Appendix M: Rye Park wind farm Preliminary Documentation – Assessment of Significance on Matters of National Environmental Significance

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renewables

RYE PARK WIND FARM

Assessment of Significance on Matters of National Environmental Significance

FINAL

November 2020

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1.0 Assessments of significance on Matters of National Environmental Significance

Assessments of significance of the following Matters of National Environmental Significance listed under the *Environment Protection and Biodiversity Conservation Act 1999* are presented below (**Tables 1.1 - 1.8**):

- White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland, listed as a critically endangered ecological community under the EPBC Act
- superb parrot (*Polytelis swainsonii*), listed as vulnerable under the EPBC Act
- swift parrot (*Lathamus discolor*), listed as critically endangered under the EPBC Act
- white-throated needletail (*Hirundapus caudacutus*), listed as vulnerable and migratory under the EPBC Act
- regent honeyeater (*Anthochaera phyrgia*), listed as critically endangered under the EPBC Act
- striped legless lizard (*Delma impar*), listed as vulnerable under the EPBC Act
- golden sun moth (*Synemon plana*), listed as critically endangered under the EPBC Act
- painted honeyeater (*Grantiella picta*), listed as vulnerable under the EPBC Act
- koala (Phascolarctos cinereus), listed as vulnerable under the EPBC Act and
- rainbow bee-eater (*Merops ornatus*), listed as marine/migratory under the EPBC Act.

The Indicative Development Footprints are equivalent to the Development Footprint terminology in the BAM; this is a combination of the Indicative Development Footprint – Wind Farm, Indicative Development Footprint – Permanent Met Masts and the Indicative Development Footprint – External Roads, and comprises the entirety of the Indicative Development Footprint for the Rye Park Wind Farm. The Indicative Development Footprint – Wind Farm includes the total indicative impact zone associated with the wind farm specific components of the Project, excluding the external road upgrades. The Indicative Development Footprint – Permanent Met Masts include the indicative impact zone for six permanent meteorological masts for the Project. The Indicative Development Footprint – External Roads, includes the total indicative impact zone of the external road upgrades associated with the Wind Farm, excluding all wind farm specific components of the Project. The *Indicative Development Footprints* provides for additional detailed design that may be undertaken by RPRE once specific turbine specifications and contractor(s) are established.

The Development Corridor encompasses the Indicative Development Footprint – Wind Farm and Indicative Development Footprint – Permanent Met Masts in their entirety as well areas of adjoining land. It does not include the Indicative Development Footprint – External Roads. The Development Corridor was considered in full during the application of the BAM to allow further avoidance and minimisation measures to be employed by RPRE.

The Project Area broadly defines the extent of landholders involved in the project, encapsulating the Development Corridor.

1.1 White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland

White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland (box-gum woodland) is listed as CEEC under the EPBC Act. This community occurs in and along the western slopes and tablelands of the Great Dividing Range from Southern Queensland (QLD) through New South Wales (NSW) to central Victoria (VIC). It is characterised by a species-rich understorey of native tussock grasses, herbs and scattered shrubs, and the dominance, or prior dominance, of white box (*Eucalyptus albens*), yellow box (*Eucalyptus melliodora*) or Blakely's red gum (*Eucalyptus blakelyii*) trees.

It is estimated that less than 5% of this CEEC remains in good condition with most of this remaining in small isolated patches (DEH, 2006). Thiele and Prober (2000) estimated that less than 0.1% of this community remains in a near-intact condition. The NSW Threatened Species Scientific Committee (2019) states that the box-gum woodland continue to be degraded at both the patch and landscape scale. This ongoing modification, while not necessarily leading to the total destruction of all elements, threatens it with extinction. The reduction in the integrity across most of its range has been very severe and is unlikely to be re-established. Many intact remnants lack an overstorey due to historical clearing of trees and can retain a native derived grassland with a highly diverse groundcover dominated by native grasses and other herbaceous plants such as native daisies, orchids, lilies and other wildflowers. However, these patches are extremely rare and very small in size (Prober & Thiele, 1995). Derived grassland patches can generally be rehabilitated with assisted regeneration if groundcovers can resist weed invasion. Areas with high densities of kangaroo grass (*Themeda triandra*), of which are present in the Indicative Development Footprints can suppress invasive exotic perennial grass species (Cole et al. 2004).

There is circumstantial evidence which suggests that clearing of this CEEC is ongoing and has increased in recent years, particularly in NSW which accounts for three quarters of the distribution of this community. Clearing is likely to continue at least in the short term in NSW under the current regulatory framework, (Tozer, Simpson & NSW Threatened Species Scientific Committee, 2019). In the period of 2009-2018, the average area of Grassy Woodlands (not specific to Box Gum Woodlands) cleared in NSW by agriculture and infrastructure was 739 hectares per year. In the years 2016-2018, clearing of Grassy Woodland rose to an average of 1402 hectares per year compared to an average of 550 hectares per year in previous years (2009-2016) (OEH, 2018; NSW TSSC, 2019).

In the Indicative Development Footprints, the box-gum woodland CEEC occurs as PCT 350 Candlebark - Blakely's Red Gum - Long-leaved Box grassy woodland in the Rye Park to Yass region of the NSW South Western Slopes Bioregion and South Eastern Highland Bioregion. At a regional scale, 87% of this PCT is estimated to have been cleared with about 60% in the Boorowa Shire which is considered an underestimate.

Within the Indicative Development Footprints, the CEEC was identified in the form of two vegetation zones, being Moderate to Good Condition (Vegetation Zone 3) and Derived Native Grassland (Vegetation Zone 4). These two vegetation zones were assessed against the key diagnostic features and condition thresholds identified in the Listing Advice (TSSC, 2006).

The Project will impact a total of 35.73 hectares of this CEEC. This comprises 19.38 hectares of woodland in moderate to good condition (Vegetation Zone 3) and 16.35 hectares of derived native grasslands (Vegetation Zone 4). All patches of box-gum woodland have been exposed to historical and ongoing grazing (predominantly sheep grazing) and other agricultural pressures. The degree of disturbance varies across the Project Area and no patches persist unaffected by such disturbances.

Of the 35.73 hectares, permanent impacts on this CEEC will comprise 26.69 hectares for creation of internal access tracks, installation of underground cabling, a substation near High Rock Road and a concrete batch

plant near Days Road. There are also minor impacts associated with external road upgrades. Partial direct impacts are expected to comprise the remaining 9.04 hectares for transmission lines within 40 metre wide or 20 metre wide easements, some permanent impacts are expected for installation of poles and string pads. Partial impacts have been calculated through the BAM (OEH 2017) within vegetation that is currently, or can grow equal to or greater than, 4 metres tall. For vegetation zones that meet these characteristics, partial direct impacts have been calculated within the 40 metre wide or 20 metre wide easement (excluding the pole and string locations) as per Section 9.1.2.3 of the BAM [OEH 2017]). However, for the purposes of this application, it is assumed that all 35.73 hectares would be removed as a result of the development.

The current impact exceeds the impact threshold of 9.5 hectares for this CEEC as identified in Condition 3 of the existing Federal Approval (EPBC 2014/7163). However, it is important to note that the increased area of CEEC is not a result of further impacts in the current Indicative Development Footprints compared to the previous assessment (NGH Environmental 2014 and 2016). The current assessment undertook a more comprehensive analysis to determine CEEC listing status of existing vegetation patches.

Key areas of box-gum woodland patches particularly large patches along Rye Park Road and other high quality roadside strips have been avoided by the Project with substantial changes in design progressing since 2011. As a result, key areas with CEEC patches have been avoided where possible.

The project is considered likely to have a significant effect on the local extent and long-term viability of the box-gum woodland CEEC. Full details of the assessment of significance for the box-gum woodland CEEC is presented in **Table 1.1**.

Table 1.1 Assessment of significance of White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland

	An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:
Criterion	a) reduce the extent of an ecological community
Response	This community is not restricted and occurs in and along the western slopes and tablelands of the Great Dividing Range from Southern QLD through NSW to central VIC. The best estimate of the extent of occurrence (EOO) for this community in a range of conditions and floristic types is 702,800 km^2 (Tozer, Simpson & NSW Threatened Species Scientific Committee, 2019). However, there is still uncertainty surrounding both the current extent of this CEEC and the extent of its pre-1750 distribution. The extent of regional occurrence for this community was determined using two regional vegetation mapping units to complete this analysis, being VIS Classification Map 1624 (Boorowa) and VIS Classification Map 3858 (Southern Forests). The CEEC listed under the EPBC Act was described as comprising 6,721 hectares within the Boorowa Shire and a further 55,798 hectares within the South West Slopes (TSSC 2006). The National Recovery Plan for this CEEC estimates that approximately 8,000 hectares occurs within the south west slopes national parks and nature reserves (DoECCW 2010). The extent of local occurrence for this community was determined within approximately 10,000 hectares based on the regional mapping units. There is a total of 1,207 hectares of vegetation that is likely to align with this CEEC occurring locally. The Project will impact on this community through the **reduction in its extent by 35.73 hectares**, of which **19.38 hectares is remnant woodland (Vegetation Zone 3)** and **16.35 hectares is derived native grasslands (Vegetation Zone 4)**. Of this, 26.69 hectares will be a permanent loss of CEEC for construction of internal tracks, underground cabling and ancillary facilities. The remaining 9.04 hectares would comprise partial direct impacts with the removal of the overstorey and mid-storey for transmission line easements. For the purposes of this application, it is assumed that all 35.73 hectares would be removed as a result of the development. This loss in the extent of this community includes both woodland and derived grassland occurring as several patches across a 33 km length. A total of 31.91 hectares of the CEEC will persist within the Development Corridor, and considerable amounts of the CEEC occur beyond the Development Corridor in the local region. At a national scale, the reduction in extent is likely to be negligible, given the large distribution of this community. However, its extent is discontinuous across its range. At a regional scale in the South West Slopes, this impact would result in a minor reduction in extent (~0.07%). At a local scale, this impact would result in a 3% reduction which is considered substantial in terms of further reducing the size and condition of patches in a region that has lost 87% of that box-gum woodland type. The CEEC mapping undertaken for this project indicates that there is probably more CEEC patches in the landscape than previously estimated. Although much of the landscape with box-gum woodland has been exposed to historical and ongoing disturbances from grazing and other agricultural pressures, the current quality of this CEEC is unlikely to return to its original state after construction.

