COPPABELLA
Wind Farm

EPBC TECHNICAL REPORT

COPPABELLA WIND FARM

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1 INTRODUCTION

1.1 PURPOSE AND APPROACH

This Technical Report has been prepared to assist the Federal Department of Environment and Energy (DoEE) to undertake an assessment of the referral of the Coppabella Wind Farm on the basis of 'Assessment on Referral Information' only. It is understood that, under this expedited pathway, no further information will be requested subsequent to the lodgement of the referral.

It is noted that a referral and Controlled Action approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC) was granted for the Yass Valley Wind Farm[1] (EPBC 2013/7002) in November 2014. The project now being referred differs from that project sufficiently to warrant a new referral application. Coppabella Wind Farm Pty Ltd (CWFPL) is the proponent for the new referral application.

This document aims to facilitate access to relevant information, given the complexity and amount of information that has been collated for the assessment of the project between 2009 and 2017.This Technical Report has been prepared to provide context and greater depth of discussion on key matters relating to the EPBC referral form questions. It includes a quick reference to key maps (provided in Appendix A) and supplementary information from relevant existing assessments (Appendix B). The latter contains the detailed material that has informed the assessment of biodiversity impacts including Matters of National Environmental Significance (MNES) for this proposal.

The approach of this report can be summarised as follows:

Context

- A description of the project site and of the project being referred. This includes a summary of the context for this referral, the benefits of the project and the types of project impacts relevant to MNES – Section 1.
- A summary of the existing assessment documentation that has been undertaken for the project; field surveys relevant to MNES and source reports used in this assessment – Section 2.

Assessment

- Identification of *all MNES* that may be relevant to the project, found through database searches (undertaken November 2017) and evaluated based on habitat preferences of each entity, targeted surveys where relevant and consideration of the type of impact that may result (i.e loss of habitat, collision with infrastructure) – Section 3.
- *For entities that have greater than low potential for impact based on Section 3,* provision of detailed information regarding records onsite, habitat usage and the importance of the site to the entity – Section 4. This section assists to characterise the potential for impact and concludes with a classification of:
    - MNES known from the project site and considered likely to be impacted by the project.
    - MNES that could occur on occasion utilise the habitat onsite and who may thereby also be impacted.

[1] The Yass Valley Wind Farm project included four 'precincts' of which the Coppabella project site was one.

To ensure this report is robust, both classes are assessed further in Section 5.

- Section 5 sets out a description of the nature and extent of potential impacts likely to be associated with the project relevant to the MNES identified above. These are primarily:
    - Habitat loss during construction of the wind farm.
    - Operational risks (primarily collision risks) during the operation of the wind farm.
- The information presented in Sections 4 and 5 provides the context for the characterisation of the significance of impacts in Section 6. Section 6 provides the likelihood that the impact would be significant for each entity with reference to the EPBC Act Significant Impact Guidelines.

Mitigation measures

- Mitigation strategies (overview and detailed) relevant to the existing approvals including the EPBC Approval and NSW Development Consent are referenced in Section 7. It is noted that a Modification Application has been lodged for the Development Consent and that Consent Conditions and mitigation measures may vary from determination of the application.
- As the existing Yass Valley Wind Farm EPBC approval and NSW approval form an important context to this referral, the ability to meet all existing conditions is also examined. Additional measures are proposed where considered warranted by this assessment. Offset commitments, a key to managing residual impacts, are also detailed.

Conclusion

- The report concludes (Section 8) with a clear statement of:
    - MNES with potential to be significantly impacted.
    - The ability to mitigate and offset impacts to these specific MNES.

1.2 THE PROPONENT AND THEIR ENVIRONMENTAL RECORD

The Coppabella Wind Farm is being developed by Goldwind and its associated body corporate; Coppabella Wind Farm Pty Ltd (CWFPL). As such, this section has been prepared based on the environmental performance of Goldwind.

Founded in Urumqi, China in 1998, Goldwind is one of the world's leading wind power companies. Goldwind provides products and services that support the global transition toward clean power. Goldwind views manufacturing wind turbine generators as its foundation, customer service as its guiding principal, and technological innovation as its path forward and potential to add value along the renewable energy industry value chain.

Established in 2009, Goldwind's local Australian team offers comprehensive wind power solutions, including investment, construction, and operational and maintenance services. Goldwind's first Australian project, Morton's Lane Wind Farm, has been operational since 2012. Goldwind Australia has a successful track record in developing wind farms including the Mortons Lane Wind Farm (operational since 2012), Gullen Range Wind Farm (operational since 2014) and Gullen Range Solar Farm operational from 2017, and White Rock Wind Farm and White Rock Solar Farm (both currently under construction). All of these projects contribute to meeting Australia's Renewable Energy Target.

Goldwind undertakes its activities in accordance with its certified management system including certification against ISO 14001:2015. Each of its renewable energy projects have specific environmental management plans relevant to construction and operations.

Goldwind has no past or present proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources.

Goldwind is committed to work health and safety, minimising environmental impact and eliminating pollution, and the supply and maintenance of quality products and services. Goldwind has developed an Environmental and Quality Management System designed to provide a comprehensive framework to address relevant requirements and to ensure that all relevant personnel assist Goldwind in meeting its environmental and other commitments.

The Goldwind Australia Management System incorporates Health, Safety, Environment and other functions through a documented set of plans, actions and procedures to manage risk in an appropriate way. Goldwind Australia has been independently externally accredited by DAkkS for the following standards:

- AS/NZS ISO 14001:2015 Environmental Management System
- AS/NZS 9001:2015 Quality Management System
- OHSAS 18001:2007 Occupational Health and Safety Management System

Goldwind has acquired projects for which Commonwealth approvals had already been obtained by other parties. They have been responsible for undertaking the following actions under the EPBC Act:

1. Yass Valley Wind Farm, Yass NSW EPBC 2013/7002
2. Cattle Hill Wind Farm, Tasmania EPBC 2009/4839
3. Stockyard Hill Wind Farm, Beaufort-Skipton EPBC 2016/7746
4. Moorabool Wind Farm, Ballan Victoria EPBC 2009/4907

Additionally, Goldwind has sought a decision from the Department of Environment and Energy on:

5. White Rock Solar Farm, Glen Innes NSW EPBC 2017/7898 – not a controlled action.

1.3 DESCRIPTION OF THE PROJECT SITE

The project site (the broader area in which infrastructure is proposed) is located on farmland north of the Hume Highway, approximately 35 kilometres west of Yass, New South Wales. Refer to Figure 1-1. The area is characterised by undulating to hilly terrain with broken ridgelines, mostly on volcanic geology. It totals approximately 6,445 ha, including up to eleven host landowners.

The site consists of one main north-west to south-east oriented ridgeline and surrounding hills. Areas within the nominated development envelope contain a combination of remnant and regrowth woodland and native and exotic dominated grasslands derived from the clearing of these woodlands. The ridgelines within the subject site are largely cleared and have been grazed for many decades and generally carry only scattered remnant trees or small isolated woodland patches.

The site is situated in the upper catchment of Jugiong Creek, which drains to the Murrumbidgee River and the Murray River. There are no major watercourses present at the site. Several small or intermittent watercourses with little remnant tree cover drain the site northwards to the Jugiong Creek system and south to Lake Burrinjuck.

The site is located in the South Western Slopes bioregion, close to the South Eastern Highlands Bioregion. Both bioregions capture a wide range of geophysical and biological variation. It lies within the

Murrumbidgee Catchment, which extends from the Great Dividing Range in the east to the confluence of the Murrumbidgee and Murray Rivers in the west near Balranald.

The site is located close to the boundary between two sub-regions: Upper Slopes to the west and Murrumbateman to the east.

- The Upper Slopes sub-region features include Ordovician to Devonian geology, large areas of intrusive granites, steep, hilly and undulating ranges, texture contrast loams and clays grading from red subsoils on upper slopes to yellow subsoils on lower slopes, and shallow stony soils on steep slopes. Vegetation is generally open forests and woodlands (Morgan 2001 in NPWS 2003).
- The Murrumbateman sub-region features fine-grained Palaeozoic sedimentary and metasedimentary rocks, with minor areas of coarse acid volcanics, undulating plateaus with rounded hills and peaks, entrenched meandering streams with chain of ponds tributaries. Soils include mottled yellow and brown texture contrast soils with strongly bleached topsoils, dark organic loams and clay loams on valley floors and saline patches. Vegetation is typically Box-Gum Woodland on lower slopes, with Red Stringybark, Bundy and White Gum on ridges (Morgan 2001 in NPWS 2003).

The South Western Slopes bioregion has been defined by the NSW and ACT Governments for the purposes of biodiversity protection and conservation planning (Fallding 2002). Within this region, the site lies in the Yass Landscape Unit. The Yass Unit is characterised by undulating country largely carrying Box-Gum Woodland. The major land uses are cropping, grazing, rural subdivisions and urban uses, with two major transport links and water-based recreation on Lake Burrinjuck (Fallding 2002). Endemic features relevant to MNES in the region include:

- The region's core nesting habitat for Superb Parrot.
- The region's only population of Grey-crowned Babbler.
- Records of vagrant Major Mitchell's Cockatoos.
- Records of Striped Legless Lizard and Pink-tailed Worm-lizard.
- The centre of the Yass Daisy distribution.
- A minor karst landscape within Hatton's Corner NR.

1.4 DESCRIPTION OF PROJECT

Within the project site is the construction footprint. This is the area where impacts will occur (and be confined). The total construction footprint totals approximately 362.29 ha. Refer to Figure 1-2.

The NSW Development Consent allows for a wind farm of up to 79 wind turbines with associated access tracks based on realistic design and including passing lanes, 33kV internal electrical reticulation system, grid connection components at 132kV (substation, 8km of 132kV transmission line and possible switchyard), permanent meteorological (met) masts, operations and maintenance building and temporary construction infrastructure. The temporary infrastructure includes construction compounds, laydown areas, batch plants and stockpile and crushing areas.

Photographs of the site including areas where project infrastructure would be located are provided in Figure 1-3.

A more detailed map of infrastructure components is provided in Appendix A.1. This shows the difference between the consented layout and the Modification Application layout (presented in the NSW Modification Application September 2017).

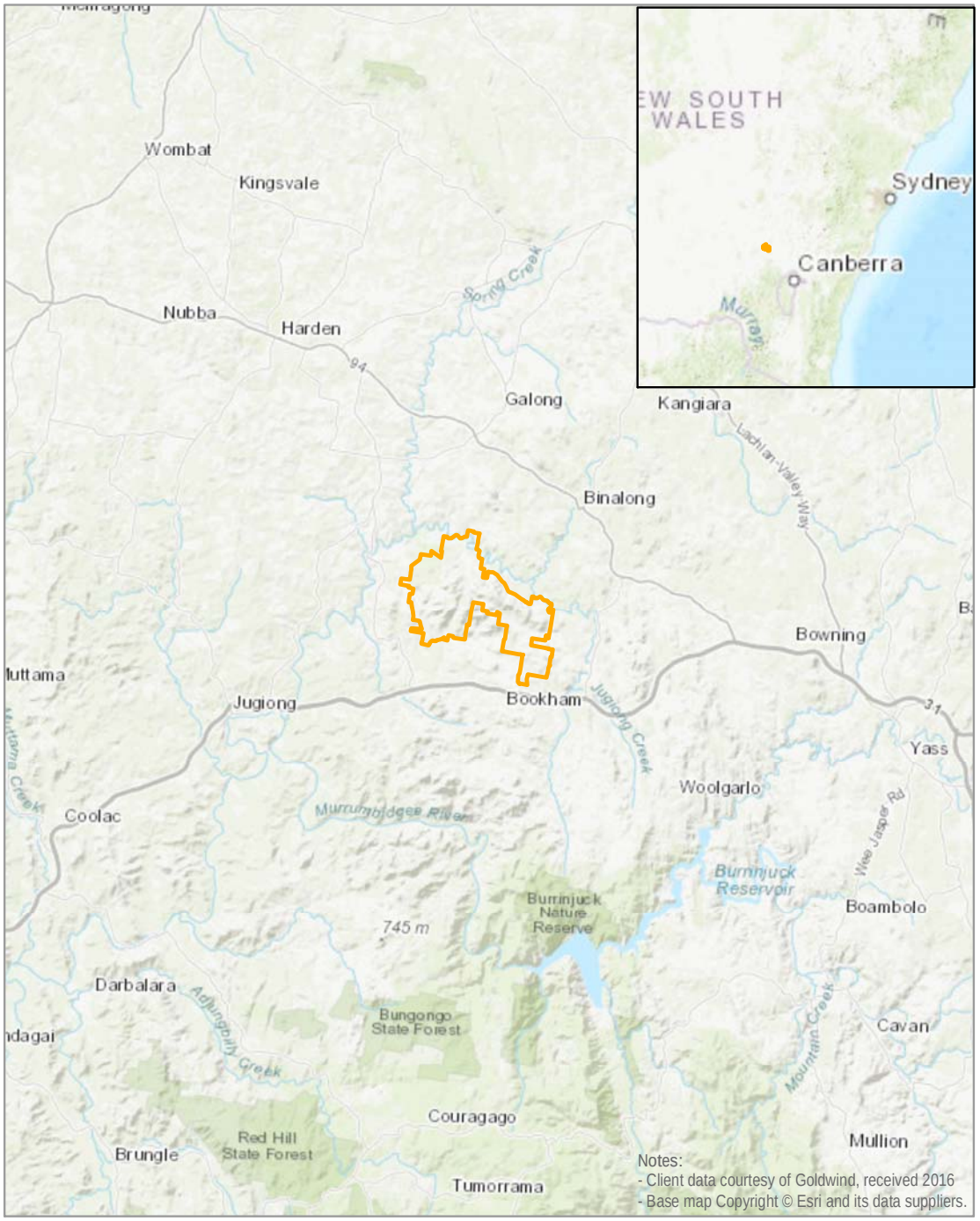


Figure 1-1 Coppabella wind farm - locality.

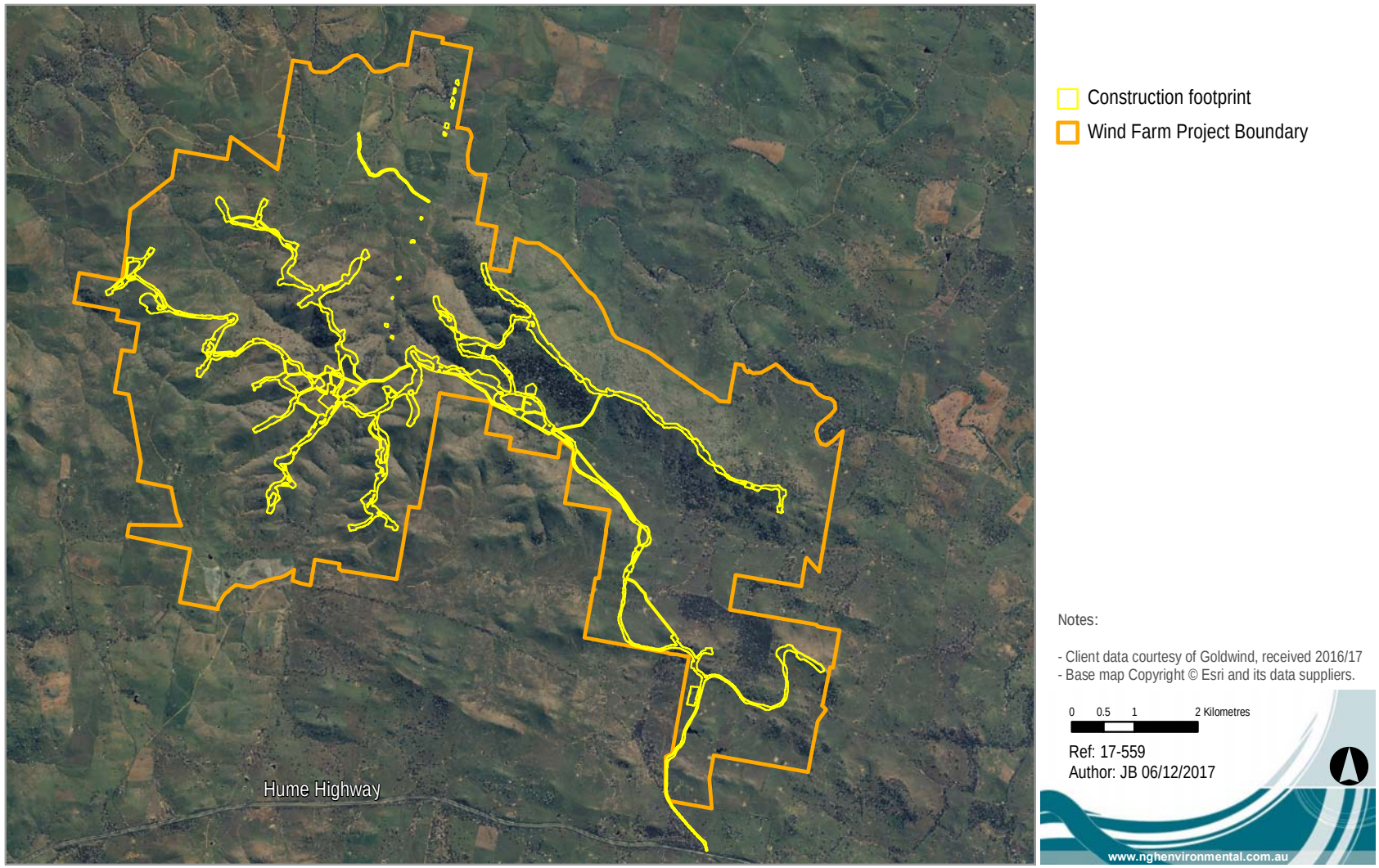


Figure 1-2 Coppabella wind farm: construction footprint.

	
Areas heavily grazed by sheep in Cluster 1	Creek crossing near proposed transmission route
	
Showing steepness of hillsides and woodland remnants	Potential reptile habitat and refuge
	
Edge of Box-gum Woodland CEEC (*E.albens* pictured)	Edge of Box-gum Woodland CEEC (*E.melliodora* pictured)

Figure 1-3 Photographs of the Coppabella project site

1.4.1 Upper limit number of wind turbines

Subject to gaining consent for the Modification Application as lodged, the revised project would involve up to 79 turbines with increased dimensions and, an increased footprint that is based on recent detailed civil works design. However, since the modification application was lodged, CWFPL has considered the removal of three turbines (75, 76 & 77) and their associated hardstands and tracks. The modified consent with removal of these three turbines and their associated hardstands and tracks results in a 76 turbine layout.

As a result of the reduction of turbines to 76 for the NSW Modification Application, this referral also seeks approval for the 76 turbine layout but notes that some of the supporting information for this referral has been prepared in respect of the 79 turbine layout. The following provides an explanatory note on the layout used for the respective parts of the assessments provided with this referral.

A 76 turbine layout, excluding Turbines 75, 76 & 77, has been used for assessing the impacts specific to MNES. Associated mapping and impact areas for relevant MNES (Critically Endangered Ecological Communities (EEC), Superb Parrot, Swift Parrot and Regent Honeyeater, Koala) similarly assume the removal of these Turbines 75, 76 & 77.

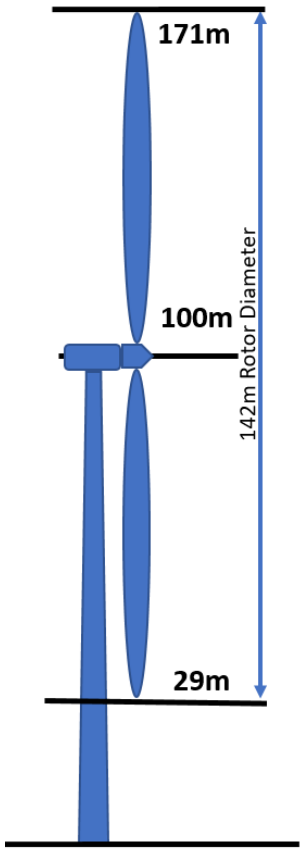
Elsewhere in this Technical Report, the 79 turbine layout is shown and discussed. Specifically:

- The broader project breakdown, presented in Table 1-1, is for all 79 turbines.
- The assessment of bird and bat collision risks in Section 5.2 is for all 79 turbines.
- The NSW endorsed offset calculations presented in Section 7.3 are for all 79 turbines.

In this manner, the information presented in this report provides the most accurate estimate of MNES impacts while being as consistent as possible with the existing material being considered for the NSW Modification Application.

1.4.2 Wind turbine dimensions

The wind turbine model is subject to confirmation but the GW140 has been used a reference model for all impact assessment and yield modelling. This model's parameters include:



- Rotor diameter up to approximately 142 m.
- Hub height up to approximately 100 m.
- Maximum height of rotor swept area approx. 171 m.
- Minimum height of rotor swept area approximately 29 m.

Figure 1-4 Turbine dimensions

1.4.3 Construction impacts – clearing

The construction footprint is estimated as 362.29 ha which includes a 5m buffer on the civil works footprint to account for disturbance during construction, such as installation of sediment erosion controls. This figure is derived from a detailed civil engineering design, taking into account realistic cut and fill batters for the terrain and larger turbines turning arcs. This is considered a 'worst case' as not all of the 79 turbines would be developed and that not all of the buffer area will involve disturbance.

The location of the proposed infrastructure layout is shown in Appendix A.1. As the clearing is derived from a civil works footprint, it is not possible to separate out all infrastructure components. Refer to Table 1-1 for breakdown of civil works (tracks, turbine footings and hardstands), cabling and overhead power lines. No additional clearing is required (such as for asset protection zones).

Table 1-1 Infrastructure components and disturbance footprint – 79 turbine layout

Infrastructure element	Area (Note 2) (approx.)	Percentage of total footprint (approx.)
Disturbance footprint		
Civil works footprint for 79 turbines (Note 1)	331.03 ha	91.37%
Additional underground cabling	28.94 ha	7.99%
Additional 132 kV OH lines (Note 3)	2.29 ha	0.63%
Total	**362.29 ha** (Note 4)	

Notes:

1. A buffer of 5m is included in the civil works footprint, to account for necessary disturbance during construction, such as installation of sediment erosion controls. While it is required as part of the clearing limit, this area can be fully rehabilitated after construction and in this area avoidance of features such as hollow bearing trees is more achievable.
2. Where overlap of infrastructure elements occurs, the impact area has been assigned to only one infrastructure component.
3. Overhead lines are calculated as an impact area only where they occur in woodland vegetation and then are given a disturbance width of 45m.
4. This is the total impact for 79 turbines. Three turbines and their associated hardstands and tracks will now be removed: 75, 76 & 77. Refer to Section 5.1.1 for MNES breakdown for the 76 turbine layout.

The project site is within the western part of the area of a prior referral EPBC 2013/7002 that combined the Coppabella, Marilba and 330kV precincts. The Marilba and 330kV precincts were excluded from the NSW planning approval (Development Consent SSD 6698). All infrastructure would now be within the Coppabella precinct project boundaries approximately 6,445 ha. Additional impacts to short sections of Whitefields Road would also be required. There would be up to eleven host landowners (refer to Appendix A.3).

1.4.4 Construction impacts – road upgrades

The main access to the project area will be from the eastern end of Whitefields Road (Figure 1-2) and involve approximately 1.3 km of Whitefields Road from the Hume Highway to a property entrance where on-site access tracks will be used. Whitefields Road would be upgraded as part of the project but as per Schedule 3, Condition 27 of the Consent, CWFPL is required to minimise impact and the detailed design for upgrade must include a landscaping plan. The clearing required for Whitefields Road is included in the civil works footprint above (Table 1-1).

Access to the 132 kV line route, to the northwest of the project will be from Coppabella Road with access via Binalong, Garry Owen Road and the northern section of Coppabella Road. Items transported by this route would include pole sections, conductors, insulators, fittings and various installation equipment to enable the construction of the northern section of the 132 kV transmission line. Only minor upgrades of Coppabella Road are anticipated and these would be subject to Council approval.

Minor upgrades are also proposed for a short section (approximately 2 km) of Coppabella Road to enable better internal access within the wind farm. The section of Coppabella Road is between two wind farm access tracks that cross Coppabella Road, between Turbine 60 and 130 at the southern end and the access track between Turbine 68 and 128 at the northern end of the short section of Coppabella Road. Pre-construction planning and design studies have indicated that access in this location will reduce access time across the site. No trees are required to be removed for this upgrade.

1.4.5 Construction impacts – reuse of excavated material

It is anticipated that there will be reuse opportunities for material excavated during earthworks onsite. Primarily, this will be due to the large amount of cut and fill required for access tracks and hardstands. This material can be beneficially reused onsite and thereby reduce the volume of traffic delivering material to the site and associated haulage impacts and costs. Efficient planning of the works seeks to balance cut and fill volumes and limit transport of material within the project area.

An integral part of the access track construction involves the excavation of rock and redistribution to other locations (particularly for tracks or hardstands) through normal cut and fill earthworks operations. While some of the excavated rock may be able to be used in the form it has been excavated, a significant proportion may require crushing to achieve suitable size for reuse at other locations. The sizing of this material can be important for compaction undertaken to form strong stable roadways. On-site crushing is a normal part of the on-site earthworks and reduces the need for a large volume of transport to site.

1.4.6 Staging

The project may be developed in stages. The actual extent of staging and scope of project components for individual stages will be confirmed prior to the commencement of the stage of construction. The conditions of consent will be addressed relative to the extent of the stage being undertaken. It is proposed that a similar approach would be appropriate for Conditions of EPBC approval.

1.4.7 Property and subdivision

The project includes the subdivision of land so as to create new lots for the approved substation, any switchyards and any deemed subdivision arising from the grant of leases or licences for project elements.

1.4.8 Decommissioning

CWFPL proposes to proactively commit to the preparation of an appropriate Decommissioning and Rehabilitation Plan within five years of the project becoming operational. The Decommissioning and Rehabilitation Plan would be updated every five years and would include:

- Environmental management controls for decommissioning.
- Estimated costs of decommissioning and funding arrangements (including residual value of turbines and infrastructure at end of life).
- In the event of any shortfall between the estimated costs of decommissioning and funding arrangements, the provision for an appropriate funding mechanism (such as a decommissioning bond or the like).

1.5 CONTEXT FOR THIS REFERRAL

The project in this referral is within the area of the Yass Valley Wind Farm Controlled Action (EPBC 2013/7002) but differs from that project, in the following ways:

- Includes development of the Coppabella precinct only.
- Utilises a larger turbine model with an overall tip height of approximately 171 metres and blade length of approximately 70 metres (rotor diameter up to 142 metres).

