

DUNDONNELL WIND FARM PROJECT

ASSESSMENT

under

ENVIRONMENT EFFECTS ACT 1978

Minister for Planning

February 2016

GLOSSARY

AH Act	<i>Aboriginal Heritage Act 2006</i>
CASA	Civil Aviation Safety Authority
C&LP	<i>Catchment and Land Protection Act 1994</i>
CHMP	Cultural Heritage Management Plan
CRM	Collision risk modelling
DEDJTR	Department of Economic Development, Jobs, Transport and Resources
DELWP	Department of Environment, Land, Water and Planning
DSE	Former Department of Sustainability and Environment
EE Act	<i>Environment Effects Act 1978</i>
EES	Environment Effects Statement
EMF	Environmental Management Framework
EPA	Environment Protection Authority
EP Act	<i>Environment Protection Act 1970</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cwth)
ESD	ecologically sustainable development
FFG Act	<i>Flora and Fauna Guarantee Act 1988</i>
GHCMA	Glenelg Hopkins Catchment Management Authority
ha	hectare
IBG	Interim Brolga Guidelines (Revision 1, February 2012)
km	kilometre
kv	kilovolt
m	metre(s)
MGPS	Mortlake Gas Power Station
MNES	Matter(s) of National Environmental Significance
MRSD Act	<i>Mineral Resources (Sustainable Development) Act 1990</i>
MW	Megawatt(s)
NTGVVP	Natural Temperate Grassland of the Victorian Volcanic Plain (EPBC Act listed)
OAAV	Office of Aboriginal Affairs Victoria
OD	Over-dimensional
P&E Act	<i>Planning and Environment Act 1987</i>
PVA	Population viability analysis
RAP	Registered Aboriginal party
RSA	Rotor swept area
SHWTLP	Seasonal Herbaceous Wetland (Freshwater) of the Temperate Lowland Plains (EPBC Act listed)
SRW	Southern Rural Water
TMP	Traffic Management Plan
VAHR	Victorian Aboriginal Heritage Register
WBPGC	Western Basalt Plains Grassland Community (FFG Act listed)

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1 INTRODUCTION

1.1 Purpose of this document

This is the assessment of environmental effects (Assessment) under the *Environment Effects Act 1978* (EE Act) for the Dundonnell Wind Farm Project (the 'Project'). It represents the final step in the Environment Effects Statement (EES) process under the EE Act by which the Minister for Planning provides advice to decision-makers on the likely environmental effects of the proposal, their acceptability and how they should be addressed in relevant statutory decisions. The Assessment is informed by the report of the Inquiry together with the EES and public submissions.

This Assessment will inform the decisions required under Victorian law for the proposal to proceed, in particular under the *Planning and Environment Act 1987* (P&E Act), the *Mineral Resources (Sustainable Development) Act 1990* (MRSD Act) and the *Aboriginal Heritage Act 2006* (AH Act). It will also inform the approvals decision under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

1.2 Structure of this Assessment

Section 1 of this Assessment provides a brief description of the project and the alternatives from which the project considered in the Assessment was derived. Section 2 of this Assessment outlines the EES process and the statutory approvals required for the proposed development. Section 3 sets out the final evaluation objectives and provides an outline of the key conclusions of the assessment.

The core part of this Assessment is found in Section 4, which assesses the environmental effects of the project based on the evaluation objectives and the applicable legislative and policy framework. Section 4 uses the relevant evaluation objectives and principles of ecologically sustainable development (ESD) to structure the integrated evaluation of the Project's environmental effects.

Section 5 provides responses to the recommendations of the Inquiry.

1.3 Project description

Dundonnell wind farm project

The Dundonnell wind farm project investigations were initially commenced in 2009 by NewEn Australia Pty Ltd. Following the project referral, the project company was sold to Trustpower Holdings Pty Ltd in June 2013. The proponent then became Dundonnell Wind Farm Pty Ltd.

The Dundonnell wind farm site comprises 4,200 ha of grazing land, approximately 23km north-east of Mortlake and 21km west of Derrinallum in south western Victoria (see Figure 1). The change of proponent coincided with some variations to the project description, including a site expansion of an additional 955.9ha, the inclusion of a quarry in the project proposal, an increase in the number of wind turbine generators (WTGs) from 89 to 104, with a maximum tip height of 165m above ground level, and a total indicative generation capacity of 312 megawatts (MW). These project variations were incorporated into the Scoping Requirements for the EES. During the course of the Inquiry public hearing, the proponent tabled a revised plan "for discussion" that showed a modified layout with 96 turbines.

The Project would require a range of on- and off-site ancillary infrastructure to support the wind farm operation. Permanent ancillary infrastructure includes an on-site operations and maintenance building, up to four anemometers (wind monitoring masts) with a height of approximately 110m, a substation and access tracks. A 200kv overhead transmission line, approximately 38km long, will connect the on-site substation to an off-site substation. A 500kv transmission line, up to 1km in length, will connect the off-site substation to the Mortlake Gas Power Station (MGPS). Temporary infrastructure for the construction period includes an on-site concrete batching plant, an on-site quarry comprising up to two pits, cleared construction laydown areas, temporary site buildings, ablutions facilities and site parking.

A detailed description of the Project is provided in Volume 1, Chapter 2 of the EES.

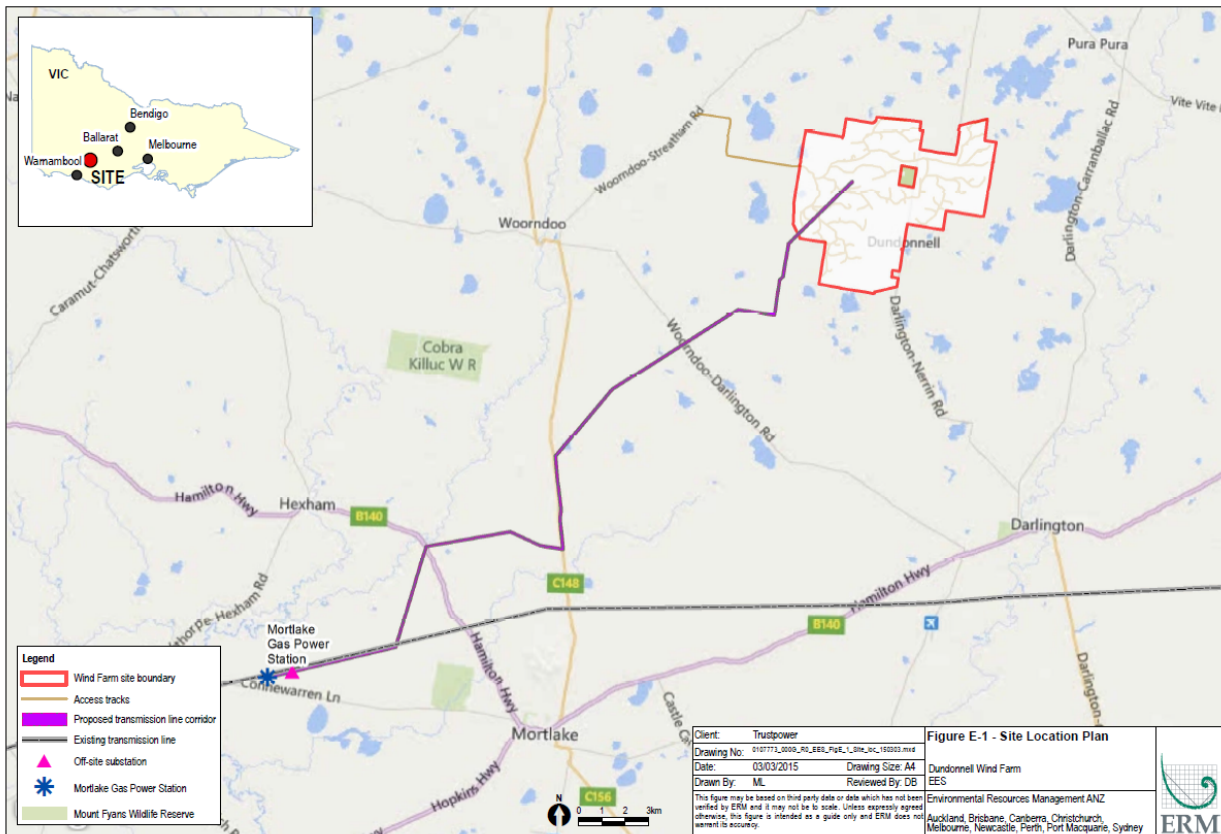


Figure 1. Dundonnell wind farm Project location (as published in the exhibited EES)

1.4 Project alternatives

As set out in the EES Scoping Requirements and the procedures and requirements the former Minister issued under the EE Act for the Project, this EES was required to consider and evaluate alternatives and explain the selection process for relevant alternatives, documenting the likely environmental effects of relevant alternatives. The explanation of relevant alternatives was specifically to address:

- site selection process for the wind farm site;
- alternative infrastructure layouts;
- WTG models and configurations; and
- the transmission line route selection process and potentially suitable technologies, including undergrounding.

Chapter 5 of the EES discusses project alternatives; which are essentially variations to the exhibited Dundonnell Wind Farm project site boundary and transmission line route alignment. This Assessment will focus on the alternatives that relate to the key environmental risks, in particular those aimed at reducing the most significant effects (biodiversity values, particularly listed threatened ecological communities, listed threatened flora species, threatened fauna such as Brolga and protected migratory bird species; scientific and landscape values associated with volcanic features on the site; traffic and transport issues; amenity effects; effects on catchment values; and cumulative adverse effects) which were flagged as priorities in the initial referral of the Project and the Minister's decision to require an EES.

1.4.1 Site Selection Process

The proponent chose the Dundonnell site because of its proven and consistent wind resource and wind energy potential, appropriate elevations and suitable topography, large surrounding landholdings and landholder interest in the project, proximity to the electricity network, adequate road access and relative isolation from nearby towns and dwellings. No comparative evaluation of other potential sites for this proposal has been provided as part of this EES. However there have been some variations and alternatives for project components which are discussed in the section below.

1.4.2 Project component alternatives

At the conceptual design stage, variations for the Project layout and grid connection were developed in the context of technical assessments undertaken for the EES. The proponent tabled further variations to the layout at the Inquiry hearing. The Project as presented in the EES proposes WTGs with an indicative generation capacity of 3MW and a maximum blade tip height of 165m. However, the actual machines to be installed will be selected from the products available on the market at the time of procurement.