	An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:
Criterion	b) fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines
Response	The Project will impact 35.73 hectares of this community, of which 26.69 hectares will be a permanent loss of this CEEC. The remaining 9.04 hectares would comprise partial direct impacts for transmission line easements. However, for the purposes of this application, it is assumed that all 35.73 hectares would be removed as a result of the development. The extent of this community includes both woodland and derived grassland across a linear 33 km length. Much of the connectivity and habitat corridor in the Indicative Development Footprint has been previously disturbed by historical and current agricultural land use. The project will have a minor increase in fragmentation with the loss of small patches which contribute to landscape scale connectivity for this community. Construction of linear infrastructure (i.e. transmission lines, underground cabling and access tracks) will reduce the current patch sizes and create a cleared corridor that may prevent short term connectivity, particularly in box-gum woodland to the south of Flakney Creek Road. However, portions of the ground layer and midstorey would be able to regenerate and/or be retained within and along most transmission line easements over time. Due to the existing fragmentation resulting from historical clearing, the indirect impacts on connectivity and habitat corridors are considered to be reduced. The Project is unlikely to lead to the substantial increased fragmentation of this community in the long-term when considering the already disturbed and fragmented landscape.
Criterion	c) adversely affect habitat critical to the survival of an ecological community
Response	According to the *Significant Impact Criteria in the Significant Impact Guidelines* (DoE 2013) habitat critical to the survival of an ecological community refers to areas that are necessary: • For the long-term maintenance of the ecological community (including the maintenance of species essential to the survival of the ecological community, such as pollinators) • To maintain genetic diversity and long term evolutionary development, or • For the reintroduction of populations or recovery of the ecological community. Such habitat may be, but is not limited to: habitat identified in a recovery plan for the ecological community as habitat critical for that species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the minister under the EPBC Act. There are very few undisturbed patches of the community remaining in existence with < 0.1% in a near-intact condition. Most remaining patches have some degree of disturbance and degradation. While habitat critical to the survival of the community has not been formally identified, given its threatened status, important habitat is assumed to consist of patches that meet the condition thresholds and listing status as an CEEC. These patches are critical because they provide essential ecosystem services for recovery of this community. There will be a permanent loss of 26.69 hectares of this community, and a partial loss of 9.04 hectares for the installation of transmission line easements. However, for the purposes of this application, it is assumed that all 35.73 hectares would be removed as a result of the development. While patches of this community recorded for the Project are considered to be important, particularly patches with a moderate to large size and in moderate to good condition, the 35.73 hectares of this community being impacted by the Project is **not considered to be critical to the survival of the CEEC**.
Criterion	d) modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns

	An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:
Response	The Project will impact 35.73 hectares of this community within the Indicative Development Footprints. Most indirect impacts are likely to be negligible once managed through the mitigation measures. While the project will impact on abiotic factors of the CEEC associated with the Project, they are limited to potential of altered surface hydrology during construction, particularly on steep slopes which may increase overland surface water flows or sediment movement which could run off into the retained CEEC patches and remove topsoil. Implementation of site-specific rehabilitation and revegetating temporary disturbed areas during the construction phase would minimise these effects. These actions would follow a detailed Biodiversity Management Plan prepared prior to construction. In conclusion, these impacts are **not considered to modify or destroy abiotic factors necessary for the survival of the CEEC**.
Criterion	e) cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting
Response	The quality of adjacent retained patches of this community have the potential to change due to edge effects such as increased light, wind, altered hydrology and weed invasion. However, given the already disturbed nature of the Project Area due to historical clearing and ongoing grazing pressures, edge effects are unlikely to cause substantial change. The Project will reduce the quality of patches of this community from partial clearing of 8.99 hectares for installation of transmission lines. These impacts will result in a substantial change in species composition and vegetation structure, including the loss of overstorey species, and potentially important species used in the condition thresholds for determining a listed community. In the long term, these partially retained patches would likely involve a proliferation of tolerant species (typically grasses), a reduction in floristic diversity (particularly of small herbs) and reduced structural complexity due to the development of a continuous grass cover with little or no inter-tussock space. The project is also likely to alter the availability of food for attracting fauna into these habitats. For the purposes of this application, it is assumed that all 35.73 hectares, including the 9.04 hectares of partial clearing, would be totally removed as a result of the development. In conclusion, the Project is expected to cause a substantial change in the species composition of the CEEC occurrence recorded within the Indicative Development Footprints.
Criterion	f) cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: • assisting invasive species, that are harmful to the listed ecological community, to become established, or • causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community.

	An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:
Response	As the Project Area already has ongoing disturbances from agricultural land uses, the presence of weeds and sheep grazing have likely resulted in the historical and ongoing use of fertilisers, herbicides or other chemicals or pollutants. It is unlikely that project impacts will cause a substantial reduction in CEEC quality for retained patches. Weeds are likely to invade the adjacent edges of the community. However, under the current land use regime, changes to the quality or integrity of the patch are likely to be negligible. The project will reduce the quality of the occurrence of this community from partial clearing of 8.99 hectares for installation of transmission lines. These impacts will result in a reduction in the quality or integrity of remaining patches due to loss of overstorey species, and potentially important species used in the condition thresholds for determining a listed community. However, for the purposes of this application, it is assumed that all 35.73 hectares, including the 9.04 hectares, would be totally removed as a result of the development. In conclusion, the Project is expected to cause a reduction in quality or integrity of the CEEC occurrence recorded within the Indicative Development Footprints.
Criterion	g) interfere with the recovery of an ecological community
Response	The national recovery plan (DoECCW 2010) promotes the recovery and prevention of CEEC extinction. It identifies five key objectives: 1. achieving no net loss in extent and condition of the ecological community throughout its geographic distribution; 2. increasing protection of sites with high recovery potential; 3. increasing landscape functionality of the ecological community through management and restoration of degraded sites; 4. increasing transitional areas around remnants and linkages between remnants; and 5. bringing about enduring changes in participating land manager attitudes and behaviours towards environmental protection and sustainable land management practices to increase extent, integrity and function of Box-Gum Grassy Woodland. The project will interfere with the recovery of this community through clearing of 35.73 hectares, particularly through the loss in extent and condition in relation to Objective 1.
Conclusion	**The extent of the community that would be directly impacted by the project comprises a total of 35.73 hectares within the Indicative Development Footprints. This impact is considered a substantial loss at a local scale, in terms of further reducing the size and condition of patches in a region that has lost 87% of that box-gum woodland type. There is likely to be a minor increase in isolation of patches due to the increase in the width of cleared land associated with construction, but fragmentation will be minimal given the already fragmented vegetation in the landscape.** **While all patches of the CEEC within the Indicative Development Footprints are considered to be locally important to the CEEC, the 35.73 hectares of impact to the CEEC is not considered important to the long-term survival of the CEEC as a whole.** **The project is unlikely to adversely modify or reduce the composition and quality of retained vegetation through edge effects.** **Through consideration of this assessment, the project is likely to have a significant impact on the box-gum woodland CEEC.**

1.2 Superb parrot (*Polytelis swainsonii*)

The superb parrot is a partially migratory / nomadic species of the inland slopes and plains of NSW and the Australian Capital Territory (ACT) which has undergone a decline in recent decades due primarily to clearance and degradation of breeding and foraging habitat (Manning *et al.* 2007). Remnant box-gum woodland of the Boorowa / Rye Park / Yass region provides critical foraging and breeding resources for superb parrot.

Superb parrots were recorded on 30 occasions during surveys conducted by Umwelt in October and November 2018 and January, February, April and July 2019 in the Project Area (including in the Indicative Development Footprints) (figure provided as Appendix J of the re-referral). This species was also recorded previously at several locations in the Project Area during the planning approval process (NGH Environmental 2014). The Indicative Development Footprints have been designed to avoid all confirmed breeding locations in the Project Area. The majority of observations of superb parrot were from the lower western facing slopes supporting open woodland downslope of the proposed turbine locations.

Umwelt has considered information provided to Tilt Renewables by the National Superb Parrot Recovery Team in regard to superb parrot flight data. The information provided is based on six superb parrots that nested in Canberra in 2015 and were satellite tracked. We note that this information and data is currently unpublished and approval would be required to present this data in any detail. While the data is useful in that it provides additional insight into the flight height of the superb parrot, its application to the assessment of this Project is limited in that the 'Surface Height' is measured Above Sea Level (ASL) plus the height of any structure over which the bird was located. Without ground height data for the flight paths being provided we cannot determine whether or not the flight heights presented would occur in the RSA for this particular Project. However as noted in our assessments, the data supports the expected utilisation of the species flying at height susceptible to blade strike in wind farms generally.

Umwelt have identified all areas of PCT 350 – Moderate Good Condition (Vegetation Zone 3) as superb parrot breeding habitat as this vegetation supports a mixture of mature canopy species that are widely used for breeding purposes by superb parrot. This includes yellow box (*Eucalyptus melliodora*) and Blakely's red gum (*Eucalyptus blakelyi*). This approach is consistent with BAM (OEH 2017).

In the original project Referral, NGH referred to foraging habitat for the superb parrot as being all stands of remnant Box Gum Woodland. While breeding habitat was restricted to known and potential nest trees within the Project Area rather than broad areas. Umwelt believe this approach to assigning breeding habitat for the superb parrot is too restrictive, given the dominance of suitable canopy species within the stands of PCT 350 – Moderate Good Condition (Vegetation Zone 3).

Despite the terminology difference, the vegetation assigned by Umwelt as 'breeding habitat' for the superb parrot is consistent with that assigned previously by NGH as 'foraging habitat'. Differences in areas between the two terminology is a result of detailed updates to the vegetation mapping for the Project (a requirement of the existing state approval) as well as the various project design changes that have occurred since the original Referral.

There is a total of 20.08 hectares of box-gum woodland in the Indicative Development Footprints that supports suitable breeding habitat. A total of 233 hollow-bearing trees potentially suitable for superb parrot will be removed. Extensive surveys did not detect breeding in the areas of habitat to be removed.

For the purposes of this assessment, Criteria a, b, c and e are assessed under the assumption that there is only one single population of superb parrot (i.e. the national population).

The assessment of significance for superb parrot is presented in **Table 1.2**. Despite avoidance of known breeding habitat, the Project has the potential to have significant impact on the superb parrot.

