documented Record (VBA)	# Records (VBA)	EPBC Act	Likely occurrence in impact area
					occur in the broader study area. The proposed development is unlikely to have a significant impact on the species, as works are limited to expanding existing roads and a Construction Environmental Management Plan will be in place to reduce run off and sedimentation and minimise impacts to water quality.
<i>Numenius madagascariensis</i> #	Eastern Curlew	-	-	CR	4: This migratory species is considered unlikely to occur in the impact area due to the absence of records within 10-kilometres (VBA, Atlas of Living Australia). There is also more suitable coastal wetland habitat for the species, which inhabits intertidal mud flats; east of the study area at Gippsland Lakes or west at Western Port Bay.
<i>Dasyurus viverrinus</i>	Eastern Quoll	-	1	EN	4: This species is considered unlikely to occur in the impact area and broader study area due to the absence of records within 10-kilometres (VBA, Atlas of Living Australia). The species has also experienced a significant decline between 1890 – 1920 (Peacock and Abbott 2014). Isolated populations persist in Victoria at Kew and Ivanhoe in the Melbourne region and Lake Corangamite, Otway Ranges. While there is suitable habitat in the impact area for this species, it is unlikely to occur due to its current sparse distribution.
<i>Petauroides Volans</i>	Greater Glider	2012	25	VU	2-3: This species is considered to have a moderate-low likelihood of occurring in the impact area, based on recent records within 10-kilometres (VBA, Atlas of Living Australia). Records exist to the south-west of the study area in Mirboo North Regional Park and to the east of the study area in the Darlimurla Forest Block. While there is suitable habitat in the impact area for this species, the proposed development is unlikely to have a significant impact on the species as the development will avoid large tracts of remnant vegetation, including the Darlimurla Forest Block (abutting the study area).
<i>Pteropus poliocephalus</i> #	Grey-headed Flying-fox	-	-	VU	2: This species is considered to have a moderate likelihood of occurring in the impact area, based on the presence of flowering eucalypts which may be used for foraging and roosting. However, the proposed development is unlikely to have a significant impact on the species as no Grey-headed Flying- fox were recorded flying over the study area and the habitat available is not used as an important roosting site.
<i>Litoria raniformis</i>	Growling Grass Frog	2010	15	VU	1: This species has been recorded in the study area during 2018 and 2019 targeted surveys (Ecology and Heritage Partners 2019). In particular, at Luxford Pond and northern tributaries and a wetland south of the Strzelecki Highway (Figure 2l, 2o). The proposed development is unlikely to have a significant impact on the species as all potential impacts such as sedimentation and reduction in water quality from the proposed road works will be managed in accordance with a Construction Environmental Management Plan.

Scientific Name	Common Name	Last Documented Record (VBA)	# Records (VBA)	EPBC Act	Likely occurrence in impact area
<i>Potorous tridactylus tridactylus</i>	Long-nosed Potoroo	-	1	VU	4: This species is considered unlikely to occur in the impact area and broader study area due to the absence of records within 10-kilometres (VBA, Atlas of Living Australia). While there is suitable habitat in the impact area for this species, it is unlikely to occur due to its current distribution in Victoria: East Gippsland, Wilsons Promontory, French Island, Otway Ranges, Lower Glenelg and Grampians.
<i>Grantiella picta</i> #	Painted Honeyeater	-	-	VU	4: This species is considered unlikely to occur in the impact area and broader study area due to the absence of records within 10-kilometres (VBA, Atlas of Living Australia). While there is suitable habitat in the impact area for this species, it is unlikely to occur based on its current known distribution.
<i>Anthochaera phrygia</i> #	Regent Honeyeater	-	-	CR	4: This species is considered unlikely to occur in the impact area and broader study area due to the absence of records within 10-kilometres (VBA, Atlas of Living Australia) and the limited availability of the species' preferred box-ironbark habitat.
<i>Pseudomys fumeus</i> #	Smoky Mouse	-	-	EN	4: This species is considered unlikely to occur in the impact area and broader study area due to the absence of records within 10-kilometres (VBA, Atlas of Living Australia) and based on its current known distribution: Grampians, Otway Range, South Eastern Highlands, coastal East Gippsland and Eden Hinterland (Menkhorst and Broome 2006).
<i>Isoodon obesulus</i>	Southern Brown Bandicoot	1978	4	EN	2-3: This species is considered to have a moderate-low likelihood of occurring in the impact area due to the absence of recent records within 10-kilometres (VBA, Atlas of Living Australia) and limited known distribution in the Strzelecki Ranges. However, there is potentially suitable habitat within the study area including dense understorey and sandy soils. Targeted surveys using 12 remote, motion-detecting cameras placed in suitable habitat, over a 28-day period (October-November 2019) did not record the species.
<i>Dasyurus maculatus maculatus</i>	Spot-tailed Quoll	-	-	EN	4: This species is considered unlikely to occur in the impact area and broader study area due to the absence of records within 10-kilometres (VBA, Atlas of Living Australia). The species has also experienced a significant decline in the past 20-30 years and north-east Victoria and East Gippsland are stronghold areas for this species (Belcher 2000). While there is suitable habitat in the impact area for this species, it is unlikely to occur due to its current sparse distribution.
<i>Lathamus discolor</i>	Swift Parrot	1977	3	CR	3: This species is considered to have a low likelihood of occurring in the impact area due to the absence of recent records within 10-kilometres (VBA, Atlas of Living Australia). Thirty-one locations are identified as important feeding habitat during the wintering period for the species in Victoria, mostly within box-ironbark forest. However, foraging areas used by Swift Parrots may change each year depending on the availability of flowering eucalypts in Victoria (Mac Nally and Horrocks 2000). Bird

Scientific Name	Common Name	Last Documented Record (VBA)	# Records (VBA)	EPBC Act	Likely occurrence in impact area
					utilisation surveys conducted for six days during June 2019 did not record the species using the study area (Ecology and Heritage Partners 2019).