1.4.2.1 Project area

A range of options for the wind farm site boundary were considered in the project planning stages. NewEn explored the feasibility of incorporating areas to the north and south-east of the current wind farm site totalling 12,000 ha. In the context of site investigations between 2009-2010 and government policy changes, including revisions of the Wind Energy Guidelines¹, this alternative was not considered viable.

The wind farm site boundary was broadly identified in 2011. Subsequent ecological studies, the identification of constraints, changes in land holder participation and WTG layout have resulted in the site boundary shifting to the east and the revised location of on-site infrastructure.

1.4.2.2 Site layout

Several alternative layouts were considered during the initial planning stage. The location of project site infrastructure has been refined to respond to specialist technical advice and the reduction of impacts. An indicative site layout for 89 WTGs, based on preliminary assessments of flora and fauna, cultural heritage, geoscience, transmission line planning and heritage constraints and stakeholder engagement was submitted with the EPBC Act referral in September 2012. The preliminary assessments influenced the location of WTGs and established buffers and avoidance areas, giving specific consideration to Brolga flocking sites in accordance with the Interim Brolga Guidelines (IBG), native vegetation, geomorphological values, aquatic habitat and sensitive heritage values.

As the Project evolved, the site layout was further adjusted to accommodate an expanded wind farm site and a maximum of 104 WTGs at a maximum height of 165m. This WTG layout was presented in the EES. At the Inquiry public hearing the proponent tabled a revised layout comprising 96 WTGs, eight having been removed and a further eight relocated to provide a turbine-free flightpath for observed Brolga movements through the south-western part of the site.

A preliminary assessment of quarry pit locations identified two quarry sites to provide crushed rock for the wind farm and access road construction. The pits are located south of Fashams Lane with areas of 19.2ha and 17.8 ha.

1.4.2.3 Transmission line route

The proposed transmission line comprises 38 km of 220kV overhead lines between the wind farm site and a substation to be constructed to the east of the Mortlake Gas Power Station (MGPS). Consideration was given to alternative design solutions including an underground transmission line, however this option was not considered viable.

A 500kV transmission line, up to 1km in length, will connect the off-site substation to the Heywood-Moorabool 500kV network at MGPS. The proposed route for the transmission line corridor was discussed with the Australian Energy Market Operator and the alignment was generally agreed with landowners.

The proponent initially proposed to build a maintenance track for the full length of the transmission line, but during the Inquiry hearing the proponent reduced the length of the proposed maintenance track to reduce the extent of native vegetation removal.

1.4.2.4 Transport routes

An established over dimensional (OD) vehicle haulage route from Portland to Woorndoo, and the approved transformer route from Geelong to Mortlake were selected for the Project, subject to permits from VicRoads.

Two possible routes for OD vehicles from Woorndoo to the wind farm site were identified. Route 1 east from Woorndoo via the Mortlake-Ararat Road, then Woorndoo–Streatham Road ending at a site access point through private land, south

¹ *Policy and planning guidelines for development of wind energy facilities in Victoria*, DELWP: note that the current version is dated January 2016, and there have been multiple revisions since the document was first published by Sustainable Energy Authority Victoria in 2003.

of Warings Lane was chosen as the preferred route, based on road surface condition and the avoidance of rocky terrain. This route has a lesser impact on school bus routes, and the amenity of dwellings located on Woorndoo-Dundonnell Road. Moyne Council prefers route 1 as it will have the least impact on residents and Council's road infrastructure.

1.4.3 Conclusion on project alternatives

The EES and supporting documentation, including additional documentation presented at the Inquiry hearing, generally provided an adequate analysis of the potential effects of this selected project location, and the project alternatives which informed the proponent's overall site selection for the wind farm and route of the proposed transmission line. The effects of the project (and the need for specific variations to the Project) are examined within the following sections. The Inquiry generally supported the modified site layout presented at the Inquiry hearing, but recommended the deletion of a further three WTGs and the provision of an additional turbine-free buffer around another Brolga breeding site. These recommendations are discussed in section 4.1.4 below.

2 STATUTORY PROCESSES

2.1 *Environment Effects Act 1978*

On 21 January 2013, the former Minister for Planning determined that an EES was required for the project under the EE Act. The EES has been prepared by the proponent in response to the Scoping Requirements issued by the Minister for the proposal on 16 September 2013.

The EES was placed on public exhibition, together with planning permit applications, a draft Quarry Work Plan and draft cultural heritage management plans (CHMPs), from 13 July 2015 until 21 August 2015. One hundred and thirty-five submissions were received. Details of submitters are included in Appendix A of the Inquiry Report. Approximately 53 submissions supported or conditionally supported the project, while 81 were opposed.

The Minister appointed an Inquiry under the EE Act to review submissions, inquire into the environmental effects of the Project, and assist statutory decision making required for the project, in accordance with terms of reference issued by the Minister on 9 August 2015.

The Inquiry held a directions hearing on 9 September 2015, followed by its public hearing over 9 days (6-9 October, 13-16 October and 20 October 2015). The Inquiry provided its report to the Minister on 11 January 2016. The report has informed the preparation of this Assessment of the environmental effects of the Project under the EE Act.

The next step is the provision of this Assessment to statutory decision-makers, who must consider it before deciding whether to grant approval to the Project.

2.2 Victorian statutory approvals

The Project requires a number of Victorian statutory approvals, including:

- Approved CHMPs for the wind farm (including quarry) and transmission line under the AH Act;
- Three planning permits under the P&E Act and the Moyne Planning Scheme, for a Wind Energy Facility, Transmission Line and Off-site substation (including planning permission for vegetation removal where relevant); and
- Work Plan and Work Authority for extractive industry under the MRSD Act.

Exhibition of draft CHMPs, a draft Work Plan and three planning permit applications was coordinated with the exhibition of the EES for the Project. The Minister called in two planning permit applications at the request of Moyne Shire Council and called in the application for the Wind Energy facility from himself so that they could be considered by a combined EE Act Inquiry and P&E Act Panel. The Minister empowered the Inquiry appointed under the EE Act also as a Panel under Part 8 of the P&E Act to consider submissions to the planning permit applications.

Under the AH Act, no approvals for a project which requires a CHMP may be granted pursuant to any other Victorian legislation until the required CHMPs have been approved by the relevant Registered Aboriginal Party (RAP), or, in the absence of a RAP for the subject land (as is the case for this Project), by the Office of Aboriginal Affairs Victoria (OAAV).

No planning permit is required for the quarry due to the requirement for an EES².

2.3 Commonwealth statutory approval

On 3 December 2012, the delegate of the Australian Government Minister for Sustainability, Environment, Water, Population and Communities decided that the proposal is a 'controlled action' (EPBC 2012/6557) and therefore requires assessment and approval under the EPBC Act. The controlling provisions under the EPBC Act relate to listed threatened species and communities (section 18 and 18A) and listed migratory species (sections 20 and 20A).

The Victoria EES process is accredited as the assessment process for the purposes of the EPBC Act under the bilateral agreement between the Commonwealth and Victoria, made under Section 45 of the EPBC Act. Therefore, the EES for the Project and this Assessment evaluate potential impacts on matters of national environmental significance (MNES) as defined under the EPBC Act, and will inform the Australian Government's approvals decision under the EPBC Act.

3 SUMMARY OF KEY FINDINGS

During the EES process it became apparent that the key risks to and effects on environmental assets from the Project arise primarily due to potential impacts on flora and fauna from the wind farm and transmission line development and operation. However, a number of other issues also require attention, especially traffic, groundwater and cultural heritage.

This Assessment concludes that the development of the Project can occur with environmentally acceptable consequences, subject to several qualifications described and explained in detail below. In particular, certain changes are needed to the turbine layout, most of which were canvassed at the Inquiry hearing. These changes are designed to reduce the likely impact of the wind farm on the Brolga, a bird species listed as threatened in Victoria under the *Flora and Fauna Guarantee Act 1988* (FFG Act).

This Assessment notes that a residual impact on the Brolga from the construction and operation of the wind farm is expected, triggering a requirement under the Interim Brolga Guidelines (IBG) for appropriate compensatory measures to be implemented to ensure no net impact on the Victorian (south-eastern Australian) population of the species. This Assessment concludes that a more extensive package of measures than those proposed in the EES may be necessary to achieve and demonstrate the required level of protection for the Brolga at a population level, while accepting that some degree of residual impact (i.e. collision casualties) must be expected as a consequence of development and operation of the wind farm. This Assessment makes some specific recommendations about such measures and the manner in which they should be implemented.

This Assessment also notes that key threats to the south-eastern Australian population of the Brolga relate to loss or modification of wetlands. While this has most commonly occurred in western Victoria as a direct result of agricultural land management, in particular the draining of wetlands on private property for farming purposes, climate change is also likely over time to reduce the suitability of remaining (or restored) wetlands for Brolga habitat purposes³. Wind farms are part of Victoria's strategic climate change mitigation response. This Assessment notes and accepts the principle underpinning the IBG that any wind farm should have no net (adverse) impact on the Brolga population, but also recognises the need for a robust response to climate change as part of the long-term strategy to protect this iconic threatened species.

More broadly, this Assessment notes that wind farms may be expected to cause deaths of birds and bats and that this expectation is reflected in the bird and bat casualty monitoring requirements which are included in the planning permits for most if not all Victorian wind farms. To enable better informed decisions about future wind farm proposals, this Assessment supports the creation of a central, comprehensive database in which all such monitoring results should be stored and collated. In particular, the potential impact of wind farms on raptors (birds of prey) at a population level may be of conservation concern and requires evaluation based on analysis of empirical data.

This Assessment also responds to a procedural issue identified by the Inquiry, in the context of informing continuous improvement of environmental assessment and decision-making practice in Victoria.

Given the above conclusions, it follows that it is my intention to issue planning permits for the discrete Project elements once prerequisite statutory steps have been completed, in accordance with the detailed findings and recommendations

² See MRSD Act, section 77T

³ For example, see Sheldon, R, 2004

of this Assessment. References in this Assessment to planning permits and proposed or potential planning permit conditions should be read in that context.

3.1 Approach to this Assessment

To provide a coherent and integrated structure for this Assessment of likely environmental effects, the key aspects of relevant legislation, statutory policy and the principles and objectives of ESD⁴ have been synthesized into a set of evaluation objectives that are pertinent to the Project. A draft set of evaluation objectives was included in the Scoping Requirements for this EES, which were used by the proponent in its assessment of alternatives and effects within the EES.