Table 1.2 Assessment of significance of superb parrot (*Polytelis swainsonii*)

	An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
Criterion	a) lead to a long-term decrease in the size of an important population of a species
Response	The Project will result in the removal of 20.08 hectares of box-gum woodland, considered to be suitable superb parrot breeding habitat. A total of 233 hollow-bearing trees will be removed. The Indicative Development Footprints have been designed to avoid all confirmed breeding locations in the Project Area. Superb parrots were recorded flying at Rotor Swept Area (RSA) height during surveys conducted in the Project Area however they were rarely recorded flying at proposed turbine locations with the majority of observations being of birds in open woodland on the lower west facing slopes of the Project Area. However, in the far southern section of the Project Area individuals were recorded flying at RSA height on four occasions by an Umwelt ecologist situated in a relatively high part of the landscape at 700 - 740 m above sea level. This observation of individuals occurring above 700 m above sea level appears to be consistent with data from satellite tracked superb parrots in Canberra which show that individuals fly at heights of more than 750 m above sea level (Superb Parrot Recovery Team unpublished data). Depending on the particular landscape at which these records were made, this likely provides further evidence of the species flying at heights susceptible to blade strike in wind farms generally. In the absence of data confirming how high these birds were flying above the ground, Umwelt cannot comment whether or not the data provided by the National Superb Parrot Recovery Team provides further evidence of the species occurring within the RSA for this project. While the majority of recorded movements appear to be in the lower parts of the landscape, the species will intermittently utilise higher parts of the landscape and occur at RSA height in these locations. Based on the avoidance of confirmed breeding areas, the low frequency of observed flights at proposed turbine locations and the Project is unlikely to lead to a long-term decrease in the superb parrot national population given the amount of habitat to be removed and the risk of blade strike.
Criterion	b) reduce the area of occupancy of an important population
Response	The Indicative Development Footprints avoid all confirmed breeding areas in the Project Area and the majority of observed flight paths. Extensive surveys did not detect breeding in the Indicative Development Footprints. The Project does not reduce the extent of confirmed breeding habitat, but reduces the extent of habitat potentially suitable for breeding present in the landscape. The project is likely to reduce the extent of foraging habitat. Due to the presence of habitat throughout the landscape, and the avoidance of confirmed breeding habitat, the overall area of occupancy for superb parrot in the Project Area is unlikely to change. With 36.33 hectares of superb parrot breeding habitat identified within the Development Corridor, 16.25 hectares will persist beyond the extent of the Indicative Development Footprints.
Criterion	c) fragment an existing important population into two or more populations
Response	Due to the spatial extent of the Project and the superb parrot's mobility, it is unlikely that the superb parrot population will be fragmented into two or more populations as a result of the construction and operation of the Project. Potential barrier effects resulting from the presence of 80 turbines in the Project Area is unlikely to restrict movement through the landscape in which the Project is located to the extent that the superb parrot's population would become fragmented into two or more populations.

	An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
Criterion	d) adversely affect habitat critical to the survival of a species
Response	The Project will result in the removal of 20.08 hectares of box-gum woodland, considered to be suitable superb parrot breeding habitat. However, given the Indicative Development Footprints avoids all confirmed breeding areas in the Project Area it is unlikely that the habitat to be removed is critical to the survival of the superb parrot.
Criterion	e) disrupt the breeding cycle of an important population
Response	The Project could disrupt the breeding cycle of superb parrot. Disturbance arising during the construction phase of the Project could prevent breeding attempts or reduce the chance of nesting success in areas adjacent to the Indicative Development Footprints. The operation of the Project could potentially influence the selection of nesting sites in potential and suitable breeding habitat adjacent to the Indicative Development Footprints but is unlikely to affect the success of commenced breeding attempts.
Criterion	f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
Response	The Project will result in the removal of 20.08 hectares of box-gum woodland, considered to be suitable superb parrot breeding habitat. A total of 233 hollow-bearing trees will be removed. These impacts are unlikely to result in the long-term decline of the superb parrot given the low observed frequency of use of habitat to be removed.
Criterion	g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
Response	The Project is unlikely to result in invasive species that are harmful to superb parrot becoming established in superb parrot habitat.
Criterion	h) introduce disease that may cause the species to decline
Response	The Project is unlikely to result in the introduction of disease that may cause the superb parrot to decline.
Criterion	i) interfere substantially with the recovery of the species
Response	The Project is unlikely to, though potentially may interfere substantially with the recovery of superb parrot given that habitat loss constitutes the chief threat to the species.
Conclusion	**The Project has a low potential of significant impact on the superb parrot.**

1.3 Swift parrot (*Lathamus discolor*)

The swift parrot is a critically endangered migrant of south-eastern Australia which occurs in temperate woodlands and forests. It has undergone a severe decline in recent decades due to broadscale breeding and foraging habitat loss and predation by introduced sugar gliders in their Tasmanian breeding range (Stojanovic *et al.* 2014, Heinsohn *et al.* 2015).

The swift parrot is an uncommon / rare visitor to woodlands in the Boorowa / Rye Park / Yass region, though the greater south-west slopes region provides key foraging habitat for this species (Saunders and Saunders and Henson 2008). All records in the Boorowa / Rye Park / Yass region since 2000 are from the Frogmore area, approximately 15 kilometres north of the Project where swift parrot were observed in 2001, 2008, 2013 and 2014. Swift parrots were not recorded during targeted surveys conducted in the Study Area by NGH Environmental from 8-12 July 2013 or by Umwelt during extensive bird surveys conducted during September and October 2018 and April, July and September 2019. For the purposes of this assessment, criteria in **Table 1.3** are assessed under the assumption that there is only one single population of swift parrot (i.e. the national population).

The assessment of significance for swift parrot is presented in **Table 1.3**. The Project is unlikely to have a significant impact on swift parrot.

Table 1.3 Assessment of significance of swift parrot (*Lathamus discolor*)

	An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:
Criterion	a) lead to a long-term decrease of a population
Response	The Project is unlikely to lead to a long-term decrease in the swift parrot's population size given: a. the removal of 20.08 hectares of box-gum woodland in the Indicative Development Footprints is unlikely to have an adverse impact on the survival of overwintering swift parrot utilising foraging resources in the south-west slopes and southern tablelands region given the low frequency with which swift parrot are likely to utilise such habitat at this location, and b. the number of individuals that may be or are likely to be impacted by collision as a result of the operation of 80 wind turbines in the Project Area is unlikely to lead to a long-term decrease in the swift parrot's population size, given the expected low frequency of individuals flying at RSA height at proposed turbine locations. However, considering their current population size and short-term population projections, any occurrence of blade strike during the lifecycle of the Project would be of considerable importance. The potential cumulative impact of removal of habitat and loss of individuals due to blade strike is unlikely to lead to a long-term decrease in the swift parrot's population size.
Criterion	b) reduce the area of occupancy of a population
Response	The Project may reduce the swift parrot's potential foraging habitat for swift parrot. However, clearance of such habitat is unlikely to have any adverse impact on the swift parrot's area of occupancy due to the presence of larger areas of equivalent habitat immediately adjacent to the Indicative Development Footprints coupled with the lack of records of swift parrot in or near the Indicative Development Footprints. Of the 36.33 hectares of potential habitat identified within the Development Corridor, 16.25 hectares will persist beyond the extent of the Indicative Development Footprints.
Criterion	c) fragment an existing population into two or more populations

	An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:
Response	Due to the nature and extent of the Project and the species' mobility it is unlikely that the swift parrot's population will be fragmented into two as a result of the construction and operation of the Project.
Criterion	d) adversely affect habitat critical to the survival of a species
Response	The habitat to be removed is not located within an important area for swift parrot (NSW BAM Support Team pers. comm 2020) and given that swift parrot have not been recorded in or near the habitat to be removed it is unlikely that such habitat is critical to the swift parrot's survival.
Criterion	e) disrupt the breeding cycle of a population
Response	The Project is unlikely to disrupt the swift parrot's breeding cycle given the Project's location relative to the swift parrot's breeding range in Tasmania.
Criterion	f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
Response	The removal of 20.08 hectares of box-gum woodland in the Indicative Development Footprints is unlikely to cause the swift parrot to decline given the species' status in the Project Area. It is unlikely that removal of such habitat would affect the survival of overwintering swift parrot utilising foraging resources in the region, and hence, in isolation, is not likely to cause the species to decline.
Criterion	g) result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat
Response	The Project is unlikely to result in invasive species that are harmful to swift parrot becoming established in swift parrot habitat.
Criterion	h) introduce disease that may cause the species to decline
Response	The Project is unlikely to result in the introduction of disease that may cause the swift parrot to decline.
Criterion	i) interfere substantially with the recovery of the species
Response	The removal of 20.08 hectares of box-gum woodland in the Indicative Development Footprints interferes with the recovery of the species as clearance of potential habitat constitutes one of the swift parrot's main threats. However, due to the reasons outlined in response to Criterion a and f regarding the predicted importance of the habitat to be removed and their likelihood of occurrence in areas to be impacted, the Project is unlikely to interfere substantially with the recovery of the species. Furthermore, the habitat to be removed is not located within an area considered important for swift parrot (NSW BAM Support Team pers. comm 2020) and is therefore unlikely to be critical for the recovery of the species.
Conclusion	**The Project is unlikely to have a significant impact on the swift parrot.**

1.4 White-throated needletail (*Hirundapus caudacutus*)

The white-throated needletail is a migratory swift which breeds in north-east Asia and spends the non-breeding season in eastern and south-eastern Australia. It occurs in southern NSW including the Boorowa / Rye Park / Yass region from November to April with numbers typically peaking during February and March. The number of white-throated needletail observed in Australia has declined in Australia by an estimated 74% since the 1950s primarily due to large-scale deforestation of its breeding habitat (Tarburton 2014). Due to its flight behaviour the white-throated needletail is particularly vulnerable to blade strike and is disproportionally represented in Australian blade strike data (Hull 2013). The white-throated needletail is listed as vulnerable and migratory under the EPBC Act.

Based on the referral guidelines for the migratory species, a total of 10 individuals corresponds to an ecologically significant proportion of their population at the national scale whilst a total of 100 individuals corresponds to an internationally significant proportion of their population (i.e. 1% of their total population) (DoE 2015). While these guidelines are specific to the migratory status of the species, it has been applied here for the threatened species assessment also. This has been done for consistency reasons and in the absence of specific measures for the species' vulnerable status. White-throated needletails were recorded on 16 occasions in the Project Area during February and March 2019 in flocks of up to 55 individuals. All observations were of birds flying within the current proposed RSA height, compared with 94% of records corresponding to the proposed RSA height of the Project as part of the existing federal approval (EPBC 2014/7163). The majority of white-throated needletails were observed between 40-80 m Above Ground Level (AGL) with 159/172 (92%) of individuals recorded in this height range.

There were no observations of white-throated needletail roosting or behaving as if preparing to roost in the Project Area. Furthermore, no white-throated needletail were seen within three hours of sunrise, which would have potentially indicated the species was roosting in the Project Area. The latest observation (and the sole observation within one hour of sunset) was of 41 individuals flying south out of the Project Area singularly or in small loose flocks over a 20 minute period. It is considered highly unlikely that the Project Area supports roosting habitat.

Separate assessments of significance have been conducted (**Tables 1.4** and **1.5**) in accordance with the species' vulnerable and migratory listing. The Project has the potential to have a significant impact on white-throated needletails under the significance criteria for both vulnerable species and migratory species as the potential for mortality of an ecologically significant proportion of its population cannot be discounted.