- Has an increased vegetation clearing footprint to address impacts for the realistic civil design footprint in the steep and challenging terrain, the 132kV connection and a larger turbine model.
- Includes minor changes to the location of ancillary infrastructure including additional temporary facilities to improve constructability and workforce safety.
- Includes minor clarifications to the project description such as:
    - Reuse of excavated material onsite.
    - Upgrade of a 2km section of Coppabella Road and use of Coppabella Road for standard vehicles (not over mass or over dimensional vehicles).
    - Possible staging of the project.
    - Potential subdivision of land (within the consented project boundaries).

The project in this referral aligns with the proposed modified project for which approval is being sought under the NSW EP&A Act.

1.6 IMPACTS ASSOCIATED WITH THE PROJECT - OVERVIEW

The infrastructure proposed to be constructed would occupy approximately 6% of the site's project boundaries, equating to a 362.29 ha construction footprint spread across an area of 6,445 ha. The key infrastructure components responsible for the impacts are access tracks, underground cabling and hardstand areas for wind turbines. Native vegetation in this area would be removed. Indirect impacts may occur to adjacent habitat due to noise and dust during extensive earthworks. A 5 m buffer on the construction footprint is included within the 362.29 ha to account for some of these type of impacts (as well as for the installation of sediment erosion controls and vehicles manoeuvring that may be required).

The nature of the impact during construction is therefore habitat loss and indirect impacts to flora and fauna due to noise and disturbance. It is noted that the distribution of impacts can be considered most similar to linear infrastructure (such as roads and transmission lines). It is not concentrated in any central location onsite. While this introduces greater potential for edge effects (such as weed ingress) it reduces the potential severity of impacts such as fragmentation or barrier effects or the potential to remove important habitat or populations that may occur in a limited area. Additional impacts during construction include soil disturbance, potential to impact heritage artefacts, noise and visual impacts for nearby receivers. These are not related to any MNES.

The key infrastructure relevant to operational impacts are the wind turbines. The existing consent allows that up to 79 turbines would be installed across the site. Collisions and potential for birds and bats to avoid areas with turbines (avoidance or barrier impacts) are the key biodiversity impacts of this stage. Additional impacts during operation include noise and visual impacts for nearby receivers. These are not related to any MNES.

Greater detail regarding the nature and extent of impacts is provided in Section 5, specific to MNES evaluated to have potential for impact.

1.7 BENEFITS OF THE PROJECT

There are local and broader benefits of the project, to the local community and to the environment. Local community involvement and the project's contribution toward meeting renewable energy demand and green house gas mitigation are discussed below.

1.7.1 Local benefits

Community benefit sharing strategy

A key feature of the Community and Stakeholder Engagement Plan for the project is a community benefit sharing strategy. During the pre-construction and construction phase, the project aims to contribute to the local community through financial support of local community initiatives and events. As of November 2017, discussions have been undertaken with 20 local community groups and schools regarding opportunities for the project to be an active member of the local community and provide financial assistance and support. The project has committed financial support to 16 community initiatives and events in the local area.

Once the project becomes operational, a Community Fund will be established and will consist of $2,500 per installed turbine each year, for the entire life cycle of the project. CWFPL will consult with the Community Consultative Committee regarding the high-level framework for the Fund. CWFPL will enter into Voluntary Planning Agreements with the Yass Valley Council and the Hilltops Council to administer the Community Fund based on the number installed turbines within each specific Local Government Area.

In addition to the Community Fund, CWFPL is currently developing a supplementary strategic community investment model which it aims to deploy alongside the Community Fund. The additional benefit sharing model recognises the increase in generation capacity of the wind turbine generators to be installed.

Neighbour benefit sharing strategy

In parallel with the community benefit sharing strategy, a neighbour benefit sharing strategy is also in place. This includes offering neighbour agreements to up to 60 residences that have been identified as eligible within the neighbour benefit sharing strategy. The neighbour agreements recognise the impacts that the wind farm may have on near neighbours to the project and outlines a process for raising any concerns for the entire life cycle of the project. As of November 2017, 43 neighbour agreements have been offered as part of the strategy. An annual payment is attached to the neighbour agreements based on distance proximity from an approved turbine location.

Local business participation program

The Local Business Participation Program (LBPP) will be a key initiative to identify capacity in the local community and maximise opportunities for local suppliers to participate in the project.

The LBPP is a three-stage process:

1. The project will be listed on an online independent business network which connects suppliers and projects.
2. An information forum will be held in the local area to provide local businesses with additional information.
3. The main contractor and/or major subcontractor engage suppliers and subcontractors according to their procurement processes.

1.7.2 Broader benefits of the project

CWFPL acknowledges that the CWF development has identified environmental impacts for the project site and that it also raises concerns for some members of the community. Accordingly, CWFPL has obtained comprehensive assessment of the relevant matters and committed to specific mitigation strategies to address them, including in perpetuity biodiversity offsets.

CWFPL believes that the adverse impacts are appropriately offset by the range of benefits associated with increased integration of renewable energy sources in the national electricity supply system. The following list summarises the direct and indirect benefits accruing from wind farm projects such as CWF.

The CWF would provide the following primary benefits:

- Generate of the order of 830 GWh of electricity annually over its operating life, sufficient to power the equivalent of 113,700 homes annually (based on average NSW household electricity consumption);
- Provide a source of renewable energy to supplement NSW and National energy requirements and assist in reducing greenhouse gas (GHG) emissions;
- Contribute to the Federal and State governments' targets for renewable energy generation and also support Australia's international commitments to taking action on climate change (i.e. COP21 Paris Agreement);
- The estimated emissions savings for CWF would be in the order of 700,000 tonnes $CO_{2\text{-}e}$ per year,
- Additionally, electricity generated from wind farms or solar does not produce wastes to air (SOx, NOx), water (Trace Elements) or solids (fly ash and bottom ash) as is the case for coal;
- Contributes to the additional generating capacity required to meet the growing energy demand in NSW, and improve security of supply through avoidance of reliance on electricity supply from other states and diversification of electricity generation sources and supply locations;
- Total project investment of $400-500 million with a significant portion to be spent locally, facilitated by the Local Business Participation Program;
- Provide direct fulltime employment opportunities for an estimated 150-200 people during construction peaks, and an estimated 10-15 permanent staff when fully operational;
- Create additional drought proof income streams for host landowners and neighbours that have opted to be part of the neighbour benefit sharing scheme; and
- Upgrades to local infrastructure such as roads and transmission lines.

Emissions reduction goals and government initiatives

The Paris Agreement adopted in 2015 set the specific goal of holding global warming to well below 2 degrees Celsius (°C) compared to pre-industrial levels, and of pursuing efforts to limit warming to 1.5°C. The Emissions Gap Report, November 2017 (EGR, 2017) is produced by the UN Environment. The Report *focuses on the "gap" between the emissions reductions necessary to achieve these agreed targets at lowest cost and the likely emissions reductions from full implementation of the Nationally Determined Contributions (NDCs) forming the foundation of the Paris Agreement. The NDCs that form the foundation of the Paris Agreement cover only approximately one third of the emissions reductions needed to be on a least-cost pathway for the goal of staying well below 2°C. The gap between the reductions needed and the national pledges made in Paris is alarmingly high (EGR 2017).*

Based on the benefits of renewable energy in reducing the carbon intensity of the electricity generation, Federal and State governments have moved to support contribution of these technologies in the generation supply components. The National Large-Scale Renewable Energy Target (LRET) has been implemented by the Federal Government to support the development of Renewable Energy technologies including wind energy. Similarly State Governments have also recognised the benefits of renewable energy and have policies and strategies that are supportive of sustainable energy development. The NSW Renewable Energy Action Plan was released in 2013 to guide NSW's renewable energy development and to support the former national target of 20% renewable energy by 2020. The CWF would support these international, national and state objectives to reduce emissions.

The Finkel Report (2017) identifies the need for; "*All governments need to agree to an emissions reduction trajectory to give the electricity sector clarity about how we will meet our international commitments."* 48 out of 49 recommendations have been adopted, but the Clean Energy Target was not included. Renewable energy projects are indicated to be able to proceed without subsidies.

Diversification of local economy

The context of climate change is relevant to a discussion on the future of agricultural land use. While approximately 6% of the project site would be developed for the wind farm infrastructure, the remaining 94% would continue to be farmed. General warming in the region is likely to reduce the capacity of the land. Pittock (2003) observed that a significant proportion of Australian exports are agricultural products sensitive to changes in climate, water availability, carbon dioxide, fertilisation, and pests and diseases. As well as direct impacts, agricultural profits could be affected by a projected increase in agricultural production in mid to high latitude northern hemisphere countries (Pittock 2003). Development of land with uses that are compatible with agricultural activities, such as wind power, therefore have potential to provide increased economic security to rural industries. As well, they provide a substitute for carbon emission producing electricity production that is stable (not dependent on other countries) and renewable.

There is potential for wind power to become a new rural industry, providing a significant new income stream for rural communities at a time when traditional land uses are under pressure (Warren *et al*. 2005). Agriculture has been identified as having a significant role to play in carbon offsetting by a CSIRO report commissioned by the Agricultural Alliance on Climate Change, which includes farming and green organisations, ABC (2007). The report states that farmers could make an extra $3 billion a year by helping to produce clean energy and by offering carbon offsets to polluters. The Climate Institute states this is a key step needed to cut greenhouse gases. These points are particularly relevant to the Yass area where agricultural endeavours have been greatly impacted by drought and where anticipated climate change projections indicate a continuation of this trend. The Proposal would provide a drought resistant supplementary income stream for involved land holders, compatible with current grazing practices.

Environmental benefits through climate change mitigation

There is scientific evidence that the Earth's climate is changing. Observations have shown global increases in air and ocean temperatures, the widespread melting of snow and ice and rising sea levels (IPCC 5AR WG1, 2013). It has further been observed that many of the world's natural systems are already being affected by the change of regional climates, in particular temperature increases (IPCC 5AR WG1, 2013). Other indicators include altered rainfall patterns and more frequent or intense weather patterns such as heatwaves, drought, and storms (DCC, 2009). In Australia, this change in the climate is anticipated to have an impact on water supply and quality, ecosystems and conservation, agriculture and forestry, fisheries, settlements and industry and human health. Australian trade and commodity prices may also be impacted on by the global impacts of climate change (DCC, 2009).

The drivers for climate change have been identified as being from both natural and anthropogenic forces, however a main contributor is the release of Green House Gases into the atmosphere (IPCC 5AR WG1, 2013). Radiative forcing (RF) (watts per square metre) quantifies the change in energy fluxes caused by change in the natural and anthropogenic drivers of climate change. Total anthropogenic RF relative to 1750 was 2.29 in 2011 and had increased about fourfold from 1950 to 2011 (IPCC 5AR WG1, 2013 Figure 1.5). Given the significant role of CO_2, mitigation by replacing fossil fuel generation with renewables is a significant component of mitigating enhanced climate change.

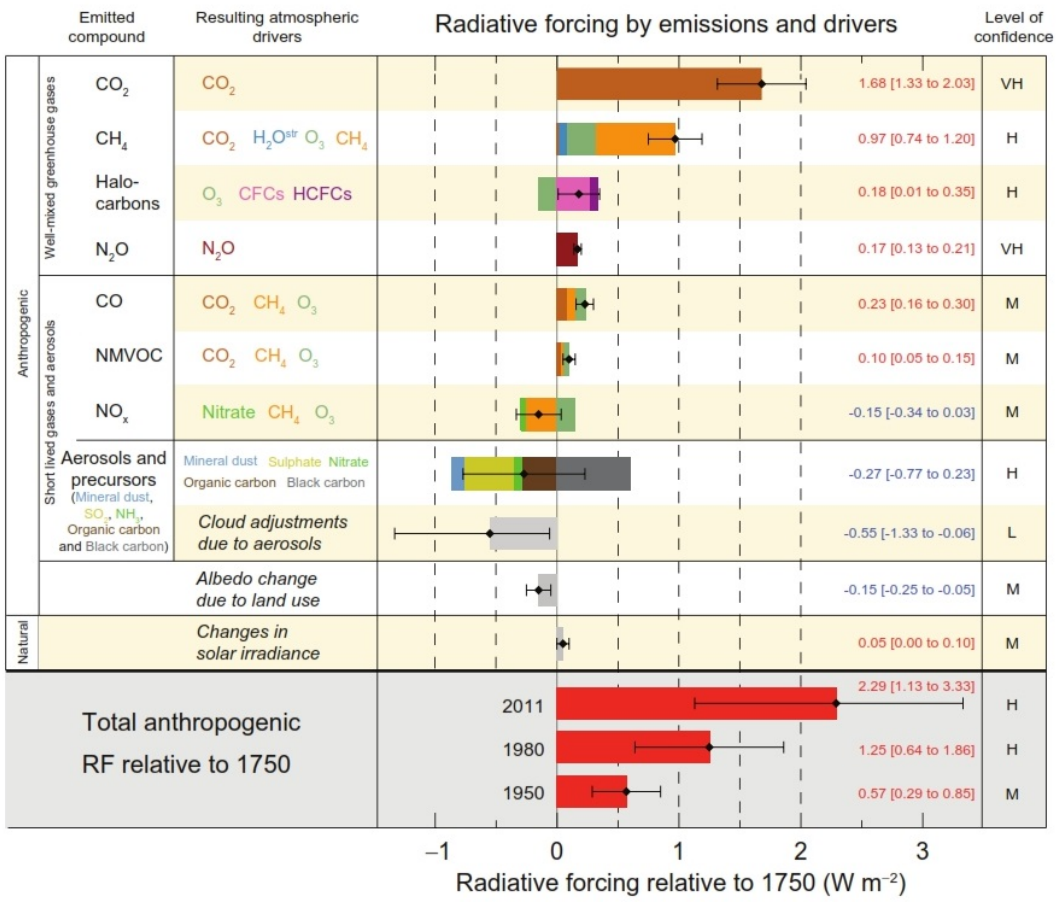


Figure 1-5 SPM.5 from IPCC AR5 WG1 SPM, 2013 – Radiative Forcing

A reflection of the importance of this process is the nomination for listing of 'Loss of terrestrial climatic habitat caused by anthropogenic emissions of greenhouse gases' as a Key Threatening Process (KTP) under the *Endangered Species Protection Act 1992* by the Threatened Species Scientific Committee. The title and definition of the threatening process were later widened to include marine areas and marine species and is now gazetted under the Environment Protection and Biodiversity Conservation Act 1999. The name of the process nominated is now: *'Loss of climatic habitat caused by anthropogenic emissions of greenhouse gases*'.

This KTP acknowledges there will be reductions in the bioclimatic range within which a given species or ecological community exists due to emissions induced by human activities of greenhouse gases. The establishment of the Threatened Species Scientific Committee is provided for under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The TSSC is an independent committee of eminent conservation scientists that provides the Federal Minister for the Environment and Energy with advice on matters relating to listing, conservation and recovery of threatened species and ecological communities, and listing and abatement of key threatening processes. The Committee has recommended that, along with the issues of emissions reduction, the adaptation requirements of species and communities likely to be affected by climate change should be given greater priority. Other Commonwealth Climate Change Risk reports have previously stated that the less effective the mitigation efforts (such as emissions reduction) are, the greater will be the need for adaptation measures.

Similarly, the NSW Scientific Committee has determined that there is evidence that modification of the environment by humans may result in future climate change. *Anthropogenic Climate Change* was listed as a Key Threatening Process on Schedule 3 of the *Threatened Species Conservation Act 1995* in November 2000.

Of relevance to the rural agricultural setting of the CWF project site, it is highlighted that in combination with climatic factors, existing processes such as land degradation, salinisation, woody weed invasion and subsequent decreases in food production can result (Australian Greenhouse Office 2003). Major changes in vegetation composition will come through shifts in rainfall patterns and increased runoff distribution and will favour the establishment of woody vegetation and encroachment of unpalatable woody shrubs in many areas (Australian Greenhouse Office 2003). In modified landscapes, the ability of organisms to survive climate change through dispersal may be limited (Brasher & Pittock 1998, Australian Greenhouse Office 1998, cited in DECC 2007). Species at particular risk from the effects of climate change include those species with long generations, poor mobility, narrow ranges, specific host relationships, isolated and specialised species and those with large home ranges (Hughes & Westoby 1994, cited in DECC 2007). Pest species may also be advantaged by climate change.

Therefore, a number of environmental gains are associated with wind farm development as they have potential to address Anthropogenic Climate Change by reducing reliance on the burning of fossil fuels for energy. The CWF will:

1. Offset fossil fuel electricity generation and meet our increasing energy demands with greater supply of renewably generated electricity.
2. To the extent that renewable energy from CWF assists mitigation of climate change, it is addressing a Key Threatening Process.
3. Offset vegetation clearing by creating long term biodiversity areas, where habitat is protected and managed in perpetuity.
4. Provide an drought proof additional income stream to agricultural host landowners, which would allow for less intensive production and provide income to undertake mitigation works, such as address salinity.

2 PREVIOUS WORK AT THE PROJECT SITE RELEVANT TO MNES

Extensive assessment of the biodiversity values at the Coppabella Wind Farm site has been undertaken for over 10 years with surveys from 2007 and underpins the assessment of impacts on MNES. The survey work completed and reports produced that are relevant to MNES are summarised in Table 2-1 and Table 2-3 below and with survey effort in respect of MNES outlined in Table 2.2.

2.1 BIODIVERSITY FIELD WORK SUMMARY

Relevant field work for MNES at the Coppabella Wind Farm site is summarised in Table 2-1, sorted by date and report.

Table 2-1 Summary of relevant flora and fauna surveys undertaken at Coppabella Wind Farm to date

Year	Survey type
Surveys undertaken in: March 2007 September November 2008 January and October 2009 Documented in Coppabella Biodiversity Assessment (2009)	Biodiversity assessment including: • Vegetation type and condition • Threatened flora survey: o Tarengo Leek Orchid o Yass Daisy • Threatened fauna: o Pink-tailed Worm-lizard o Striped Legless Lizard o Superb Parrot o Regent Honeyeater
October 2009 targeted survey Document in Addendum to Supplementary Ecology Report (below)	Targeted fauna surveys including: • Cage trapping • Spotlighting • Call playback • Hollow bearing tree (HBT) mapping
October 2012 survey Documented in Supplementary Ecology Report, submitted November 2012	Follow up surveys for additional areas includes: • Vegetation type and condition • Yass daisy population mapping • Fauna habitat evaluation (including HBT) • Bird and reptile census (including Pink-tailed Worm-lizard, Striped Legless Lizard) • Constraints mapping
November/December 2013	Golden sun moth – initial survey
June 2014	Field validation of treeless pasture was undertaken with OEH in 2014. This was to ensure that degraded pasture was properly assigned to native vegetation communities, particularly Box Gum Woodland, when considering impact areas.
November 2014	Sample Biometric plot data collected

Year	Survey type
November 2014	Flight path mapping Superb Parrot Bird utilisation surveys
December/January 2014-15	Targeted surveys: • Golden Sun Moth (second survey) • Striped Legless Lizard
November/December 2016	Flight path mapping Superb Parrot Bird utilisation surveys (20-minute point count)
November/December 2016 January 2017 May 2017 July 2017 Documented in Modification Application Environmental Assessment Report	Follow up surveys for additional impact areas for project modifications including: • Validation / mapping vegetation type and condition • Mapping of significant weeds • Vegetation plot data • Hollow bearing tree survey within specific areas (vicinity of turbine 56, along Coppabella Road, and within the buffered civil design footprint).
October/November 2017	Additional targeted surveys including: • Vegetation mapping • Collection of plot data • Targeted surveys for Yass Daisy, Small Purple Pea.
November/December 2017	Flight path mapping Superb Parrot (survey complete, reporting in prep.)

Table 2-2 provides a summary of the estimated cumulative survey effort total for each MNES with potential or known habitat in the Coppabella Wind Farm project area. Refer to Section 4 for MNES habitat evaluation.

Approximately 347 hours of vegetation and flora survey has been conducted on site. Extensive fauna survey has also been undertaken including 174 hours plus trapping, habitat assessment and Golden Sun Moth surveys (the latter surveys recorded as number rather than hours of survey). Surveys have been conducted on site in 2007, 2008, 2009, 2012, 2013, 2014, 2015, 2016 and 2017, a period of more than 10 years. A third round of intensive targeted Superb Parrot survey was completed in December 2017 during preparation of this report. The breadth and extent of surveys has been sufficient to provide opportunity to record both resident Superb Parrots as well as occasional visitors, although survey timing has been strongly biased toward spring/summer.

Table 2-2 Summary of survey effort for MNES with potential or known habitat in Coppabella Wind Farm project area

MNEs	EPBC status	Survey type	Survey effort
Box Gum Woodland CEEC	CE	Random meander, spot inspection, quadrats, biometric plots (2007 to 2017)	347 hours / 14.5 days
Hoary Sunray *Leucochrysum albicans var. tricolor*	E	Flora surveys (2007 to 2017), random meander (Cropper 1993)	347 hours / 14.5 days
Tarengo Leek Orchid *Prasophyllum petilum*	E	Flora surveys (2007 to 2017), random meander (Cropper 1993)	347 hours / 14.5 days

MNEs	EPBC status	Survey type	Survey effort
Yass Daisy *Ammobium craspedioides*	V	Flora surveys (2007 to 2017), random meander (Cropper 1993)	351.5 hours / 16.5 days
Small Purple Pea	V	Targeted flora surveys (October 2017 also including Yass Daisy) Evenly spaced transects 10-20m, apart	4.5 hours
Dwarf Bush Pea	V		
Golden Sun Moth *Synemon plana*	CE	Targeted surveys referencing *Significant Impact Guidelines for Golden Sun Moth* (2013, 2014/15)	76 surveys at proposed turbine sites on site; 55 offsite surveys
Pink-tailed Worm-lizard *Aprasia parapulchella*	V	Rock rolling and habitat searches (2007-2015), referencing *Threatened Biodiversity Survey and Assessment Guidelines* (DEC 2004).	22.25 hours, >2600 rocks
Striped Legless Lizard *Delma impar*	V	Rock rolling and habitat searches (2007-2015) referencing *Threatened Biodiversity Survey and Assessment Guidelines* (DEC 2004).	22.25 hours, >2600 rocks
Superb Parrot *Polytelis swainsonii*	V	General bird census (2006-2016) referencing *Threatened Biodiversity Survey and Assessment Guidelines* (DEC 2004) Targeted survey and flight path mapping (3 survey programs: 2014, 2016, 2017) referencing S*urvey guidelines for Australia's threatened birds Guidelines for detecting birds listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999*	29 hours Approximately 180hrs survey effort per 6 day survey: 540 total hours onsite for 3 surveys
Swift Parrot *Lathamus discolor*	CE, Ma	General bird census (2006-2016) referencing *Threatened Biodiversity Survey and Assessment Guidelines* (DEC 2004). Habitat assessment	29 hours > 60 surveys
Regent Honeyeater *Anthochaera phrygia*	CE, Mi	General bird census (2006-2016) referencing *Threatened Biodiversity Survey and Assessment Guidelines* (DEC 2004). Habitat assessment	29 hours > 60 surveys
Painted Honeyeater *Grantiella picta*	V	General bird census (2006-2016) referencing *Threatened Biodiversity Survey and Assessment Guidelines* (DEC 2004). Habitat assessment	29 hours > 60 surveys
Koala *Phascolarctos cinereus* (combined populations of Qld, NSW and the ACT)	V	Habitat assessment Vegetation surveys (2007-2017)	> 60 surveys 347 hours
Cattle Egret *Ardea ibis* Great Egret *Ardea alba*	Ma	General bird census (2006-2016), referencing *Threatened Biodiversity Survey and Assessment Guidelines* (DEC 2004).	29 hours

MNEs	EPBC status	Survey type	Survey effort
White-bellied Sea-eagle *Haliaeetus leucogaster*	Ma	General bird census (2006-2016) referencing *Threatened Biodiversity Survey and Assessment Guidelines* (DEC 2004).	29 hours
Rainbow Bee-eater *Merops ornatus*	Ma	General bird census (2006-2016) referencing *Threatened Biodiversity Survey and Assessment Guidelines* (DEC 2004).	29 hours
White-throated Needletail *Hirundapus caudacutus*	Mi, Ma	General bird census (2006-2016) referencing *Threatened Biodiversity Survey and Assessment Guidelines* (DEC 2004).	29 hours
Other species		Passive Anabat surveys Spotlighting and call playback Amphibians Cage and Elliot trapping referencing *Threatened Biodiversity Survey and Assessment Guidelines* (DEC 2004).	96 hours 21 hours 6 hours 222 trap nights

2.2 REPORTS AND ASSESSMENT SUMMARY

Numerous flora and fauna assessments and summary reports have been prepared for the Coppabella Wind Farm, including as a precinct of the broader Yass Valley Wind Farm proposal. A summary of relevant assessments is provided in Table 2-3. Several of these reports are appended to this Technical Report (A and B) where the information is directly relevant to the assessment of MNES for the current Coppabella Wind Farm proposal.

Table 2-3 Summary of relevant assessments and reports prepared for Coppabella Wind Farm (and associated projects) to date

Report	Assessment Summary	Provided as an Appendix to this report (yes / no)
Biodiversity Assessment: Coppabella Hills Precinct (2009).	This was the first assessment undertaken at Coppabella precinct, based on surveys from 2007. The assessment involved a general flora and fauna Biodiversity Assessment (BA) to review the ecological value of the site and assess the impact of the development. Field surveys were undertaken across the Coppabella Precinct to document and analyse threatened species habitat suitability, vegetation communities, and the significance of biodiversity values present. Additional targeted surveys for threatened fauna (Squirrel Glider, Bush Stone Curlew, and Barking Owl), as well as hollow-bearing trees were further undertaken after the initial general field surveys. Assessments of Significance, consistent with State and Commonwealth legislation, were undertaken to document the potential impact to threatened entities / vegetation communities known, or with potential to occur at the wind farm. A series of recommended mitigation measures to avoid and reduce impact to flora and fauna were developed, based on identified values and potential impacts.	Yes, Appendix B.1
Wind Farm Risks to Birds and Microbats - Appendix G Environmental Assessment Proposed Yass Valley Wind Farm: Coppabella Hills and Marilba Hills Precincts (2009)	Literature review of wind farm impacts upon birds and bats. Risk assessment for common, migratory and threatened species that may occur at Coppabella Wind Farm.	Yes, Appendix B.7.