Table 1 lists the final set of evaluation objectives used in this Assessment and the core legislation that underpins them.

Evaluation Objectives	Key Legislation
Biodiversity – To avoid or minimise adverse effects on native vegetation and listed flora and fauna species and ecological communities, including those listed under the FFG Act or EPBC Act, and address offsetting required for potential losses consistent with relevant policy.	P&E Act FFG Act Wildlife Act EPBC Act
Landscape and Geoscience Values – To avoid or minimise adverse effects on the landscape and geoscience values of the region.	P&E Act
Land use and Socio-economic – To avoid or minimise disruption and other adverse effects on local infrastructure (including roads), land use (including agricultural and residential) and to neighbouring landowners and road users during construction and operation of the Project.	P&E Act
Amenity – To avoid or minimise adverse noise, visual and other amenity effects on nearby residents and local communities, to the extent practicable.	EP Act P&E Act MRSD Act
Cultural Heritage – To avoid or minimise adverse effects on Aboriginal and historic cultural heritage and associated values.	AH Act Heritage Act
Catchment Values – To maintain the functions and values of aquatic environments, surface water and groundwater, including avoiding effects on hydrology and protected beneficial uses.	C&LP Act EP Act Water Act
Environmental Management Framework – To provide a transparent framework with clear accountabilities for managing environmental effects and hazards associated with construction, operation, decommissioning and rehabilitation phases of the Project, in order to achieve acceptable environmental outcomes.	P&E Act MRSD Act
Sustainable Development – Overall, to ensure that the Dundonnell Wind farm Project achieves a balance of economic, environmental and social outcomes that contributes to ecologically sustainable development and provides a net community benefit over the short and longer-term.	P&E Act

Table 1. Assessment evaluation objectives

4 ASSESSMENT OF ENVIRONMENTAL EFFECTS

The following detailed analysis of specific environmental effects is structured in line with the evaluation objectives set out in section 3.1.

⁴ See *Ministerial guidelines for assessment of environmental effects under the Environment Effects Act 1978* made under section 10 of the EE Act, pp. 19 and 27.

4.1 Biodiversity

Evaluation objective - *To avoid or minimise adverse effects on native vegetation and listed flora and fauna species and ecological communities, including those listed under the FFG Act or EPBC Act, and address offsetting required for potential losses consistent with relevant policy.*

Key issues

In the context of the relevant legislation and statutory policy, the evaluation of potential effects on biodiversity and native vegetation needs to address the following issues:

- Whether the potential effects on native vegetation are acceptable, including whether the removal of native vegetation that forms part of a listed threatened ecological community is acceptable in the context of the relevant policy framework.
- Whether the potential direct and indirect effects on threatened species of flora and fauna and listed ecological communities under the Commonwealth EPBC Act and/ or under the FFG Act and their habitat are acceptable in the context of proposed mitigation measures.
- Where residual impacts are considered to be acceptable, whether appropriate and adequate offsets have been identified and can be secured in accordance with the appropriate policy.

Discussion and findings

4.1.1 Native vegetation

The wind farm site comprises about 4,200 ha and supports scattered patches of remnant native vegetation totalling about 136 ha (about 3%). The wind farm layout and micro-siting of the turbines will largely be able to avoid direct impacts on native vegetation. However, the main access track will result in the removal of 0.666 ha of remnant native grassland vegetation, which meets the definitions of listed threatened ecological communities under both the Commonwealth EPBC Act (Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP) – Critically Endangered) and the Victorian FFG Act (Western Basalt Plains Grassland Community (WBPGC) – Threatened). The extent of clearance for the access road has been reduced from 1.023 hectares by narrowing the track width.

Significant native vegetation remnants exist in the reserves for the public roads which will be used to access the Project site, especially during the construction phase. Some upgrades to road formations are proposed, but all native vegetation is to be avoided in the course of those works.

Native vegetation patches also exist along the route of the transmission powerline which will export power from the wind farm to the offsite substation and then to the MGPS. Of about 17.2 ha of native vegetation along the alignment, up to 4.2 ha might be removed, most of which is either NTGVVP or Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (SHWTLP), which is also listed as Critically Endangered under the EPBC Act. About 0.9 ha of the native vegetation which might be removed for the construction of the powerline and associated access track corresponds to the WBPGC listed as threatened under the FFG Act. I note that the transmission line alignment was also modified to reduce the removal of trees (River Red Gums).

A number of threatened plant species listed under either or both of the EPBC Act and FFG Act could occur within the patches of remnant vegetation which could be removed, mostly in the remnant patches of listed threatened communities. Seasonal surveys have been conducted for several species, one of which (Spiny Rice-flower) was found to occur along the powerline access track route; the proponent has proposed a route adjustment to avoid impacts on five Spiny Rice-flower plants. The results of seasonal surveys for several threatened spring flowering plant species were not known or reported to the Inquiry, and it is not clear whether those surveys were undertaken in the spring of 2015.

I note that the Inquiry has found the proposed (reduced) extent of native vegetation removal to be acceptable, subject to offsets. The Inquiry noted that DELWP, in its capacity as a referral authority for the planning permit applications for native vegetation removal, advised that appropriate measures had been taken to minimise removal of native vegetation and that subject to appropriate offset arrangements it would not object to permits for removal.

It is my Assessment that the proponent has generally responded appropriately to the occurrence of significant native vegetation that could be affected by the Project and has sought to minimise impacts to the extent reasonably practicable. I note that both Commonwealth and State policies provide for offset arrangements to be made for removal of native vegetation which is both unavoidable and found to be acceptable in ecological terms (see Section 4.1.2 below).

Accordingly **it is my Assessment** that, subject to the qualification in the following paragraph and to compliance with approvals conditions relating to the securing and management of offsets, the removal of the reduced extents of native vegetation identified in the Inquiry report may be approved.

I am concerned that three years after the decision that an EES was required for the Project, following the conclusion of the public exhibition period and Inquiry hearings, and after the Inquiry has reported to me, results of seasonal (spring) surveys for several listed threatened species have not been provided. While it may be improbable that such rare species persist in the relatively disturbed and fragmented patches of remnant native vegetation potentially affected by the Project, that possibility remains. **It is my Assessment** that conditions on state and Commonwealth approvals requiring the reporting of comprehensive seasonal survey results for all listed threatened species for which those survey results are still outstanding to the relevant authorities, and requiring the implementation of adequate avoidance, mitigation and offset actions (as may be appropriate) for any such species which are detected, should be applied.

See also section 4.1.5 below, specifically regarding MNES.

4.1.2 Native vegetation offsets

As mentioned above, both the Commonwealth and Victorian biodiversity protection systems provide for compensation ("offsets") for relevant biodiversity values which may be allowed to be removed in the course of a development project.

The ecological communities listed as threatened under the Commonwealth and Victorian systems are defined differently, but most if not all of the native vegetation listed as threatened under the FFG Act meets the definitions of ecological communities listed under the EPBC Act. Accordingly, and subject to meeting the specific requirements of both jurisdictions' policies, **it is my Assessment** that a single native vegetation offset program should be prepared to meet all offset requirements in a fully integrated manner.

4.1.3 Terrestrial fauna (excluding Brolga)

The primary impact of development projects on terrestrial (including arboreal) fauna commonly results from removal of vegetation (habitat). However, wind farm developments also potentially impact on birds and bats through the collision risk they pose to flying species. Collisions may occur with turbine blades, guy wires (eg for wind monitoring masts) and powerlines, as well as other structures such as fences. Small (insectivorous) bats may also be killed by barotrauma resulting from abrupt changes of air pressure close to the moving turbine blades⁵. Impacts might also result from the inclination of some species to avoid land occupied by turbines, leading to otherwise suitable habitat being under-utilised or abandoned.

A number of significant fauna species are known to occur on or near the site, and the potential presence of others, while not detected in the EES field surveys, cannot be completely ruled out. Terrestrial fauna species of National or State significance of key interest for the purposes of this Assessment are noted in Table 2 below.

Species	EPBC status	FFG status	DELWP Advisory List
Southern Bent-wing Bat	Critically endangered	Threatened	Critically endangered
Yellow-bellied Sheathtail Bat	-	Threatened	Data deficient
Fat-tailed Dunnart	-	-	Near threatened
Sharp-tailed Sandpiper	Migratory	-	-
Red-necked Stint	Migratory	-	-
Double-banded Plover	Migratory	-	-
Eastern Great Egret	Migratory	Threatened	Vulnerable
Glossy Ibis	Migratory	-	Near threatened
Common Sandpiper	Migratory	-	Vulnerable
Wood Sandpiper	Migratory	-	Vulnerable
Common Greenshank	Migratory	-	Vulnerable
Latham's Snipe	Migratory	-	Near threatened
Striped Legless Lizard	Vulnerable	Threatened	Endangered
Corangamite Water Skink	Endangered	Threatened	Critically endangered
Growling Grass Frog	Vulnerable	Threatened	Endangered
Golden Sun Moth	Critically endangered	Threatened	Critically endangered

Table 2: Significant fauna species which could be affected by the Project.

⁵ EES Vol. 1, p. 12-17

With respect to the Southern Bent-wing Bat, I note that a small number of calls of this species were recorded on the wind farm site during two of the four bat survey periods (<0.1% of identified calls). I note also that no calls of the species were recorded from higher than 30 metres – that is, all recorded calls were from below the rotor swept area (RSA). While this species is acknowledged to be critically endangered at both national and State levels, this status reflects its reliance on only two known maternity caves, the closer of which is about 70 km from the wind farm site. However, the Dundonnell site is towards the limit of the species' range and the records do not suggest the site is of importance to the species.

With respect to the Yellow-bellied Shearwater, I note that a small number of calls of this species were recorded on the wind farm site during two of the four bat survey periods (<0.1% of identified calls). I note also that no calls of the species were recorded from higher than 30 metres – that is, all recorded calls were from below the RSA. Although the status of the species in Victoria is of concern, the evidence indicates that the site is unlikely to be of importance for the population.

With respect to the Fat-tailed Dunnart, I note that one individual was recorded on the site, indicating a very low population density in the context of the survey effort. Appropriate wildlife protection measures in the construction environmental management plan should provide adequately for this species.