Table 1.4 Assessment of significance of white-throated needletail (*Hirundapus caudacutus*) – threatened species assessment

	An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
Criterion	a) lead to a long-term decrease in the size of an important population of a species
Response	The Project is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the white-throated needletail is likely to decline. Rather, the Project will modify the airspace of the main NNW-SSE aligned ridge on which the Project is located such that white-throated needletail may be at risk of mortality resulting from blade strike whilst foraging at, or dispersing through, this area. The number of individuals that may be impacted by collision as a result of the operation of 80 turbines in the Project Area may potentially lead to a long-term decrease in the population size of white-throated needletail given that an ecologically significant proportion of their population is likely to utilise airspace on the main ridge of the Project annually. The lack of information regarding their level of susceptibility to blade strike in Australia, and more specifically a lack of quantitative information on the proportion of individuals that fly at RSA height at a location with turbines likely to be impacted by blade strike means that there is a high level of uncertainty when estimating the actual likely number of individuals that may be impacted.
Criterion	b) reduce the area of occupancy of an important population
Response	The Project would not reduce the area of occupancy of white-throated needletails. It may potentially result in increased avoidance of airspace in the Project Area due to the presence of turbines.
Criterion	c) fragment an existing population of white-throated needletail into two or more populations
Response	The Project will not fragment an existing important population of white-throated needletails into two or more populations given the species' mobility and the spatial extent of the Project.
Criterion	d) adversely affect habitat critical to the survival of a species
Response	Due to the dispersed and aerial nature of white-throated needletails it is unlikely that there is any specific habitat critical for the survival of the species outside of their breeding range. The NNW-SSE aligned ridge running the length of the Project Area is likely to be an important feature in a regional context for white-throated needletail however it is unlikely to support habitat critical to the species' survival.
Criterion	e) disrupt the breeding cycle of an important population
Response	The Project will not disrupt the breeding cycle of white-throated needletail given the Project's location relative to the white-throated needletail's breeding range.
Criterion	f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
Response	The Project is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the white-throated needletail is likely to decline. The Project will however modify the airspace of the main NNW-SSE aligned ridge on which the Project is located such that white-throated needletails may be at risk of mortality resulting from blade strike whilst foraging at, or dispersing through, this area.
Criterion	g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
Response	The Project will not result in invasive species that are harmful to white-throated needletail becoming established in white-throated needletail habitat.

	An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
Criterion	h) introduce disease that may cause the species to decline
Response	The Project is unlikely to result in the introduction of disease that may cause the white-throated needletail to decline.
Criterion	i) interfere substantially with the recovery of the species
Response	Direct and indirect impacts from wind farms are known threats to white-throated needletail (TSSC 2019) however the number of individuals that are likely to be impacted by the operation of 80 turbines in the Project Area is unlikely, in isolation, to substantially interfere with the recovery of white-throated needletail.
Conclusion	**The Project has the potential to have a significant impact on the white-throated needletail as there is a chance that there could be mortality of an ecologically significant proportion of its population.**

In order to assess potential impacts on a species listed as migratory under the EPBC Act, consideration of the following classification criteria concerning what is considered important habitat is required.

'Important habitat' for a migratory species is defined in the Matters of National Environmental Significance - Significant impact guidelines (DoE 2013a) as:

a) habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or

b) habitat that is of critical importance to the species at particular life-cycle stages, and/or

c) habitat utilised by a migratory species which is at the limit of the species range, and/or

d) habitat within an area where the species is declining.

The Project Area is located within a region that is likely to occasionally support an ecologically significant proportion of the white-throated needletail's population given the observations from the Project Area during surveys conducted in February and March 2019. White-throated needletail are likely to be declining at the national scale and are hence considered likely to be declining in the area in which the Project is located (Tarburton 2014).

Table 1.5 Assessment of significance of white-throated needletail (*Hirundapus caudacutus*) – migratory species assessment

	An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:
Criterion	a) 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
Response	The Project is unlikely to substantially destroy or isolate an important area of white-throated needletail habitat although it may modify the airspace of the main NNW-SSE aligned ridge on which the Project is located such that white-throated needletail may be at risk of mortality resulting from blade strike whilst foraging at, or dispersing through this location.
Criterion	b) result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or

	An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:
Response	The Project will not result in an invasive species that is harmful to white-throated needletail becoming established in an area of important white-throated needletail habitat.
Criterion	c) seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.
Response	An ecologically significant proportion of the white-throated needletail population is likely to utilise the Project Area each summer / autumn given the maximum observed flock size of 55 individuals from 16 observations of this species recorded from a total of six survey days in February / March 2019 exceeded the abundance threshold corresponding to an ecologically significant proportion of the white-throated needletail's population. The white-throated needletail is known to be at risk of mortality from blade strike, and there is insufficient data to determine whether annual mortality is likely to exceed the thresholds for an ecologically significant proportion of the population. While the proposal may not form a barrier to white-throated needletail during migration, or feeding during migration, it is possible that it will increase mortality of the species during the migratory period. Based on the known blade strike risk, there is potential that mortality rates could exceed 10 individuals (i.e. an ecologically significant proportion of the population) per year. This would constitute disruption of the lifecycle of the species. The Project may seriously disrupt the lifecycle of an ecologically significant proportion of the white-throated needletail's population.
Conclusion	**The Project has the potential to have a significant impact on the white-throated needletail as there is a chance that there could be mortality of an ecologically significant proportion of its population.**

1.5 Regent honeyeater (*Anthochaera phyrgia*)

The regent honeyeater is a critically endangered, partially nomadic species occurring in temperate woodlands and forests within a patchy distribution between central VIC and south-east QLD which has undergone a severe decline in recent decades (Garnett *et al.* 2011). The regent honeyeater's chief threat is loss of breeding and foraging habitat (DoE 2016).

The regent honeyeater is a rare visitor to the Boorowa / Rye Park / Yass region having been recorded in the most recently near Yass in 1998 and near Frogmore in 2001 and 2003. It was not recorded during bird surveys conducted in the Project Area by NGH Environmental during November 2013 or by Umwelt during surveys conducted in February, March, October and November 2018 and January, February, March, April and July 2019. There are no contemporary or historic records from the Project Area.

For the purpose of this assessment, it is assumed that the regent honeyeater has the potential to utilise woodland habitat within the Project Area, for foraging and potentially breeding, as the species is highly mobile and irregularly detected over a wide range. The likelihood of the species utilising habitat in the project area is consistent with that of extensive areas of degraded woodland and dry forest throughout the species range. For the purposes of this assessment, criteria in **Table 1.6** are assessed under the assumption that there is only one single population of regent honeyeater (i.e. the national population).

The assessment of significance for regent honeyeater is presented in **Table 1.6**. The Project is unlikely to have a significant impact on regent honeyeater.

Table 1.6 Assessment of significance of regent honeyeater (*Anthochaera phyrgia*)

	An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:
Criterion	a) lead to a long-term decrease of a population
Response	The Project is unlikely to lead to a long-term decrease in the regent honeyeater's population size given: a. the importance of the habitat to be removed for breeding individuals is considered low; b. the removal of 20.08 hectares of box-gum woodland in the Indicative Development Footprints is unlikely to have an adverse impact on the survival of regent honeyeater utilising foraging resources in, or dispersing through, the greater region given the very low frequency with which regent honeyeater are likely to utilise habitat at this location, and c. the number of individuals that may be or are likely to be impacted by collision as a result of the operation of 80 wind turbines in the Project Area is unlikely to lead to a long-term decrease of the regent honeyeater's population size, given the expected low frequency of individuals dispersing through the Project Area and the very low proportion of which are likely to be flying at RSA height at proposed turbine locations. However, given their current population size, any occurrence of blade strike during the lifecycle of the Project would be of considerable importance. The potential cumulative impact of removal of habitat and loss of individuals due to blade strike is unlikely to lead to a long-term decrease in the regent honeyeater's population size.
Criterion	b) reduce the area of occupancy of a population
Response	The Project would reduce the extent of potential habitat available to be utilised by the regent honeyeater's in the Project Area by approximately 20.08 hectares. However, habitat to be removed is likely to be only very rarely utilised by regent honeyeater given the findings of bird surveys conducted in the Project Area to date and the species' status in the region. Extensive equivalent habitat remains in the surrounding landscape, and regent honeyeater is a highly mobile species and is unlikely to be impacted by fragmentation. Hence, the removal of such habitat is unlikely to have an impact on the regent honeyeater's current known area of occupancy. Of the 36.33 hectares of habitat identified within the Development Corridor, 16.25 hectares will persist beyond the extent of the Indicative Development Footprints.
Criterion	c) fragment an existing population into two or more populations
Response	The Project is unlikely to fragment an existing important population of the regent honeyeater into two or more populations given the regent honeyeater's mobility.
Criterion	d) adversely affect habitat critical to the survival of a species
Response	Regent honeyeaters have not been recorded in the Project Area and the habitat to be removed is not located within an important area for regent honeyeater (NSW BAM Support Team pers. comm 2020).Hence, it is unlikely that habitat present in the Indicative Development Footprints is critical to the survival of the regent honeyeater.
Criterion	e) disrupt the breeding cycle of a population
Response	The Project is unlikely to disrupt the breeding cycle of the regent honeyeater given that the species is very unlikely to breed in the Project Area during the life of the Project and the construction and operation of the Project is unlikely to prevent or adversely disrupt any breeding attempts if they were to occur.
Criterion	f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

	An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:
Response	The removal of 20.08 hectares of box-gum woodland in the Indicative Development Footprints is unlikely to cause the regent honeyeater to decline given the species' status in the Project Area. It is unlikely that removal of such habitat would affect the survival of regent honeyeater utilising foraging or breeding resources in the region, and hence, in isolation, is not likely to cause the species to decline.
Criterion	g) result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat
Response	The Project is unlikely to result in invasive species that are harmful to the regent honeyeater becoming established in regent honeyeater habitat.
Criterion	h) introduce disease that may cause the species to decline
Response	The Project is unlikely to result in the introduction of disease that may cause the regent honeyeater to decline.
Criterion	i) interfere substantially with the recovery of the species
Response	The removal of 20.08 hectares of box-gum woodland in the Indicative Development Footprints has the potential to interfere with the recovery of the species as clearance of habitat constitutes the regent honeyeater's chief threat. However, as regent honeyeater are likely to only very rarely occur in the Indicative Development Footprint, the importance of vegetation in this area for regent honeyeater is likely to be low and the clearance of such is unlikely to interfere substantially with the recovery of regent honeyeater.
Conclusion	**The Project is unlikely to have a significant impact on the regent honeyeater.**

1.6 Painted honeyeater (*Grantiella picta*)

The painted honeyeater is a nomad which occurs from eastern Northern Territory to south-eastern Australia where it predominantly occurs on the slopes and plains of the Murray-Darling Basin. It inhabits a range of woodlands and shrublands, particularly those that support a high density of mistletoe cover. The painted honeyeater's main threat is habitat loss across its non-breeding and breeding range (Garnett *et al*. 2011). It is listed as vulnerable under the EPBC Act.

The painted honeyeater is an uncommon species in the Boorowa / Rye Park / Yass region where it is predominantly recorded in box-gum woodland and in riverine areas during spring and summer. Painted honeyeater were recorded at six locations in the Project Area by NGH Environmental during November 2013 including near, but not within the Indicative Development Footprints. There are no other records of painted honeyeater in the Indicative Development Footprints. The species is an occasional, and potentially breeding visitor to the Project Area, with their occurrence likely to be correlated with the availability of flowering mistletoes. For the purposes of this assessment, Criteria a, b, c and e are assessed under the assumption that there is only one single population of painted honeyeater and this is considered important. The assessment of significance for painted honeyeater is presented in **Table 1.7**. The Project is unlikely to have a significant impact on painted honeyeater.