Report	Assessment Summary	Provided as an Appendix to this report (yes / no)
Supplementary Ecology Report: Yass Valley Wind Farm (2012)	This assessment was supplementary to the Biodiversity Assessment. The assessment considered impacts from additional areas added (turbines, access and electricity easements and substations) to the development footprint not previously assessed within the BA in 2009. The report also reviewed commitments documented within the BA to undertake further targeted survey work as well as document offsetting requirements. The further survey work undertaken in this report is documented in Table 2-1 above.	No
Yass Valley Wind Farm Preferred Project Report (2012)	The report responds to the issues, including flora and fauna impacts, raised in the submissions from members of the public and Government Agencies on the Yass Valley Wind Farm Environmental Assessment.	No. Relates to a wider project.
EPBC Additional Information Report (2014)	This report was supplementary to the EPBC Referral for Yass Valley Wind Farm. The report provides additional information as requested by DoE in 2014. It includes detail on: • Scope of works and construction details • Cumulative flora and fauna impacts • Particular issues raised for certain flora and fauna • Avoid, mitigate, offset.	No – superseded by this Technical Report
Biodiversity Risks, Impacts and Offsets: Yass Valley Wind Farm PAC Submission (2015)	This report summarises the status of the biodiversity risks, impacts and offsets of the wind farm. In particular, the report provides an overview of the biodiversity survey and assessment history, the extent of impact areas and the approach to avoid, mitigate and offset impact. Biodiversity reports and map sets are included as Appendix G of said report. Those relevant to flora and fauna include: • Vegetation type and condition across the site; • Hollow- bearing trees by precinct; and • Golden Sun Moth survey results for 2013 and 2014 – the species was not recorded or considered likely to occur in the Coppabella precinct.	Yes – Golden Sun Moth results only, Appendix B.4

Report	Assessment Summary	Provided as an Appendix to this report (yes / no)
Yass Valley Wind Farm Superb Parrot 2014 Spring survey results (letter provided to client)	This letter summarises the methods employed and results obtained from the 2014 surveys, including maps detailing survey effort / location and survey results. High use flight paths were not identified or considered likely to occur near turbine sites.	Yes, Appendix B.5
Yass Valley Wind Farm Superb Parrot 2016 Spring survey results (letter provided to client)	This letter summarises the methods employed and results obtained from the 2016 surveys, including maps detailing survey effort / location and survey results. High use flight paths were not identified or considered likely to occur near turbine sites.	Yes, Appendix B.6
Modification Application Environmental Assessment Report: Coppabella (formerly Yass Valley) Wind Farm (2017). The project as described in the Modification Application is fully consistent with the Coppabella Wind Farm project being referred to the DoEE at this time.	This report was prepared to support an application to modify Development Consent SSD-6698 (Modification Application) for the Coppabella Wind Farm. The report provides context and detailed assessment to support the application. The modification to the already approved project altered the extent of the previously assessed impacts. This report identified the impact changes by: • Reviewing the environmental impacts considered for the approved project. • Identification of areas where the modifications could result in new or increased impacts. • Identification of any modifications that could result in inconsistency with existing consent conditions. Specialist investigations / field surveys were then undertaken to review and accommodated the new impacts including: • Additional assessments of new / increased impacts, specific to the modification. • Review of options to avoid or reduce new or increased impacts of the modification. • Identification of appropriate mitigation measures and offsets to address new or increased impacts of the modification. • Consultation with relevant agencies and/or the community as applicable to the potential impacts. The further field survey work completed to assess the impacts of the Coppabella Wind Farm are documented in Table 2-1 above.	Yes – Sections relevant to MNES only: 8-10, Appendix B.2

Report	Assessment Summary	Provided as an Appendix to this report (yes / no)
Coppabella Wind Farm – proposed turbine modification impacts on birds and bats (2017)	Assessment of operational impacts on birds and bats of the current turbine parameters and layout, based on site-specific bird surveys and flight height resulted extrapolated from other Australian wind farms. Finds an overall low collision risk for Coppabella Wind Farm.	Yes, Appendix B.8
Coppabella Wind Farm Targeted Flora Surveys 2017	A report documenting the methods and results of these targeted surveys to address areas that would now be impacted that were outside the previous construction footprint. No threatened flora species were found within the construction footprint during the surveys.	Yes, Appendix B.9
Yass Valley Wind Farm Superb Parrot 2017 Spring Survey **(survey completed, results pending).**	Upon completion of the field survey the results will be summarised and provide comparisons to previous years' data. Preliminary results include: 5 days in field were undertaken by 6 ecologists. Very few parrots were seen within the locality overall and only 1 parrot observed on a transect. Some individuals, although not large flocks, were observed on lower elevations outside the project area, but were not observed to make large-scale movements into or across ridgelines within the wind farm. This survey supports previous conclusions that turbine locations at Coppabella do not lie within any high use Superb Parrot flight paths.	No

3 IDENTIFICATION OF MNES WITH POTENTIAL FOR IMPACT

An EPBC Protected Matters Search was completed on 3 November 2017 within a 50km radius of the centre of the project site (Appendix C).

Table 3-1 and Table 3-2 present an evaluation of whether the habitat for each of these threatened communities threatened species or migratory species is present at the Coppabella Wind Farm site, and whether they are likely to occur. The table also provides an indication of whether each MNES is likely to be impacted by the proposal and would therefore require further assessment.

The evaluation is informed by:

- Ecological information available on government species profile databases (i.e. habitat).
- Record information available on NSW's Bionet or Atlas of Living Australia (ALA).
- Habitat descriptions for the site.
- Targeted surveys (where relevant).
- The description of the proposal.
- Previous impact assessments (i.e. impact yes/no).

In summary, the evaluation identifies eleven MNES which have some potential to be impacted, either by collision risk or habitat loss.

Threatened ecological community:

- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box Gum Woodland or BGW CEEC).

Threatened fauna:

- Regent Honeyeater.
- Painted Honeyeater.
- Swift Parrot.
- Superb Parrot.
- Koala.

Migratory fauna:

- White-throated Needletail.
- Cattle Egret.
- Great Egret.
- White-bellied Sea Eagle.
- Rainbow Bee-eater.

These are considered further in Section 4, in terms of their likely use of the site. Impact types are discussed quantified in Section 5.

Table 3-1 Evaluation for EPBC Act threatened species returned form database search

Scientific name	Common name	EPBC Act	Habitat present (yes, no)	Likelihood of occurrence	Potential for impact (yes, no)
ECOLOGICAL COMMUNITY					
Alpine Sphagnum Bogs and Associated Fens		E	No	Nil. Not recorded during flora surveys.	No
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia		E	No	Nil. Not recorded during flora surveys.	No
Natural Temperate Grassland of the South Eastern Highlands		CE	No	Nil. Not recorded during flora surveys.	No
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland		CE	Yes	The community has been recorded on-site and will be impacted.	Yes Habitat loss
FLORA					
Ammobium craspedioides	Yass Daisy	V	Yes	Species has been recorded within the broader project site however, targeted survey did not detect this species within the construction footprint. Known locations near the footprint have been buffered to avoid indirect impacts to the species. Refer to 'Minimisation with respect to constraints' map and table in Appendix E.	No
Caladenia concolor	Crimson Spider Orchid	V	No	Grows in regrowth woodland on granite ridge country that has retained a high diversity of plant species. The degraded woodland on -site does not provide habitat for this species and it is not known in the locality.	No
Grevillea iaspicula	Wee Jasper Grevillea	E	No	Nil. Grows only on rocky outcrops, cave entrances and cliff bases in limestone. There is no limestone on-site.	No
Leucochrysum albicans var. tricolor	Hoary Sunray	E	Yes	Unlikely to occur due to heavy grazing pressure over most of the site. Not detected within the construction footprint during targeted surveys.	No
Pelargonium sp. Striatellum (G.W. Carr 10345)	Omeo Stork's-bill	E	No	Nil. The species has a specific habitat and is usually found just above the high-water level of ephemeral lakes or irregularly inundated grasslands nearby wetland / aquatic habitats. The species is known from only 4 locations in NSW, with three on lake-beds on the basalt plains of the Monaro and one at Lake Bathurst. Habitat for the species is not present.	No

Scientific name	Common name	EPBC Act	Habitat present (yes, no)	Likelihood of occurrence	Potential for impact (yes, no)
Pomaderris pallida	Pale Pomaderris	V	No	Nil. The species usually grows in shrub communities surrounded by Brittle Gum (*Eucalyptus mannifera*) and Red Stringybark (*E. macrorhyncha*) or *Callitris* spp. woodland. Habitat for the species is not present.	No
Prasophyllum petilum	Tarengo Leek Orchid	E	Yes, but marginal	Nil. This species is known only from ungrazed or lightly grazed remnants of high native species diversity a habitat not occurring within the turbine clusters.	No
Pterostylis oreophila	Blue-tongued Orchid	CE	No	Nil. The species grows along sub-alpine watercourses under thickets of Mountain Tea-tree in muddy ground very close to water. Habitat for the species is not present.	No
Rutidosis leptorrhynchoides	Button Wrinklewort	E	Yes	Nil. The species occurs in Box Gum Woodland, but was not detected during surveys of the project site or during targeted surveys of the construction footprint.	No
Swainsona recta	Small Purple-pea	E	Yes	Nil. The species occurs in grassy understorey of woodland, but was not detected during surveys of the project site or during targeted surveys of the construction footprint.	No
Thesium australe	Austral Toadflax	V	No	Nil. The species occurs within grassland, often in association with Kangaroo Grass (*Themeda australis*). Kangaroo Grass was recorded at the site, but the degraded grasslands and low abundance of Kangaroo Grass is not suitable habitat for this species. The species was not detected during flora surveys and is not known for the locality.	No
FAUNA - AMPHIBIANS					
Litoria booroolongensis	Booroolong Frog	E	No	Nil. The species lives along permanent stream / creeks with some fringing vegetation cover such as ferns, sedges or grasses. Rocks and dense vegetation bordering or within streams is required by the species. Habitat for this species is not present in the construction footprint.	No
Litoria raniformis	Southern Bell Frog	V	No	Nil. The species is usually found in or around permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys. Habitat for this species is not present in the construction footprint.	No
Pseudophryne pengilleyi	Northern Corroboree Frog	CE	No	Nil. The species occurs in forests, sub-alpine woodlands and tall heath. Breeding habitat is pools and seepages in sphagnum bogs, wet heath, wet tussock grasslands and herbfields in low-lying depressions. Habitat for this species is not present in the construction footprint.	No
FAUNA - AVES					
Anthochaera	Regent	CE	Yes	Yes, potential foraging habitat within Box Gum Woodland. Not recorded during any surveys within the	Yes

Scientific name	Common name	EPBC Act	Habitat present (yes, no)	Likelihood of occurrence	Potential for impact (yes, no)
phrygia	Honeyeater			project site but it could occur from time to time. The species forages over a large range but as the population is small in number, collision risks are the key issue.	Habitat loss Collision
Botaurus poiciloptilus	Australasian Bittern	E	No	Nil. The species favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (*Typha* spp.) and spikerushes (*Eleocharis* spp.). Habitat for this species is not present and it has not been recorded from the locality.	No
Calidris ferruginea	Curlew Sandpiper	CE	No	Nil. The species generally occupies littoral and estuarine habitats, and is mainly found in intertidal mudflats of sheltered coasts in NSW. Habitat for this species is not present.	No
Grantiella picta	Painted Honeyeater	V	Yes	The species is known from Cootamundra and north of Young (~50km west of the site) and marginal habitat though mistletoe are present within the site. The species was not recorded during any surveys but it could occur from time to time. As the population is small in number, collision risks are the key issue.	Yes Habitat loss Collision
Lathamus discolor	Swift Parrot	CE, Mi	Yes	The species does not breed on the mainland but migrates to forage. Box Gum Woodland provides potential foraging habitat. The species was not recorded during field surveys but it could occur during migration. As the population is small in number, collision risks are the key issue.	Yes Habitat loss Collision
Leipoa ocellata	Malleefowl	V	No	Nil. The species predominantly occurs in mallee vegetation with a dense and diverse shrub-layer. Habitat for this species is not present.	No
Numenius madagascariensis	Eastern Curlew	CE	No	The species occurs in intertidal mudflats and sandflats, often with beds of seagrass, on sheltered coasts, especially estuaries, mangrove swamps, bays, harbours and lagoons. Habitat for this species is not present.	No
Polytelis swainsonii	Superb Parrot	V	Yes	The species has been recorded on-site and is known for the locality. Several targeted surveys are available to inform site utilisation by this species, in terms of habitat use and collision risk.	Yes Habitat loss Collision
Rostratula australis	Australian Painted Snipe	E	No	Nil. The species occurs in shallow, brackish or freshwater terrestrial wetlands, usually supporting a mosaic of low, patchy vegetation, as well as lignum and canegrass. Habitat for this species is not present.	No
FAUNA - INSECTS					
Synemon plana	Golden Sun Moth	CE	Yes	Nil. Grasslands within the site were initially considered potential habitat for this species. The species was not detected during targeted surveys. Surveys focused on detailed micro-habitat analysis and detection of presence of the species and was undertaken in two years (December 2013 and December 2014/January 2015) with reference to know populations on the adjacent Marilba precient. Supporting material is	No

Scientific name	Common name	EPBC Act	Habitat present (yes, no)	Likelihood of occurrence	Potential for impact (yes, no)
				provided in Appendix B.4, demonstrating the low likelihood of this species occurring and being impacted at the Coppabella precinct.	
FAUNA - MAMMALS					
Dasyurus maculatus maculatus (SE mainland population)	Spotted-tailed Quoll	E	No	Nil. The species has a large home-range and lives in various environments including forests, woodlands, coastal heathlands and rainforests. They make dens in rock shelters, small caves, hollow logs and tree hollows. They use these dens for shelter and to raise young. The woodland on site is considered too sparse and degraded to provide habitat for this species.	No
Mastacomys fuscus mordicus	Broad-toothed Rat	V	No	Nil. This species lives in dense vegetation of wet grass, sedge or heath and under snow in winter. Habitat for this species is not present.	No
Nyctophilus corbeni	Corben's Long-eared Bat	V	No	Nil. This species is most common in box, ironbark and cypress pine woodland on the western slopes and plains. The Pilliga Scrub region (near the northern border of NSW) is the stronghold for this species. The degraded woodland on-site is not considered suitable habitat for this species.	No
Petauroides volans	Greater Glider	V	No	Nil. The species occurs in Eucalypt forests and woodlands. It feeds almost exclusively on young leaves and flower buds of select eucalypt species. The degraded woodland on-site is considered to open and sparse to provide suitable roosting or foraging resources to sustain this species.	No
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)	Koala	V	Yes	Low. Woodland patches, including Box-gum Woodland, especially along riparian areas. Feed tree for the species are located within the site but the Koala has not been recorded during any surveys onsite.	Yes Habitat loss
Pseudomys fumeus	Smokey Mouse	E	No	Nil. The species occurs in heath to dry sclerophyll forest, especially along ridgetops with a heath understorey, and occasionally adjacent wetter habitats such as fern gullies. The species generally requires a floristically diverse shrub layer. Habitat for this species is not present.	No
Pteropus poliocephalus	Grey-headed Flying-fox	V	No	Nil. The species is a canopy-feeding frugivore and nectarivore, which utilises vegetation communities including rainforests, open forests, closed and open woodlands, *Melaleuca* swamps and *Banksia* woodlands. The degraded woodland on-site is not considered suitable for this species, nor would it provide adequate foraging resources.	No
FAUNA - REPTILES					
Aprasia	Pink-tailed Legless	V	Yes	Nil. The species occurs in open woodland areas with native grassy groundlayers, but it was not identified	No

Scientific name	Common name	EPBC Act	Habitat present (yes, no)	Likelihood of occurrence	Potential for impact (yes, no)
parapulchella	Lizard			after intensive targeted survey. The vegetation and rock structures were not considered to be of high likelihood of providing quality habitat.	
Delma impar	Striped Legless Lizard	V	Yes	Nil. The species occurs in natural temperate grassland and less often in exotic dominated grasslands, but it was not identified after intensive targeted survey. The vegetation and rock structures were not considered to be of high likelihood of providing quality habitat.	No

Table 3-2 Evaluation for EPBC Act migratory and/or marine species returned from database search

Scientific name	Common name	EPBC Act	Habitat present (yes, no)	Likelihood of Occurrence	Potential for Impact (yes, no)
MIGRATORY TERRESTRIAL SPECIES					
Hirundapus caudacutus	White-throated Needletail	Mi, Ma	Yes	The species has been recorded near wind farm site. It could occur during migration.	Yes Collision
Monarcha melanopsis	Black-faced Monarch	Mi, Ma	No	Nil. The species is primarily found in rainforests. It is sometimes found in nearby open eucalypt forests (mainly wet sclerophyll forests), especially in gullies with a dense, shrubby understorey. Habitat for this species is not present, and as it primarily occurs along the eastern slopes and tablelands of the Great Divide in NSW where it migrates along the eastern coastline, it is unlikely to pass through the site during migration events.	No
Motacilla flava	Yellow Wagtail	Mi, Ma	No	Nil. The species occurs in a variety of damp or wet habitats with low vegetation, supporting rushes or grasses. Habitat for this species is not present.	No
Myiagra cyanoleuca	Satin Flycatcher	Mi, Ma	No	Nil. The species is found in tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests. The species is unlikely to occur as optimal habitat including breeding habitat (dense gullies) is not present on the site.	No
Rhipidura rufifrons	Rufous Fantail	Mi, Ma	No	Nil. The species is found in rainforest, dense wet forests, swamp woodlands and mangroves, preferring shaded environments. Habitat for this species is not present.	No

Scientific name	Common name	EPBC Act	Habitat present (yes, no)	Likelihood of Occurrence	Potential for Impact (yes, no)
MIGRATORY MARINE SPECIES					
Actitis hypoleucos	Common Sandpiper	Ma	No	Nil. The species occupies coastal wetlands and some inland wetlands. Habitat for this species is not present.	No
Apus pacificus	Forked-tailed Swift	Ma	Yes, but species is aerial	Nil. The species occurs over inland plains but is almost exclusively aerial, flying from < 1 m to at least 300 m above ground (probably much higher) and forage on the wing for flying insects. The site is outside this species primary migratory range, which generally occurs east of the Great Divide, and it is highly unlikely to occur.	No
Ardea alba	Great Egret	Ma	Yes, but marginal	Moderate. The species is widespread across Australia, and it could occur on-site at times at dams or ephemeral wetlands after significant rainfall; however, their migratory pathway is most likely to follow wetland corridors that do not occur on the site. There is no breeding habitat on site.	Yes Habitat loss
Ardea ibis	Cattle Egret	Ma	Yes, but marginal	Moderate. The species has been recorded near Murrumbidgee west of the site. This species however is widespread across Australia, and they could occur on-site at times at dams or ephemeral wetlands after significant rainfall, or within moist pastures for foraging; however, their migratory pathway is most likely to follow wetland corridors that do not occur on the site.	Yes Habitat loss
Calidris acuminata	Sharp-tailed Sandpiper	Ma	No	Nil. The species prefers grassy edges of shallow inland freshwater wetlands. It is also found around sewage farms, flooded fields, mudflats, mangroves, rocky shores and beaches. Habitat for this species is not present.	No
Calidris ferruginea	Curlew Sandpiper	CE, Ma	Refer to Aves section above		
Calidris melanotos	Pectoral Sandpiper	Ma	No	Nil. The species occurs primarily within shallow fresh to saline wetlands, coastal lagoons, estuaries, bays, swamps, and lakes. Habitat for this species is not present.	No
Gallinago hardwickii	Latham's Snipe, Japanese Snipe	Ma	No	Nil. The species primarily occurs within freshwater wetlands on or near the coast, generally among dense cover. Habitat for this species is not present.	No
Haliaeetus leucogaster	White-bellied Sea-Eagle	Ma	No	Low. This species has been recorded along the Murrumbidgee River system near the site at Burrinjuck Dam and Yass. The species primarily breeds and forages within coastal and wetland habitats and estuaries, but can occur within terrestrial habitats where there are large rivers and reservoirs. Has potential to travel through the area from time to time.	Yes Collision

Scientific name	Common name	EPBC Act	Habitat present (yes, no)	Likelihood of Occurrence	Potential for Impact (yes, no)
Merops ornatus	Rainbow Bee-eater	Ma	Yes	The species was observed on site during the 2009 Biodiversity Assessment and has been recorded near Jugiong Creek. Habitat for this species would not be impacted, but the migratory nature of the species puts it at risk of collision.	Yes Habitat loss Collision
Numenius madagascariensis	Eastern Curlew, Far Eastern Curlew	CE, Ma	Refer to Aves section above		
Pandion haliaetus	Osprey	Ma	No	Nil. The species occurs in littoral and coastal habitats and terrestrial wetlands. They require extensive areas of open fresh, brackish or saline water for foraging. Habitat for this species is not present.	No
Rostratula *benghalensis (sensu lato)*	Painted Snipe	E, Ma	No	Nil. The species primarily occurs in shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. Emergent tussocks of grass, sedges, rushes or reeds, or samphire are usually present. Habitat for this species is not present.	No

Conservation Codes: CE: Critically Endangered; E: Endangered; Ma: Marine; Mi: Migratory; V: Vulnerable.

4 ECOLOGICAL BACKGROUND FOR MNES WITH POTENTIAL FOR IMPACT

Key ecological information for the eleven MNES with potential to be impacted by the Coppabella Wind Farm is provided in this section. The candidates identified in Section 3 and discussed further here include:

Threatened ecological community:

- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (BGW CEEC).

Threatened fauna:

- Regent Honeyeater.
- Painted Honeyeater.
- Swift Parrot.
- Superb Parrot.
- Koala.

Migratory fauna:

- White-throated Needletail.
- Cattle Egret.
- Great Egret.
- White-bellied Sea Eagle.
- Rainbow Bee-eater.

These candidates have either been identified onsite or acknowledged as being able to occur from time to time. This section provides a detailed discussion of habitat requirements of these entities and the quality of habitat provided at the project site. This is undertaken to provide information necessary to carry out a detailed impact assessment. Section summary summarises those species with potential for significant impacts.

4.1 BOX GUM WOODLAND CEEC

4.1.1 Definition of EPBC listed ecological community

The EPBC Act Policy Statement for the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community ('Box Gum Woodland/BGW CEEC') (DEH 2006) generally describes the community as:

> *"either a woodland or a derived grassland (a grassy woodland from which the trees have been removed). It has a ground layer of native tussocks and herbs, and a sparse, scaterred shrub layer. White Box (Eucalyptus albens), Yellow Box (E. melliodora) or Blakely's Red Gum (E. blakelyi) dominate the ecological community where a tree layer still occurs… sites dominated by other trees species that do not have Yellow Box, White Box or Blakely's Red Gum as co-dominants are not considered to be part of the ecological community except in the Nandewar Bioregion."*

The project is not located within the Nandewar Bioregion (being wholly located within the South Western Slopes Bioregion) and as such, Yellow Box, White Box or Blakely's Red Gum must be dominant or co-dominant to comprise the EPBC listed ecological community. Grassy woodland and derived grassland vegetation that is or was dominated by one or more of these three species, is dominant across the project site.

The EPBC Policy Statement for the BGW CEEC goes on to specify certain criteria that must be met to be considered the BGW CEEC. Vegetation forms part of the BGW CEEC if:

- One of the most common overstorey species is, or was:
    - Yellow Box.
    - Blakely's Red Gum, or
    - White Box.
- The understorey is predominantly native.
- The patch is greater than 0.1ha.
- And either:
    - There are 12 or more non-grass species in the understorey including at least one important species (based on a list issued by the DoE), *or*
    - If native species diversity is lower than this, then the patch is greater than 2ha with an average of 20 or more mature trees per hectare, or with natural regeneration of the dominant overstorey eucalypts.

This specific criteria has been used throughout the surveys at the project site to specifically determine which areas within the broader Box Gum Woodland community would be considered the BGW CEEC.

4.1.2 Survey conducted and an assessment of defining criteria

A number of flora surveys have been conducted by NGH Environmental across the project site where a focus of the surveys has been to identify the BGW CEEC. These include:

- Surveys for the Coppabella Hills Precinct Biodiversity Assessment (Coppabella BA) (NGH 2009) – September 2008 and March 2009.
- BioBanking Plot surveys focussed on the development footprint - December 2016.
- Targeted surveys and BGW CEEC validation – November 2017.

The surveys for the Coppabella BA were broad across the project footprint and resulted in the broader mapping of the BGW CEEC across the project site. Almost all of these surveys were 'random meanders' (as defined in Cropper 1993). As such they were not specific to a 0.1 hectare area utilised to determine species richness. For example, Site 10b extended across a patch of mapped BGW CEEC (refer to mapping in Appendix A.4). Although not specifically documented within the Coppabella BA, it is assumed that those survey sites used to determine the presence of the BGW CEEC, would have taken the 0.1 hectare area into account.

The BioBanking Plot and BGW CEEC validation surveys were more focussed and targeted areas within the current development footprint. The BioBanking Plot surveys employed 20m x 20m (0.04 hectare) floristic plots to determine species richness as specified by the BioBanking Assessment Methodology. The BioBanking plot surveys conducted to date have met the minimum requirements of the NSW Framework for Biodiversity Assessment (refer to Section 7.3).

The CEEC validation surveys used a 0.1 hectare area as recommended in the policy statement. The CEEC validation surveys also aimed to define the extent of the 'patches' (as defined in the EPBC Act Policy

Statement for the BGW CEEC) that encroached within the development footprint, to allow for an informed assessment of the significance of the impacts on each individual patch.

Two patches occur within the development footprint and are discussed further below. Four survey sites are relevant for characterising the BGW CEEC and its extent within the development footprint and associated patch. The survey sites are assessed against the criteria in Table 4-1 below and are mapped in Appendix A.4. All species recorded at each of the survey sites are included as Appendix D.

Table 4-1 Evaluation of survey sites against the criteria for the BGW CEEC

Key diagnostic characteristics	Site 10a (NGH 2009) Patch 2	Site 10b (NGH 2009) Patch 2	Plot YVP6 (NGH 2016) Patch 1	Area 4 (NGH 2017) Patch 2
Is, or was previously, at least one of the most common overstory species White Box, Yellow Box or Blakey's Red Gum (or Western Grey Box or Coastal Grey Box in the Nandewar Bioregion)?	Yes	Yes	Yes - but overstorey not present across the majority of this patch	Yes
Does the patch have a predominantly native understorey?	Yes	Yes	Yes	Yes
Is the patch size 0.1 ha or greater in size?	Yes	Yes	Yes	Yes
There are 12 or more native understory species present (excluding grasses). There must be at least one important species.	Yes	Yes	Yes	Yes
If less than 12 native understory species present	As the above criteria are met the criteria below are not necessary to determine the BGW CEEC however, they are included for completeness			
Is the patch 2ha or greater in size?	Yes	Yes	Yes	Yes
Does the patch have an average of 20 or more mature trees per ha, or is there natural regeneration of the dominant overstory Eucalypts?	Likely (not directly assessed)	Likely (not directly assessed)	Unlikely (not directly assessed)	Likely (not directly assessed)

4.1.3 Distribution across the site and within the construction footprint

Approximately 233.37 ha of BGW CEEC has been mapped in the project area (refer to mapping in Appendix A.4). Much of the BGW CEEC is avoided by the project. There are two smaller patches within the centre of the project area with larger patches occurring in the far east however, the majority, which is outside the footprint, has not been validated during the recent surveys. As discussed above, validation has focussed on areas that would be directly impacted by the project.