With respect to the migratory bird species, I note that little suitable habitat occurs on the site and only two of the eight species have been recorded within the wind farm boundaries (although one record of 20 Latham's Snipe is of significance). Better habitat for most of the migratory bird species is provided by larger wetlands in the broader area surrounding the wind farm site. However, noting the significant record of Latham's Snipe within the wind farm boundaries and the potential for migratory species to make long-distance journeys over the site independent of use of nearby habitat, **it is my Assessment** that the bird and bat monitoring program should pay particular attention to detecting and identifying any migratory bird species killed.

With respect to the Striped Legless Lizard, I note that a substantial survey effort did not detect the species on the site. Appropriate wildlife protection measures in the construction environmental management plan should provide adequately for this species if it occurs.

With respect to the Corangamite Water Skink, I note that limited habitat for the species occurs within the wind farm boundaries, in areas from which WTGs have been excluded. Minor shadow flicker effects could marginally reduce habitat suitability in known and potential habitat areas within and adjacent to the wind farm, although the proposed changes to the wind farm layout would further reduce if not eliminate those effects. The Project should have little if any impact on the population of Corangamite Water Skinks in the vicinity of the wind farm.

With respect to the Growling Grass Frog, I note that a substantial survey effort did not detect the species on the site. Appropriate wildlife protection measures in the construction environmental management plan should provide adequately for this species if it occurs.

The greatest risk arising from the Project for mobile terrestrial fauna such as Fat-tailed Dunnart, Striped Legless Lizard and Growling Grass Frog is for animals to become trapped in excavations left open overnight. I note that the Environmental Management Framework (EMF) in the EES identifies this risk for Growling Grass Frog (impact no. 12-07). It is my Assessment that the final EMF should address this risk for all relevant threatened terrestrial fauna species, and provide for salvage of trapped individuals by an appropriately qualified wildlife handler.

With respect to the Golden Sun Moth, I note that one area of potential habitat has been identified on the wind farm site, and that the Project will not result in any impacts on that area. Consequently, I accept the proponent's conclusion that there will be no impact on the Golden Sun Moth.

It is my Assessment that the potential impacts on nationally and State significant fauna species (other than Brolga) will be manageable within acceptable limits. Additional comments on fauna species which constitute MNES are provided in section 4.1.5 below. Potential impacts on Brolga are discussed in section 4.1.4.

There is little doubt that casualties to a variety of common bird and bat species which occur on and around the wind farm site will occur if the Project proceeds. That impact is regrettable, but while those species remain secure ("least concern") and losses do not impact upon populations to an ecologically significant extent the effects of the wind farm on those species do not warrant a finding that the Project should not be allowed to proceed. Many human-generated changes to the landscape and human activities affect wildlife populations and the impacts of wind farms should be considered in that broader context, notwithstanding the relatively dramatic nature of collisions as a type of impact.

I note that most if not all planning permits which have been issued for wind farms to be constructed and operated in Victoria include conditions requiring the implementation of bat and avifauna (bird) monitoring programs, to document the collision (or related) casualties resulting from the wind farm on a sampling basis. Unfortunately, there has been no coordinated assembly or collation of the monitoring data from those developments, which involve a number of independent

wind farm developers and operators. As a result, assessments of subsequent wind farm proposals such as Dundonnell must be made in the absence of broad-based, empirical information in the Victorian context about one of the key environmental impacts of such projects. I note that the Inquiry has expressed concern about this situation (pp. 23-24).

I agree with the Inquiry that this situation is undesirable and **it is my Assessment** that it should be remedied as soon as practicable. This is not a matter for the Dundonnell proponent or project-specific approvals decisions about the Dundonnell wind farm, but rather a matter for DELWP (in terms of its jurisdiction for wildlife), the Department of Economic Development, Jobs, Transport and Resources (DEDJTR) (in terms of its jurisdiction for energy), local government (where local government is the responsible authority for existing wind farm permits) and the industry as a whole. It might require some collaborative effort by operators to configure monitoring programs which can generate comparable and compatible datasets, in consultation with DELWP which should be the custodian of the consolidated database. I note that it is some fifteen years since the first Victorian wind farm commenced operations, and I understand that a wealth of data relevant to wind farm decision-making and wildlife management should have been collected at considerable expense by various wind farm operators.

The Inquiry refers to monitoring data from the relatively recently commissioned Macarthur wind farm, quoting bird-strike and bat-strike figures over the wind farm's first two years of operation. I note in particular the comment that some 30% of the native birds killed were raptors (birds of prey). Because of their ecological role, raptors generally comprise a much smaller proportion of the avifauna of any particular locality (cf Dundonnell, where raptors were reported to comprise 1.6% of the birds observed during the Bird Utilisation Survey⁶), so this figure may be of considerable conservation concern, but until it can be placed in context with the monitoring results from other operations it is not possible to determine whether the Macarthur results are representative or whether they may be indicative of particular circumstances applying at Macarthur but not elsewhere.

This is relevant to Dundonnell in particular because the Mt Fyans Wildlife Reserve is located entirely within and indeed quite close to the geographical centre of the Dundonnell wind farm. It appears that the Victorian Government acquired the land at Mt Fyans, and created the Wildlife Reserve, for the protection of breeding Peregrine Falcons, at a time (late 1970s - early 1980s) when that species was considered to be threatened. The Peregrine Falcon is now regarded as a "least concern" species in Victoria and Australia, although it remains an iconic species and is protected wildlife under the *Wildlife Act 1975*. Peregrine Falcons still occur at Mt Fyans, but the continued viability of the site for breeding is likely to be at risk if the wind farm development proceeds.

It is my Assessment that the potential impact on Peregrine Falcons or other wildlife species which occur in the Mt Fyans Wildlife Reserve should not prevent the wind farm development from proceeding. In this context I note that the Peregrine Falcon is not listed as threatened under relevant legislation, and it has not been suggested that other listed species occur at Mt Fyans or could be at risk from the wind farm development. However, **it is my assessment** that monitoring to determine not only whether Peregrine Falcons are killed by collisions with turbines but also to ascertain the ongoing presence or absence of Peregrine Falcons, and whether they continue to breed, within the Mt Fyans Wildlife Reserve, should be undertaken by the proponent under approvals conditions for the wind farm. This reflects the State Government's investment in the acquisition of the land comprising the reserve, and the general level of protection intended to be afforded to protected wildlife within a wildlife reserve under the *Wildlife Act 1975*.

4.1.4 Brolga

The Brolga is a species of crane endemic to the Australasian region and the only crane species occurring in southern Australia. A "south-eastern Australian" Brolga population of something less than a thousand birds, and apparently isolated from the much larger northern Australian population, occupies a distribution centred on western Victoria and extending into far south-eastern South Australia and the Riverina district of southern New South Wales. The status of the south-eastern Australian population is reflected by the listing of the Brolga as Threatened in Victoria under the FFG Act and as Vulnerable under the *Threatened Species Conservation Act 1995* (NSW). An Action Statement for the Brolga applies in Victoria under the FFG Act.

Many of the wind farms developed or proposed in Victoria are in the south-western part of the State, corresponding to the "core" range of the south-eastern Australian Brolga population. As a result, the Brolga Scientific Panel was convened, and in 2011 issued the Interim Brolga Guidelines (IBG) under the auspices of the Department of Sustainability and Environment (DSE; now DELWP). The version of the IBG currently applicable is revision 1, dated February 2012.

⁶ EES Vol. 1, p. 12-9

The IBG set out recommended turbine-free buffer distances to be maintained in the design of wind farms from known breeding sites (3.2 kilometres) and known flocking sites (5 kilometres), each with an additional 300 metres disturbance allowance. The IBG also provide for proponents to calculate alternative site-specific buffers, subject to the adopted methodology being acceptable to DELWP.

The proponent has adopted the latter approach for Dundonnell, which has many recorded breeding sites and traditional and non-traditional flocking sites within five kilometres of the wind farm boundary. The adopted approach relies on habitat mapping and anticipated habitat use by Brolga, based on the proponent's consultant's extensive observation of Brolga breeding and flocking behaviour at western Victorian sites. DELWP advised by letter dated 17 November 2015, following the conclusion of the Inquiry hearing, that the proponent's methodology and derived buffers were acceptable under the IBG⁷.

The Inquiry noted that the proponent tabled a revised WTG layout at the public hearings, removing eight WTGs from the south-western part of the site and relocating a further eight, to provide a turbine-free flight-path between wetlands adjacent to the wind farm boundaries which have been recognised as important flocking (non-breeding) habitat. The Inquiry recommended the removal of a further three WTGs in this area. The Inquiry also noted the identification of an additional breeding record at a wetland in the north-western part of the site (wetland 117), for which no turbine-free buffer had been proposed, and recommended that wetland 117 should be considered a breeding site and a turbine-free buffer applied, while noting the proponent's estimate that a further eight turbines could be lost to provide such a buffer.

The proponent's Brolga consultant noted that even with the application of buffers around recorded breeding and flocking sites there could still be flights across the wind farm by Brolgas which could lead to casualties, and provided collision risk modelling (CRM) which suggested that up to thirteen Brolgas could be killed over the nominal 25 year life of the wind farm (one bird lost per two years⁸). Under a population viability analysis (PVA), this loss was presented as acceptable, but to comply with the "no net adverse impact" principle underpinning the IBG, compensatory arrangements would be required to recruit up to an additional thirteen Brolgas into the population over that period.

The Inquiry also considered the risk of Brolga collisions with the transmission line. The transmission line passes through or close to several wetlands which serve as Brolga habitat.

Having regard to the extensive discussion of issues related to Brolgas in the EES, submissions, documents tabled at the Inquiry hearings and the Inquiry report, a number of matters emerge on which it is appropriate that this Assessment should make findings:

- Validity of the project-specific breeding and flocking site buffers adopted by the proponent;
- Validity of the CRM/ PVA approach adopted by the proponent;
- Whether wetland 117 should be buffered as a breeding wetland;
- Appropriateness of the wind farm layout changes proposed by the proponent during the Inquiry hearing;
- Appropriateness of the removal of further three turbines recommended by the Inquiry;
- Whether the transmission line should be diverted around wetland 612;
- What would comprise an adequate compensation package for Brolgas in response to the modelled residual collision risk;
- The implications of the Dundonnell wind farm proposal for cumulative impacts of the wind energy industry on the Victorian Brolga population.