Table 1.7 Assessment of significance of painted honeyeater (*Grantiella picta*)

	An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
Criterion	a) lead to a long-term decrease in the size of an important population of a species
Response	The Project is unlikely to lead to a long-term decrease in the painted honeyeater's population size given: a. the importance of the habitat to be removed for breeding individuals is likely to be low due to the lack of breeding records in the Indicative Development Footprints; b. the removal of 20.08 hectares of box-gum woodland in the Indicative Development Footprints is unlikely to have an adverse impact on the survival of painted honeyeater utilising foraging resources within, or dispersing through, the greater region, given the likely low importance of habitat to be removed for painted honeyeater, and c. the number of individuals that may be or are likely to be impacted by collision as a result of the operation of 80 wind turbines in the Project Area is unlikely to lead to a long-term decrease of the painted honeyeater's population size given the expected low frequency of individuals flying at RSA height at proposed turbine locations. The potential cumulative impact of removal of habitat and loss of individuals due to blade strike is unlikely to lead to a long-term decrease in the painted honeyeater's population size.
Criterion	b) reduce the area of occupancy of an important population
Response	The Project would reduce potential habitat for the painted honeyeater in the Project Area by approximately 20.08 hectares. Much of this habitat may be only rarely utilised by painted honeyeater dependent on seasonally unpredictable availability of foraging resources and given the findings of bird surveys conducted in the Project Area to date. The species is highly mobile, and would continue to utilise habitat in the landscape. Clearance of habitat is unlikely to substantially impact the area of occupancy at the landscape scale due to the presence of larger areas of equivalent or higher quality habitat immediately adjacent to the Indicative Development Footprints and elsewhere in the Project Area. Of the 36.33 hectares of habitat identified within the Development Corridor, 16.25 hectares will persist beyond the extent of the Indicative Development Footprints.
Criterion	c) fragment an existing population into two or more populations
Response	The Project is unlikely to fragment an existing important population of the painted honeyeater into two or more populations given the painted honeyeater's mobility.
Criterion	d) adversely affect habitat critical to the survival of a species
Response	The habitat to be removed is unlikely to be critical to the survival of the painted honeyeater given painted honeyeaters have not been recorded breeding or foraging in the Indicative Development Footprints.
Criterion	e) disrupt the breeding cycle of an important population
Response	The Project is unlikely to disrupt the breeding cycle of painted honeyeater given that the construction and operation of the Project is unlikely to prevent or adversely disrupt breeding attempts in the Project Area.
Criterion	f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
Response	The removal of 20.08 hectares of box-gum woodland in the Indicative Development Footprints is unlikely to cause the painted honeyeater to decline given the likely low importance of the habitat to be removed.

	An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
Criterion	g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
Response	The Project is unlikely to result in invasive species that are harmful to painted honeyeater becoming established in painted honeyeater habitat.
Criterion	h) introduce disease that may cause the species to decline
Response	The Project is unlikely to result in the introduction of disease that may cause the painted honeyeater to decline.
Criterion	i) interfere substantially with the recovery of the species
	The removal of 20.08 hectares of box-gum woodland in the Indicative Development Footprints interferes with the recovery of the species as clearance of habitat constitutes one of the painted honeyeater's key threats. However, the Project is unlikely to interfere substantially with the recovery of painted honeyeater given the low level of dependence the painted honeyeater is likely to have on the vegetation to be removed.
Conclusion	**The Project is unlikely to have a significant impact on the painted honeyeater.**

1.7 Striped legless lizard (*Delma impar*)

The striped legless lizard (*Delma impar*) is listed as vulnerable under the EPBC Act. It is a grassland specialist occurring in native grassland, near grassy woodland and exotic pasture. It is mostly associated with dense perennial tussock grasses such as speargrass (*Austrostipa bigeniculata*) and kangaroo grass (*Themeda triandra*). The species shelters under surface rock, in cracks in the soil, or in tussocks, and feeds selectively on surface active and sedentary arthropod prey, especially spiders, butterfly and moth larvae, field crickets and cockroaches (DSEWPC, 2011, TSSC, 2016). The striped legless lizard is patchily distributed throughout south-eastern NSW, the ACT, north-eastern, central and south-western VIC, and south-eastern South Australia (SA). There are outlying records from Gilgandra and Muswellbrook in NSW (TSSC, 2016).

The main threat to striped legless lizard across its entire range is habitat degradation and destruction, particularly to natural temperate grassland which has been drastically altered since European settlement (Kirkpatrick et al. 1995). Striped legless lizard is known to occur in modified grasslands, but it can be eliminated from an area by extended intense grazing, pasture improvement, ploughing, drought or other heavy disturbance. Smith & Robertson (1999) suggest that the species can recolonise areas, but is likely dependent on the availability of nearby undisturbed refuge areas.

The habitat assessment completed as part of the Preliminary Documentation identified a total of 6,407 hectares of native grasslands within four categories (excellent, good, moderate and low) within the Project Area / Site Boundary assessed as part of the Preliminary Documentation (Epuron 2017). It is noted that the Site Boundary / Project Area assessed as part of the Preliminary Documentation (Epuron 2017) relates to the extent of relevant landholdings of all landholders involved with the project at the time of the Preliminary Documentation. Umwelt has not completed an assessment of this extent and therefore cannot be directly compared with the revised assessment.

During the Preliminary Documentation process, NGH took the approach of known habitat being that of suitable habitat (i.e. excellent and good quality habitat) contiguous with that of the known record (Epuron 2017). The justification for this position was that suitable habitat at the site is present as disjunct patches across very broad areas separated by expanses of less suitable habitat. BCD supported the approach, where known habitat was defined as continuous excellent and good condition habitat separated by no more than 30 metres (Epuron 2017). As a result, 512 hectares of known habitat for striped legless lizard was identified

as being impacted by the Project Area assessed as part of the Preliminary Documentation (Epuron 2017). This is referred to as the area of 'known habitat' for striped legless lizard which occurs in the north of the Project, south of Grassy Creek Road.

This known area of known habitat is mapped within the Project Area assessed as part of the Preliminary Documentation (Epuron 2017), which is much larger than that considered by Umwelt. It extends well beyond the Development Corridors and Indicative Development Footprints. Umwelt supports this approach, as did BCD on 13 October 2015 (Epuron 2017).

Umwelt used the original mapping of known striped legless lizard habitat, i.e. 512 hectares in the Project Area assessed as part of the Preliminary Documentation (Epuron 2017), to determine impacts on known habitat. Of the 512 hectares of known habitat for striped legless lizard identified within the Project Area assessed as part of the Preliminary Documentation (Epuron 2017), This comprises 125.45 hectares within the Development Corridor – Wind Farm and 0.66 hectares within the Development Corridor Permanent Masts. Of which the extent within the Development Corridors, 43.29 hectares occurs within thin the Indicative Development Footprints assessed as part of the modification project., comprising 42.72 hectares within the Indicative Development Footprint – Wind Farm and 0.57 hectares within the Indicative Development Footprint – Permanent Met Masts. We note that the impacts identified for the species in relation to the permanent met masts occurs at the boundary edge of the habitat for the species. While it presents an impact to the species it will not further fragment or isolate the remaining habitat.

The following information regarding 'important populations' is taken from the EPBC Act Significant Impact Guidelines 1.1.

An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- *Key source populations 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.*

Given the difficulty in detecting this species and the lack of records in the region, the Department of Agriculture, Water and the Environment (DAWE)considers that when one or more individuals are found on a site that they are a member/s of an important population (TSSC, 2016). Also, if important habitat is present for the striped legless lizard, this acts as a surrogate for an 'important population' of the species (DoEE, 2018). Although specific habitat requirements for striped legless lizard are not fully understood, known important habitat for the striped legless lizard is likely to be habitat critical to the survival of the species, with one or more characteristics listed in the *Conservation Advice* (TSSC, 2016). Habitat in the Indicative Development Footprints is considered habitat critical to the survival of the species because it is likely to provide:

- Breeding habitat: one individual striped legless lizard was recorded in habitat that is likely to contain more individuals containing tussock grasses, some surface rock, including exotic grasses.
- Foraging habitat: the site has rocks and tussock grasses as a derived native grassland and the species has been recorded in the past site is and connected to grasslands.
- Habitat occurs on the edge of the 'known or likely to occur' distribution in the South West Slopes region, north of the known occurrences at Yass, and represents a newly discovered range extension for 'likely to occur' distribution (see SLL Distribution dataset, DoEE, 2019).

Based on this assessment process, 126.11 hectares of suitable habitat occurs within the Development Corridors and can be considered important habitat for the striped legless lizard. Therefore, by this assessment process, the Development Corridors are likely to contain an important population of this species within the known habitat area. Of the total habitat within the Development Corridors, the Project will impact 43.29 hectares of habitat through the construction of northern wind turbines to the south of Grassy Creek Road, and associated infrastructure.

The Project has the potential to have a significant impact on striped legless lizard due to impacts on a potentially important population. Full details of the assessment of significance for the striped legless lizard is presented in **Table 1.8.**

Table 1.8 Assessment of significance of the striped legless lizard (*Delma impar*)

	An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
Criterion	a) lead to a long-term decrease in the size of an important population of a species
Response	Of the ten tile array survey locations within identified potential habitat in the Development Corridors, only one location recorded the striped legless lizard. The Project will impact on 43.29 hectares of important habitat for a local population of the stiped legless lizard at this location. This impact is within the known habitat continuous from the record. Based on our experience and knowledge of this species, it is fair to assume that there are additional populations within consistent habitat beyond the Development Corridors. The construction of the northern wind turbines to the south of Grassy Creek Road and associated infrastructure will result in permanent impacts on this habitat. Clearing of habitat could result in direct morality of potential individuals. This will lead to a reduction in available habitat which may affect the ability of this species to survive within its local distribution. However, 82.82 hectares of the known important habitat will remain intact at this location within the Development Corridors. The potential for indirect impacts is considered low, given the already disturbed location from historical land clearing and ongoing grazing which the species has tolerated. Without a detailed understanding of the local occurrence of this species outside of the Development Corridors and impacts to important habitat within the limits of its distribution, it must be assumed that the project may possibly lead to a long-term decrease in size of the important population. However as noted earlier, it is fair to assume that there are additional populations within consistent habitat beyond the Development Corridors.
Criterion	b) reduce the area of occupancy of an important population
Response	The Project will impact on 43.29 hectares of important habitat in an area likely to be occupied by a local population of the stiped legless lizard. The area of occupancy for the important population extends beyond the Indicative Development Footprints and comprises 82.82 hectares that will not be directly impacted (Development Corridors). Furthermore, based on local knowledge and observations, it is likely that the area of occupancy of this species extends beyond the Development Corridors assessed for the project. The extent of this is unknown but is unlikely to be small. However, when assessed against the area of habitat confirmed within the Development Corridors, the project will reduce the area of occupancy by 34.3%.
Criterion	c) fragment an existing important population into two or more populations
Response	The construction of the northern wind turbines to the south of Grassy Creek Road and associated infrastructure will result in permanent impacts on this habitat. The landscape is already highly fragmented from historical land clearing. Much of the groundcover is partially intact and grazed by livestock. Clearing of this habitat is unlikely to fragment the existing important population into two or more populations. After construction, the striped legless lizard will be able to move freely across the access track and constructed wind turbine location between retained habitat.