There are two patches of BGW CEEC that overlap with the development footprint that would be directly impacted (refer to mapping in Appendix A.4):

- Patch 1 between Turbine 19 and Turbine 29 (9.78 ha) The extent of Patch 1 has been largely field validated around its entire extent; and
- Patch 2 in between Turbine 23 and Turbine 28 (101.36 ha).

The boundary of Patch 2 has been validated on the southern extent where it adjoins the development footprint. An east-west fence line occurs in this area and to the south the groundcover becomes exotic dominated. The boundaries around the remainder of the patch have been inferred from previous field data, existing vegetation mapping and interpretation of aerial imagery. The surrounding areas have not

been mapped in detail and may or may not have a native understorey. Also, areas dominated by Long-leaved Box (*Eucalyptus goniocalyx*) occur in close proximity, so in particular areas, it cannot be conclusively determined what the past overstorey composition may have been. A conservative approach has been undertaken, including only that which has a high probability of being part of the patch. In this way the proportional impacts of the development on the patch are not being underestimated.

An additional patch of the CEEC occurs just outside of the development footprint to the east of Turbine 38. This patch (12.13 ha) would not be directly impacted by the proposal however, may be impacted indirectly given that construction would occur immediately adjacent.

BGW CEEC occurs onsite and would be affected by the project. An impact on local viability may occur.

4.2 REGENT HONEYEATER

4.2.1 Records on site

Regent Honeyeater has not been recorded on site. There are several records for the species around the Coppabella Wind Farm area. The closest records are around Binalong and Bookham, however these date from the 1970s and 1980s (five km or less from site). There are also four records south-east of Yass from the late 1990s. The closest records within the last 15 years are from between Boorowa and Rugby, approximately 50 km north-east of Coppabella Wind Farm. Looking more broadly, there are a sparse number of Regent Honeyeater records from the South-west Slopes region generally.

4.2.2 Habitat description

Regent Honeyeater breeding areas are clearly defined and well-documented in the *National Recovery Plan* (DOE 2016). The South-west Slopes do not host a Regent Honeyeater breeding area. Foraging habitat only (during autumn-winter particularly) is relevant for Regent Honeyeater at the Coppabella Wind Farm site. This habitat consists of eucalypt woodlands and forests (DOE 2016). The RP lists key tree and mistletoe species for Regent Honeyeater. At the Coppabella Wind Farm, there are two key tree species listed in the plan: White Box and Yellow Box. These tree species occur in BGW on the site. At Coppabella, White Box dominated BGW generally occurs on the rocky upper slopes while Yellow Box dominated BGW generally occurs in the more fertile flats and valleys.

Literature indicates that habitat preferences for Regent Honeyeater are very similar to that of Swift Parrot (refer above Section 4.4). Additionally, Regent Honeyeater (DOE 2016, Roderick and Ingwersen 2014, Roderick *et al.* 2013):

- Shows a strong preference for areas with fertile soils with high soil water content, including creek flats, river valleys and lower slopes.
- Is associated with the presence of mistletoe species around 50% of the time.

At Coppabella Wind Farm, the areas identified as preferred habitat for Swift Parrot (refer Section 4.4) are also considered preferred habitat for Regent Honeyeater. These are mapped in Appendix A.6.

4.2.3 Importance of habitat in Coppabella Wind Farm project area

In summary, all occurrences of BGW or dry grass forest at Coppabella Wind Farm have potential to be utilised by Regent Honeyeater, and are termed 'potential habitat' for Regent Honeyeater. However, not all of these areas match the microhabitat descriptions above. Areas that fit the above descriptions are termed

the 'preferred habitat' for Regent Honeyeater. Potential 'preferred habitat' for the Regent Honeyeater coincides with preferred habitat for the Swift Parrot and is mapped in Appendix A.6. These areas represent 164 ha or 2.5 % of the project area and 2.5 ha or 1.5% occurs within the mapped construction footprint. Some of these areas also contain a low abundance of *Amyema pendulum*, a mistletoe species that is not listed in the Recovery Plan but may provide foraging resources for Regent Honeyeater.

The National Recovery Plan defines habitat critical the survival of Regent Honeyeater as *"Any breeding or foraging habitat in areas where the species is likely to occur"* (DOE 2016). The map provided in the plan shows areas where Regent Honeyeater is likely to occur. In the region, this appears to follow the Murrumbidgee River and other major waterways, although the scale of the map in the Recovery Plan does not allow close inspection. The Atlas of Living Australia (www.ala.org) provides a digitised version of the 'likely' and 'maybe' distribution areas of Regent Honeyeater. Coppabella Wind Farm appears to intersect the 'likely' areas at its' western edge along Coppabella Road and along the transmission line near the township of Bookham. Therefore, even though the species has not been detected onsite, potential 'preferred habitat' within the Coppabella Wind Farm site is considered important and is habitat critical to the survival of Regent Honeyeater.

Potential 'preferred habitat' within the Coppabella Wind Farm site is considered habitat critical to the survival of Regent Honeyeater.

4.3 PAINTED HONEYEATER

4.3.1 Records on site

Painted Honeyeater has not been recorded on site. The Coppabella Wind Farm site is along the western edge of their distribution (based on ALA expert distribution). There are sparse records for this species in the district: the closest are a 1950s record approximately five km south of the project site and; a 2003 record along the Murrumbidgee River approximately 10 km south of the turbine area and six km west of the Transmission line. There are also two records (2002, 2012) north of Boorowa, approximately 40 km from the site. There are numerous records to the west around Cootamundra and approximately 30 km east of Yass (i.e. 70 km east of site). Painted Honeyeater is recorded as an uncommon resident in the South-west Slopes IBA (BirdLife International 2017a).

4.3.2 Habitat description

Painted Honeyeater primarily occurs on the inland slopes of the Great Dividing Range, although it is nomadic and may occur in low densities in other parts of NSW in suitable habitat. It inhabits dry open forests and woodland including Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark open forests, also paperbark and casuarinas (OEH 2017; Pizzey *et al.* 2003). It is a specialist feeder on mistletoe, particularly of genus *Amyema*, and generally requires five or more mistletoes per hectare (DECC 2008b). The species is a seasonal migrant with movements linked to the fruiting of mistletoe.

At the Coppabella Wind Farm site, potential habitat for the species would be BGW, however mistletoe is neither widespread nor abundant where it does occur. Mistletoe was identified in low abundance[2] in the woodland on midslopes below Turbines 9-14 and near Turbines 78-80 (refer to turbine layout Appendix

[2] Relative abundance using a modified Braun-Blanquet scale was usually recorded as 1 for mistletoe. This means than one to a few individuals are present with less than 5% cover.

A.1). These are areas of good and moderate-good condition BGW, i.e. CEEC. CEEC occupies approximately 233 ha of the project area.

In the Rye Park locality (approximately 20 km east of Coppabella) in November 2013, the Painted Honeyeater was observed to forage consistently over several weeks in the same patch of the best quality Box Gum Woodland habitat in the project site, despite scattered Box Gum Woodland trees being available elsewhere (D. Frazer and B. Heinze *pers.obs*). The species largely relied on this particular patch of better-quality woodland as a preference which also supported a high abundance of mistletoe.

4.3.3 Importance of habitat in Coppabella Wind Farm project area

The importance of the habitat at Coppabella for Painted Honeyeater is generally taken to be low, on account of:

- Sparse records for the species locally indicating its' occurrence is occasional rather than regular.
- Suitable foraging habitat for this specialist feeder is in low abundance at few locations, suggesting use would only be occasional.

Potential habitat for the Painted Honeyeater within the Coppabella Wind Farm site is considered of low importance.

4.4 SWIFT PARROT

4.4.1 Records on site

The Swift Parrot has not been recorded on site. There is a paucity of records for the species around the Coppabella wind Farm area. Closest records are between Jugiong and Galong (aka Garryowen), within a few km west of the site. These consist of two records from 1997. However, there are many records from the South-west Slopes region generally and the IBA includes important wintering habitat for Swift Parrot.

4.4.2 Habitat description

Swift Parrot breeds in Tasmania and winters on the mainland. Winter-autumn foraging habitat only is relevant for Swift Parrots at Coppabella Wind Farm. This habitat consists of eucalypt woodlands and forests (Saunders and Tzaros 2011). The Recovery Plan lists key tree species for Swift Parrot (Saunders and Tzaros 2011). At the Coppabella Wind Farm, there are two key tree species listed in the plan: White Box and Yellow Box. These tree species occur in BGW on the site. At Coppabella, White Box dominated BGW generally occurs on the rocky upper slopes while Yellow Box dominated BGW generally occurs in the more fertile flats and valleys (*pers.obs*. Dave Maynard, NGH Environmental).

Potential Swift Parrot habitat can also be defined by the presence of winter-flowering eucalypts, for which it roams widely. White Box is winter flowering. Another tree species on site, the Long-leaved Box, is winter flowering and occurs in the dry forest. Based on these habitat descriptions, areas of dry grass forest and BGW at Coppabella Wind Farm provide winter habitat for Swift Parrot. Literature indicates the following further habitat preferences (Saunders and Tzaros 2011, Roderick and Ingwersen 2014, Roderick *et al.* 2013):

- Winter foraging habitat includes scattered trees, remnant vegetation and continuous forest / woodland.

- Seem to prefer sites with a high level of tree diversity (i.e. four or more tree species).
- More likely to occur in open forest and woodland with a sparse shrub or grass understorey. However, understorey condition is not an indication of habitat suitability.
- Prefer larger patches (>1000 ha), but are sometimes recorded in small patches (<1 ha).
- Past clearing and the lack of mature trees does not affect use of habitat where suitable flowering trees are present.
- Prefers rich and fertile sites lower in the landscape and along gullies or lower slopes.

The Biodiversity Assessment for the Coppabella Hills Precinct (NGH Environmental 2009a; provided in full in Appendix B.1) presents the flora survey results for representative areas of woodland across the project area. The results indicate that woodland on the valley flats, sheltered slopes and mid-slopes generally has a high level of tree diversity (more than four eucalypt tree species including Long-leaved Box, Yellow Box and White Box) and sparse shrub layer. These sites are:

- In the south-eastern corner of the project area, west of Turbine 75.
- Along the lower slope of northern ridgeline below Turbines 9 and 10.
- Along the flats west of Turbine 75.
- In the saddle north of Turbine 80.

Woodland on lower slopes (~450 m elevation) at the southern end of the project area tended to have low tree diversity. Woodland on crests and upper slopes tends to be of low diversity with young regrowth trees, with one exception – a small area of open woodland on the hill crest at south from Turbine 80. In this area, the trees are mature with large DBH (up to 100 cm), bearing multiple hollows. This patch of woodland is in proximity to a large tract of high quality vegetation on the flats to the north. The botanical condition of the understorey in this area is poor-moderate.

4.4.3 Importance of habitat in Coppabella Wind Farm project area

All occurrences of BGW or dry grass forest at Coppabella Wind Farm have potential to be utilised by Swift Parrot, and are termed 'potential habitat' for Swift Parrot. However, not all of these areas match the microhabitat descriptions above. Areas that fit the above descriptions 'preferred habitat'. Potential 'preferred habitat' for the Swift Parrot coincides with preferred habitat for the Regent Honeyeater and is mapped in Appendix A.6. These areas represent 789 ha or 12 % of the project area and 60 ha or 1.5% occurs within the mapped construction footprint.

The habitat at Coppabella Wind Farm is considered important to Swift Parrot. Although the local area of the wind farm does not appear to be used regularly (based on records), the South-western Slopes of NSW KBA recognises the importance of the region to wintering Swift Parrots. The National Recovery Plan cites as critical habitat areas of habitat where Swift Parrot possesses site fidelity or where its specific ecological requirements are met (Saunders and Tzaros 2011). On this basis, the habitat at Coppabella Wind Farm could be considered a 'critical habitat area'.

Potential 'preferred habitat' within the Coppabella Wind Farm site is considered habitat critical to the survival of Swift Parrot.

4.5 SUPERB PARROT

4.5.1 Records on site

The Superb Parrot has been confirmed to use the Coppabella Wind Farm site. Numerous observations of the species on site have been made opportunistically as well as during targeted surveys between 2008 and 2016. Observations on site include the following locations:

- Flying over woodland patch around proposed Turbines 78, 79, 80 and in the saddle to the south-east (identified in NGH Environmental 2009a as "flying … over the woodland patch to the north of Coppabella cluster 10" p.96).
- Flying through woodland and grassland around 500 m south of proposed Turbine 41 (NGH Environmental 2015).
- 2016 targeted survey seen in woodland patches and roadside vegetation around proposed underground cabling route around 400 m west of Turbine 68 (NGH Environmental 2017).

Opportunistic observations outside of the Coppabella Wind Farm have been more numerous and include observations in remnant habitat:

- Along Whitefields Road.
- North of Garry Owen Road.
- Along Coppabella Road.
- Along Illalong Road.
- Along railway corridor.

Additionally, they have been seen on private property adjoining the project, in woodlands, planted shelterbelts and other linear corridors in the locality. Details of these observations can be found in NGH Environmental (2009, 2015, 2017). Locations are shown on map 'Superb Parrot Habitat' in Appendix A.5. Targeted flight path surveys undertaken 2014 and 2016 map the flight paths, generally in low lying area of the project site and surrounds, avoiding most of the proposed turbine ridges (Appendix B.5 and B.6). A third year of targeted surveys were undertaken in 2017 and similarly show low levels of activity in the more elevated areas of the site, where turbines are proposed (NGH Environmental *in prep*.).

4.5.2 Habitat description

Habitat for the Superb Parrot on the NSW South-western Slopes is mainly Boree and Box-Gum Woodlands (Baker-Gabb 2011). Nesting habitat on SW Slopes is often open Box-Gum Woodland or isolated paddock trees. Species known to be used are Blakely's Red Gum, Yellow Box, Apple Box and Red Box (Davey 1997). The species feeds in trees and understorey shrubs and on the ground. Food items are mainly flowers, fruits

and seeds. Food species include Common Wallaby-grass (*Austrodanthonia caespitosa*), numerous wattle species, eucalypts, mistletoes and introduced plants including cereal grains and barley-grasses (Baker-Gabb 2011, Pizzey et al. 2006).

At the Coppabella Wind Farm project site, Superb Parrot habitat occurs in the form of Box Gum Woodland (BGW). 1003 ha of BGW of all condition classes occurs at Coppabella Wind Farm, spread over the 6,445 ha site. It is possible to delineate suitable areas of BGW habitat based on published literature and site surveys.

Literature indicates the following habitat preferences and use for Superb Parrot:

General

- The Superb Parrot forages in Box Eucalypt Woodland, particularly that dominated by Yellow Box or Grey Box (Webster 1988 in Baker-Gabb 2011).
- Distribution and abundance is influenced by tree cover and species composition (Manning 2004).
- The Superb Parrot is associated with low to moderate elevations and in landscapes of limited relief (Manning *et al.* 2006 & 2007).
- Superb Parrots occur where vegetation is not completely cleared, but is not too dense (Manning *et al.* 2006 & 2007). Manning *et al.* (2006) suggest optimum amount of tree cover where Superb Parrots occur is between 0 and 35% (0% represents a few isolated trees).
- When making local foraging movements, Superb Parrots usually move along wooded corridors, or make local movements within breeding territory, seldom crossing extensive open areas (Manning *et al.* 2006 & 2007).
- Optimum elevation for the Superb Parrot between 350 m and 550 m. Below 350 m abundance increased with elevation and above 550 m there is a reduction in abundance as elevation increases. A general reduction in abundance was also observed as terrain variability increases (Manning *et al.* 2007).

Nesting

- Superb Parrot nest trees tend to be close to watercourses and within 10 km of BGW (Baker-Gabb 2011).
- The species is faithful to traditional nest sites (Webster 1988 in Baker-Gabb 2011).
- Blakely's Red Gum is an important nesting tree.
- Nest trees tend to be older, often affected by dieback with little regeneration (Manning 2004).
- Forests and woodland used for nesting include the following eucalypt species that occur on site include: River Red Gum *Eucalyptus camaldulensis* (limited to Jugiong Creek), Blakely's Red Gum *E. blakelyi*, Apple Box *E. bridgesiana*, White Box *E. albens* and Red Box *E. polyanthemos*.

Flight height

- Flight path mapping at another proposed wind farm site in the region found that 95% of flights were recorded at heights within the tree canopy or below 20 m.
- Flight path mapping at the Coppabella Wind Farm project site found flight height was generally between 10 and 20 m above the ground in 2014. A median flight height of eight metres was found in 2014. Both surveys recorded a maximum flight height of 40 m.

These points are discussed in greater detail in NGH Environmental (2015, 2017).

4.5.3 Importance of habitat in Coppabella Wind Farm project area

In summary, all occurrences of BGW or paddock trees at Coppabella Wind Farm have potential to be utilised by Superb Parrot. However, only a fraction of the broad habitat type fits into the microhabitat descriptions above. The areas at Coppabella Wind Farm that match the microhabitat descriptions above are termed the 'important habitat' for Superb Parrot. This supersedes earlier versions of mapped important habitat during the 2009 surveys and has now been mapped as areas where both conditions below are met:

- BGW below 550 m elevation, and
- BGW (and derived grassland) between 0 – 35% tree cover.

There is 789 ha of important habitat for Superb Parrot within the Coppabella Wind Farm project site of which 60 ha occurs within the construction footprint. Across the project site 1002 hollow-bearing trees are estimated to occur[4] within the mapped important habitat area. Seventy-six hollow-bearing trees occur within important habitat in the construction footprint.

Furthermore, the Coppabella Wind Farm occurs within the core nesting area for the Superb Parrot (Baker-Gabb 2011). Therefore, the important habitat on site supports an 'important population' of Superb Parrot under the *Significant Impact Guidelines 1.1* (DOE 2013). The important habitat at Coppabella Wind Farm would also be considered *"habitat critical to the survival of the Superb Parrot"*, according to the description provided on p.6 of the Recovery Plan (Baker-Gabb 2011). In summary, habitat critical to the survival of Superb Parrot is considered to be:

- Habitat used for nesting.
- Habitat used for foraging.

Therefore, important habitat mapped for the Coppabella Wind Farm site is considered important and is habitat critical to the survival of the Superb Parrot. This is mapped in Appendix A.5.

Mapped 'important habitat' within the Coppabella Wind Farm site is considered habitat critical to the survival of Superb Parrot.

4.6 KOALA

Koalas have not been recorded at the Coppabella Wind Farm site. There is a 2004 Koala record along the Jugiong Creek, just east of the project site. This species was historically abundant in the south of NSW, although it now occurs in sparse and possibly disjunct populations. Using the Yass (Linton Hostel), Boorowa Post Office and Harden (East Street) stations, the average annual rainfall for the Coppabella Wind Farm is around 600 – 659 mm (BOM 2017). This falls into the inland geographic context for the Koala (less than 800 mm average annual rainfall) (DOE 2014).

4.6.1 Habitat description

Habitat for the Koala in the inland zone includes woodlands and forests, including BGW in remnant and regrowth patches, particularly along riparian areas (DOE 2014). It may also utilise isolated paddock trees (White 1999 in DECC 2008). The Referral Guidelines place equal importance on food trees elsewhere referred to as 'primary', 'secondary' or 'supplementary' food tree species (DOE 2014).

The Coppabella Wind Farms falls into the Central and Southern Tablelands Koala Management Area (DECC 2008). All eight eucalypt species that occur on site are food tree species listed for this region: White Box *Eucalyptus albens,* Blakely's Red Gum *E.blakelyi*, Apple Box *E.bridgesiana*, River Red Gum *E.camaldulensis*,

Bundy *E.*goniocalyx, Red Stringybark *E.macrorhyncha*, Yellow Box *E.melliodora* and Red Box *E.polyanthemos* spp *polyanthemos* (DECC 2008).

The 'primary' Koala feed tree, River Red Gum, occurs along Jugiong Creek. The other trees (classed as secondary and supplementary feed trees in DECC (2008) in woodland and dry forest on the site. Additional microhabitat features for the Koala include (DECC 2008):

- Floristic diversity (including trees of primary, secondary and supplementary feed species).
- Structural diversity including preference for larger girth trees (greater than at least 25 cm) and requirement for shelter on the ground (such as large hollow logs).
- Vegetation on fertile soils appears to be preferred along with sites with higher soil moisture (e.g. creeklines, river flats and valleys).
- Appear to be dependent on vegetated corridors to travel safely along the ground between trees.

4.6.2 Importance of habitat in Coppabella Wind Farm project area

The area between the historic record at Jugiong Creek and the Coppabella Wind Farm site consists mostly of paddock trees with small patches of fragmented open woodland. The woodland on site is mostly fragmented and in poor condition. A high proportion of BGW on site occurs on upper slopes with rocky and poor soils (with apparent low soil moisture).

The edge of the impact area (i.e. the construction footprint) occurs approximately four kilometres west from the 2004 Koala record along the creek. Despite Jugiong Creek being connected to woodland south (based on aerial imagery) around the township of Bookham (with an active Landcare group), there appears to be no other records in the district.

A critical habitat assessment has been undertaken in accordance with DOE (2014) and included in Table 4-2 below. The habitat in the project area scores five and seven. Habitat in the Coppabella Wind Farm project site meets or exceeds the threshold score of five is considered to contain habitat critical to the survival of Koala. The areas of mapped potential Koala Habitat Map are provided in Appendix A.7.

Table 4-2 Koala habitat assessment tool from DOE (2014)

Attribute	Score	Inland habitat	Evidence
Koala occurrence	0 (low)	No evidence of one or more koalas *within two km* of the edge of the impact area within the last 10 years.	There is an isolated 2004 ALA record of Koala approximately four km east of the site along Jugiong Creek (just west of Illalong Road).
Vegetation composition	2 (high)	Has forest, woodland or shrubland with emerging trees with two or more known koala food tree species.	Woodland and dry forest on site are dominated by a mix of *Eucalyptus* species. Eight eucalypt species have been recorded across the project area (species names listed in Section 4.6.1 above).
Habitat connectivity	2 (high)	Area is part of a contiguous landscape > 1000 ha.	Areas of woodland and scattered trees on the eastern side of the project area and downslope of the main ridge (where Turbines 1-14 are located) do not appear to present barriers. These patches are estimated to make up more than 1000 ha and extend beyond project boundary.

Attribute	Score	Inland habitat	Evidence
	0 (low)	Not part of a contiguous landscape > 500 ha	The western portion of the site would appear to not be contiguous landscape, as barriers (i.e. unsuitable habitat and treeless areas more than 2 km wide, DOE 2014) occur.
Key existing threats	1 (medium)	Areas which score 0 for koala occurrence and are likely to have some degree dog of vehicle threat present.	Dogs and vehicles are used for mustering around the farmland.
Recovery value	2 (high)	Habitat is likely to be important for achieving the interim recovery objectives for the inland context, as per Table 1 (DOE 2014).	Objectives are: • 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[2]. • Maintain the quality, extent and connectivity of large areas of koala habitat surrounding habitat refuges. Most of the habitat on site is in poor condition. However, woodland on site includes good quality remnants (i.e. CEEC). These areas are likely to contribute to the first objective. Areas described under 'habitat connectivity' as part of the contiguous woodland are likely to contribute to the second objective.
Score	**7** **5**	**Habitat critical to the survival of Koala** **Habitat critical to the survival of Koala**	**Score ≥ 5. Eastern portion of the site 'Area 1' as per Koala Habitat Map, Appendix A.7.** **Score ≥ 5. Western portion of the site 'Area 2' as per Koala Habitat Map, Appendix A.7.**

Mapped 'potential habitat' within the Coppabella Wind Farm site is considered habitat critical to the survival of the Koala.

4.7 WHITE-THROATED NEEDLETAIL

The White-throated Needletail was not recorded at Coppabella Wind Farm during field surveys but there is a 2014 record from approximately one km west of the site near Berremangra Rooad (ALA). A few additional records occur approximately 20 - 30 km distant from the site.

4.7.1 Habitat description

The White-throated Needletail primarily occurs over eastern and northern Australia. They are an aerial species and range from heights of less than one m up to more than 1000 m above the ground. They are recorded flying over most habitats. When flying above farmland, they are more often recorded above partly cleared pasture, or remnant vegetation at the edge of paddocks. The species is also known to roost in trees on occasion (DOEE 2017). The species does not breed in Australia (DOEE 2017).

4.7.2 Importance of habitat in Coppabella Wind Farm project area

The White-throated Needletail has potential to utilise the aerial habitat above much of the wooded habitat on site. As the species breeds in Asia, is primarily an aerial feeder, and widespread within its Australian distribution, the habitat within the project boundaries is is not considered to be important to this species.

Potential habitat for the White-throated Needletail within the Coppabella Wind Farm site is considered of low importance.

4.8 CATTLE EGRET AND GREAT EGRET

These two species are assessed together, given their general habitat requirements and potential to occur within the Coppabella Wind Farm is the same. The Cattle Egret and Great Egret were not recorded within Coppabella Wind Farm during surveys. There are scattered ALA records for Cattle Egret in the district including a 1992 record in the approximate location of the Coppabella Wind Farm (between Binalong and Bookham). There are a number of records near the Murrumbidgee River west of the site. There are two recent (2016, 2017) ALA Great Egret records in the district, both associated with major waterways (i.e. Lake Burrinjuck, Murrumbidgee River near Jugiong).

4.8.1 Habitat description

Both species are widespread across Australia and can be found in grasslands, woodlands and wetlands, but are not common in arid areas. Both species also use pastures and croplands, especially where drainage is poor (Pizzey et al. 2006).

4.8.2 Importance of habitat in Coppabella Wind Farm project area

Farm dams and moist pastures (after rainfall) within the wind farm may provide habitat for the Cattle Egret and Great Egret. Pasture areas occupy 1,558 ha of the project area. In particular, the provision of water for stock in farming areas have favoured the expansion of the Cattle Egret's range, but it is not preferred or optimal habitat for either species. The importance of the habitat at Coppabella for Cattle Egret and Great Egret is generally taken to be low, on account of:

- Neither species was recorded during field surveys. Given their conspicuous nature it is assumed both species do not regularly inhabit the wind farm as they would have been observed during field surveys.
- Farm dams and inundated pastures are not primary habitat.

Potential habitat for the Cattle and Great Egret within the Coppabella Wind Farm site is considered of low importance.

4.9 WHITE-BELLIED SEA-EAGLE

The White-bellied Sea-eagle was not observed on site. Although records in the district are few (and there are none within 30 km of the Coppabella Wind Farm), the site falls within the likely expert distribution of the species (ALA).