4.1.4.1 Validity of the project-specific breeding and flocking site buffers adopted by the proponent

The IBG were prepared in the context of advice from acknowledged Brolga experts, but their interim nature reflects the limited empirical information available at the time relevant to potential interactions between Brolgas and the wind energy industry. A PhD study supported by funding from government and industry was commissioned with the objective of gathering definitive information about Brolga movements and use of habitat in the landscape. Progress of the study was delayed by several factors, but it is understood that the PhD thesis is to be submitted for examination during the first half of 2016. I note that the PhD student, Ms Inka Veltheim, made a written submission on the EES but did not appear at the public hearing.

I am satisfied that the IBG represent the most appropriate guidance for addressing issues associated with Brolgas arising from wind farm proposals in Victoria. I note that the IBG makes provision for adoption of project-specific buffers

⁷ See Inquiry report, Appendix D: Attachment 1 to DELWP letter of 17 November 2015.

⁸ EES Vol. 1, p. 13-11

in place of the default buffers, subject to DELWP's satisfaction⁹, and that DELWP has effectively given that in this case¹⁰. Accordingly, **it is my Assessment** that the adoption of the proponent's proposed project-specific buffers in this case is appropriate.

4.1.4.2 Validity of the CRM/ PVA approach adopted by the proponent

The IBG set out a three level methodology for assessment of likely impacts of a wind farm proposal on Brolgas. Level 3 assessment "comprises four steps to identify suitable mitigation measures for the proposed development to produce a zero net impact on the Victorian Brolga population". The four steps are:

1. Avoid or mitigate all potential impacts to Brolga breeding and flocking home ranges within the radius of investigation with turbine-free buffer areas.
2. Develop a site-specific collision risk model for Brolgas utilising or moving through the radius of investigation.
3. Use PVA to estimate the impact of the proposed development.
4. Identify appropriate compensation strategies to ensure a zero net impact on the Victorian Brolga population.

The application of CRM followed by PVA is therefore an intrinsic element of the process under the IBG. Accordingly, and in the absence of strong evidence that the methodologies used by the proponent were inappropriate, **it is my Assessment** that the outputs of the CRM and PVA should be accepted for the purpose of calculating offset obligations, subject to verification by monitoring. This can be addressed through planning permit conditions for the Project.

4.1.4.3 Whether wetland 117 should be buffered as a breeding wetland

Submissions considered by the Inquiry included a Brolga breeding record for wetland 117, located in the north-western corner of the wind farm. This record was collected by PhD student Inka Veltheim in 2010, but wetland 117 was not addressed as a breeding site in the EES and no turbine-free buffer was proposed. The Inquiry noted evidence that:

- the wetland has been the subject of drainage works which prevent it from functioning as a wetland in any but an exceptionally wet year;
- it is the intention of the landowner to improve the functionality of the drainage regime so the site is unlikely to function as a wetland in future; and
- provision of a turbine-free buffer for wetland 117 would result in the removal of a further eight WTGs (without identification of which WTGs would be lost).

The fact that the use of wetland 117 as a breeding site was not recognised during the preparation of the EES, and as a result the wind farm layout design did not provide for turbine-free buffers, is unfortunate. However, wetland 117 meets the definition of a breeding site under the IBG and therefore the IBG stipulate that it should be buffered. **It is my Assessment** that wetland 117 should be buffered as a breeding site and that the wind farm layout should be varied accordingly to provide a turbine-free buffer derived in accordance with the IBG, either by applying the default 3.2 km plus 300 metre buffer or by calculating a project-specific buffer consistent with the methodology applied for other breeding sites within the radius of investigation, subject to DELWP's approval of the application of the methodology for wetland 117.

I note with concern the stated intention of the landowner to enhance the drainage regime for wetland 117. Action Statement no. 119 for the Brolga under the FFG Act notes the apparently poor recruitment rate of the south-eastern Australian Brolga population (a factor which has been affirmed by subsequent studies, eg Herring 2004¹¹) as a matter of concern for the continued survival of the Brolga in Victoria. It also notes that the modification and disappearance of breeding wetlands impacts on recruitment. It would be inconsistent and contrary to the best interests of Brolga conservation in Victoria for the IBG to be applied to calculate a modelled loss of Brolgas over time due to collisions, and impose a compensatory regime for those anticipated losses, while allowing a known breeding site within the wind farm footprint to be lost due to land management practices.

Accordingly, **it is my Assessment** that wetland 117 must be maintained in at least its current condition in terms of drainage, and ultimately must be restored to a more natural wetting and drying regime for the life of the Project, and that a turbine-free buffer must be applied. I note that when the wetland has been restored, its improvement as potential future Brolga breeding habitat should be taken into account in the calculation of offset measures required for the wind farm.

⁹ Interim Brolga Guidelines (DSE, 2012), p. 8

¹⁰ See Inquiry Report, Appendix D: Attachment 1 to DELWP letter of 17 November 2015

¹¹ *Dancing Brolgas* by Matthew Herring, *Wingspan*, Vol. 14 No. 4, December 2004, pp. 20-21

If the proponent wishes to redesign the WTG layout in other parts of the wind farm to add WTGs to replace those lost in the provision of a turbine-free buffer for wetland 117, the proponent should provide supporting documentation demonstrating that the redesigned array will have no greater adverse impact on other environmental values (eg native vegetation) than the layout presented in the EES, and as modified in the revised plan tabled at the Inquiry public hearing.

4.1.4.4 Appropriateness of the wind farm layout changes proposed by the proponent during the Inquiry hearing

At the Inquiry public hearing, the proponent tabled a revised site layout comprising the removal of eight WTGs in the south-west corner of the wind farm, and the relocation of a further eight WTGs. The objective of the change was to reduce the potential impact on Brolgas moving between wetland 139 (immediately south of the wind farm site) and wetlands adjacent to the western boundary of the wind farm such as wetlands 113 and 585, following observation of flightpaths during the 2015 flocking season¹².

Brolga behaviour during the flocking (non-breeding season) generally involves birds congregating in the evening at a favoured roosting wetland ("flock roost site"), from which they fly out at dawn to forage¹³. While the IBG adopt a relatively simple model of non-breeding season movements, Ms Veltheim's submission advises that preliminary results from her PhD research cast light on a more complex pattern in the real world, including mid-flocking season movements of birds between discrete flocking sites. Several of the Brolgas fitted with transmitters as part of Ms Veltheim's study were recorded making flights across the wind farm site¹⁴.

Accordingly, the principle of avoiding placing WTGs within flightpaths likely to be used habitually by Brolgas in the light of empirical data is to be supported. At the same time, it is not practicable to design the wind farm to avoid all observed or recorded flights, noting that in any case most flights are unobserved and therefore avoiding observed flights will not necessarily avoid all actual flightpaths. Depending on circumstances, birds might choose to travel along any route through the site. In this context, it is noted that the IBG recognise and provide for some level of residual collision impact on Brolgas which may result from the operation of an individual wind farm, and for which compensatory measures must be implemented to achieve "a zero *net* impact on the Victorian Brolga population"¹⁵.

Therefore, **it is my Assessment** that the WTG layout in the south-west sector of the wind farm should be redesigned to provide for a turbine-free flightpath for Brolgas travelling generally along the north-west/ south-east route between wetlands to the immediate west and to the immediate south of the wind farm site. In particular, the removal of eight WTGs (T079, T089, T091, T092, T098, T099, T0102 and T0103) offered by the proponent at the inquiry public hearing is supported¹⁶.

The relocation of a further eight WTGs (T081, T084, T088, T090, T093, T095, T096 and T101) also offered by the proponent is likewise supported, while noting the Inquiry's comment that the points to which some of those WTGs are proposed to be relocated appear to be closer together than may be technically feasible for operational purposes. **It is my Assessment** that the final micro-siting of WTGs, including relocated WTGs, must not encroach into the turbine-free flightpath to the south and west of a line generally passing through T101 (relocated), T100, T096 (relocated), T090 (relocated), T088 (relocated), T081 (relocated) and T084 (relocated), as shown in Inquiry document 9, Fig. 2.2.

4.1.4.5 Appropriateness of the removal of further three turbines recommended by the Inquiry

I note that the Inquiry has also recommended the removal of WTGs T081, T084 (both proposed to be relocated but retained in the layout) and T073 to provide a greater buffer for wetland 585, which (along with wetlands 112 and 139) is identified as a "traditional flocking site" by the proponent's expert consultant investigations for the EES¹⁷. I note in this context that the Inquiry was concerned that clear mapping depicting the adopted turbine-free buffers for the seven non-breeding (flocking) sites located within five km of the wind farm site (given the default 5 km buffer for "flock roost sites" in the IBG) was not provided in the EES or until late in the public hearing process¹⁸. Therefore the application of the

¹² Inquiry Hearing documents 39, paragraph 102, and 62

¹³ IBG, pp. 5, 9

¹⁴ Submission no. 128 to the EES from Ms Inka Veltheim

¹⁵ IBG, p. 6

¹⁶ Inquiry hearing document 9

¹⁷ EES Volume 2 Annex M, Fig. 18

¹⁸ Inquiry hearing document 62

methodology adopted by the proponent for each of the relevant flocking sites was not transparent, although DELWP advised the Inquiry that it “has no concerns with the site-specific buffers proposed ... and considers the buffers ‘fit for purpose’”¹⁹. Relocated WTG T084 is the closest WTG to wetland 585 of the three WTGs recommended for removal by the Inquiry, being about 700 metres from the eastern shoreline of the wetland. I also note that the WTG is (narrowly) east of a straight line between the easternmost points of wetlands 585 and 139, which is the general line of movement the revised layout is intended to accommodate. The habitat to the east of relocated WTG T084 (which is the westernmost WTG of the wind farm) has generally been characterised as of limited value or appeal for Brolgas, and it is not anticipated that many flights would enter this area²⁰. Accordingly, while I appreciate the Inquiry’s intent to apply “an added level of conservatism”, I am not convinced that the removal of the three additional WTGs recommended by the Inquiry would deliver benefits for the Brolga which would counter-balance the impact on the economic performance of the wind farm. **It is my Assessment** that WTGs T081, T084 and T073, as shown in Inquiry document 9, Fig. 2.2, may be included in the wind farm layout to be approved, but any further micro-siting or layout redesign must maintain the turbine-free flightpath described above.