	An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
Criterion	d) adversely affect habitat critical to the survival of a species
Response	Based on to the Significant Impact Criteria in the Significant Impact Guidelines (DoE 2013) habitat in the Indicative Development Footprints may be habitat critical to the survival of the species because it is likely to provide: • Breeding habitat: one individual striped legless lizard was recorded in habitat that is likely to contain more individuals containing tussock grasses, some surface rock, including exotic grasses. • Foraging habitat: the site has rocks and tussock grasses as a derived native grassland and the species has been recorded in the past site is and connected to grasslands. • Habitat occurs on the edge of the 'known or likely to occur' distribution in the South West Slopes region, north of the known occurrences at Yass, and represents a newly discovered range extension for 'likely to occur' distribution (see SLL Distribution dataset, DoEE, 2019). The Project will impact on 43.29 hectares of important habitat for a local population of the stiped legless lizard. The construction of the northern wind turbines to the south of Grassy Creek Road and associated infrastructure will result in permanent impacts on this habitat. Clearing of habitat may also have direct morality on individuals. The potential for indirect impacts and deterioration on remaining grassland is considered low, given the already disturbed location from historical land clearing and current grazing regime. The remaining 82.82 hectares of important habitat will maintain the long-term viability of the important population and is likely to maintain the species genetic diversity and evolutionary development at the location. Therefore, the Project is unlikely to cause adverse impacts to habitat critical to the survival of the species, including the local occurrence of the important population.
Criterion	e) disrupt the breeding cycle of an important population
Response	In order to breed, the species requires two or more adult individuals or juveniles at a site containing complex grass structures including areas of tussocks with high biomass, surface rocks or invertebrate burrows necessary as sites for oviposition and which provide protection for eggs from disturbance (TSSC, 2016). The removal of rocks and tussock grasses is likely to disrupt breeding and alter behavioural patterns of this individuals in the area of impact. The remaining 82.82 hectares of important habitat will maintain habitat features required for breeding for the long-term viability of the important population. Therefore, the Project is unlikely to disrupt the breeding cycle of the entire important population.
Criterion	f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
Response	The Project will impact on 43.29 hectares of habitat that is potentially important for a local population of the stiped legless lizard. The construction of the northern wind turbines to the south of Grassy Creek Road and associated infrastructure will result in permanent impacts on this habitat. Clearing of habitat would result in removal of or disturbance to habitat features such as rocks and reduce the quality and availability of habitat. It is noted however that the quality of habitat has already been reduced through the historical agricultural land use. Despite this, the species persists to occupy the habitat. The loss of surface rocks, arthropod burrows and suitable cracks in soil is particularly important for stiped legless lizards which can take refuge and escape from trampling livestock and bushfire. The Project will result in a decrease in the extent of these important habitat features within the identified habitat area which is likely to reduce or modify the overall quality of habitat for the important population. However, the 82.82 hectares that will remain in the Development Corridors, as well as the habitat beyond this boundary also contains these important habitat features. It is considered likely that the persisting habitat will support the important population.

	An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
Criterion	g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
Response	The associated indirect impacts of this key threatening process are well documented and include increased potential for the proliferation of invasive species. The potential for indirect impacts and deterioration on remaining grassland is considered low, given the existing site disturbance and presence of weeds at the location from historical land clearing and current grazing regime. Weeds are likely to invade the adjacent edges of the habitat. However, under the current land use regime, changes to the quality and integrity of the important habitat are likely to be negligible.
Criterion	h) introduce disease that may cause the species to decline
Response	There are no known diseases that are likely to be introduced.
Criterion	i) interfere substantially with the recovery of the species
Response	The national recovery plan for the striped legless lizard (Smith & Robertson, 1999) aims to ensure the long-term survival of the species and maintain its potential for evolutionary development in the wild across its natural geographic range. It identifies four key objectives relevant to this Project: 1. Determine the distribution of potential striped legless lizard habitat. 2. Determine the current distribution and abundance of striped legless lizard in VIC, NSW, the ACT and SA. 3. Determine the habitat use and ecological requirements of striped legless lizard. 4. Identify the nature and extent of the threatening processes affecting striped legless lizard. The Project generally aligns and does not interfere with the objectives of this plan.
Conclusion	**The Project will remove 43.29 hectares of habitat for a potentially important population of striped legless lizard. Based on local knowledge and observations, it is likely that the area of occupancy of this species extends beyond the Development Corridors assessed for the Project. The extent of this is unknown but is unlikely to be small. The remaining 10.38 hectares (in the Development Corridors) of important habitat is likely to maintain the species genetic diversity and evolutionary development at the location. However, when assessed against the area of habitat confirmed within the Development Corridors, 34.3% of the confirmed important habitat will be impacted. In conclusion, the Project has the potential to cause a significant impact on striped legless lizard.**

1.8 Golden sun moth (*Synemon plana*)

The golden sun moth typically occurs in native grassland and grassy woodlands containing wallaby grass (*Rytidosperma* spp.), speargrass (*Austrostipa* spp.), and redleg grass (*Bothriochloa* spp.), as well as in degraded grasslands dominated by the exotic Chilean needlegrass (*Nassella nessiana*) (DEWHA, 2009).

Golden sun moths occur in derived native grasslands, non-native grasslands and open woodlands throughout the Yass region between Boorowa and Queanbeyan, NSW, including throughout northern ACT. Limited information is available regarding the extent of populations in NSW. The ACT is known to support approximately 1,800 hectares of golden sun moth habitat (CPR 2017), following intensive survey effort, representing approximately 78 of 128 known sites in the local population. Surveys in the Yass Valley Region have identified several thousand hectares of confirmed and potential habitat for the species. Studies of golden sun moth across the species' range show genetic variation increasing with the geographic distance between populations (CPR 2017). Five key genetic clusters have been identified, one encompassing the

populations from the ACT and nearby NSW and the remainder in Victoria. Populations in the ACT/NSW cluster are likely to have recently undergone further genetic differentiation as a result of habitat fragmentation associated with the introduction of agriculture.

A key threat to golden sun moth is loss of grassy ecosystems cleared for agriculture and urban development, particularly natural temperate grasslands and box-gum woodland which have been dramatically altered. The species is also sensitive to certain development impacts due to its limited dispersal ability, seasonal lifecycle (underground larvae), short adult lifespan, specific habitat requirements and fragmented distribution. The limited dispersal ability of the golden sun moth means habitat areas separated by >200 m are effectively isolated and should be considered as separate habitat areas (DEWHA, 2009).

Following extensive consultation with DPIE and BCD, it was agreed that a revised assessment process would be employed to define the impact assessment for golden sun moth. It was acknowledged through the consultation process that the species' habitat is difficult to assess, and this is further complicated for a Project of this scale, and over a long project timeframe and approval history.

Umwelt developed two methods to map golden sun moth species polygons, depending on whether sightings had been recorded in particular locations, or whether suitably-timed surveys had recorded an absence of the species. Each method comprised particular attributes that led to areas of grassland habitat being excluded or included for consideration as the species polygon across all grassland habitats, including derived native grasslands (Vegetation Zone 4 [PCT 350 – DNG] and Vegetation Zone 6 [PCT 351 – DNG], as well as non-native vegetation (Vegetation Zone 10). Attributes considered included relevant vegetation zones, wallaby grass cover categories, golden sun moth records (and 200 metre buffers thereof), shading effects, soil moisture, vegetative barriers, slope and aspect.

The first method applies to the process undertaken to determine golden sun moth habitat within the Development Corridors that do not support existing golden sun moth records, while the second method applies to the process undertaken to determine habitat for the species where the species has been recorded. The second method is of importance because it recognises the species has been recorded potentially outside of ideal habitat requirements, i.e. the species has been recorded in grassland habitat that perhaps does not support suitable cover of wallaby grass. The two methods are described in Section 2.4.2 of the re-referral document.

The Project will result in impacts to 85.28 hectares of golden sun moth habitat within the Indicative Development Footprints. With 224.21 hectares of golden sun moth habitat identified within the Development Corridor, 138.93 hectares will persist beyond the extent of the Indicative Development Footprints.

There is a possibly of a significant impact on the golden sun moth if the action results in, or exceeds, the following impact thresholds in **Table 1.9** as set out in the *significant impact guidelines for the critically endangered golden sun moth* (DEWHA, 2009).

All ten habitat areas exceed the impact threshold for populations that support the ecological health of the overall golden sun moth species. As a result, the Project is considered to have a significant impact on the golden sun moth species. Full details of the assessment of significance for the golden sun moth is presented in **Table 1.10.**

Table 1.9 Impact thresholds of affected golden sun moth habitat areas

Ecological element affected	Impact Threshold
Large or contiguous habitat area (>10 ha)	Habitat loss, degradation or fragmentation >0.5 ha
Small or fragmented habitat area (<10 ha)	Any habitat loss, degradation or fragmentation
Habitat connectivity	Fragmentation of a population through the introduction of a barrier to dispersal

Table 1.10 Assessment of significance of golden sun moth (*Synemon plana*)

	An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:
Criterion	a) lead to a long-term decrease of a population
Response	The Project will result in impacts to 85.28 hectares of golden sun moth habitat across numerous habitat areas within the Indicative Development Footprints, all of which would be considered to be >10 hectares. There will be permanent habitat loss >0.5 ha in the majority of these habitat areas >10 ha. As a result, the project impacts will exceed the impact threshold for populations that support the ecological health of the overall golden sun moth species. There are extensive areas (potentially several thousand hectares) of suitable habitat dominated with wallaby grass (*Rytidosperma* spp.) in the surrounding landscape with characteristics similar to golden sun moth habitat areas found in the Development Corridor. On the basis that there are likely to be thousands of hectares of potential habitat present in the landscape, the 85.28 ha of habitat is likely to support a negligible proportion of the population. Of habitat for the golden sun moth identified in the Development Corridor, the Project will impact on 38 % of this within the Indicative Development Footprint. Within the wider region, this proportion will decrease. Identified impact thresholds provided are based on golden sun moth habitat being natural temperate grassland, not native pastures derived from box gum woodland and dry forest. Despite this, due to there being substantially over identified impact thresholds, the potential for a long term decrease in the local population cannot be discounted. Therefore, the Project has a possibly of leading to a long term decrease of a population of golden sun moth.
Criterion	b) reduce the area of occupancy of a population
Response	The Project will result in impacts to 85.28 hectares of golden sun moth habitat across numerous habitat areas within the Indicative Development Footprints, all of which would be considered to be >10 hectares. On the basis that there are likely to be thousands of hectares of potential habitat present in the landscape, the 85.28 ha of habitat is likely to support a negligible proportion of the population. Identified impact thresholds provided are based on golden sun moth habitat being natural temperate grassland, not native pastures derived from box gum woodland and dry forest. Despite this, due to there being substantially overidentified impact thresholds, habitat areas exceed the impact threshold for populations that support the ecological health of the overall golden sun moth species. The Project will reduce the area of occupancy in all populations.
Criterion	c) fragment an existing population into two or more populations