4.9.1 Habitat description

The species primarily breeds and forages within coastal and wetland habitats and estuaries, but can occur within inland habitats where there are large rivers and reservoirs (DOEE 2017, BirdLife Australia 2017). Pairs form permanent territories and are generally sedentary (BirdLife Australia 2017, DOEE 2017). Immature birds may disperse long distances and both immature birds and adults may move in response to drought or food shortages (DOEE 2017).

4.9.2 Importance of habitat in Coppabella Wind Farm project area

Habitat for the White-bellied Sea-eagle does not occur on site. Although the species is strongly associated with waterways, dispersing immature birds or adult birds moving in response to droughts do have the potential to travel through the Coppabella Wind Farm area from time to time. The importance of habitat at Coppabella Wind Farm to the White-bellied Sea-eagle is considered to be very low.

Potential habitat for the White-bellied Sea Eagle within the Coppabella Wind Farm site is considered of low importance.

4.10 RAINBOW BEE-EATER

The Rainbow Bee-eater was observed on site during the 2009 Biodiversity Assessment and has been recorded near Jugiong Creek. There are scattered records between Binalong, Bookham and Bowning, with numerous records south of the Hume Highway near Burrinjuck.

4.10.1 Habitat description

The Rainbow Bee-eater is found throughout mainland Australia and is widespread, except in desert areas, and breeds throughout most of its range, although southern birds move north for winter (DOEE 2017).

The Rainbow Bee-eater is most often found in open forests, woodlands and shrublands, and cleared areas, usually near water (DOEE 2017). The species is also recorded in various cleared or semi-cleared habitats, including farmland and areas of human habitation (DOEE 2017). The species forages for insects from open perches, pursuing prey on the wing (Collins 2006; Pizzey et al. 2006).

4.10.2 Importance of habitat in Coppabella Wind Farm project area

Watercourses within the wind farm site are predominantly degraded and cleared of tree cover. However, Jugiong Creek provides good water flow and mature trees and is considered to be the best habitat available within the local area for this species. The transmission line crosses Jugiong Creek in the north of the project site.

Disturbed riparian forest occurs along Jugiong Creek and approximately 0.3 ha is within the construction footprint where the transmission line crosses the Jugiong Creek. The importance of the habitat at Coppabella Wind Farm is assumed to be low.

Potential habitat for the Rainbow Bee-eater within the Coppabella Wind Farm site is considered of low importance.

4.11 SUMMARY AND ASSESSMENT PATHWAY

In summary, two MNES are known from the Coppabella project site and important areas are considered likely to be substantively impacted by the project:

1. BGW CEEC (critically endangered).
2. Superb Parrot (vulnerable).

Three additional species could occur and there is potential (not verified) for important areas to be impacted by the project:

3. Regent Honeyeater (critically endangered).
4. Swift Parrot (critically endangered).
5. Koala (vulnerable).

For a further six species, habitat that occurs onsite would not be considered important:

6. Painted Honeyeater (vulnerable).
7. White-throated Needletail (migratory marine).
8. Cattle Egret (marine).
9. Great Egret (migratory marine).
10. White-bellied Sea-eagle (marine).
11. Rainbow Bee-eater (marine).

A summary of the habitats present, abundance of records on the project site and locality, the likelihood of occurrence and importance of the habitat on the project site is provided in Table 4-3 below.

Further assessment

An assessment of the nature of the potential biodiversity impacts of the Coppabella Wind Farm proposal on MNES follows in Section 5. Section 5 provides context to the Assessments of Significance undertaken in Section 6.

While there is low potential for significant impact on species unlikely to occur or where it has been concluded that the site provides habitat that would not be considered important to the species, for certainty, Assessments of Significance have been undertaken for the following entities:

1. BGW CEEC (critically endangered).
2. Superb Parrot (vulnerable).
3. Regent Honeyeater (critically endangered).
4. Swift Parrot (critically endangered).
5. Koala (vulnerable).
6. Painted Honeyeater (vulnerable).
7. Cattle Egret (marine) and Great Egret (migratory marine)
8. Rainbow Bee-eater (marine).

Table 4-3 Summary of habitat for MNES with potential for impact at Coppabella Wind Farm

Species / Community	Broad habitat	Microhabitat	Records on site	Records nearby	Likelihood	Importance of habitat	Potential impact phase/type (discussed in Section 5)	Assessment of significance undertaken, Section 6
Threatened ecological communities								
BGW CEEC	Yes	Yes	Yes	Many	Known	High	Habitat loss: construction/clearing	Yes, Section 6.1
Threatened species								
Superb Parrot	Yes	Yes	Yes	Many	Known	High	Habitat loss: construction/clearing Collision: operation/collision	Yes, Section 6.2
Regent Honeyeater	Yes	Yes	No	Historical	Possible	High	Habitat loss: construction/clearing Collision: operation/collision	Yes, Section 6.3
Swift Parrot	Yes	Yes	No	Few	Possible	High	Habitat loss: construction/clearing Collision: operation/collision	Yes, Section 6.4
Koala	Yes	Yes	No	Few	Unlikely	High	Habitat loss: construction/clearing	Yes, Section 6.5
Painted Honeyeater	Yes	Marginal	No	Few	Possible	Low	Habitat loss: construction/clearing Collision: operation/collision	Yes, Section 6.6
Migratory species								
White-throated Needletail	Yes	No	No	Yes	Possible	Low	Collision: operation/collision	No
Cattle Egret	Yes	No	No	Few	Possible	Low	Habitat loss: construction/clearing	Yes, Section 6.7
Great Egret	Yes	No	No	Few	Unlikely	Low	Habitat loss: construction/clearing	Yes, Section 6.7 (combined)
White-bellied Sea-eagle	No	No	No	No	Unlikely	Low	Collision: operation/collision	No
Rainbow Bee-eater	Yes	No	Yes	Yes	Known	Low	Habitat loss: construction/clearing Collision: operation/collision	Yes, Section 6.8

5 NATURE AND EXTENT OF IMPACTS ON MNES

5.1 HABITAT LOSS AND MODIFICATION

In total, the area within the site boundaries totals 6,445 ha. The total construction footprint for the 79 turbine layout totals approximately 362.29 ha. This impact is considered further in this section, in terms of the habitat it provides for MNES.

Loss of habitat and habitat modification to construct the turbine towers and surrounding hardstand areas, control building, substation, new and widened access tracks, cabling and transmission easements are the key direct impacts of the construction phase. Clearing areas, calculated using the civil earthworks footprint of the project, including a 5m buffer and in consideration of the habitat preferences set out in Section 4, for relevant MNES are shown in Table 5-1. This is with the exception of the transmission lines. Transmission line impact areas have been calculated only where they occur in woodland / forest and then with a width of 45m. In grassland, they will affect minimal impact.

As requested in consultation with DoEE, a 30m buffer has been applied to patches of BGW CEEC to account for indirect impacts to the community. Parts of Patch 3 (which would not be directly impacted by the proposal) fall within this buffer.

Clearing of habitat for the White-throated Needle-tail and White-bellied Sea-eagle are not relevant as the species are almost entirely aerial when in the project site.

5.1.1 Quantified impacts for relevant MNES (76 turbine layout)

Table 5-1 Summary of clearing impacts upon MNES (note: only those for which habitat loss impact type was identified are included in this table)

MNES	Habitat within project site boundaries	Habitat within the buffered (by 5m) construction footprint	Additional 30m buffer for indirect impacts	Total impacted
Threatened ecological community:				
BGW CEEC (total)	**233.37 ha**	**3.23 ha**	**3.62 ha**	**6.85**
BGW CEEC (Patch 1)	9.78 ha	2.80 ha	2.49 ha	5.29 ha
BGW CEEC (Patch 2)	101.36 ha	0.43 ha	0.76 ha	1.19 ha
BGW CEEC (Patch 3)	12.13 ha	0.00 ha	0.37 ha	0.37 ha

MNES	Habitat within project site boundaries	Habitat within the buffered (by 5m) construction footprint
Threatened fauna		
Superb Parrot	789 ha important habitat (1002 estimated HBTs in important habitat)	60 ha important habitat 76 HBTs in important habitat
Regent Honeyeater	164 ha preferred habitat	2.5 ha preferred habitat
Swift Parrot	164 ha preferred habitat	2.5 ha preferred habitat

MNES	Habitat within project site boundaries	Habitat within the buffered (by 5m) construction footprint
Koala	**1202 ha total** 944 ha Area 1 (woodland and forest) 258 ha Area 2	**42 ha total** 24 ha Area 1 18 ha Area 2
Painted Honeyeater	233 ha (i.e. CEEC)	3 ha
Migratory species (that are not included above)		
White-throated Needle-tail	6,445 ha	0
Cattle Egret	1558 ha (pasture)	331 ha
Great Egret	1558 ha (pasture)	331 ha
White-bellied Sea-eagle	0	0
Rainbow Bee-eater	(riparian forest)	0.3 ha

Additional indirect impacts from construction may arise as a result of erosion and sedimentation of waterways and adjacent habitats, weed establishment, noise and other disturbances associated with the construction phase. These are manageable and also addressed with the provision of the 5m buffer on the construction footprint; this provides a conservative / worst case impact area for further assessment.

It is noted that the MNES impact areas above do not include the three turbines now proposed to be removed: 75,76 &77. This provides the most accurate estimate of MNES impacts. As the tracks and cabling are still required to access turbines further along the ridge (Turbines 73 and 74), the overall impact area reduction is small; 6.49 ha in total. For completeness, it is noted that, Turbines 75,76 &77:

- Did not impact any CEEC.
- Did not impact any modelled Superb Parrot preferred habitat.
- Did not impact any modelled Regent Honeyeater or Swift Parrot preferred habitat (these species are not known from the site, but potential habitat has been modelled).
- Did impact on 10 hollow bearing trees.
- Did impact on 6.49 ha of mapped contiguous habitat for the Koala (not known from the site but potential habitat has been modelled).

Refer to Appendix A.4-6 for MNES map sets.

5.2 COLLISION AND BEHAVIOURAL IMPACTS

The key *operational* impacts of wind farms have the most relevance to species which fly in the path of moving turbine blades. There are three key impact types:

1. Collision with wind turbines: 'Collision' refers to fatality caused by direct collision with turbine blades or towers. The significance of the fatalities is species-specific. If the species is a low density in the landscape or susceptible to multiple collision events (such as for flocking species), collision may threaten a local population. If the species is a top order predator or keystone species, there may be ecological ramifications of ongoing fatalities.
2. Barotrauma (sudden decompression): Rapid or excessive air-pressure change near moving turbine blades had been linked to bat fatalities as result of a haemorrhaging of the lungs (pulmonary barotrauma) (Baerwald *et al. 2*008). This is most relevant to microbats.
3. Avoidance behaviour caused by the presence of the turbines and associated infrastructure: Depending on where the turbines are located, this may affect foraging patterns, nesting, roosting or movements around the site. It equates to a loss of habitat if areas carrying

infrastructure are avoided altogether, and therefore can have resultant impacts on the carrying capacity of the site and surrounding areas.

A detailed discussion on operational impacts of wind farms is provided in NGH Environmental (2009a, 2009b) and specific to the height of the turbines proposed in BLA (2017). All three are provided as appendices to this report; Appendix B.1, B.7, B.8. These key operational impact types are summarised below to assist the impact assessment.

5.2.1 Collision and barotrauma

An operational risk assessment was undertaken for the turbine dimensions originally proposed in 2009 Yass Valley Wind Farm project (NGH Environmental 2009a, 2009b). These had a maximum tip height of 150m. At that time, 30 species were found to have potential to be impacted by the operational phase of the wind farm, including three MNES with potential for a moderate level of impact:

- Superb Parrot.
- Swift Parrot.
- Rainbow Bee-eater.

The revised Coppabella Wind Farm project, while including a reduced number of turbines, now includes larger turbine dimensions; up to approximately 170m tip height. To address changes since 2009 and the difference in the blade height, a bird and bat risk assessment specific to the revised Coppabella Wind Farm was undertaken by Brett Lane and Associates (BL&A) (refer to Appendix B.8) based on the updated turbine parameters (Table 5-2).

Table 5-2 Proposed turbine specifications for the Coppabella Wind Farm

Turbine specification	Turbine dimensions - GW140 (approx. m)
Maximum Rotor Swept Area (RSA) height (tip height)	171
Minimum RSA height (above ground)	29
Rotor radius	70
Rotor diameter	140
Total RSA m^2/turbine	15, 460 m^2

In summary, BL&A (2017) found that the larger wind turbine models now proposed would reduce the risk of collision and barotrauma for the species assessed in 2009 (as well as others that occur on site). They key issue is that the lower blade tip would now be higher above the ground (and tree canopy), reducing the risk to most species which fly at these heights. The minimum RSA height would be approximately 29 m; the majority (96%) of birds recorded at wind farm sites in south-eastern Australia have been recorded below this height (this includes 84% of records from birds on the ground) (BL&A 2017). Of the 16% of birds recorded in flight, 61% are recorded below 30 m height (BL&A 2017). This suggests that the majority of birds at a wind farm site are not at risk from operational impacts. This agrees with results of collision monitoring at Australian wind farms, below.

Smales (2015) reviewed collision monitoring data from eight wind farms operating in south-eastern Australia, totalling approximately 195 monitored turbines, monitored for between one and nine years. Covering "916 turbine-years of operation" (Smales 2015 p.26), there were 125 documented fatalities of 28 species (four bat species and 24 bird). Of the data reviewed in Smales (2015):

- One quarter of the fatalities were Australian Magpie *Cracticus tibicen.*

- Considered together, Nankeen Kestrel *Falco cenchroides* and Brown Falcon *Falco berigora* accounted for a further quarter of all fatalities.
- White-striped Freetail Bat *Tadarida australis*, Swamp Harrier *Circus approximans* and Wedge-tailed Eagle *Aquila audax* each accounted for approximately seven percent of all fatalities.
- Other species accounted for one to two percent of fatalities.

Based on these results, the species most affected to date in mainland Australia are generally common and widespread. However, there have been a number of NSW threatened and EPBC listed migratory species found in low numbers at mainland wind farms (Smales 2015, NGH Environmental *unpubl. data*):

- Little Eagle (NSW listed).
- Dusky Woodswallow (NSW listed).
- White-throated Needletail (EPBC listed migratory).
- Eastern Bentwing-bat (NSW listed).

5.2.2 Avoidance / barrier effect

Rows of turbines throughout the project area could act as multiple barriers to the movement of birds and bats (Smales 2006, Masden *et al.* 2009, BL&A 2009). Long term or permanent behaviour displacement leading to barrier effect has been clearly demonstrated at overseas and offshore wind farms, but has yet to be demonstrated at Australian terrestrial wind farms (Masden *et al.* 2009, Hull and Muir 2013, EPHC 2010, Hull 2013).

Barrier effects could be seen in migrating species if they were to modify their trajectory in response to the wind farm (behavioural displacement) (e.g. Larsen and Guillemette 2007, Masden *et al.* 2009). Very little research has been conducted on the potential barrier effect of wind farms, with no substantial data readily available in an Australian context. However, studies reveal that changes in foraging and migratory behaviour over time are highly site- and species-specific, and causes are difficult to isolate from other variables (e.g. Madsen and Boertmann 2008, Pearce-Higgins et al. 2009, Tosh *et al.* 2014). Further, migration of Australian species tends to be diffuse rather than concentrated along known and predictable routes (Smales 2015). This makes any analysis specific to Coppabella Wind Farm limited. As such, no species-specific discussion is provided for barrier effects and behaviour displacement.

Operational impacts for relevant MNES are considered individually below, for the Superb and Swift Parrot, Regent and Painted Honeyeater, White-throated Needletail, White-bellied Sea-eagle and Rainbow Bee-eater.

5.2.3 Qualified impacts for relevant MNES

Superb Parrot

Superb Parrot was originally assessed as being at moderate risk from operational impacts (collision) at Coppabella Wind Farm (NGH Environmental 2009). The assessment was undertaken with no flight height data available for the species, but assumed that Superb Parrot would generally fly below the height of the RSA. The species was nominated as a focus of the Operational Bird and Bat Management Plan.

A comprehensive assessment of risks to bird and bats during the operational phase was undertaken by BL&A (2017; provided as Appendix B.8). This assessment specifically assessed the risk of the taller turbines proposed for Coppabella Wind Farm than those considered for the formerly proposed Yass Valley Wind Farm. The analysis by BL&A (2017) included site-specific flight data, including Superb Parrot flight path

mapping surveys that were a condition of EPBC Approval for the earlier iteration of the project (refer to Appendices B.5 and B6).

Based on all observations of Superb Parrots in 2014 and 2016, the average flight height was between about 10-15 m, with few records above 30 m and only one record of a maximum height of 40 m (NGH Environmental 2017 in BL&A 2017). BL&A (2017) found that the risk to Superb Parrot at Coppabella Wind Farm would be less than the previously assessed Yass Valley Wind Farm on account of the higher lower limit of the RSA of the new turbine design.

Regent Honeyeater & Painted Honeyeater

Regent Honeyeater and Painted Honeyeater were previously assessed at low risk from operational impacts at Coppabella Wind Farm (NGH Environmental 2009). This was mostly due to an assumed low flight height. Research in grazing landscapes in southern NSW shows a pronounced trend for nectarivores to move along densely vegetated areas, and using the same route for return journeys (Fischer and Lindenmayer 2002). This suggests that if present, Regent Honeyeater and Painted Honeyeater are more likely to use valleys, roadsides remnant corridors and low hills than the disturbed high ridges of the proposed turbines site to reach foraging habitat.

While not specifically considered in the updated assessment, the reduced risk to birds overall at Coppabella Wind Farm also applies to Regent Honeyeater and Painted Honeyeater.

Swift Parrot

Swift Parrot was previously found to be at moderate risk from operational impacts at Coppabella Wind Farm (NGH Environmental 2009). While not specifically considered in the updated assessment, the reduced risk to birds overall at Coppabella Wind Farm also applies to Swift Parrot. Modelling the cumulative impact of wind farms upon the Swift Parrot, Smales (2005) assumed that 75% of Swift Parrot flights would be below the RSA (average RSA of 33 m). This modelling predicted fewer than one Swift Parrot death per year from turbine collision across 35 wind farms in the species' range. The risk to Swift Parrot at Coppabella Wind Farm is likely to be low.

White-throated Needletail

White-throated Needletail was previously assessed as being at low risk from collision with turbines (NGH Environmental 2009). This is mostly due to an assumed very high flight height, little local habitat and secure population. During migration, White-throated Needletail flies at great heights up to 2000 m ASL (Pizzey et al. 2006) and would fly above RSA (170 m) during major migratory events.

However, as already noted White-throated Needletail have been recorded amongst carcasses at monitored operational wind farms. It is assumed that the species may fly within RSA when foraging or coming in to trees to rest occasionally. There is therefore some potential of collision at Coppabella Wind Farm where suitable foraging habitat occurs. The impact of an occasional White-throated Needletail mortality upon the population is likely to be minor, due to:

- Foraging habitat on site less than optimal (given the extensive clearing) and few local records.
- The species population is considered stable, not considered globally threatened and is classified as being of least concern (Birdlife International 2017b).
- Although the species' total population is unknown, it is described as 'abundant' in some regions of Australia during the non-breeding season (Chantler 1999).
- The species has a widespread distribution in eastern and south-eastern Australia.

White-bellied Sea-eagle

The White-bellied Sea-eagle was originally assessed as being at low risk from operational impacts (collision) at Coppabella Wind Farm (NGH Environmental 2009). Biosis found that 70% of White-bellied Sea-eagles flights were between 30 and 120 m above the ground at wind farms within its' range (Smales 2005b). This places the species within the RSA and potentially a higher risk species for collisions, given the percentage of time spent at RSA height. Collision with wind turbines is listed as a threat to the species in the preliminary determination for NSW vulnerable species listing (NSW Scientific Committee 2016).

White-bellied Sea-eagle habitat does not occur locally and their movements across the site are likely to be diffuse and irregular, rather than concentrated. The ridges do not directly bisect large waterbodies and it is expected the species would follow riparian corridors further south and west of the wind farm near Murrimbidgee River and Lake Burrinjuck.

Smales (2005b) modelled a cumulative annual total of between 0.9 and 2.1 White-bellied Sea-eagle deaths at 35 wind farms across its' range. This (two fatalities/year/35 wind farms) is equivalent to an average of 0.05 White-bellied Sea-eagle deaths per year at each of the 35 wind farms, or one death every 17 years of operation at each wind farm. However, later modelling at Bluff Point and Studland Bay Wind Farms in Tasmania, located in prime coastal sea-eagle, estimated 0.1-0.9 White-bellied Sea-eagle deaths per year (at each wind farm) (Smales 2005b). Actual carcass monitoring at these wind farms found no White-bellied Sea-eagle mortalities over five years (Studland Bay) and 0.4 White-bellied Sea-eagle mortalities per year over 10 years (Bluff Point). Thus it appears that despite the percentage of time spent at RSA height, predicted and actual deaths of White-bellied Sea-eagle at wind farms is relatively low.

The collision risk modelling used by Smales (2005b) uses input variables based on observations of the eagle at wind farms that occur within its primary habitat type and within an established White-bellied Sea-eagle territory. This suggests that the operational impact to White-bellied Sea-eagles at Coppabella Wind Farm, where an established territory and habitat does not exist for the species, would be very low.

Rainbow Bee-eater

Rainbow Bee-eater was previously assessed as having a moderate risk for operational impacts. The species has potential to encounter turbines particularly during migratory movements.

Migration and movement patterns are poorly understood. Populations that breed in southern Australia are migratory and move north after breeding and remain there for the duration of the Australian winter. Northern populations are considered to be resident (Saunders & Ingram 1995).

The species is highly manoeuvrable and their flight agility is likely to accommodate movement around turbine structures. The species appears not to have been recorded at carcass monitoring at operational wind farms, based on available Australian monitoring literature (e.g. Smales 2015). The collision risk potential of Rainbow Bee-eater is thus considered to be low.

The global population size of the Rainbow Bee-eater is unknown, but it is assumed to be large as the species is widely distributed (i.e. the global extent of occurrence is estimated at 1,000,000 to 10,000,000 km^2). Rainbow Bee-eater is said to be seasonally common and locally abundant throughout much of its range. The species population is considered stable and is not globally threatened and is classified as being of least concern (Birdlife International 2017b). The impact of unexpected collisions on the Rainbow Bee-eater population is likely to be minor.

5.2.4 Summary of operational impacts

The risk to MNES from operational impacts at Coppabella Wind Farm is low. This is based on:

- Site specific surveys (i.e. Superb Parrot flight path mapping by NGH Environmental, and BL&A 2017; Appendices B.5, B.6, and B.8).
- Site specific collision risk modelling and assessment (BL&A 2017; Appendix A.8).
- Risk assessments documented in NGH Environmental (2009a, 2009b; Appendices A.1 and A.7).
- Literature and analysis provided above.

Operational impacts are not considered further in this. An adaptive Bird & Bat Monitoring Plan would be implemented to monitor collision impacts and management measures would be adopted to avoid or minimise unacceptable impacts, should they occur (refer to Section 7). This provides an 'insurance policy' should unforeseen operational impacts occur and require adaptive management.

6 ASSESSMENTS OF SIGNIFICANCE

A significant impact is an impact which is important, notable, or of consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts.

Assessments of significance were undertaken for the nine MNES identified in Section 5 and listed below. These were undertaken with reference to the EPBC Act Significant Impact Guidelines for:

1. BGW CEEC.
2. Superb Parrot.

For these two entities, habitat loss due to the project would coincides with known habitat and potential for notable impacts has been identified.

For the following three species, potential to impact on important habitat was observed and potential for notable impacts has been identified:

3. Regent Honeyeater.
4. Swift Parrot.
5. Koala.

For the following four species, while habitat importance is likely to be low, assessments have been completed for thoroughness, to properly characterise the significance of potential impacts:

6. Painted Honeyeater.
7. Cattle Egret and Great Egret (combined assessment).
8. Rainbow Bee-eater.

For the remaining two species, habitat that occurs onsite would not be considered important and impacts are considered unlikely to be notable and therefore assessments have not been completed:

9. White-throated Needletail.
10. White-bellied Sea-eagle.

The assessments of significance are undertaken for clearing and habitat loss impacts only (i.e. construction impacts). The risk of operational impacts (i.e. blade-strike) as discussed in Section 5.2 are considered to be low and highly unlikely to be significant and is not considered below.

A summary of the results in the following assessments is provided below.

1. **BGW CEEC – impacts could be significant.**
2. **Superb Parrot - impacts could be significant.**
3. Regent Honeyeater - impacts unlikely to be significant.
4. Swift Parrot - impacts unlikely to be significant.
5. Koala - impacts unlikely to be significant.
6. Painted Honeyeater - impacts unlikely to be significant.
7. Cattle Egret - impacts unlikely to be significant.
8. Great Egret - impacts unlikely to be significant.
9. Rainbow Bee-eater - impacts unlikely to be significant.

6.1 BOX GUM WOODLAND CEEC ASSESSMENT OF SIGNIFICANCE

A) WILL THE ACTION REDUCE THE EXTENT OF AN ECOLOGICAL COMMUNITY?

The project will reduce the extent of Box Gum Woodland CEEC in the project area in two locations; Patch 1 between Turbine 19 and Turbine 29 and Patch two in between Turbine 23 and Turbine 28. The clearing is expected to affect mostly derived grassland within Patch 1 and understorey within structural woodland within Patch 2. Approximately 2.80 ha and 0.43 ha would be removed from a total of 9.78 ha and 101.36 ha within Patch 1 and Patch 2 respectively. This equates to 28.62% and <0.01% of each patch. The infrastructure to be located within the CEEC is electrical reticulation and access tracks. Site surveys by ecologists have demonstrated that impacts have been minimised and tree clearance may be avoided through micro-siting.

B) WILL THE ACTION FRAGMENT OR INCREASE FRAGMENTATION OF AN ECOLOGICAL COMMUNITY?

The woodlands in the project area are already highly fragmented and occur largely as small remnants, roadside corridors and paddock trees. The project would not substantially add to the existing fragmentation in the broader project area. With regards to the patches of BGW CEEC within the development footprint, Patch 1 would be fragmented into two patches by the project. Minor removal of understorey at the southern extent of Patch 2 would not fragment this patch.

C) WILL THE ACTION ADVERSELY AFFECT HABITAT CRITICAL TO THE SURVIVAL OF AN ECOLOGICAL COMMUNITY?

According to the National Recovery Plan, habitat on the moderate to highly fertile soils of the western slopes of NSW is habitat critical to the survival of BGW. The project falls within this area. The Recovery Plan further states that all occurrences of BGW that meet the CEEC criteria should be considered critical to the survival of this ecological community. In this way, the action *would* adversely affect habitat critical to the survival of the BGW CEEC. On the scale of the locality, the area of impact is relatively small (3.23 ha from an estimated 233.37 ha of CEEC on the project site) however, a large proportion (28.62%) of habitat critical to the survival of Patch 1 would be directly impacted.