I note that a permanent monitoring mast is proposed to be located in the south-west corner of the wind farm site, adjacent to Woorndoo-Dundonnell Road. The mast might represent a more significant collision risk for Brolgas than any single WTG, due to its isolated location, relatively less robust appearance, lack of moving parts (at least of the scale of turbine blades) and the need for guy wires or similar features to support the mast. I understand that during the non-breeding season (bearing in mind that the proposed turbine-free flightpath is associated with non-breeding rather than breeding behaviour) it is common for Brolgas both to move out from the overnight roosting wetland to begin foraging before full daylight, and to return to roost after sundown²¹. In poor light a structure such as a monitoring mast might represent a serious collision risk. I note that the Inquiry has expressed concern about the collision risk associated with this mast and at least two of the other three permanent monitoring masts proposed to be constructed on the wind farm site. Therefore, **it is my Assessment** that the mast should be relocated to a site representing a lesser collision risk to Brolgas (to the east of the straight line between the easternmost points of wetlands 585 and 139). The mast and in particular supporting wires should also be clearly marked with appropriate products designed to improve its visibility to birds and substantially reduce the risk of collision (see also below). **It is my Assessment** that the three other proposed permanent monitoring masts should be marked in a similar manner.

Brolgas are known to be susceptible to collision with power transmission lines²². The nature of the export transmission line for the Dundonnell wind farm may be less likely to pose a collision risk for adult Brolgas than the higher voltage transmission lines which have been linked empirically with Brolga deaths. I note that the Inquiry has expressed particular concern about the portion of the export transmission line traversing the turbine-free flightpath across the south-western part of the wind farm site, and has supported marking of the powerline through this area. **It is my Assessment** that this recommendation is supported.

4.1.4.6 Whether the transmission line should be diverted around wetland 612

I note also that powerlines or other overhead infrastructure may affect the suitability of potential breeding sites for Brolgas. Such structures may represent a collision risk, in particular for juvenile birds with undeveloped flying skills around the time of departure from the breeding site²³. The powerline alignment presented in the EES passes over or very close to two wetlands identified in the EES as Brolga breeding sites (wetlands 145, south-west of Woorndoo-Darlington Road, and 612, east of Mortlake-Ararat Road) and close to other breeding sites (such as wetland 137 at the south end of Veals Lane). Given the residual risk which the overall wind farm development represents to Brolgas, which must be offset, it seems inappropriate for the Project to introduce further avoidable impacts on Brolgas. Accordingly, **it is my Assessment** that the transmission line should be aligned as necessary so as to avoid passing over either of wetlands 145 or 612, and that the powerline should be appropriately marked along any part of its length within three kilometres of any recorded Brolga breeding wetland.

¹⁹ See Inquiry Report, Appendix D: Attachment 1 to DELWP letter of 17 November 2015

²⁰ For example, see EES Vol. 1, p. 13-5

²¹ Marchant, S & P J Higgins, 1993, p. 475

²² For example, see Goldstraw, P W and P B du Guesclin, 1991

²³ Action Statement for Brolga, no. 119 under *Flora and Fauna Guarantee Act 1988*, DSE 2003

4.1.4.7 What would comprise an adequate compensation package for Brolgas in response to the modelled residual collision risk

I note that the IBG provides for potential residual impacts on Brolgas as a result of wind farm development, and addresses offset options in the context of a Level Three assessment, Step Four which is aimed at ensuring a zero net impact on the Victorian Brolga population. Offset options proposed in the IBG are reducing mortalities from powerline collisions and protection and enhancement of breeding sites. This Assessment includes recommendations above regarding specific actions to be taken in the design, approval and implementation of the Dundonnell wind farm to reduce its residual impact. However, it is accepted that, even after all practicable mitigation measures have been applied, the construction of a wind farm comprising nearly a hundred WTGs within the range of the Victorian Brolga population is likely to cause some level of Brolga casualties over its 25 year design life. The casualty predictions to which the offset plan must respond have been derived from CRM and PVA conducted in accordance with the IBG as advised by DELWP to the Inquiry.

Part of the challenge in achieving recruitment to the Brolga population to compensate for predicted losses will be around verifying recruitment gains and determining that the actions taken have delivered the required additional recruitment over the period. Recruitment (measured by the percentage of juvenile birds in non-breeding flocks) is commonly poor in Victoria (3-4% compared to 15% regularly recorded in northern Australia²⁴). While this might be influenced by the greater variability in breeding season conditions in southern Australia, especially with respect to the need for adequate autumn-winter rainfall to inundate seasonal wetlands favoured for breeding, it will be challenging both to achieve and to quantify population gains resulting from enhancement of breeding sites. The challenge is further complicated by the fact that young Brolgas generally do not begin to breed until at least three and more commonly four years old²⁵. The critical issue for securing the long-term future of the Victorian (south-east Australian) Brolga population is not just more chicks hatching and being fledged (although that is obviously vital), but those additional birds actively entering the breeding population in the future and replacing older birds over time.

An alternative option for offsetting, marking powerlines to reduce collision mortalities, might be able to achieve better quantifiable gains. Importantly, in the context of the mobility of the population, powerlines to be marked might be some distance from the wind farm for which offsets are being provided. In particular, high voltage long-distance powerlines may be likely to pose the most significant risk to Brolgas. I note that a substantial international literature exists regarding collisions of large birds, including other crane species, with transmission lines, and some comparative studies have quantified the mortality reduction achieved on a per kilometre basis by certain forms of marking²⁶. While such quantitative assessment would have to be calculated in the context of the size and relative sparseness of the Victorian Brolga population (relative to the bird populations investigated in published studies), effective powerline marking could provide significant benefit to the Brolga population by reducing a casualty risk that applies to birds already old enough to breed.

Accordingly, **it is my Assessment** that the project approvals should include conditions requiring the reduction of the residual risk to Brolgas by all reasonably practicable means consistent with the IBG and the formulation and implementation of an offset strategy which will ensure that the project has zero net impact on the Victorian Brolga population, in accordance with the IBG. The strategy should be broad-based and should be developed in consultation with appropriate ecological experts in DELWP and prepared to the satisfaction of the responsible authority. The strategy should include monitoring provisions aimed at determining as quantitatively as possible the effectiveness of the strategy and a review program (in the light of the design 25 year life of the wind farm) to enable the strategy to be refined adaptively as necessary on a regular basis, to the satisfaction of the responsible authority.

4.1.4.8 The implications of the Dundonnell wind farm proposal for cumulative impacts of the wind energy industry on the Victorian Brolga population

Brolgas in Victoria undertake seasonal movements between breeding and non-breeding ("flocking") sites, as well as a range of other movements. Seasonal movements may entail journey of many kilometres. While the IBG require each separate wind farm development to have no net impact on the Brolga population, the potential establishment of a number of adjacent wind farms could create a barrier effect which cannot be attributed to individual operations in any meaningful way.

²⁴ Herring, *ibid*

²⁵ Reardon, M, *Brolga Country*, p. 121

²⁶ For example, Hill et al, 2011.

The closest approved wind farm development to Dundonnell is the Salt Creek wind farm, located about 11 km to the west of Dundonnell. Salt Creek has not yet been constructed. While an optimum flightpath width for Brolgas between adjoining wind farms has not been quantified, I note that a minimum separation distance of 1340 metres has been recommended to avoid barrier effects on migrating Common Cranes, which occur in Europe²⁷. Therefore, in the context of existing approvals for other wind farms, **it is my Assessment** that the project is unlikely to contribute to a cumulative barrier effect for Brolgas.

4.1.4.9 Procedural matters

The Inquiry report expresses concern that the Environment arm of DELWP did not appear at the Inquiry public hearing or take part in or listen to the evidence which was given about Brolgas, which were a key issue for the Project, especially with regard to the interpretation and application of the Interim Brolga Guidelines. This Assessment does not respond directly to this concern, but notes that DELWP should consider and act on the comments as appropriate.

As a point of clarification, I note that notice issued under Section 8B (which applies section 8C) of the EE Act prevents decisions from being made under an Act or law in relation to a project that is subject to an EES, and therefore does not constraint the ability of an authority or agency to provide advice in relation to a policy, guideline or other documents that might be relevant to that EES process.

The IBG currently in effect are dated February 2012. As noted above, I understand that the South-West Victorian Brolga Study PhD thesis is likely to be submitted for examination during the first half of 2016. Once the thesis has been accepted, **it is my Assessment** that DELWP should facilitate the reconvening of the Brolga Scientific Panel as quickly as feasible, with a view to reviewing the IBG in the light of the study findings. Further, **it is my Assessment** that an open and transparent process should be adopted, recognising the high level of interest in the Brolga as an iconic “flagship” species, the extent of knowledge in the community and the reliance of Brolgas in Victoria in very large part on sympathetic management of private land.

4.1.5 Matters of National Environmental Significance

The listed threatened species and communities under the EPBC Act that could be significantly affected by the Project have been discussed in detail above. The Inquiry has addressed matters of national environmental significance (MNES) discretely in its report, with reference to its broader discussion of flora and fauna issues. Specific assessment conclusions with respect to each of the key matters of national environmental significance are presented below.

MNES	Inquiry findings and recommendations
Natural Temperate Grassland of the Victorian Volcanic Plain	0.666 ha to be removed for the main access track on the wind farm site. Up to 1.028 ha to be removed for the transmission line and associated access track. Removal minimized and acceptable subject to development of a Native Vegetation Management Plan and appropriate offsets.
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	Up to 2.056 ha to be removed for the transmission line and associated access track. Removal minimized and acceptable subject to development of a Native Vegetation Management Plan and appropriate offsets.
Winter-flowering flora species (Spiny Rice-flower, Basalt Rustyhood, Dense Greenhood, Leprechaun Greenhood)	Only Spiny Rice-flower detected. Strategy identified by proponent's consultant (proposed realignment of access track) to be investigated with a view to adoption.
Spring-flowering flora species (Adamson's Blown-grass, Button Wrinklewort, Clover Glycine, Fragrant Leek-orchid, Hoary Sunray, Spiny Peppergrass, Maroon Leek-orchid, Small Golden Moths)	Targeted seasonal surveys to be conducted and reported. Action acceptable subject to targeted surveys confirming that the species are not present.
Corangamite Water Skink	No significant impacts.
Growling Grass Frog	No significant impacts.
Striped Legless Lizard	No significant impacts; mitigation measures should be incorporated into environmental management plan.
Migratory birds (including Common Greenshank, Latham's Snipe)	Unlikely that the proposed wind farm will significantly affect any migratory species' populations.
Southern Bent-wing Bat	Low level of use of the site; the proposed wind farm does not represent a significant threat to the species.
Golden Sun Moth	All potential habitat on the wind farm site to be retained; no significant impacts.