	An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:
Response	There will be permanent impacts occurring in golden sun moth habitat areas from the construction of turbines, internal and external access tracks, and installation of underground cabling. There will also be construction of ancillary facilities such as a construction compound and concrete batch plant in a habitat area at the southern extent of the Indicative Development Footprint – Wind Farm Installation of transmission line easements will partially impact on golden moth habitat and vary in the scale of habitat loss. The installation of poles will be a permanent impact, however the easement itself is likely to retain the ground layer which may provide habitat for golden sun moth depending on the level of ground disturbance. Some 224.21 hectares of habitat area within the Development Corridor will persist beyond the extent of the direct impacts of the Indicative Development Footprints. Direct impacts are likely to separate or fragment these remaining habitat areas, but are unlikely to cause large barriers or isolate populations, such as breaks of 200 m or more that will restrict dispersal. Therefore, the Project is unlikely to fragment the existing populations into two or more populations.
Criterion	d) adversely affect habitat critical to the survival of a species
Response	All habitat areas throughout the Development Corridor are considered critical to the survival of the golden sun moth species. Although, there are likely to be thousands of hectares of potential habitat present in the landscape, the 85.28 ha of habitat impacted in the Indicative Development Footprints is likely to support a negligible proportion of the population. Despite this, due to there being substantially over identified impact thresholds, all habitat areas exceed the impact threshold for populations that support the ecological health of the overall golden sun moth species. Therefore, the Project has a possibility of adversely affecting habitat critical to the survival of the golden sun moth species.
Criterion	e) disrupt the breeding cycle of a population
Response	The Project will result in impacts to 85.28 hectares of known breeding habitat for golden sun moth habitat across habitat areas within the Development Corridor. All habitat areas exceed the impact threshold for populations that support the ecological health of the overall golden sun moth species, including areas for feeding, breeding and dispersal. Therefore, the Project has a possibly of disrupting the breeding cycle of populations in the Indicative Development Footprints.
Criterion	f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
Response	The Project will result in impacts to 85.28 hectares of known breeding habitat for golden sun moth habitat across the Development Corridor. All habitat areas exceed the impact threshold for populations that support the ecological health of the overall golden sun moth species. Habitat loss is likely to lead to a decline in the population of the species in the Project Area. The decline in the species is associated with a direct loss of individuals such as underground larvae and habitat. The quality of adjacent habitat areas have potential to change due to edge effects such as shading, wind, altered hydrology and weed invasion. However, given the already disturbed nature of the Project Area, edge effects are unlikely to cause a decline in remaining habitats. Direct impacts are likely to separate or fragment these remaining habitat areas, but are unlikely to cause large barriers or isolate populations such as breaks of 200 m or more that will restrict dispersal. The Project is considered unlikely to cause a continuing long term decline in the remaining population post-construction.
Criterion	g) result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat

	An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:
Response	A principal threat to golden sun moth is weed invasion, particularly introduced pasture grasses that compete with native *Austrostipa* spp. and *Rytidosperma* spp., grasses. This excludes the exotic Chilean needlegrass (*Nassella nessiana*) which provides habitat for the golden sun moth. The associated indirect impacts of this key threatening process are well documented and include increased potential for the proliferation of invasive species. Most of the Development Corridor is exposed to historical and ongoing disturbances from grazing and other agricultural pressures. Given the occurrence of existing weeds in habitat areas, the Project is unlikely to introduce invasive species such as weeds that are harmful to the golden sun moth or its habitat. Measures to minimise invasion of weeds during construction and operation would be implemented to mitigate increases of weed invasion into golden sun moth habitat.
Criterion	h) introduce disease that may cause the species to decline
Response	There are no known diseases that are likely to be introduced.
Criterion	i) interfere substantially with the recovery of the species
Response	There is currently no specific recovery plan for the golden sun moth, but the following regional priority recovery and threat abatement actions relevant to the Project are recommended in the conservation advice (DoE, 2013) for the species: • Minimise disturbance in areas where the golden sun moth occurs, excluding necessary actions to manage the conservation of the species. Retain and protect natural grassland remnants within the known distribution of the species. • Ensure remnant populations remain connected or linked to each other; in cases where remnants have become isolated, consider revegetation to re-establish links and aid dispersal. • Manage any changes to hydrology that may result in changes to water table levels and/or increased run-off, salinity, or pollution. • Identify populations of high conservation priority. Search for the species in suitable habitat in areas that are proposed for development. • Control invasions of weeds and pasture species, and consider the impact of herbicide use in habitat; where possible use methods that directly target weeds such as spot spraying and hand removal to minimise the adverse impact on the golden sun moth. The Project somewhat contradicts with these recommendations. The Proponent is committed to implementing the hierarchy of avoidance measures through the final design phase of the Indicative Development Footprints. It is expected that additional avoidance and disturbance minimisation will be possible for the project. Environmental management during construction will include weed control and hygiene protocols to minimise weed dispersal, will be designed to minimise risks associated with herbicide use. The offset package for the Project may provide opportunities for linking, enhancing or establishing additional populations.
Conclusion	**The Project will result in impacts to 85.28 hectares of golden sun moth habitat across numerous habitat areas within the Indicative Development Footprints. Although, there are likely to be thousands of hectares of potential habitat present in the landscape, the 85.28 ha of habitat impacted in the Indicative Development Footprints is likely to support a negligible proportion of the population. Despite this, due to there being substantially over identified impact thresholds, all habitat areas exceed the impact threshold for populations that support the ecological health of the overall golden sun moth species.** **The Project is likely to have a significant impact on the golden sun moth.**

1.9 Koala (*Phascolarctos cinereus*)

The koala is listed as vulnerable under the EPBC Act. The species is known to occur naturally in eucalypt woodlands and forests from north-eastern QLD, along the eastern coast of NSW, to the south-east corner of SA. The species has a fragmented distribution, and in NSW it mainly occurs on the central and north coasts, with some populations in the west of the Great Dividing Range.

1.9.1 Habitat Assessment

In accordance with the EPBC Act Referral Guidelines for the Vulnerable Koala (DoE 2014), the habitat assessment tool was applied (**Table 1.11**), to determine whether the Indicative Development Footprints are considered to contain habitat critical to the survival of the species (DoE 2014).

Table 1.11 Assessment of Koala Habitat in the Study Area

Koala Habitat Assessment Tool (Table 4 from DoE 2014)			Survey Area Assessment	
Attribute	**Score**	**Inland (<800mm)**	**Allocated Score**	**Score Justification**
Koala occurrence	+2 (high)	Evidence of one or more koalas within the last 5 years.	0	The Atlas of NSW Wildlife search identified one koala record within 2 km of the Indicative Development Footprints, recorded in 2004.
	+1 (medium)	Evidence of one or more koalas within 2 km of the edge of the impact area within the last 10 years.		
	0 (low)	None of the above.		
Vegetation composition	+2 (high)	Has forest, woodland or shrubland with emerging trees with 2 or more known koala food tree species, **OR** 1 food tree species that alone accounts for >50% of the vegetation in the relevant strata.	2	Plant Community Types (PCT) 289, 350 and 351 within the Indicative Development Footprints generally support 15 per cent of regionally relevant eucalypt species for the koala.
	+1 (medium)	Has forest, woodland or shrubland with emerging trees with only 1 species of known koala food tree present.		
	0 (low)	None of the above.		
Habitat connectivity	+2 (high)	Area is part of a contiguous landscape ≥ 1000 hectares.	2	The Indicative Development Footprints cross through patches of remnant vegetation which form part of a contiguous landscape >1000 ha.
	+1 (medium)	Area is part of contiguous landscape < 1000 hectares, but ≥ 500 hectares.		
	0 (low)	None of the above.		

Koala Habitat Assessment Tool (Table 4 from DoE 2014)			Survey Area Assessment	
Attribute	**Score**	**Inland (<800mm)**	**Allocated Score**	**Score Justification**
Key existing threats	+2 (high)	Little or no evidence of koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence.	1	While the Indicative Development Footprints encompass predominately pastoral land and patches of remnant vegetation, some areas overlap existing roads which pose a potential vehicle threat to koalas.
	+1 (medium)	Evidence of infrequent or irregular koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence, **OR** Areas which score 0 for koala occurrence are likely to have some degree of dog or vehicle threat present.		
	0 (low)	Evidence of frequent or regular koala mortality from vehicle strike or dog attack in the Survey Area at present, **OR** Areas which score 0 for koala occurrence and have a significant dog or vehicle threat present.		
Recovery value	+2 (high)	Habitat is likely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1 (of the referral guideline).	1	Table 1 of the Referral Guidelines (DoE 2014) prescribes that for inland areas, the interim recovery objectives are to: • Protect and conserve the quality and extent of habitat refuges for the persistence of the species during droughts and periods of extreme heat, especially in riparian environments and other areas with reliable soil moisture and fertility. • Maintain the quality, extent and connectivity of large areas of koala habitat surrounding habitat refuges.
	+1 (medium)	Uncertainty exists as to whether the habitat is important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.		
	0 (low)	Habitat is unlikely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.		
TOTAL SCORE			6	≥ 5 indicates habitat critical for the survival of the koala.

As the habitats identified in the impact area scored six using the Referral Guidelines habitat assessment tool, the Indicative Development Footprints are considered to form part of an area of habitat critical to the survival of the koala (DoE 2014).

1.9.2 Assessment of Significance

The Project will result in the loss of approximately 106.29 ha of potential foraging and breeding habitat for the koala within the Indicative Development Footprints, comprised of vegetation within the following PCTs:

- 289 Mugga Ironbark - Inland Scribbly Gum - Red Box shrub/grass open forest on hills in the upper slopes sub-region of the NSW South Western Slopes Bioregion (Moderate to Good Condition);
- 350 Candlebark - Blakely's Red Gum - Long-leaved Box grassy woodland in the Rye Park to Yass region of the NSW South Western Slopes Bioregion and South Eastern Highland Bioregion (Moderate to Good Condition) and
- 351 Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion (Moderate to Good Condition and Argyle Apple Forest).

Together, these PCTs contain several koala tree species per schedule 2 of the State Environmental Planning Policy (SEPP), including Blakely's red gum (*Eucalyptus blakelyi*), apple box (*Eucalyptus bridgesiana*), river red gum (*Eucalyptus camaldulensis*), bundy (*Eucalyptus goniocalyx*), red stringybark (*Eucalyptus macrorhyncha*), yellow box (*Eucalyptus melliodora*), brittle gum (E*ucalyptus mannifera*) and Mugga ironbark (*Eucalyptus sideroxylon*).