D) WILL THE ACTION MODIFY OR DESTROY ABIOTIC FACTORS NECESSARY FOR AN ECOLOGICAL COMMUNITY'S SURVIVAL?

Track establishment and cabling construction would involve excavation, movement of vehicles and machinery (causing soil compaction) and to some extent (for tracks), changes to surface water flows. These activities may modify the affected patches of CEEC, but impacts are likely to be localised and are not expected to affect the survival of the larger CEEC patches at Coppabella Wind Farm. Given its smaller size, Patch 1 is more susceptible to these impacts and the effects on the survival of the patch are uncertain. Additionally, indirect impacts on Patch 1 such as edge effects (2.49 ha within the 30m buffer) would further increase the susceptibility of Patch 1.

E) WILL THE ACTION CAUSE SUBSTANTIAL CHANGE IN THE SPECIES COMPOSITION OF AN OCCURRENCE OF AN ECOLOGICAL COMMUNITY…?

During the construction phase, activities including clearing, excavation, compaction from the vehicles and machinery and other physical disturbances, pose a risk of weed spread in the BGW CEEC (and thus, change in species composition). This risk to the BGW CEEC would be managed through an appropriate construction environmental management plan (e.g. weed hygiene, erosion and sedimentation controls) to minimise weed spread during the construction phase. During the operational phase of the wind farm, regular existing

land management practices would continue and no further change to the species composition of the BGW CEEC is anticipated other than what would have occurred under existing management.

F) WILL THE ACTION CAUSE A SUBSTANTIAL REDUCTION IN THE QUALITY OR INTEGRITY OF AN OCCURRENCE OF AN ECOLOGICAL COMMUNITY …?

The CEEC will be affected by trenching for laying cabling and establishment of a managed unpaved track. The action poses several risks to the quality and integrity of the BGW CEEC. Given the existing presence of weed species the most pertinent of these is the risk of weed spread from adjacent poorer condition woodland and pasture. Another risk is poor natural rehabilitation following soil disturbance. These risks to the BGW CEEC would be managed through an appropriate construction environmental management plan in order to avoid a substantial reduction in the quality or integrity of the remaining BGW CEEC patches. As a worst case, a 30m buffer has been applied to the directly impacted areas to account for indirect impacts that may cause a reduction in the quality or integrity of the patches (such as edge effects). Under this assumption, up to 2.49 ha and 0.76 ha could be indirectly impacted from a total of 9.78 ha and 101.36 ha within Patch 1 and Patch 2 respectively. Up to 0.37 ha may be indirectly impacted within Patch 3 however, given that the existing edge of this patch would not change, it is likely that edge effects are already occurring here.

G) WILL THE ACTION INTERFERE WITH THE RECOVERY OF AN ECOLOGICAL COMMUNITY?

At present, the quality of the majority of the Box Gum Woodland on site has been heavily impacted by clearing, grazing, cultivation and the introduction of weed and pasture species. BGW CEEC occurs as small and larger scattered remnants on saddles and flats and these areas are not currently directly protected or managed for conservation. As such, the BGW CEEC on site is most likely to be in a state of slow decline, rather than recovery and susceptible to threatening processes.

- Three threat abatement plans are relevant to the BGW CEEC:Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads (DSEWPAC 2011)
- Threat abatement plan for disease in natural ecosystems caused by *Phytophthora cinnamomi* (DoE 2014)
- Threat abatement plan for predation, habitat degradation, competition and disease transmission by feral pigs (DOEE 2017)

BGW CEEC is listed in the threat abatement plan for Cane Toads as being within current geographical range for the species. The proposal site is however, outside of the known main distribution of the Cane Toad, which is north of Wollongong (NSW BioNet 2017). As such, it is the future spread of this species that poses a risk to elements of the BGW CEEC. Wind farm infrastructure components are most likely to be delivered through ports and transported along haulage routes which are south of Wollongong and the main distribution of the Cane Toad. As such it is unlikely that the project would contribute to the future spread of the species.

Rainfall is a key factor influencing the distribution of disease caused by *Phytophthora cinnamomi*. It does not usually cause severe impacts in undisturbed vegetation at sites that receive a mean annual rainfall of less than 600 millimetres (DOE 2014). The proposal site occurs within the area that is mapped as receiving a mean annual rainfall of greater than 600 millimetres (DOE 2014) and as such there is a risk of *P. cinnamomi* introduction (such as on machinery and equipment) and establishment. Management measures include hygiene protocols for the management of weed spread as part of the Construction Environment Management Plan that would be prepared for the project. These measures would also be applicable to managing the spread of disease such as *P. cinnamomi* however, an additional

recommendation has been made within this assessment to specifically consider pathogen hygiene in the Biodiversity Management Plan (Section 7.1.2). With the implementation of these measures, the risk is considered manageable.

Feral pigs have not been recorded during biodiversity surveys at the proposal site but are likely to occur from time to time. Control of feral pests is a NSW condition of consent for the project (Condition 21; Biodiversity Management Plan – refer to Appendix F). As such, the proposal is unlikely to exacerbate the risks posed to the BGW CEEC by feral pigs.

A draft national recovery plan for the BGW CEEC has been produced (DECCW 2010). The overall aim of the plan is to promote the recovery and prevent the extinction of the Endangered ecological community through:

- Achieving no net loss in extent and condition of the ecological community throughout its geographic distribution;
- Increasing protection of sites in good condition;
- Increasing landscape functionality of the ecological community through management and restoration of degraded sites;
- Increasing transitional areas around remnants and linkages between remnants; and
- 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 proposal site contains areas in good condition which would be lost as a result of the proposal which is not consistent with these objectives. However, the areas to be lost are not considered substantial in the broader recovery of the community.

The draft recovery plan lists 34 recovery actions for the community, under five strategies:

- Improve baseline information;
- Increase protection of Box-Gum Grassy Woodland;
- Improve Community Engagement;
- Continue ecosystem function and management research; and
- Improve compliance and regulatory activities.

While not relevant to the assessment of significance, it is noted that an Offset Strategy has been included within this report (Section 7.3) which aims to address the objectives of the recovery plan in relation to no net loss of the community. This potentially includes increased protection of sites in good condition and increasing landscape functionality of the community through management and restoration of degraded sites.

6.1.2 Summary

- **The Coppabella Wind Farm would:**
    - Reduce the extent of BGW CEEC on site by 3.23 ha (spread over two patches). Approximately 2.80 ha of this would be lost from Patch 1 (9.78 ha) which equates to 28.62% of the patch.
    - Affect habitat critical to the community (based on the description in the Recovery Plan).
    - Have a localised effect on abiotic factors during the construction phase with uncertain future effects on Patch 1.

  - Pose of risk of weed spread and other edge effects therefore change in species composition in affected CEEC patches could occur in areas adjacent to the development footprint.
  - Carry a risk of loss of quality or integrity of Patch 1.
  - Be capable of managing many of these impacts through effective implementation of a construction environmental management plan.
  - Provide opportunities for contributing to the recovery of the BGW CEEC through offsetting.
- **The Coppabella Wind Farm would not:**
  - Considerably increase existing fragmentation of the community across the broader project site.
  - Interfere substantially with the recovery of BGW CEEC.

The Coppabella wind farm may have a significant impact on BGW CEEC.

Many of the risks and affects documented in the Assessment of Significance could be mitigated through the measures proposed (Section 7) however, considering the impacts of the project on Patch 1, a significant impact is considered likely.

6.2 SUPERB PARROT ASSESSMENT OF SIGNIFICANCE

For a vulnerable species, significant impact criteria refer to 'important populations' defined as those which are (DoE 2013):

1. Key source populations either for breeding or dispersal, and/or;
2. Populations necessary for maintaining genetic diversity, and/or;
3. Populations near the limit of the species range.

The Coppabella Wind Farm intersects the South-west Slopes of NSW Key Biodiversity Area (KBA - formerly Important Bird Area). This KBA was identified around the core breeding area for Superb Parrot (Dutson *et al.* 2009). This suggests that the population of Superb Parrot occurring at Coppabella Wind Farm meet the first two criteria for an important population.

A) WILL THE ACTION LEAD TO A LONG-TERM DECREASE IN THE SIZE OF AN IMPORTANT POPULATION OF A SPECIES?

Population size is affected by availability of habitat and key resources (i.e. foraging, breeding, corridors) which allow the species to breed and move through the landscape. The action would involve the clearing of around 60 ha of important habitat for Superb Parrot including 76 hollow-bearing trees (59 surveyed and 17 assumed to be hollow). Across the whole construction footprint, around 473 Hollow bearing trees (HBT) are estimated to require removal. However, direct impacts to Superb Parrot habitat are spread across the 6, 445 ha[3] project area rather than concentrated in a small area (refer to 'Superb Parrot habitat' map in Appendix A.5). Not all of these trees have been confirmed as hollow-bearing by field surveys, nor have the specifics of the hollows been surveyed. It is assumed that all HBT cleared within the important habitat area are potentially suitable Superb Parrot nest trees although in actuality only a portion of these are likely to meet the parrot's requirements which are detailed in the Recovery Plan (e.g. close to water, with entrance 5-13 m above ground, within 10 km of extensive foraging habitat; Baker-Gabb 2011). Another assumption

[3] NGH Environmental 2017a

made is that the density and suitability of HBT is similar in important habitat adjacent to the construction footprint[4]. The percentage of HBT cleared to that assumed available in important habitat is 7.5%.

The loss of 7.5% of assumed available breeding habitat (i.e. HBT) is considered unlikely to lead to a long-term decrease in the size of the important Superb Parrot population that occurs at Coppabella Wind Farm.

The action would not affect the nature of the landscape (agricultural matrix) or interrupt vegetated movement corridors (lower relief areas) and so is unlikely to affect dispersal.

WILL THE ACTION REDUCE THE AREA OF OCCUPANCY OF AN IMPORTANT POPULATION?

The area of occupancy for Superb Parrot is estimated at approximately 5,360 km^2 and in NSW includes the Riverina, South-West Slopes and Southern Tablelands (TSSC 2016). To reduce the area of occupancy, the action would need to effectively render an area of habitat unusable to the species. The action would not reduce the area of occupancy as the Superb Parrot would be able to continue utilising the matrix of habitat scattered throughout the Coppabella Wind Farm.

WILL THE ACTION FRAGMENT AN EXISTING IMPORTANT POPULATION INTO TWO OR MORE POPULATIONS?

Fragmentation of habitat for this highly mobile species could occur if large areas of wooded habitat, vegetated corridors or hollow-bearing trees were completely removed. The action would not affect the ability of Superb Parrot to move through the landscape as the matrix of vegetated corridors, patches of woodland and scattered trees throughout grassland would be largely retained over the project area. As such, the action would not fragment the important population.

WILL THE ACTION ADVERSELY AFFECT HABITAT CRITICAL TO THE SURVIVAL OF A SPECIES?

There is no formally listed Critical Habitat relevant to Superb Parrot. However, hollow-bearing trees are critical to the life cycle of this species. As already discussed, it is estimated that 76 hollow-bearing trees would be removed in important Superb Parrot habitat. As such detailed information is not available for each hollow-bearing tree, a worst-case scenario is assumed that all the HBT removed within the important habitat would be suitable nesting habitat for Superb Parrot. In this way, habitat critical to the survival of Superb Parrot would be adversely affected.

WILL THE ACTION DISRUPT THE BREEDING CYCLE OF AN IMPORTANT POPULATION?

It is possible that the breeding cycle of Superb Parrot may be disrupted during the wind farm construction phase (expected to last 18 – 24 months, Epuron 2014). Impacts, such as loss of a potential or historical nesting trees, are likely to be confined to a discrete number of breeding pairs though rather than disrupting breeding at a population scale. Therefore, the action is considered unlikely to disrupt the breeding cycle of an important population.

[4] In important habitat in construction footprint, there is assumed to be 76 HBT within 60 ha, or 1.27 HBT per hectare (i.e. 76 HBT ÷ 60 ha). Assuming density and suitability of HBT is equal in important habitat outside of the construction footprint, there would be 926 HBT in important habitat outside of the construction footprint. This is calculated by 1.27 HBT x 789 ha important habitat on site (1002 HBT) minus 76 HBT in the construction footprint. Clearing represents 7.5%, i.e. 76 HBT ÷ 1002 HBT x 100%.

WILL THE ACTION MODIFY, DESTROY, REMOVE OR ISOLATE OR DECREASE THE AVAILABILITY OR QUALITY OF HABITAT TO THE EXTENT THAT THE SPECIES IS LIKELY TO DECLINE?

As discussed the Superb Parrot is a highly mobile species in an agricultural matrix landscape. The habitat includes scattered trees in pasture, woodland and forest patches and vegetated corridors along roads, gullies and waterways. Although the action would reduce 'important habitat' through clearing small discrete areas, the landscape within the project area and overall habitat availability would essentially remain unchanged such that the species is unlikely to decline.

WILL THE ACTION RESULT IN INVASIVE SPECIES THAT ARE HARMFUL TO A VULNERABLE SPECIES BECOMING ESTABLISHED IN THE VULNERABLE SPECIES' HABITAT?

The National Recovery Plan notes that cats and foxes pose a risk to Superb Parrot when foraging on the ground although does not list them as a major threat (Baker-Gabb 2011). Fox was recorded once during surveys; ALA shows many records in the region including around the site. Cat records are scattered through the district, the closest two records being approximately 10 km south and east of the site. A major threat to Superb Parrot is competition for nest hollows, such as from the invasive and exotic Common Starling (Baker-Gabb 2011). Regional and local records for Common Starling are more numerous than Superb Parrot (ALA). Thus, the action would not cause or facilitate these invasive species becoming establish as they are already established in the Superb Parrot habitat.

WILL THE ACTION INTRODUCE DISEASE THAT MAY CAUSE THE SPECIES TO DECLINE?

Superb Parrot may be susceptible to *Psittacine* beak and feather disease. This viral disease spread between birds, is of most concern in captivity situations and parrots under stress due to environmental conditions may be most susceptible (DEH 2004). The disease is already present in the wild bird population and would not be introduced by the action.

WILL THE ACTION INTERFERE SUBSTANTIALLY WITH THE RECOVERY OF THE SPECIES?

While foraging habitat would also be cleared, the action would not substantially change the overall foraging habitat availability or habitat matrix. The proposal would primarily impact upon breeding habitat for the species; this habitat is not readily replaceable. Loss of breeding hollows is a well documented and ongoing threat to Superb Parrot (Manning et al. 2004, TSSC 2016, Baker-Gabb 2011), and this has potential to interfere with the recovery of the species.

6.2.2 Summary

- **The Coppabella Wind Farm would:**
  - Adversely affected habitat critical to the lifecycle of the species (i.e. clearing of HBT).
  - Have potential to interfere with species' recovery due to the clearing of an estimated 76 from 1002 hollow-bearing trees in important habitat on site within the core breeding area (region).
- **The Coppabella Wind Farm would not:**
  - Reduce the area of occupancy, fragment the population, disrupt the breeding cycle.
  - Affect availability and quality of habitat causing species decline
  - Cause the establishment of invasive species or introduce disease
- It is not clear whether the action would lead to a long-term decrease in the size of an important population due to clearing of hollow-bearing trees.

The Coppabella Wind Farm may cause a significant impact upon Superb Parrot.

6.3 REGENT HONEYEATER ASSESSMENT OF SIGNIFICANCE

The following presents the significant impact criteria for a critically endangered species (DoE 2013).

WILL THE ACTION LEAD TO A LONG-TERM DECREASE IN THE SIZE OF A POPULATION?

Regent Honeyeater may occur in the project area from time to time although it is not an important area for the species (BirdLife International 2017b, c). Regent Honeyeater is highly mobile and moves across the landscape to areas with an abundance of flowering eucalypts and mistletoe.

The action would clear around 2.5 ha of Regent Honeyeater habitat from 164 ha of preferred habitat across the 6,645 ha project area. Clearing for the most part consists of small discrete sections of clearing where patches of habitat intersect lineal infrastructure rather than whole habitat patches. Breeding habitat would not be affected (breeding occurs elsewhere, Captertee Valley, Bundarra-Barraba and Hunter Valley regions – DOE 2016). The general character of the landscape (agricultural matrix) would remain unchanged within Coppabella Wind Farm. On this basis, the action is unlikely to lead to a long-term decrease in population of Regent Honeyeater.

WILL THE ACTION REDUCE THE AREA OF OCCUPANCY OF THE SPECIES?

To reduce the area of occupancy, the action would need to effectively kill an area of habitat for the species. The action would not reduce the area of occupancy as the Regent Honeyeater would be able to continue utilising the matrix of habitat (including foraging resources) scattered throughout the Coppabella Wind Farm.

WILL THE ACTION FRAGMENT AN EXISTING POPULATION IN TO TWO OR MORE POPULATIONS?

Fragmentation of habitat for this highly mobile species could occur if large areas of wooded habitat or vegetated corridors were completely removed effectively creating a barrier of inhospitable habitat. The action would not affect the ability of Regent Honeyeater to move through the landscape as the matrix of vegetated corridors, patches of woodland and scattered trees would be largely retained over the project area. As such, the action would not fragment the population.

WILL THE ACTION ADVERSELY AFFECT HABITAT CRITICAL TO THE SURVIVAL OF A SPECIES?

The National Recovery Plan defines habitat critical to the survival of Regent Honeyeater as *"any breeding or foraging areas where the species is likely to occur"* and *"any newly discovered breeding or foraging locations"* (DoE 2016). By this definition, foraging habitat in the project area could be considered habitat critical to Regent Honeyeater, despite the few records locally. Areas of critical habitat would be cleared and therefore would be adversely impact. However, the magnitude and nature of impact (i.e. discreet areas where linear infrastructure bisects preferred habitat) is unlikely to affect the survival of the species.

WILL THE ACTION DISRUPT THE BREEDING CYCLE OF A POPULATION?

There are three known breeding sites in NSW: Bundarra-Barraba, Capertee Valley and Hunter Valley districts (DoE 2016). These sites are not near the project area. The action would not disrupt the breeding cycle of Regent Honeyeater.

WILL THE ACTION MODIFY, DESTROY, REMOVE, ISOLATE OR DECREASE THE AVAILABILITY OR QUALITY OF HABITAT TO THE EXTENT THAT THE SPECIES IS LIKELY TO DECLINE?

As discussed, the Regent Honeyeater is a highly mobile species that migrates through a range of habitats, preferring more fertile sites including "creek flats, broad river valleys and lower slopes", and also utilising scattered trees (DoE 2016 p.10). They require vegetated movement corridors (DoE 2016). The habitat on site consists of scattered trees in pasture, woodland and forest patches and vegetated corridors along roads, gullies and waterways. Although the action would reduce habitat through clearing small discrete areas, the landscape within the project area would essentially remain unchanged. Therefore, the action would not affect the habitat to the extent that Regent Honeyeater would decline.

WILL THE ACTION RESULT IN INVASIVE SPECIES THAT ARE HARMFUL TO AN ENDANGERED SPECIES BECOMING ESTABLISHED IN THE ENDANGERED OR CRITICALLY ENDANGERED SPECIES' HABITAT?

Feral honeybees *Apis mellifera* are a threat to Regent Honeyeaters, competing for nectar (DoE 2016). These already occur in the local area (ALA) and so would not become established in Regent Honeyeater habitat as a result of the action.

WILL THE ACTION INTRODUCE DISEASE THAT MAY CAUSE THE SPECIES TO DECLINE?

Regent Honeyeater is not known to be susceptible to any particular disease. Management measures include hygiene protocols as part of the Construction Environment Management Plan that would be prepared for the project. The action is unlikely to introduce disease that would affect the Regent Honeyeater.

WILL THE ACTION INTERFERE WITH THE RECOVERY OF THE SPECIES?

While the proposal would clear native vegetation, and this is a threatening process relevant to Regent Honeyeater, it would also help to ameliorate climate change impacts to habitat, which is another threat to Regent Honeyeater (DoE 2016). Further, changes to the habitat in the project area brought about by the action would not substantially change the overall habitat availability or habitat matrix.

On this basis, the action would not substantially interfere with Regent Honeyeater recovery.

6.3.2 Summary

- **The Coppabella Wind Farm could:**
  - Adversely affect critical foraging habitat (i.e. clearing of winter flowering eucalypt communities that may be used from time to time).
- **The Coppabella Wind Farm would not:**
  - Cause the population to decrease, reduce the area of occupancy or fragment the population.
  - Disrupt the breeding cycle.
  - Decrease availability or quality of habitat.
  - Introduce invasive species or disease.
  - Interfere with recovery of Regent Honeyeater.

The Coppabella Wind Farm would be unlikely to have a significant impact upon Regent Honeyeater.

6.4 SWIFT PARROT ASSESSMENT OF SIGNIFICANCE

The following presents the significant impact criteria for a critically endangered species (DoE 2013).

WILL THE ACTION LEAD TO A LONG-TERM DECREASE IN THE SIZE OF A POPULATION?

Swift Parrot may occur in the project area during the winter when the species migrates from Tasmania. Swift Parrot is highly mobile and moves across the landscape to areas with an abundance of winter-flowering eucalypts. The South-Western Slopes of NSW KBA has been established in recognition of the importance of the regional habitat to the Swift Parrot (BirdLife International 2017a); the project area intersects the KBA.

The action would clear around 2.5 ha of Swift Parrot preferred winter habitat from 164 ha of preferred habitat across the 6,645 ha project area. Clearing for the most part consists of small discrete sections of clearing where patches of habitat intersect lineal infrastructure rather than whole habitat patches. Breeding habitat would not be affected (occurs in Tasmania only). The general character of the landscape (agricultural matrix) would remain unchanged within Coppabella Wind Farm.

On this basis, the action is unlikely to lead to a long-term decrease in population of Swift Parrot.

WILL THE ACTION REDUCE THE AREA OF OCCUPANCY OF THE SPECIES?

To reduce the area of occupancy, the action would need to effectively render an area of habitat unusable to the species. The action would not reduce the area of occupancy as the Swift Parrot would be able to continue utilising the matrix of habitat (including foraging resources) scattered throughout the Coppabella Wind Farm.

WILL THE ACTION FRAGMENT AN EXISTING POPULATION IN TO TWO OR MORE POPULATIONS?

Fragmentation of habitat for this highly mobile species could occur if large areas of wooded habitat or vegetated corridors were completely removed effectively creating a barrier of inhospitable habitat. The action would not affect the ability of Swift Parrot to move through the landscape as the matrix of vegetated corridors, patches of woodland and scattered trees would be largely retained over the project area. As such, the action would not fragment the population.

WILL THE ACTION ADVERSELY AFFECT HABITAT CRITICAL TO THE SURVIVAL OF A SPECIES?

Foraging habitat in the project area could be considered habitat critical to Swift Parrot on the following basis:

- The National Recovery Plan cites as critical habitat areas of habitat where Swift Parrot possesses site fidelity or where its specific ecological requirements are met (Saunders and Tzaros 2011).
- The South-western Slopes of NSW KBA recognises the importance of the area to wintering Swift Parrots, therefore demonstrating that the criteria above are met.
- The TSC Act (NSW) defines critical habitat as any areas of habitat for endangered or critically endangered species.
- Winter flowering eucalypts occur on site.

Areas of critical habitat would be cleared and therefore would be adversely impacted. However, the magnitude and nature of impact (i.e. discreet areas where linear infrastructure bisects preferred habitat) is unlikely to affect the survival of the species.

WILL THE ACTION DISRUPT THE BREEDING CYCLE OF A POPULATION?

The Swift Parrot breeds in Tasmania and migrates to the mainland for winter foraging. The action would not disrupt these processes and so would not disrupt the breeding cycle.

WILL THE ACTION MODIFY, DESTROY, REMOVE, ISOLATE OR DECREASE THE AVAILABILITY OR QUALITY OF HABITAT TO THE EXTENT THAT THE SPECIES IS LIKELY TO DECLINE?

As discussed the Swift Parrot is a highly mobile species that migrates through a range of habitats. The autumn-winter habitat typically consists of forests and woodlands and they require vegetated movement corridors (Saunders and Tzaros 2011, Roderick *et al.* 2013). The habitat on site consists of scattered trees in pasture, woodland and forest patches and vegetated corridors along roads, gullies and waterways. Although the action would reduce habitat through clearing small discrete areas, the landscape within the project area would essentially remain unchanged such that it is unlikely to cause the species to decline.

WILL THE ACTION RESULT IN INVASIVE SPECIES THAT ARE HARMFUL TO AN ENDANGERED SPECIES BECOMING ESTABLISHED IN THE ENDANGERED OR CRITICALLY ENDANGERED SPECIES' HABITAT?

Cats are an invasive species that may threaten Swift Parrot (Saunders & Tzaros 2011). As already discussed (see Section 6.2), a number of invasive species are already established in the area, and would not be introduced as a result of the action.

WILL THE ACTION INTRODUCE DISEASE THAT MAY CAUSE THE SPECIES TO DECLINE?

Swift Parrot may be susceptible to Psittacine beak and feather disease. This viral disease is spread between birds, is of most concern in captivity situations and parrots under stress due to environmental conditions may be more susceptible (DEH 2004, Saunders & Tzaros 2011). The disease is already present in the wild bird population and would not be introduced by the action.

WILL THE ACTION INTERFERE WITH THE RECOVERY OF THE SPECIES?

While the proposal would clear native vegetation, and this is a threatening process relevant to Swift Parrot, it would also help to ameliorate climate change impacts to habitat, which is another threat to Swift Parrot (Saunders & Tzaros 2011). Further, changes to the habitat in the project area brought about by the action would not substantially change the overall habitat availability or habitat matrix. On this basis, the action would not substantially interfere with Superb Parrot recovery.

6.4.2 Summary

- **The Coppabella Wind Farm could:**
    - Adversely affect critical foraging habitat (i.e. clearing of winter flowering eucalypt communities that may be used from time to time).

The Coppabella Wind Farm would not:

- Cause the population to decrease, reduce the area of occupancy or fragment the population.
- Affect the breeding cycle.
- Decrease availability or quality of habitat.
- Introduce invasive species or disease.
- Interfere with the recovery of Swift Parrot.

The Coppabella Wind Farm would be unlikely to have a significant impact upon Swift Parrot.

6.5 KOALA ASSESSMENT OF SIGNIFICANCE

The Coppabella Wind Farm would clear 42 ha of woodland and forest in Koala habitat (from 1202 ha), which is considered habitat critical to the survival of the species (refer Section 4.6.2).

6.5.1 Part 1 – Koala Referral Guidelines

DOES THE IMPACT AREA CONTAIN HABITAT CRITICAL THE SURVIVAL OF THE KOALA (HABITAT SCORE ≥ 5)?