Table 3: Relevant Matters of National Environmental Significance

²⁷ *Ibid.*

It is **my Assessment** that the proposed action (construction and operation of the proposed wind farm, transmission line and substation) in accordance with the EES (and as varied in proponent presentations at the Inquiry public hearing) will not result in unacceptable impacts on matters of MNES, subject to:

- avoidance of any additional impacts on threatened native vegetation resulting from the micro-siting of WTGs and transmission line poles;
- avoidance of direct impacts on Spiny Rice-flower plants by appropriate realignment of the transmission line access track;
- completion and reporting of results of targeted surveys for spring-flowering species which were not available for presentation in the EES or at the Inquiry public hearing, provided that those survey results confirm that there will be no impact on those species;
- development and implementation of an integrated offset strategy which meets both Commonwealth and Victorian policy requirements; and
- inclusion of appropriate measures for the protection of terrestrial fauna, especially amphibians, reptiles and mammals, in the construction environmental management plan, in particular with respect to rescue and salvage of animals which may be trapped in excavations left open overnight.

If the targeted surveys for spring-flowering flora species listed under the EPBC Act detect individuals or populations of those species, it is **my Assessment** that the survey results should be communicated to the Commonwealth Department of the Environment and the DELWP as a matter of urgency, and no works that might affect the detected plants should be undertaken until authoritative advice about the matter has been received from those authorities. In that context, I note that seven of the eight relevant species are also listed as threatened under the FFG Act.

4.1.6 Conclusion on biodiversity

Having regard to the EES, submissions and the Inquiry Report, it is **my Assessment** that with respect to biodiversity values the project can be developed and operated in an environmentally acceptable manner, subject to the variations and qualifications set out above. I note the need for appropriate environmental management plans and monitoring plans to be developed and anticipate that these can be provided for through planning permit conditions.

4.2 Landscape and geoscience values

Evaluation objective – *To avoid or minimise adverse effects on the landscape and geoscience values of the region.*

Key issues

The wind farm will comprise up to 96 turbines with a maximum tip height of 165 metres in a largely open landscape. The project also includes such potentially visible elements as monitoring masts, a quarry, the export transmission line and a substation near Mortlake. It will undoubtedly be visible for many kilometres, depending on the viewpoint and prevailing weather and light conditions.

The site is not within an area designated to be of special landscape significance under the Moyne Planning Scheme or any other relevant instrument.

The site is within the Victorian volcanic plain, and some submitters drew attention to its location within the Kanawinka Geopark. I note that Kanawinka Geopark website (www.kanawinkageopark.org.au) contains a notice stating that “The association Kanawinka Inc is in the process of being cancelled”, and neither Kanawinka nor indeed Australia appears on the list of members of the Global Geoparks Network (“under the umbrella of UNESCO”) at www.globalgeopark.org. Therefore it is not clear that the Kanawinka Geopark has any status or level of recognition relevant to environmental assessment or land use planning.

The proponent commissioned Dr Neville Rosengren to appraise the geoscience values of the site. Dr Rosengren’s recommendations, which are highly detailed and address individual geoscience sites within the wind farm site (although some are outside the current WTG array footprint) have been addressed in a general sense through the Environmental Management Framework for the project. Dr Rosengren’s recommendations may be particularly relevant to micro-siting of WTGs and to the relocation of WTGs to provide the turbine-free flightpath in the south-western part of the wind farm.

Discussion and findings

The Inquiry has concluded that the impacts of the project on landscape and geoscience values can be managed within acceptable limits, while noting the subjective nature of visual impact in terms of viewer perception and response. The Inquiry recommended that the full detail of Dr Rosengren's recommendations should be recovered and addressed through the environmental management regime for the project. I note that many of the features described in Dr Rosengren's report (EES Volume 2, Annex E) maps the significant geoscience sites in detail, and provides detailed and practical recommendations relevant to planning, design and construction of the wind farm. I also note that the wind farm layout presented in the EES avoids placing WTGs within features where Dr Rosengren has recommended that WTG construction should not occur. However, several geoscience sites are located in the western part of the wind farm, where WTG relocation is proposed or may be proposed in the future (for example if the WTG layout is proposed to be modified in order to provide a turbine-free buffer for wetland 117).

4.2.1 Conclusions on landscape and geoscience values

Having regard to the Inquiry's analysis, the EES and submissions, **it is my Assessment** that:

- The mitigated impacts of the project on landscape and geoscience values are environmentally acceptable, while noting that viewer associations and values will subjectively influence the way a new, visible landscape feature is perceived;
- The planning permit conditions for the project should ensure that Dr Rosengren's recommendations are given due weight in the project's environmental management framework, especially with regard to relocation of WTGs and associated infrastructure.

4.3 Land use and socio-economic

Evaluation objective – *To avoid or minimise disruption and other adverse effects on local infrastructure (including roads), land use (including agricultural and residential) and to neighbouring landowners and road users during construction and operation of the project.*

Key issues:

The key land use and socio-economic issues to be considered are whether:

- The Project will have overall economic benefits for the region and State (including employment, income, local/regional investment, royalties etc).
- The social benefits for the region outweigh any adverse effects on the local and regional communities.
- The Project will significantly impact traffic, road safety or road maintenance in the project area.

Discussion and findings

4.3.1 Economic issues

The EES estimated the project will make a significant net contribution of \$309 million to the Gross State Product over the three year construction period, and once operational it is estimated this figure will rise to \$12 million of value added per year. The Project will also make a significant economic contribution to the region and specifically to Moyne Shire. The Project would provide both direct and indirect employment opportunities: a combined total of approximately 300 positions at the construction phase and 16 positions at the operational phase. A significant number of non participant submitters in support of the proposed wind farm cited local job opportunities, and potential economic and community benefits with a flow on effect to local businesses in nearby towns as an important factor. Similarly, participating landholders acknowledged the benefits of an additional income stream to supplement farm revenue.

A neighbouring farming business raised its concern about the constraint that the development of a wind farm would have on aerial spraying as part of routine farming practice. The Inquiry accepted that concern but did not find it would create grounds for concluding that the wind farm footprint should be reduced or removed.

4.3.2 Community

The wind farm site is located on land primarily cleared for improved pasture, grazing and cropping. The study area for the socio-economic assessment includes the wind farm site, transmission line corridor and off site substation, and the study also considered the potential impacts of the project on the broader regional and local community.

The only community facility at Dundonnell is the local hall. A number of submitters in support of the wind farm identified the potential for the proponent to provide financial contributions to support the viability of local community infrastructure, sporting and community associations.

In contrast, some residents raised concerns of potential financial costs to the community and social fabric if residents or businesses relocated as a result of amenity impacts from the project.

4.3.3 Health impacts

A number of residents raised the potential for health impacts from vibration and infrasound caused by the wind farm operation. The *Wind farms sound and health: Technical information fact sheet*, Department of Health and Human Services May 2013 advises that "...infrasound from wind farms is at levels well below the hearing threshold and is therefore inaudible to neighbouring residents. There is no evidence that sound which is at inaudible levels can have an physiological effect on the human body. This is the case for sound at any frequency including infrasound." The Inquiry considered evidence and submissions on the matter and concluded that there is no health basis on which to refuse or modify the project.

4.3.4 Roads

The primary OD and construction access route to the wind farm site is proposed via Woorndoo-Streatham Road and Mortlake-Ararat Road (OD route 1). These rural roads currently support low levels of local traffic, including private vehicles, school buses, freight and agricultural machinery.

The existing condition of local roads and impacts on local traffic was raised by Moyne Shire Council as a key issue. Council supports transport route 1 as it would have the least impact on residents and local road infrastructure. However, due to the potential impact of increased traffic volumes and heavy vehicles, such as quarry excavation equipment on roads which are not fit for that purpose, the EES identifies the need for an upgrade prior to commencement of construction. These roads are narrow, 4m wide sealed roads, which are suitable for current volumes of 130 vehicle movements per day. The *Traffic Impact Assessment* prepared by Cardno for the proponent predicts traffic volumes of 190 vehicle movements per day during site establishment and 400 vehicle movements per day during construction, including heavy vehicles.

Material from the quarry excavation is required to construct internal roads and road access to the property entrance at Woorndoo-Streatham Road. The timing and logistics of this activity was raised as an issue by Moyne Shire Council.

The Inquiry noted that agreement between Moyne Shire Council and the proponent has been reached to construct the Woorndoo-Streatham Road to an agreed standard prior to commencement of the wind farm construction.

Moyne Shire Council requested a planning permit condition which empowers Council to endorse the Traffic Management Plan (TMP) in consultation with VicRoads and the Minister for Planning, six weeks prior to commencement of construction. Moyne Shire Council would be the responsible authority for enforcement of the TMP. Council has requested specific permit conditions relating to road upgrades and the appointment of a road quality auditor.

The Inquiry has addressed Traffic and transport as a discrete issue. The primary traffic impacts of the project are expected to accrue during the construction phase with the delivery of very large components of towers, turbines and blades to the site, along with construction materials. The inclusion of an on-site quarry in the project, while it will require delivery of quarry-related machinery during the establishment phase, should enable overall heavy vehicle movements on local roads to support construction of the wind farm to be reduced by up to 75%. Such a reduction is important in the context of the road management and maintenance issues which were cited by various parties in relation to the recent construction of the Macarthur wind farm, for which all building and construction materials were sourced from off-site.

The Inquiry supported the agreements reached between the proponent and Moyne Shire Council regarding Council having an approving role in the Traffic Management Plan, pre-construction of the Woorndoo-Streatham Road (while protecting remnant native vegetation in the road reserve) and appointment of a road quality auditor.

4.3.5 Quarry

As noted in section 2.2 above, a planning permit is not required for the quarry because it is being assessed through an EES. The decisions about issuing a work authority and approving a work plan for the quarry under the MRSD Act will be made after consideration of this Assessment. Therefore, it is appropriate that this Assessment specifically addresses the quarry, while noting that comments on the quarry are to be found in other relevant parts of this Assessment.

The purpose of the quarry is to supply requisite construction material from an on-site source, thereby reducing the need for heavy vehicle traffic on public roads to deliver those materials from off-site. This approach therefore offers considerable advantages from the perspectives of public road users and road management authorities and is to be supported.