There are several OEH BioNet Atlas of NSW Wildlife (DPIE 2020) records of the koala that are proximate to the Indicative Development Footprints, including:

- historic record from 1970 located approximately 4.2 km west of the Indicative Development Footprints near Rye Park
- historic record from 1981 located approximately 2.5 km south of the Indicative Development Footprint near Coolalie Road
- historic record from 1997 located approximately 6.5 km west of the Indicative Development Footprint near Wargeila Road
- one record from June 2004 approximately 0.4 km east of the Indicative Development Footprints near Pudman Lane
- several records from 2004-2006 approximately 7.5 km south of the Indicative Development Footprints in Mundoonen Nature Reserve.

Extensive surveys of the Indicative Development Footprints conducted by NGH between 2011-2104, and by Umwelt between 2017-2020 did not detect any koalas or signs there of, in the Indicative Development Footprints or wider Development Corridor.

An assessment of significance for the koala has been prepared in consideration of the EPBC Act Referral Guidelines for the Vulnerable Koala (DoE 2014). In the case of a vulnerable species, an **important population** is a population that is necessary for a species' long-term survival and recovery. This may include populations that are:

- key source populations either for breeding or dispersal; or
- populations that are necessary for maintaining genetic diversity, and/or
- populations that are near the limit of the species range.

The assessment of significance for koala is presented in **Table 1.12**. Given the lack of records of koala within the Indicative Development Footprints and the paucity of recent (in last 10 years) records in the nearby locality despite extensive surveys, the Indicative Development Footprints are unlikely to support a key source koala population for breeding or dispersal. The Indicative Development Footprints are unlikely to comprise populations necessary for maintaining genetic diversity, and are not near the limit of the known range of this species. Therefore the Indicative Development Footprints are unlikely to contain, or have a significant impact on, an important population of the koala.

Table 1.12 Assessment of significance of koala (*Phascolarctos cinereus*)

	An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
Criterion	a) lead to a long-term decrease in the size of an important population of a species
Response	While the Project will result in the loss of approximately 106.29 ha of potential koala habitat, and may affect koala movement in the region during the construction phase, no important populations of koala have been recorded within the Indicative Development Footprints. Despite extensive surveys dating back to 2011, records of the species within the wider locality are all over a decade old, with the most recent records (from 2006) occurring over 7 km from the Indicative Development Footprints. It is considered unlikely that the Project will lead to a decrease in the size of important populations of koala.
Criterion	b) reduce the area of occupancy of an important population
Response	The Project will result in the loss of approximately 106.29 ha of vegetation which includes occurrences of key feed trees for the koala. While this will increase existing fragmentation of habitat in the region, the linear nature of the Indicative Development Footprints will allow for continued use of existing movement corridors for the species. These corridors will allow the species to access large areas of similar habitat in the wider locality, some of which show greater evidence of koala presence and are protected, such as Mundoonen Nature Reserve to the South. The Project will result in a reduction of the potential area of occupancy for the koala in the Indicative Development Footprints, however this is unlikely to substantially reduce the area of an important population in the wider locality or region.
Criterion	c) fragment an existing important population into two or more populations
Response	The habitats within the Indicative Development Footprints currently contain fragmented woodlands surrounded by tracts of derived native grasslands and agricultural land. As the Indicative Development Footprints do not support an important population of the koala, the Project will not result in the fragmentation of an important population of koala into two or more populations.
Criterion	d) adversely affect habitat critical to the survival of a species

	An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
Response	The assessment of koala habitat within the context of the koala referral guidelines indicates that the Indicative Development Footprints comprises habitat critical to the survival of the species. Use of habitats within the Indicative Development Footprints by the koala has not been recorded despite extensive surveys dating back to 2011. The removal of approximately 106.29 ha of potential koala habitat is dispersed across the 33 kilometres of the Development Footprint, and in the context of extensive habitat available in the landscape, changes in the extent of habitat critical to the survival of the species is likely to be negligible. This removal of habitat will contribute to fragmentation of habitat within the landscape however due to past agricultural activity, including extensive land clearing, vegetation in much of the landscape is already highly fragmented. Impacts on koala habitat are unlikely to substantially increase fragmentation of the habitat present, and movement corridors that currently permit the species to move across the landscape and access other areas of similar suitable habitat in the wider region would be retained. The Project is unlikely to adversely affect habitat critical to the survival of the koala.
Criterion	e) disrupt the breeding cycle of an important population
Response	No important populations of the koala have been identified within the Indicative Development Footprints, nor have any breeding populations of this species been recorded in the wider locality. The Project is therefore unlikely to disrupt the breeding cycle of an important population of this species.
Criterion	f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
Response	The removal of approximately 106.29 ha of potential koala habitat is dispersed across the 33 kilometres of the Development Footprint, and in the context of extensive habitat available in the landscape, changes in the extent or quality of habitat is likely to be negligible. The removal of approximately 106.29 ha of potential koala habitat will contribute to fragmentation of habitat within the landscape, but will leave movement corridors allowing for the species to move across the landscape and access other areas of similar suitable habitat in the wider region. As no important populations of the koala have been identified within the Indicative Development Footprints, it is unlikely that the Project will modify, destroy, remove, isolate, or decrease the availability or quality of habitat for this species to the extent that the koala would be likely to decline.
Criterion	g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
Response	The Project is not expected to result in invasive species that are harmful to the koala becoming established in koala habitat.
Criterion	h) introduce disease that may cause the species to decline
Response	The koala is known to contract strains of *Chlamydia* and the koala retrovirus. Chlamydia infections are known to cause reduced female fertility and are expected to reduce the reproductive potential of koala populations. It has been predicted that up to half of the koalas in south-east QLD have reproductive disease likely to result in infertility (TSSC 2012a, 2012b). The koala retrovirus can cause a range of conditions including leukaemia and immunodeficiency syndrome. It is estimated that up to 100% of koala populations in QLD and NSW have the koala retrovirus (TSSC 2012a, 2012b). The Project does not involve any processes that are likely to introduce a disease for the koala that may cause this species to decline.
Criterion	i) interfere substantially with the recovery of the species

	An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
Response	Following determination of the importance of the habitat for the koala in the Indicative Development Footprints, an assessment was undertaken to determine the impacts which are likely to substantially interfere with the recovery of the koala. The Referral Guidelines (DoE 2014) identifies impacts likely to substantially interfere with the recovery of the koala. The Project may: • result in an increase to vehicle movements, however this will be largely confined to the construction phase and will be negligible during the operational phase. It is considered unlikely to subject the koala to increased mortality levels. The Project is not expected to: • introduce or increase dogs to the local area and therefore is unlikely to increase the threat of dog attacks to any local koala population • result in the creation of substantial additional barriers to koala movement in the local area • facilitate the introduction or spread of pathogens as *Phytophthora cinnamomi* or *Chlamydia* or • result in hydrological changes to the surrounding environment such that the function and integrity of the existing habitat for the koala is jeopardized. Based on the above, it is considered unlikely that the Project will interfere with the recovery of the koala throughout its range in Qld, NSW and the ACT.
Conclusion	**The Project is unlikely to have a significant impact on the koala.**

1.10 Rainbow bee-eater (*Merops ornatus*)

The rainbow bee-eater is an aerial nomad / migrant, marine listed species under the EPBC Act. The species is distributed across much of mainland Australia. The number of locations that the rainbow bee-eater occurs in is unknown, and has not been estimated. The concept of discrete locations is difficult to apply to the species because of its widespread distribution and its ability to undertake long-distance movements (Species Profile and Threats Database, 2020). The species distribution extends from Australia into eastern Indonesia, the Lesser Sundas and Sulawesi, and east to Papua New Guinea, the Bismarck Archipelago and, rarely, the Solomon Islands (Species Profile and Threats Database, 2020). It is a vagrant visitor to locations further north including Palau, south-western Micronesia, Saipan, the northern Mariana Islands, and Miyako Island and the southern Ryuku Islands in Japan (DoE, 2020).

The rainbow bee-eater is not considered globally threatened, and its global population is assumed to be large as the rainbow bee-eater is widely distributed and is said to be seasonally common and locally abundant throughout much of its range (BirdLife International 2005; del Hoyo et al. 2001). Global population size trends have not been quantified, but they are not expected to approach the rate of decline that is required for the species to be listed as a threatened species (BirdLife International 2005a).

The rainbow bee-eater was recorded on 12 occasions, with the majority (8/12 [67%]) of observations in flight in the Project Area were of flocks flying between 30-150 m AGL. Wind farms have not been identified as a formal threat for the species. In fact, the only actual identified threat to the species is the introduced cane toad which reduces breeding success and productivity by feeding on eggs and nestlings (DoE, 2020).

As the rainbow bee-eater was often recorded within the Project RSA, it will be susceptible to impacts from blade strike. Furthermore, the Project will impact on 9.15 hectares (PCT 335) of habitat that could potentially be used for breeding purposes. An assessment of significance has been conducted (**Table 1.13**) in accordance with the species' migratory listing to determine the extent of impacts to the species.

In order to assess potential impacts on a species listed as migratory under the EPBC Act, consideration of the following classification criteria concerning what is considered important habitat is required.

'Important habitat' for a migratory species is defined in the Matters of National Environmental Significance - Significant impact guidelines (DoE 2013a) as:

a) habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or

b) habitat that is of critical importance to the species at particular life-cycle stages, and/or

c) habitat utilised by a migratory species which is at the limit of the species range, and/or

d) habitat within an area where the species is declining.

Table 1.13 Assessment of significance of rainbow bee-eater (*Merops ornatus*) – migratory species assessment

	An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:
Criterion	a) 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
Response	While the Project is likely to destroy 5.50 hectares (PCT 335) of habitat that could potentially be used for breeding purposes, this habitat is not considered to be important habitat for the species. The species is not known to have a restricted breeding habitat, thus it is assumed it breeds throughout its range of distribution. The Project does not occur at the limit of the species range, and there is not available information to suggest the species is declining in the area. However the Project may modify the airspace of the main NNW-SSE aligned ridge on which the Project is located such that rainbow bee-eater may be at risk of mortality resulting from blade strike whilst foraging at, or dispersing through this location.
Criterion	b) result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or
Response	The Project does not comprise an area of important habitat for the rainbow bee-eater. Therefore it will not result in an invasive species that is harmful to rainbow bee-eater becoming established in an area of important rainbow bee-eater habitat.
Criterion	c) seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.
Response	The Project is not considered likely to seriously disrupt the lifecycle of an ecologically significant proportion of the rainbow bee-eater's population. With the species occurring throughout Australia and having not been identified as being in a decline, the population recorded at the Project is not considered to be an ecologically significant proportion of the population. As the rainbow bee-eater was often recorded within the Project RSA, it will be susceptible to impacts from blade strike. Furthermore, the Project will impact on 5.50 hectares (PCT 335) of habitat that could potentially be used for breeding purposes. Therefore while the Project has the potential to impact on the species through blade strike and removal of habitat that could be potentially used for breeding purposes, it is not considered likely to exceed the thresholds for an ecologically significant proportion of the population.
Conclusion	**The Project is unlikely to have a significant impact on rainbow bee-eater.**

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