Yes.

DO THE AREA(S) PROPOSED TO BE CLEARED CONTAIN KNOWN KOALA FOOD TREES?

Yes.

AREA YOU PROPOSING TO CLEAR ≤ 2 HA OF HABITAT CONTAINING KNOWN KOALA FOOD TREES WITH A HABITAT SCORE OF 5?

No.

ARE YOU PROPOSING TO CLEAR > 20 HA OF HABITAT CONTAINING KNOWN KOALA FOOD TREES IN AN AREA WITH A HABITAT SCORE OF ≥ 8?

No.

COULD THE ACTION INTERFERE SUBSTANTIALLY WITH THE RECOVERY OF THE KOALA?

Increase dog attack fatalities? No

Increase vehicle-strike fatalities? Possible during construction period (~ two years), with increase in traffic using road including heavy vehicles. Unlikely during operational period as traffic volume not increased and most road use limited to internal tracks.

> *Mitigation recommended (construction impacts)*: road signage along Whitefields Road adjacent to the area of Koala habitat with score ≥7 in the Coppabella Wind Farm site to alert drivers. This area connects to better quality habitat areas. If Illalong Road is to be used for site access (not planned at this stage), erect signage between the Hume Highway and Burley Griffin Way. Illalong Road runs parallel to Jugiong Creek in this area, near the Koala record.
>
> *Mitigation recommended (operational impacts)*: maximum speed limit of 40 km/hr on internal tracks.

Facilitating introduction or spread of disease or pathogens? Unlikely as not known in the area. Also, hygiene protocols to be adopted to minimise weed spread, etc. This will further reduce risk. Refer to Section 6.5.2 for more details.

Creating a barrier to movement to, between or within habitat critical to survival? No. Development mostly lineal and in small discreet patches spread over a large area (6,445 ha). Detailed planning and further micro-siting will ensure minimal tree clearing in CEEC areas. Refer to Appendix E for details on how impacts to trees and CEEC have been minimised.

Changing hydrology which degrades habitat in the long-term? Track establishment and cabling construction would involve excavation, movement of vehicles and machinery (causing soil compaction) and to some extent (for tracks), changes to surface water flows. These activities may modify the affected

patches of woodland and forest, but impacts are likely to be localised and are not expected to lead to a long-term degradation of habitat.

In summary, the action is not considered likely to interfere substantially with the recovery of the Koala.

COULD THE ACTION REQUIRE REFERRAL FOR SIGNIFICANT IMPACTS ON KOALA?

Referral is recommended for adversely affect habitat critical to the survival of Koala, with reference to the points Table 6-1.

Table 6-1 Nature of action for clearing of habitat critical to the survival of Koala

Nature of Action	Coppabella Wind Farm
Score of impact area Area 1 – score 7 Area 2 – score 5	 24 ha cleared from 944 ha available (2.5%) 18 ha cleared from 258 ha available (7%)
Method of clearing	Combination of selective clearing in some sensitive areas (e.g. where micrositing would occur – refer to Appendix E), and clear-felling along narrow lineal corridor (i.e. roads and turbine locations). The above clearing areas are spread out over 6,445 ha site as shown in Map 'Modified Construction Footprint' in Appendix A.1.
Density or abundance of Koalas	Very low

6.5.2 Part 2 – MNES Significant Impact Guidelines

For a vulnerable species, significant impact criteria refer to 'important populations' defined as those which are (DoE 2013):

1. Key source populations either for breeding or dispersal, and/or;
2. Populations necessary for maintaining genetic diversity, and/or;
3. Populations near the limit of the species range.

The single record from nearby the Coppabella Wind Farm would be part of an important population as the species is close to the western limit of its' range is the region (based on likely distribution and records in ALA).

WILL THE ACTION LEAD TO A LONG-TERM DECREASE IN THE SIZE OF AN IMPORTANT POPULATION OF A SPECIES?

No. The clearing of 42 ha of critical Koala habitat from 1202 ha available in the project area constitutes 3.5% habitat loss. The clearing is spread throughout the habitat available in a mostly narrow linear footprint. Koala density in the area appears to be very low based on only one local record. The action would be unlikely to lead to a long-term decrease in population size.

WILL THE ACTION REDUCE THE AREA OF OCCUPANCY OF AN IMPORTANT POPULATION?

No. To reduce the area of occupancy, the action would need to effectively render an area of habitat unusable to the species. The action would not reduce the area of occupancy as the Koala would be able to continue utilising the matrix of habitat scattered throughout the Coppabella Wind Farm.

WILL THE ACTION FRAGMENT AN EXISTING IMPORTANT POPULATION INTO TWO OR MORE POPULATIONS?

No. At no point, would the proposed clearing create a barrier for Koala (i.e. cleared area greater than 2 km wide, as defined in DOE 2014) as the nature of the clearing is narrow and mostly linear. Therefore, the action would not fragment the important population.

WILL THE ACTION ADVERSELY AFFECT HABITAT CRITICAL TO THE SURVIVAL OF A SPECIES?

Yes. Around 1202 ha of habitat critical the survival of Koala occurs at Coppabella Wind Farm (refer to Section 4.6.2) and 42 ha of this would be cleared.

WILL THE ACTION DISRUPT THE BREEDING CYCLE OF AN IMPORTANT POPULATION?

Possible. It is not known if breeding occurs in the area. Relevant aspects of breeding cycle include: mating, period when females have dependent young and dispersal. It is considered that the narrow linear nature of the proposed clearing would have minimal disturbance during mating and dependency periods as Koalas would be able to move to other suitable areas of habitat. However, dispersal and movement may be affected near roads where there is a risk of vehicle-strike. Koala warning signage is recommended along site access roads (Whitefields Road) and maximum speed limits of 40 km/hr on internal tracks. Refer to 6.5.1 for details. Mitigation would minimise risk of breeding disruption to Koala.

WILL THE ACTION MODIFY, DESTROY, REMOVE OR ISOLATE OR DECREASE THE AVAILABILITY OR QUALITY OF HABITAT TO THE EXTENT THAT THE SPECIES IS LIKELY TO DECLINE?

No. Although the action would reduce critical Koala habitat, the landscape within the project area and overall habitat availability would essentially remain unchanged such that the species is unlikely to decline.

WILL THE ACTION RESULT IN INVASIVE SPECIES THAT ARE HARMFUL TO A VULNERABLE SPECIES BECOMING ESTABLISHED IN THE VULNERABLE SPECIES' HABITAT?

No. Weeds such as Blackberry *Rubus fruticosus* and Sweet Briar *Rosa rubiginosa* already occur on site (NGH Environmental 2009a) and these have the potential to reduce free movement of Koala along the ground (DECC 2008). Wild and domestic dogs are also harmful to Koala (DECC 2008). Dogs already occur in the project site as working farm dogs and wild dogs are also likely to occur locally. The action would not introduce these invasive species which already established on site.

WILL THE ACTION INTRODUCE DISEASE THAT MAY CAUSE THE SPECIES TO DECLINE?

No. Koalas carry *Chlamydia* spp. to which they are adapted. However other strains which are more harmful to Koala may be derived from cows and sheep (DECC 2008). The properties involved in the Coppabella wind Farm are working farms which carry stock such as cows and sheep. Any potential for disease introduction already exists at the site and would not be caused by the action.

WILL THE ACTION INTERFERE SUBSTANTIALLY WITH THE RECOVERY OF THE SPECIES?

No. As detailed in Section 6.5.1, the action is not considered likely to interfere substantially with Koala recovery.

6.5.3 Summary

The density or abundance of Koala in the project area is very low. Habitat scores are 7 for the eastern area (Area 1) and 5 for the western area (Area 2). Any local Koalas are considered part of an important population (refer to Section 6.5.2). Refer to Koala habitat map in Appendix A.7.

- **The Coppabella Wind Farm would:**
  - Clear 42 ha of habitat critical to the survival of koala (i.e. habitat scoring five or more).
- **The Coppabella Wind Farm would not:**
  - Lead to a long-term population decrease, reduce the area of occupancy or fragment the population.
  - Increase dog fatalities, or vehicle-strike threat during the operational period, introduce invasive species, diseases or pathogens.
  - Create barriers to movement.
  - Degrade habitat due to hydrological changes.
  - Interfere substantially with the recovery of Koala.
- **The Coppabella Wind Farm may:**
  - Increase vehicle-strike threat during the construction phase.
  - Disrupt the dispersal phase of the breeding period due to vehicle-strike.

The action would be unlikely to have a significant impact upon Koala.

Significant impact is considered unlikely due to the very low abundance of Koala (based on site surveys and available local records), the generally poor condition of habitat and most importantly, the nature of the development. This being: relatively small discreet areas of impact spread over a large project area. Current land management practices would continue and the wind farm would be relatively benign to Koala during operational phase.

6.6 PAINTED HONEYEATER ASSESSMENT OF SIGNIFICANCE

For a vulnerable species, significant impact criteria refer to 'important populations' defined as those which are (DoE 2013):

4. Key source populations either for breeding or dispersal, and/or;
5. Populations necessary for maintaining genetic diversity, and/or;
6. Populations near the limit of the species range.

The importance of the habitat at Coppabella Wind Farm is considered low (refer to Section 4.3.3) and it is considered that the above criteria for an important population are not met for Painted Honeyeater.

WILL THE ACTION LEAD TO A LONG-TERM DECREASE IN THE SIZE OF AN IMPORTANT POPULATION OF A SPECIES?

The action is not expected to affect an important population.

WILL THE ACTION REDUCE THE AREA OF OCCUPANCY OF AN IMPORTANT POPULATION?

To reduce the area of occupancy, the action would need to effectively render an area of habitat unusable to the species. The action would not reduce the area of occupancy as the Painted Honeyeater would be able to continue utilising the matrix of habitat scattered throughout the Coppabella Wind Farm.

WILL THE ACTION FRAGMENT AN EXISTING IMPORTANT POPULATION INTO TWO OR MORE POPULATIONS?

An important population of Painted Honeyeater is not considered to occur at Coppabella Wind Farm. In any case, the action would be undertaken in landscape of fragmented woodland. The action would be unlikely to exacerbate the existing fragmentation of habitat to the extent that the population of Painted Honeyeater that may visit the site from time to time would be affected.

WILL THE ACTION ADVERSELY AFFECT HABITAT CRITICAL TO THE SURVIVAL OF A SPECIES?

There is no formally listed Critical Habitat relevant to Painted Honeyeater. Critical habitat needs of the species are poorly understood (DSE 2003). However, the habitat on site appears to be of low quality and importance to the species. The action is not expected to adversely affect habitat critical to the survival of Painted Honeyeater based on current information.

WILL THE ACTION DISRUPT THE BREEDING CYCLE OF AN IMPORTANT POPULATION?

Painted Honeyeaters are highly nomadic and specialised, and move about in response to mistletoe flowering. They nest in loose colonies and have a high site fidelity, generally using the same nest sites each season (DEHP 2017). Information about key breeding sites is difficult to find; it appears that breeding may occur in the region but the bird is uncommon (BirdLife International 2017c). Given the habitat on site is considered of low importance and is in low abundance, the action is not expected to disrupt the breeding cycle of Painted Honeyeater.

WILL THE ACTION MODIFY, DESTROY, REMOVE OR ISOLATE OR DECREASE THE AVAILABILITY OR QUALITY OF HABITAT TO THE EXTENT THAT THE SPECIES IS LIKELY TO DECLINE?

Although the action would reduce 'potential habitat' through clearing small discrete areas (clearing 3.3 ha of CEEC from 233 ha CEEC in the project area), the landscape within the project area and overall habitat availability would essentially remain unchanged such that the species is unlikely to decline.

WILL THE ACTION RESULT IN INVASIVE SPECIES THAT ARE HARMFUL TO A VULNERABLE SPECIES BECOMING ESTABLISHED IN THE VULNERABLE SPECIES' HABITAT?

The Conservation Advice (DOE 2015) lists predation by invasive species such as Black Rats as a threat to Painted Honeyeater. Black Rats (or any rats) were not recorded at Coppabella Wind Farm despite 150 Elliot trap nights. The action is unlikely to cause the Black Rat to become established as the nature and land use of the site will remain unchanged, i.e. an agricultural landscape used for grazing and cropping.

WILL THE ACTION INTRODUCE DISEASE THAT MAY CAUSE THE SPECIES TO DECLINE?

The Painted Honeyeater is not known to be susceptible to disease.

WILL THE ACTION INTERFERE SUBSTANTIALLY WITH THE RECOVERY OF THE SPECIES?

While potential foraging habitat would be cleared, the action would not substantially change the overall foraging habitat availability or habitat matrix. The action would be unlikely to substantially interfere with Painted Honeyeater recovery.

6.6.2 Summary

- **The Coppabella Wind Farm would not:**
    - Affect an important population of Painted Honeyeater.

- Reduce the area of occupancy, fragment the population, disrupt the breeding cycle.
- Affect critical habitat, availability and quality of habitat causing species decline.
- Cause the establishment of invasive species or introduce disease.
- Interfere with species' recovery.

The action would be unlikely to have a significant impact upon Painted Honeyeater.

6.7 CATTLE EGRET, GREAT EGRET

The significant impact criteria for migratory species focus on effects upon important habitat. The project site does not meet the important habitat definition (Table 6-2).

Table 6-2 Analysis of whether the habitat on site is important habitat for Cattle Egret and Great Egret

Important habitat definition	Analysis of project site
Habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population.	The ALA density grid was used to show density of records across its' range. The ALA online map shows a low density of Cattle Egret and Great Egret records for the district compared to other parts of Australia. The habitat is not used by an ecologically significant proportion of the population. **This criterion does not apply.**
Habitat that is of critical importance to the species at particular life-cycle stages.	The project area, and the surrounding region, is not known to be important for pre-migration staging, or breeding or other life-cycle stages (DOEE 2017). **This criterion does not apply.**
Habitat utilised by a migratory species which is at the limit of the species range.	The project area is not near the limit of the species range, which extends through most of Australia. **This criterion does not apply.**
Habitat within an area where the species is declining.	Cattle Egret seems to be increasing in range and population while the Great Egret appears to be declining (DOEE 2017). Declines have been recorded in wetland habitat in parts of NSW and Victoria, Darling Plains and Riverina and other coastal habitats in Australia, and is not relevant to the south-western slopes region. **This criterion does not apply.**

WILL THE ACTION SUBSTANTIALLY MODIFY (INCLUDING BY FRAGMENTING, ETC), DESTROY OR ISOLATE AN AREA OF IMPORTANT HABITAT FOR A MIGRATORY SPECIES?

The project area is not an area of important habitat (refer to Table 6-2).

WILL THE ACTION RESULT IN AN INVASIVE SPECIES THAT IS HARMFUL TO THE MIGRATORY SPECIES BECOMING ESTABLISHED IN AN AREA OF IMPORTANT HABITAT FOR THE MIGRATORY SPECIES?

The project area is not an area of important habitat (Table 6-2).

WILL THE ACTION SERIOUSLY DISRUPT THE LIFECYCLE (BREEDING, FEEDING, MIGRATION OR RESTING BEHAVIOUR) OF AN ECOLOGICALLY SIGNIFICANT PROPORTION OF THE POPULATION OF A MIGRATORY SPECIES?

The action would not affect the lifecycle of an ecologically significant proportion of the population, as shown in Table 6-2.

In summary, the action would be unlikely to have a significant impact upon Cattle Egret or Great Egret.

6.8 RAINBOW BEE-EATER

The significant impact criteria for migratory species focus on effects upon important habitat. The project site does not meet the important habitat definition (Table 6-3).

Table 6-3 Analysis of whether the habitat on site is important habitat for Rainbow Bee-eater

Important habitat definition	Analysis of project site
Habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population.	The ALA density grid was used to show density of records across its' range. The ALA online map shows a low density of Rainbow Bee-eater records for the district compared to other parts of Australia. The habitat is not used by an ecologically significant proportion of the population. **This criterion does not apply.**
Habitat that is of critical importance to the species at particular life-cycle stages.	The project area, and the surrounding region, is not known to be important for pre-migration staging, or breeding or other life-cycle stages. **This criterion does not apply.**
Habitat utilised by a migratory species which is at the limit of the species range.	The project area is not near the limit of the species range, which extends through Australia. **This criterion does not apply.**
Habitat within an area where the species is declining.	Results from Barrett *et al.* (2003) suggest that Rainbow Bee-eater is declining across south-eastern Australia, however, the authors attributed most of the decline in reporting rate to change in survey methods between periods. Birdlife (2015) shows that Rainbow Bee-eater is in decline along the east coast, but not in the south-east mainland region. The project area falls into the south-east mainland region. **This criterion does not apply.**

WILL THE ACTION SUBSTANTIALLY MODIFY (INCLUDING BY FRAGMENTING, ETC), DESTROY OR ISOLATE AN AREA OF IMPORTANT HABITAT FOR A MIGRATORY SPECIES?

The project area is not an area of important habitat (refer to Table 6-3).

WILL THE ACTION RESULT IN AN INVASIVE SPECIES THAT IS HARMFUL TO THE MIGRATORY SPECIES BECOMING ESTABLISHED IN AN AREA OF IMPORTANT HABITAT FOR THE MIGRATORY SPECIES?

The project area is not an area of important habitat (Table 6-3).

WILL THE ACTION SERIOUSLY DISRUPT THE LIFECYCLE (BREEDING, FEEDING, MIGRATION OR RESTING BEHAVIOUR) OF AN ECOLOGICALLY SIGNIFICANT PROPORTION OF THE POPULATION OF A MIGRATORY SPECIES?

The action would not affect the lifecycle of an ecologically significant proportion of the population, as shown in Table 6-3.

In summary, the action would be unlikely to have a significant impact upon Rainbow Bee-eater.

7 MITIGATION OF IMPACTS

The mitigation measures accompanying the project are derived from:

1. EPBC 2013/7002 Yass Valley Wind Farm approval.
2. NSW planning approval (Development Consent SSD 6698).
3. Statements of Commitment made by the proponent under the EP&A Act Part 3A on how they propose to manage the project to minimise, and where possible avoid, impacts).
4. The commitments made in the current modified project (project as described in this referral and consistent with that currently being assessed by the NSW).

Items 1-3 are provided in full in Appendix F.

This section investigates their currency to the new project being referred and summarises proposed changes (item 4) separately for the Commonwealth and NSW approvals.

7.1 COMMONWEALTH APPROVAL

7.1.1 Framework

A Controlled Action approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC) was granted for the Yass Valley Wind Farm (EPBC 2013/7002) in November 2014. The project now being referred as the Coppabella Wind Farm differs from that project sufficiently to warrant a new referral application. Nonetheless, the EPBC 2013/7002 approval conditions have relevance to this new referral.

The mitigation strategies for the approved project (EPBC 2013/7002) focused on minimising impacts and offsetting residual impacts. The original EPBC Act conditions of approval for the project include:

- Preparation of a Biodiversity Management Plan to minimise impact on BGW during construction and birds and bats during operation.
- Investigation of site usage by Superb Parrot.
- Offset Strategy for BGW, Golden Sun Moth, Superb Parrot, Regent Honeyeater and Swift Parrot.

The existing approval conditions are summarised in in Appendix F.

It is noted that minimisation of impacts during detailed design and construction is a key requirement of the existing Commonwealth and NSW conditions. A process has been completed as part of the early design and assessment of the project whereby minimisation of impacts on higher conservation value areas has informed the construction footprint. The table and map set included in Appendix E (sourced from the Coppabella Wind Farm Modification Application Environmental Assessment; NGH Environmental 2017b) shows areas where minimisation of biodiversity impacts has been considered during the detailed design process. This includes four issues relevant to MNES (refer to Appendix E).

7.1.2 Additional mitigation measures arising from this assessment

The Koala has potential to occur nearby the site (refer to Section 4.6). An increase in traffic particularly during the construction phase of the wind farm has potential to increase vehicle-strike fatalities, a key threat for the Koala. The following mitigation measures are therefore now proposed (refer to Section 6.5 for justification) during both the construction and operational phases of the project:

- Koala Warning signage along Whitefields Road adjacent to the area of Koala habitat with score ≥7 in the Coppabella Wind Farm site to alert drivers to the potential hazard.
- A maximum speed limit of 40 km/hr on internal tracks within the Coppabella Wind Farm project area.

Additionally, to address the risk of pathogens such as Phytophthora cinnamomi, it is recommended:

- Pathogen hygiene protocols be included in the Biodiversity Management Plan for the project.

7.1.3 Ability to meet conditions

Due to the modification of the project in 2017, some of the EPBC Act conditions of approval are no longer relevant to the project, such as offsets for Golden Sun Moth which surveys have shown does not occur in areas that would now be impacted. These conditions are discussed below. Most measures remain relevant and work toward satisfying them has commenced.

Table 7-1 Summary of EPBC approval conditions and any compliance issues for the subject MNES (grey shading indicates potential non-compliance)

CoA/SoC	MNES	Yass Valley Wind Farm Approval condition (extract)	Coppabella Wind Farm - Ability to comply
	Conditions of Approval		
CoA 1	Box Gum Woodland CEEC	*The approval holder must submit … a Biodiversity Management Plan (BMP)… The BMP must include, …* *b. a risk analysis that demonstrates that the selected turbine sites… will not results in a significant impact on high use flight paths of birds and bats listed as migratory or threatened;* *c. an adaptive bird and bat monitoring program …* *h. a procedure for micro-siting turbines and other infrastructure that minimises the impact on Box Gum Woodland (BGW).*	Yes, this can be met for the Coppabella Wind Farm.
CoA 2	Superb Parrot	*… the approval holder must undertake an analysis of local movement patterns … over at least 3 years …*	Yes, this can be met for the Coppabella Wind Farm. The third year of surveys is currently being completed (November 2017).
CoA 3	Box Gum Woodland CEEC, Superb Parrot, Swift Parrot, Regent Honeyeater, Golden Sun Moth	*… the approval holder must prepare … an Offset Management Strategy (OMS) that provides for the ongoing protection of the following matters, which include BGW … The OMS must demonstrate potential offset sites … can be created and management to … provide for the protection of … habitat of threatened species on these sites ...*	Generally can be met for the site however, the Golden Sun Moth, Swift Parrot and Regent Honeyeater are no longer considered to have potential for a significant impact and therefore offsets are not proposed.

CoA/SoC	MNES	Yass Valley Wind Farm Approval condition (extract)	Coppabella Wind Farm - Ability to comply
			Refer to Sections 3,4,5 and 6.
CoA 4	Box Gum Woodland CEEC, Superb Parrot, Swift Parrot, Regent Honeyeater, Golden Sun Moth	*An OMP must be prepared in accordance with the approved OSM… An Offset Management Plan (OMP) must be implemented that puts into action obligations of the OMS… The OMP will provide for the protection and conservation management of BGW and threatened species (including their habitat) …*	As above.

As set out above, the Golden Sun Moth, Swift Parrot and Regent Honeyeater are no longer considered to have potential for a significant impact and therefore offsets would not be required. It is proposed to remove these entities from the offset management strategy and plan for the project. It is noted however that suitable habitat for the Swift Parrot and Regent Honeyeater would be offset as part of the NSW approval. Refer to Section 7.2 and 7.3.

This section demonstrates that all EPBC 2013/7002 conditions are able to be met for the new Coppabella Wind Farm or, are no longer be relevant to the project.

7.2 NSW APPROVAL

7.2.1 Framework

The biodiversity mitigation strategies for the approved NSW project (Coppabella precinct only: NSW planning approval SSD 6698) also focused on minimising impacts and offsetting residual impacts. Relevant to MNES, the original NSW conditions of approval for the project include:

- A BGW clearance limit.
- Preparation of a Biodiversity Management Plan to minimise impacts on BGW, hollow bearing trees and other biodiversity features.
- Preparation of an Adaptive Bird and Bat Management Plan to minimise impacts and birds and bats during operation.
- Offsets in accordance with the Framework for Biodiversity Assessment (for Major Projects).

Refer to Appendix F for full list of conditions and commitments.

7.2.2 Ability to meet conditions

The Modification Application (NGH Environmental 2017) currently with NSW DPE for determination commits to all original NSW approval conditions, including the Statements of Commitment (SoC's) made by the proponent. These commitments are still considered relevant to the Coppabella Wind Farm and work toward satisfying them has commenced.

However, as part of the Modification Application, several additional measures relevant to management of biodiversity impacts are also committed to by the proponent and several variations are being sought to reflect the new project requirements. The full set of proposed changes are provided below. Those relevant to MNES are shaded grey and relate specifically to:

- Updates to the clearance limit and offsets to reflect the modified project (relevant to BGW CEEC and fauna habitat).
- Accurate identification, mapping and quantification of all HBTs (relevant to Superb Parrot).
- Pre-clearance surveys for specific threatened flora (relevant to Yass Daisy).

Table 7-2 Changes sought to NSW consent conditions

ID	Original versus proposed change to consent condition	
1 – Sched 2, Cond 8	**Original**	Condition 8 requires that: "No wind turbines may be greater than 150 metres (measured from above ground level to the blade tip height)".
	Proposed	*Condition 8 to be amended as follows: "No wind turbines may be greater than 171 metres (measured from above ground level to the maximum blade tip height)".*
2 – Sched 2, Cond 9	**Original**	Condition 9: The Applicant may micro-site the wind turbines and ancillary infrastructure without further approval provided: (a) they remain within the development corridor shown in the figure in Appendix 3.
	Proposed	*Condition 9 reworded such that: The Applicant may micro-site the wind turbines and ancillary infrastructure without further approval provided:* *They remain generally in accordance with the Modification layout.*[5] *Additional areas that may be required during the development of the final infrastructure layout are proposed to be addressed by requiring that they meet predefined criteria as follows:* • *Not within 40m of waterways.* • *Not on steeply sloping terrain.* • *Not requiring any greater level of environmental impact.*
3 - Sched 2, Cond 9	**Original**	Appendix 2: General layout of the development
	Proposed	*Appendix 2: General layout of the development as modified.*[6]
4 – Sched 3, Cond 8	**Original**	Condition 8 allows that: … "The following construction activities may be undertaken outside these hours without the approval of the Secretary: activities that are inaudible at non-associated residences; the delivery of materials as requested by the NSW Police Force or other authorities for safety reasons; or emergency work to avoid the loss of life, property and/or material harm to the environment."
	Proposed	*Condition 8 allows that: … "The following construction activities may be undertaken outside these hours without the approval of the Secretary:* • *activities that are inaudible at non-associated residences;* • *activities approved under an out-of-hours (OOHW) work protocol (to form part of the EMS required by Schedule 4, Condition 1)* • *the delivery of materials as requested by the NSW Police Force or other authorities for safety reasons; or*

[5] Modified layout provided in this document as Appendix A.2 of the Modification Report.

[6] As above.

ID	Original versus proposed change to consent condition	
		• *emergency work to avoid the loss of life, property and/or material harm to the environment."*
5 - Sched 3, Cond 11	**Original**	There is currently no allowance to update the background noise levels to derive reliable compliance criteria relative to likely hub height for operational noise monitoring. Condition 11, Table 3 also requires that the project does not exceed specific criteria for residences C04 and C74. This is based on outdated data at a different hub height.
	Proposed	*Replace Condition 11 with:* *11A Background Noise Survey and Verification Report* *Prior to commissioning of the wind farm, the Applicant shall provide an updated determination of background noise levels at representative non-associated residence locations and calculate the appropriate noise criteria according to this Condition 11. The report should also predict the wind farm noise levels at all non-associated residences. The report is to be prepared in consultation with the EPA.* *11B Operational Noise Criteria – Wind Turbines* *The Applicant shall ensure that the noise generated by the operation of wind turbines does not exceed the greater of:* *a) 35dB(A); or* *b) The existing background noise level for each integer wind speed from cut-in speed to the rated power of the wind turbine generators, by more than 5 dB(A)* *Unless otherwise replaced by an equivalent NSW wind farm noise guideline, noise generated by the project is to be measured in accordance with the relevant requirements of Sections 3.1 and 3.2 of the South Australian Environmental Protection Authority's Wind Farms Environmental Noise Guidelines 2009.* *However, these criteria do not apply if the Applicant has an agreement with the owner/s of the relevant residence or land to generate higher noise levels, and the Applicant has advised the Department in writing of the terms of this agreement.*
6 - Sched 3, Cond 19	**Original**	Condition 19: the applicant shall ensure no more than 68.3 ha of Box Gum Woodland EEC … is cleared for the development unless the Secretary agrees otherwise.
	Proposed	*Condition 19 amended as follows: the applicant shall ensure no more than 181 ha of Box Gum Woodland EEC … is cleared for the development unless the Secretary agrees otherwise.*
7 - Sched 3, Cond 20	**Original**	Condition 20 requires that: Within 2 years of the commencement of construction, unless otherwise agreed by the Secretary, the Applicant shall retire biodiversity credits of a number and class specified in Tables 4 and 5 below to the satisfaction of OEH.
	Proposed	*Proposed to update to Tables 4 and 5 of the Consent as shown below with explicit allowance in Condition 20 for staging of offsets, such that the offsets are required only for areas that are impacted*[7]*.*
Table 4 Ecosystem credits		

[7] This would have a large implication for the project's viability where less than 79 turbines are developed.

ID	Original versus proposed change to consent condition						
Vegetation community	**PC type code**	**Plant community type name**	**Biometric condition**	**Management zone area (ha) (approx.)**	**Loss in site value score**	**Credits req for TS**	**Ecosystem credits required**
Box-Gum Woodland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate to good (high diversity)	0.23	49.48	15	15
Box-Gum Woodland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate to good (low diversity)	29.78	32.29	1098	1098
Box-Gum Woodland derived grassland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Low	81.45	9.90	0	0
Box-Gum Woodland derived grassland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate to good (high diversity)	1.93	20.83	50	50
Box-Gum Woodland derived grassland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate to good (low diversity)	119.21	15.10	2439	0
Long-leaved Box Dry Grass Forest	MR598	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion	Moderate to good (high diversity)	0.30	32.81	16	16
Long-leaved Box Dry Grass Forest	MR598	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion	Moderate to good (low diversity)	6.43	61.46	391	391
Long-leaved Box Dry Grass Forest derived grassland	MR598	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion	Moderate to good (low diversity)	13.62	15.62	257	0
River Red Gum and riparian	MR616	Yellow Box - River Red Gum tall grassy riverine woodland of NSW South Western Slopes Bioregion and Riverina Bioregion	Moderate to good (low diversity)	0.27	31.77	8	8

ID	Original versus proposed change to consent condition			
Table 5 Species credits				
Scientific name		**Common name**	**TS offset multiplier**	**Species credits required**
Anthochaera phrygia		Regent Honeyeater	7.7	3396
8		**Additional clarification to be included in consent:**		
	Proposed	*Reuse of suitable material excavated during any project earthworks onsite is allowable for use in any areas of the development footprint.*		
9		**Additional clarification to be included in consent:**		
	Proposed	*A minor upgrade to Coppabella Road (approximately 2km, identified on Figure 3-3) is to be designed in consultation with Hilltops Council to facilitate movements between parts of the layout during construction and operation. No over size or over mass vehicles are proposed for this section of Coppabella Road. No tree removal is allowed for the upgrade works, other than may be consented by Hilltops Council.*		
10		**Additional clarification to be included in consent:**		
	Proposed	*The project is proposed to be developed in stages.*		
11		**Additional clarification to be included in consent:**		
	Proposed	*The modification also clarifies that the project includes the subdivision of land so as to create new lots for the approved substation and switchyards; and any deemed subdivision arising from the grant of leases or licences for project elements*		
12		**Additional biodiversity management clarification to be included in consent:**		
	Proposed	*To be required within the Biodiversity Management Plan:* • *Accurate identification, mapping and quantification of all HBTs within the modification layout footprint prior to construction.* • *Pre-clearance surveys for threatened flora (Yass Daisy, Small Purple-pea and Dwarf Bush-pea) in moderate to good (high diversity) condition woodland, forest and derived grasslands outside of the consented development envelope. If threatened flora species area identified in the construction footprint, they would be avoided by the project. If unavoidable, translocation would be implemented. Any residual impacts would be offset.* • *Pre-clearance surveys for threatened raptor nests in areas outside of (within 200m) the consented development envelope. If raptor nests are identified, surveys would be undertaken to determine if they are in use by threatened species for breeding. If in use by threatened raptor species, nests would not be impacted until breeding activities have ceased.*		
13		**Additional clarification to be included in consent:**		
	Proposed	*CWFPL proposes to proactively commit to the preparation of an appropriate Decommissioning and Rehabilitation Plan within 5 years of the project becoming operational. The Decommissioning and Rehabilitation Plan would be updated every 5 years and would include:* • *Environmental management controls for decommissioning;* • *Estimated costs of decommissioning and funding arrangements (including residual value of turbines and infrastructure at end of life); and*		

ID	Original versus proposed change to consent condition
	• *In the event of any shortfall between the estimated costs of decommissioning and funding arrangements, the provision for an appropriate funding mechanism (such as a decommissioning bond or the like).*

7.3 OFFSETTING RESIDUAL IMPACTS

Offsets are required by both the Commonwealth and NSW approval authorities. At the Commonwealth level, offsets are required where impacts to a MNES are deemed significant. This is relevant to:

1. BGW CEEC.
2. Superb Parrot.

In NSW, offsets in accordance with the Framework for Biodiversity Assessment (for Major Projects) area required. This includes the broader BGW EEC (NSW listed) and the Superb Parrot as well as supplementary offsets for hollow bearing trees (which are a key resource for the Superb Parrot). Additional species and habitat will also be offset as part of the NSW offset package.

Offsets are proposed in accordance with the Framework for Biodiversity Assessment (FBA). This is the NSW offset tool for major projects and it has been endorsed by the Commonwealth government. It meets the NSW endorsed offsets policy in that it:

- Uses the prescribed 'linear' assessment method in the FBA to assess the landscape values of the project. This is done accurately using GIS analysis of the footprint buffered by 550m (as required by the methodology).
- Uses standardised field data, collected in accordance with the FBA. The methods and quantity of data satisfy the minimum requirements of the FBA.[8] The input include 'plot' data from quadrats as well as properly timed targeted species surveys.
- Uses the approved online calculator to calculate the 'ecosystem' and 'species' credits required for the project.
- Commits to offset the credit requirement, in accordance with the FBA rules and methodology.

It is proposed that the offsets will:

- Account for the final impact area of the development.
- Be managed for biodiversity improvement in perpetuity.
- Be compliant with OEH endorsed offset guidelines and methodologies.
- Additionally, account for impacts to Hollow bearing trees (HBTs).
- Incorporate input from OEH, Local Land Services, Commonwealth DoE and Council, as appropriate.

This section outlines that approach.

[8] This is with the exception of two Long-leaved Box Dry Grass Forest plots which were collected in November 2017 and will be used to update the credit calculations. This has no impact on MNES.

7.3.1 Updating the offsets for the modified project

Additional survey and assessment has been completed, for the modified Coppabella Wind Farm project, which has more accurately defined the distribution of vegetation types, their condition and the quantum of impacts now proposed for flora and fauna. Additional BioBanking plot data has been collected to meet the requirements of the BioBanking Assessment Methodology (BBAM) for the increased area of impact. Revised credit calculations have been run for the Coppabella Wind Farm which has determined a revised credit requirement for the project as detailed in Table 7-3 below. The revised assessment was completed as 'major project' in the BioBanking Credit Calculator (BCC) as a 'linear development'.

The results of the revised offset calculations are presented in Table 7-3 below.

Table 7-3 Revised offset requirements for the project

Ecosystem credits

The vegetation zones below are based on the FBA methodology, used to identify zones that are largely homogenous in terms of structure and composition. The blue shading indicates those zones in which CEEC is present. This higher quality category is mostly made up of the high diversity BGW and derived grassland. Some small areas of Long-leaved Box Dry Grass forest have been mapped within Patch 2 where Long-leaved Box is locally dominant within the construction footprint. These areas have been included as a worst case extension of the patch into the construction footprint as it is assumed that surrounding cleared areas may have been derived from the clearing of Box-Gum Woodland. Yellow Box and Blakely's Red Gum, are the dominant species across the remainder of Patch 2.

Vegetation community	PC type code	Plant community type name	Biometric condition	Management zone area (ha) (approx.)	Loss in site value score	Credits req for TS	Ecosystem credits required
Box-Gum Woodland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate to good (high diversity)	0.34	49.48	15	15
Box-Gum Woodland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate to good (low diversity)	36.50	32.29	1098	1098
Box-Gum Woodland derived grassland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Low	95.02	9.90	0	0
Box-Gum Woodland derived grassland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate to good (high diversity)	2.32	20.83	50	50
Box-Gum Woodland derived grassland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate to good (low diversity)	141.83	15.10	2439	0
Long-leaved Box Dry Grass Forest	MR598	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion	Moderate to good (high diversity)	0.51	32.81	16	16

Vegetation community	PC type code	Plant community type name	Biometric condition	Management zone area (ha) (approx.)	Loss in site value score	Credits req for TS	Ecosystem credits required
Long-leaved Box Dry Grass Forest	MR598	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion	Moderate to good (low diversity)	7.53	61.46	391	391
Long-leaved Box Dry Grass Forest derived grassland	MR598	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion	Moderate to good (low diversity)	14.63	15.62	257	0
River Red Gum and riparian	MR616	Yellow Box - River Red Gum tall grassy riverine woodland of NSW South Western Slopes Bioregion and Riverina Bioregion	Moderate to good (low diversity)	0.27	31.77	8	8
					Total:		**1578**

Species credits

Scientific name	Common name	TS offset multiplier	Species credits required
Anthochaera phrygia	Regent Honeyeater	7.7	3396

Supplementary offsets: hollow bearing trees

The project commits to offsetting HBTs removed by the project. While the BBAM takes into account HBTs in assigning credits, this additional commitment recognises the importance of this resource in the locality and the need to provide an incentive during construction to reduce the impacts on this important resource.

Detailed field mapping and conservative extrapolation provides an estimate of the number of hollow bearing trees to be impacted as 473 – an additional 75 trees occur within 5m of the footprint and are anticipated to be able to be avoided in most cases.

The final number of HBTs impacted by the project would be quantified. In respect of the offset area, a verification process would be undertaken (which may include extrapolation of field data) to estimate the number of hollows to be protected within the offset package. This would be documented within the Offset Plan, to be developed in consultation with OEH.

7.3.2 Mechanisms for securing an offset site

The Schedule 3 Condition 20 of the NSW Development Consent requires offset credits be retired:

> *…in accordance with the NSW Biodiversity Offsets Policy for Major Projects, and can be achieved by:*
>
> *(a) acquiring or retiring credits under the Biobanking scheme in the TSC Act;*
>
> *(b) making payments into an offset fund that has been established by the NSW Government; or*
>
> *(c) providing suitable supplementary measures.*

The preferred method for securing offset sites required for the Coppabella Wind Farm is option (a); Credits representative of the physical offsets would be secured and banked under the Biobanking scheme. If CWFPL is unable to secure sufficient credits for physical offsets, alternate allowable options in NSW would be undertaken (options (b) and (c)). However:

It is considered highly feasible that all Commonwealth offsets (being a smaller subset of the overall offset package) will be able to be physically secured 'like for like' within the project site boundaries. This is a commitment of the project and is discussed further below. More than seven times the Box Gum Woodland offset requirement is available within the project boundaries.

7.3.3 Implementation overview

The intention of offsets is to account for impacts on biodiversity values. For projects that require some flexibility in developing the final construction footprint and take some time to construct, it can be a relatively complicated process to identify and secure the precise quantum of offset land at key stages of the project's detailed planning and construction phase.

The following stages of implementing the Offset Package are proposed. The aim is to set out a clear path to identifying, securing and managing suitable offset lands in accordance with the conditions of the Development Consent.

Table 7-4 Implementation of offsets.

Phases of planning and implementation of offsets	Timing
1. Offset Strategy sets out methods to:	This document provides the Offset Strategy
a) estimate loss of habitat required for the project	
b) calculate the offset requirement	
c) secure the offset site in perpetuity	
d) manage the offset site in perpetuity	
2. Offset Plan reflects consultation with Local Land Services (LLS, previously CMA), Council the Commonwealth Dept. Environment and OEH in relation to:	Pre-construction
a) Updating the credit requirement for the areas to be impacted, based on the latest construction design (on the basis of field collected plot data).	Pre-construction
b) Selecting the final suite of offset sites including accurate calculation of uppermost credits generated at the offset site (on the basis of field collected plot data). This will allow for some refinement based on the final construction footprint.	Pre-construction
a) Management planning for each offset site:	During construction
o Establishment of baseline data.	
o Documentation of key biodiversity risks, opportunities and relevant local initiatives.	
o Refinement of management actions specific to the site (with input from the landowner), including monitoring regime and reporting requirements.	
o Consultation with LLS and OEH to finalise the Offset Plan (could be documented separately for each site or in one combined document).	
3. Verification of the actual area of native vegetation clearing required for the final construction footprint.	During construction.
4. Formalisation of the security mechanism for the offset site (Biobanking agreements).	Retire credits within 2 years of commencement of construction.
5. Monitoring and management as required at the offset site.	During operation.

7.3.4 Investigation of suitable offset sites

General criteria

Using the OEH credit converter tool, approximately 170 ha of native vegetation including approximately 90 ha of potential Regent Honeyeater habitat must be secured. This is detailed in Section 10 of the Modification application, extracted and provided as Appendix B.2 of this report. As stated above, Commonwealth offsets will form a smaller subset of the overall offset package.

At various stages during the planning and assessment stage of this project, potential offset areas have been identified and evaluated. Many additional potential areas that appear to offer high quality offsets have not

yet been surveyed. It is noted that several areas and not one contiguous site can be used to meet the offset criteria. The final 'package' may comprise a number of sites although preference will be given to minimising the edge area of the package as a whole.

The selection process has involved the following considerations:

- Areas of high constraint, where these areas occur sufficient distance from wind farm infrastructure, are the most likely candidates. Where they can be secured in relatively continuous areas, they would represent the least ongoing management cost as they are already in good condition. They provide good habitat values worth protecting and improving in perpetuity.
- Areas of EEC vegetation in better quality in the lower elevation landscape provide habitat for Superb Parrot and would offset habitat loss for this species.
- Areas of more intact woodland, provide hollow-bearing trees for a number of threatened birds and provide landscape connectivity in a relatively cleared and open landscape. Areas that increase and protect landscape connectivity area are worth protecting in perpetuity.

Based on the investigations and assessment carried out on the project site, there is a high level of confidence that suitable offsets are available within the site boundaries or on land immediately adjacent to the site which is owned by involved landowners. Key factors contributing to this confidence include:

- Since 2008, a very broad survey coverage has been achieved. The surveyed land surrounding the impact areas provide similar habitat types and values as those that would be impacted. This is verified by on ground survey and site inspections. These areas are therefore well placed to provide a 'like for like' offset.
- A substantial amount of area is available from which to select the most suitable offset sites. While not all of the land within the project site boundaries is available or suitable for offsets, the area of land impacted by wind farm infrastructure (the construction footprint) is approximately 5% of the land included within the Coppabella project boundaries.
- The project has been developed to reflect biodiversity constraints identified early and throughout the assessment process and therefore, the areas adjacent to the construction footprint are more likely to contain better habitat values, more appropriate to an offset site.

The total amount of area investigated to date with potential to be used as offsets is mapped in Appendix A.8.

While it is considered preferable to offset within the Coppabella site on host landholdings, it is also considered feasible that some of the landowners in the nearby Marilba area may be interested. While they are no longer involved in the project, relationships exist with these landowners and areas of high biodiversity value are known to occur.

Specific criteria

AVOIDANCE OF INDIRECT IMPACTS OF THE OPERATIONAL WIND FARM

The preference of the proponent is to secure offset lands from within the project boundary. In order that the offset sites are not adversely impacted by operational impacts of the wind farm, the proponent would ensure the following minimum buffers between wind farm infrastructure and offset areas:

- Approximately 300m from wind turbines (300m from turbine tower centres);
- Approximately 50m from tracks, powerlines and other linear infrastructure (50m from centrelines); and

- Approximately 50m from the outer edge of all other infrastructure.

SUITABLE VEGETATION TYPES

Broad vegetation mapping is available within the Coppabella Wind Farm site. As expected, the lands adjacent to the construction footprint contain similar habitat and are therefore broadly suitable as offsets. Table 7-5 demonstrates that there is approximately 886 ha of NSW listed EEC available on residual areas of the project site that is highly likely to satisfy Commonwealth offset requirements, including after applying the above buffer distances. From within this area, 'like for like' CEEC and Superb Parrot offsets would be identified. Refer to Appendix A.8.

Table 7-5 Potential offset areas – within the Coppabella precinct relevant to MNES

Vegetation community	PC type code	Plant community type name	Biometric condition	Estimated offset area required (ha)	Available at Coppabella (ha)	Net
Box-Gum Woodland (also considered habitat for the Superb Parrot)	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate to good	125.10	886.05	**760.95 surplus**

'Like for like' physical offsets for Commonwealth matters are a commitment of the project. More than seven times the Box Gum Woodland offset requirement is available within the project boundaries.

7.3.5 Management measures at the offset sites

Management measures required at the offset sites are likely to include:

- Exclusion of commercial apiaries;
- Exclusion of feral species;
- Control of overabundance of native herbivores;
- Fox control;
- Slashing;
- Management of grazing for conservation (note: while grazing is not prohibited, it must be managed carefully for the objective of biodiversity improvement. This may affect the timing of grazing and stocking rates. It will require agreed monitoring methods to inform stock management);
- Weed control;
- Management of human disturbance;
- Retention of regrowth and remnant native vegetation;
- Replanting or supplementary planting where natural regeneration will not be sufficient;
- Retention of dead timber;
- Erosion control;
- Retention of rocks; and
- Monitoring of performance.

A management plan for each offset area, using the Biobanking proforma, would be established, including targeted management actions, success criteria, triggers for action and monitoring requirements. The plan would be developed in consultation with OEH and submitted as part of the formal Biobanking application process for each site.

7.3.6 Cost effectiveness of measures at the offset sites

By seeking land within the project boundaries and immediately adjacent areas, the offsets are not only suitably matched to the areas being impacted, they make use of existing relationships with host landholders and neighbours and thereby spread the benefits of the wind farm to the locality.

The offset site management actions are funded through the Biobanking Scheme, whereby, the proponent pays a once off payment into the fund administered by OEH. The money is metered out annually to fund actions under the endorsed management plans. Accruing interest allows for in perpetuity income stream.

As above, the management actions are expected to largely be in line with existing management activities on these large agricultural allotments and thereby provide an additional income stream to the landowners to manage these lands for biodiversity improvement.

In summary, existing mitigation strategies (Biobanking offsets) will be adequate to address the impacts to MNES.

It is considered highly feasible that sufficient physical offset sites can be developed within the project site boundaries and adjacent areas to meet the MNES offset requirement. This would be detailed within an offset management plan.

As the wind farm may be developed in stages (or it is possible that a number of turbine sites would not be developed at all), staging for offsets is also proposed.

8 CONCLUSION

This Technical Report has been prepared to assist the Federal Department of Environment and Energy (DoEE) to undertake an assessment of the referral of the Coppabella Wind Farm on the basis of 'Assessment on Referral Information' only.

This assessment has collated field survey information and assessments for the broader project site, prepared between 2009 and continuing into December 2017. Based on this extensive understanding of the site and the risks posed by the construction and operation of the Coppabella Wind Farm, two MNES have potential for significant impacts:

1. White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (BGW CEEC). A total area of 233.37 ha have been identified in the project area of which 3.23 ha is within the footprint (including a 5m buffer on the civil footprint) and could be directly impacted. Additional areas are likely to be indirectly impacted and a 30m buffer has been created to account for this (additional to the 5m buffer above). A total of 3.62 ha occurs within the 30m buffered area.
2. Superb Parrot (Vulnerable). The Superb Parrot appears to have a low collision risk as high use flight paths do not coincide with the RSA. However, there are concerns about reduction in habitat. 60ha of important habitat would be removed. The NSW endorsed offset scheme will conserve suitable habitat (including all Box Gum Woodland in better than low condition and will include a specific hollow bearing trees commitment) in perpetuity.

Avoidance and minimisation, where avoidance cannot be further employed, have been applied to address the CEEC impacts. For the Superb Parrot, avoidance and minimisation have similarly been applied to hollow bearing trees and BGW habitat onsite.

NSW Biobanking offsets retired in perpetuity under the NSW Biobanking offset scheme are proposed to offset residual impacts to these MNES. This scheme is endorsed under the EPBC Act. Special provisions for 'like for like' offsets will be required to ensure the Commonwealth listings are adequately addressed. Finally, an adaptive Bird and Bat Management Plan would be developed and implemented to manage unforeseen collision impacts, should on-ground monitoring determine management actions are warranted. These measures are wholly consistent with the existing EPBC approval for the Yass Valley Wind Farm and commitments made under the NSW *Environmental Planning and Assessment Act 1979* approval process.

Nine additional species were found to have potential for impact, given the site provides potential habitat and that the species could occasionally occur:

1. Regent Honeyeater (critically endangered).
2. Painted Honeyeater (vulnerable).
3. Swift Parrot (critically endangered).
4. Koala (vulnerable).
5. White-throated Needletail (migratory marine).
6. Cattle Egret (marine).
7. Great Egret (migratory marine).
8. White-bellied Sea-eagle (marine).
9. Rainbow Bee-eater (marine).

Impacts to these species have been shown to be unlikely to be significant. For Koala, minimisation has been undertaken for BGW habitat on site, and additional specific mitigation is recommended to manage

potential for vehicle collisions (as set out in Section 7.1.2). Pathogen management has also been recommended to be included in the Biodiversity Management Plan for the construction phase. No specific mitigation is required for the other MNES however; they will be afforded additional protections through the CEEC commitments and through the broader range of mitigation measures set out in Appendix F to manage all impacts of the project.

The feasibility of the mitigation strategies has been confirmed. Particularly, onsite offsets are being progressed concurrent with preparation for construction and finalised prior to commissioning of the wind farm.

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APPENDIX A KEY MAPS

The following maps have either been created specifically for this assessment or have been sourced from existing assessments and are referenced in the referral and Technical Report:

1. Modified construction footprint versus approved infrastructure, NGH Environmental (2017b).
2. Modified construction footprint versus approved infrastructure showing detailed vegetation mapping, NGH Environmental (2017b).
3. Involved landowner map (host property boundaries), NGH Environmental (2017b).
4. CEEC at Coppabella Wind Farm, created for this assessment.
5. Superb Parrot habitat, created for this assessment.
6. Swift Parrot and Regent Honeyeater habitat, created for this assessment.
7. Koala habitat, created for this assessment.
8. Areas being investigated for offsets, NGH Environmental (2017b).

APPENDIX B SUPPORTING ASSESSMENTS

The following reports were key to the assessment of MNES and are referenced in the referral and Technical Report:

1. Biodiversity Assessment: Coppabella Hills Precinct, NGH Environmental (2009a), including species list from original survey work.
2. NSW Modification Application Ecology chapters 8-10, NGH Environmental (2017b; project description coincides with this referral).
3. Yass Valley Wind Farm – Golden Sun Moth and Striped Legless Lizard 2014/2015 Summer Survey Results. NGH Environmental (2015b).
4. Golden Sun Moth survey effort and results 2015. Extracted from NGH Environmental (2015c).

Superb Parrot surveys (2014, 2016):

5. 2014 Superb Parrot Flight Path Mapping surveys, NGH Environmental (2015a).
6. 2016 Superb Parrot Flight Path Mapping surveys, NGH Environmental (2017a).

Operational bird and mat impacts assessment (2009, 2017):

7. Wind Farm Risks to Birds and Microbats (Appendix G of the Environmental Assessment. Proposed Yass Valley Wind Farm: Coppabella Hills and Marilba Hills Precincts. Report prepared by NGH Environmental for Epuron. NGH Environmental (2009b)
8. Coppabella Wind Farm – proposed turbine modification impacts on birds and bats, BL&A (2017).
9. Coppabella Wind Farm – targeted threatened flora surveys October 2017, NGH Environmental (2017c)

APPENDIX C PROTECTED MATTERS SEARCH NOVEMBER 2017

APPENDIX D FLORA LIST FOR BGW CEEC SURVEY SITES

APPENDIX E MINIMISATION WITH RESPECT TO BIODIVERSITY CONSTRAINTS

This table and map set are sourced from the Coppabella Wind Farm Modification Application Environmental Assessment; NGH Environmental (2017b). It shows area where minimisation of biodiversity impacts has been considered during the detailed design process. Green shading indicates items where lower impact solutions have been found (i.e. where minimisation of impact has been achieved). Bold text indicates direct reference to MNES. ID codes refer to reference areas on the E.2 map.

APPENDIX F MITIGATION MEASURES FOR THE PROJECT

The mitigation measures accompanying the project are derived from:

1. EPBC 2013/7002 Yass Valley Wind Farm approval.
2. NSW planning approval (Development Consent SSD 6698).
3. Statements of Commitment made by the proponent; under the EP&A Act Part 3A reforms, Proponents were required to provide a *Statement of Commitments* on how they propose to manage the project to minimise, and where possible avoid, impacts).
4. The commitments made in the Coppabella Wind Farm Modification Application (NGH Environmental 2017); currently being assessed by the NSW DPE and provided separately in Appendix B.2 specific to biodiversity.

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