I note that the selected quarry pit sites avoid areas of high biodiversity, geomorphological or heritage significance. I note that the Inquiry has recommended that the water storage facility for the quarry should be designed to minimise its potential attraction to birds, in accordance with the proponent's consultant's recommendations. **It is my Assessment** that this recommendation is supported and should be addressed in the approved quarry work plan.

I note also that the quarry pit design presented in the EES maintains the floors of both pits above the regional water table, which is important for the continued function of local aquifers, bores and springs. **It is my Assessment** that the approved quarry work plan should demonstrate that the regional water table will not be intercepted by quarry works.

The Inquiry has recommended that the water storage dam should be designed and maintained so as to limit its attractiveness as habitat for Brolgas or other waterbirds. **It is my Assessment** that this recommendation is supported.

4.3.6 Fire

Although the Project site is not covered by the Wildfire Management Overlay, it is declared within an area declared to be "bushfire-prone" under the *Building Regulations 2006*. While the presence of WTGs will affect the deployment of fire-fighting aircraft in the vicinity of the wind farm, this will be offset by the provision of a constructed access track network through the site, much of which would not currently be as readily accessible by fire-fighting vehicles.

Appropriate fire prevention measures will be needed as part of the construction environmental management plan, as the construction phase is the period when activities associated with the development may be more likely to increase the risk of bushfire ignition. I note that the Inquiry has concluded that measures are available to mitigate that risk to a satisfactory degree.

4.3.7 Conclusion on land use and socio-economic issues

Having regard to the Inquiry Report, EES and submissions, **it is my Assessment** that:

- The general social and economic effects of the Project are likely to be beneficial, while noting that individual community members will form views about the desirability of the Project based on their respective values and perspectives;
- Both national and State health authorities have concluded that evidence does not support the view that direct health effects accrue from wind farm operations;
- In the context that under current State policy wind farm proponents must obtain written consent from non-participating residents whose homes are within one kilometre of a proposed WTG, the wind farm layout provides for a buffer of greater than 2 km between the nearest non-participating dwelling and the nearest WTGs;
- The inclusion of an on-site quarry will substantially reduce the potential effects of the Project on the condition and maintenance needs of the public road network;
- The agreements noted by the Inquiry between the proponent and Moyne Shire Council to protect the interests of Council and rate-payers with respect to roads can be appropriately reflected in approvals conditions;
- The approved work plan for the quarry as proposed in the EES can be used to apply necessary controls which will minimise the risk of adverse environmental effects; and
- Appropriate fire prevention measures should be provided for through the construction environmental management plan.

Accordingly, it is my intention in due course to issue permits with conditions reflecting the above conclusions.

4.4 Amenity

Evaluation objective – *To avoid or minimise adverse noise, visual and other amenity effects on nearby residents and local communities, to the extent practicable.*

Key issues

The key issues related to amenity relate to effects arising from visual impacts, traffic, noise, vibration and air quality.

Discussion and findings

Visual impacts have been addressed under section 4.2 above. The Civil Aviation Safety Authority (CASA) has indicated that 48 of the 96 WTGs included in the revised layout tabled at the Inquiry hearing be fitted with red lights at night. The visual impact of the Project would be significantly increased if a requirement to fit lights to WTGs for civil aviation safety reasons is applied. I also note that the assessment on this matter conducted for the EES did not conclude that lighting would be required. The Inquiry noted expert advice that CASA does not have the regulatory power to require lighting and expressed concern about the ongoing uncertainty regarding the lighting of WTGs for aviation safety reasons. The Inquiry also noted the substantially greater visual intrusion that lit WTGs would make at night. Consequently, the Inquiry concluded that aviation safety lighting should not be required. Given this, **it is my Assessment** that night lighting is not required.

The requirement to provide visual marking of monitoring mast guys and powerlines to mitigate potential collision impacts on Brolgas will lead to those elements of the project being more conspicuous than they would otherwise be. However, the most visually intrusive components of any wind farm proposal are the WTGs themselves. I have concluded that the mitigated impacts of the Project on landscape values will be acceptable, and the greater visibility of the visually marked Project components does not materially affect that finding, including with respect to amenity.

The nature of the Project is such that amenity-related effects will occur during construction, including increased traffic, especially heavy vehicles, on the local road network. There will also be construction noise and possibly some air quality impacts resulting from construction activities. Installation of tower footings in particular might lead to some vibration effects, depending on the construction methods used.

Common amenity-related effects resulting from quarrying include dust, noise and vibration, primarily from blasting.

I note that the Project site is relatively well buffered from nearby residences, which are sparsely distributed in a rural pastoral landscape. The quarry will operate with a separation distance from residences considerably larger than the 500 metres recommended by the Environment Protection Authority (EPA). I note also that the establishment and operation of the quarry must take place in line with a work authority and an approved work plan under the MRSD Act.

The effects of traffic on the structural integrity of public roads has been addressed in section 4.3 above. While a substantial increase in traffic, especially heavy vehicles, can be expected over the duration of the construction phase, I note that this will be in the context of structural upgrades to certain roads and to traffic, including construction traffic, being within the capacity of the road system. I note that some temporary traffic measures may be required for delivery of particular over-dimensional loads, which may cause some inconvenience to local road users. An adequate and effective communication program conducted by the wind farm developer should at least enable the local community to plan travels with regard to potential delays attributable to the project.

Operational noise from WTGs may be annoying to some people in certain circumstances. In the case of Dundonnell, I note that the closest non-participating dwelling is more than two km from the nearest WTGs, whereas under current planning policy written permission from non-participating residents is required only where those dwellings are less than one km from the nearest WTG. I have dealt with the difficult issue of noise-related health effects from wind farms in section 4.3 above. With regard to amenity, I am satisfied that the available separation distances and good construction and operational practice should mitigate effectively against adverse impacts on neighbouring residents.

4.4.1 Conclusions on amenity

In light of the EES, submissions and the Inquiry Report, **it is my Assessment** that:

- Amenity-related effects on traffic should be manageable and acceptable, while noting the need for the proponent to be proactive in keeping the local community informed about specific potential disruptions;
- The visual effects of the Project are acceptable, while recognising that the developed wind farm will be visible for considerable distances;

- Lighting of WTGs for aviation safety reasons, while recommended by CASA, would make the wind farm more visually intrusive at night and should only be required where a clear safety benefit would result;
- Visual marking of specific components of the project to mitigate potential biodiversity impacts, as recommended under section 4.1 above, will not significantly increase the amenity-related visual effects of the Project;
- Noise, vibration and air quality effects associated with the construction phase of the Project, including the establishment and operation of the quarry, should be readily manageable within acceptable limits. In particular, **it is my Assessment** that the approved work plan for the quarry should specify operational performance requirements consistent with established standards that will protect the amenity of neighbouring residents.

4.5 Cultural heritage

Evaluation objective - *To avoid or minimise adverse effects on Aboriginal and historic cultural heritage and associated values.*

Key issues

The key issue to be considered for this section is whether the Project would have a significant effect on Aboriginal or historic cultural heritage sites and values.

Aboriginal cultural heritage values are protected under the AH Act, which sets out requirements for CHMPs. The Act provides that a CHMP must be prepared for any project for which an EES is required, irrespective of other triggers. In the case of Dundonnell, two draft CHMPs have been prepared, one for the wind farm development, including the quarry, and one for the transmission line, including the off-site substation. As no RAP has been appointed for the subject area, the role of approving the CHMPs reverts to the OAAV.

Historic heritage values are protected under the *Heritage Act 1995*, which provides for the registration of significant heritage values through the Victorian Heritage Register and the Heritage Inventory. More local heritage values may also be acknowledged and protected through the application of the Heritage Overlay in the relevant planning scheme. The historic heritage values identified in relation to the Project are addressed through the Heritage Inventory.

Discussion and findings

4.5.1 Aboriginal cultural heritage

Desktop and field investigations identified six Aboriginal cultural heritage places on the wind farm site and four sites of moderate archaeological potential along the transmission line route. Three places on the Victorian Aboriginal Heritage Register (VAHR) with locations within the wind farm site could not be found; however the recorded locations for those sites are well away from proposed wind farm infrastructure and as a result they will not be affected. Two of the other three sites, both artefact scatters, will be affected and the proposed management is to salvage the artefacts. Both sites are considered to be of low scientific significance²⁸.

Measures to manage the values of all six sites will be set out in the final CHMPs.

In addition to management of known Aboriginal cultural heritage, the draft CHMPs include contingency procedures for finds of previously unknown Aboriginal cultural heritage. The Inquiry has noted that the layout of the wind farm, with works generally located within the higher parts of the site away from areas likely to be of greater Aboriginal archaeological sensitivity, reduces the risk that previously unknown Aboriginal cultural heritage values will be affected. However, the process of "micrositing", whereby the exact footing locations for WTGs are chosen, generally consistent with the indicative layout and in the context of local ground conditions, will necessitate further site-specific investigations to confirm whether as yet unknown Aboriginal cultural heritage values may be affected.

I note that no other Victorian approvals for the project may be granted before the required CHMPs for the project have been approved by OAAV. I also note that OAAV routinely consults relevant Aboriginal community interest groups when dealing with CHMPs for which no RAP has been appointed.

I understand that additional Aboriginal cultural heritage surveys were undertaken on the wind farm site following the Inquiry hearing. These surveys included the revised locations for wind energy turbines, which had been presented to the

²⁸ Scientific significance is assessed using standard criteria

Inquiry. The outcomes of the surveys have informed revisions to the draft CHMPs, which were exhibited with the EES. Further detailed provisions regarding investigations, mitigation and management measures are recommended²⁹.

4.5.2 Historic cultural heritage

Desktop and field surveys identified one Heritage inventory site, the Fasham House Complex, plus possibly various dry stone walls as historic cultural heritage sites in the impact areas. Consent under the Heritage Act is required for works affecting the Heritage Inventory-listed Fasham House Complex. The proponent's field surveys also led to several other sites, which will not be affected by project works, being added to the Heritage Inventory. I note that many stretches of dry stone walls in various conditions of repair feature across the wind farm site. In that context, I note that the mitigation measures for dry stone walls in the EES have generally been endorsed by the Inquiry, which however noted that demolition of dry stone walls for any purpose other than installing a gate may trigger a requirement for a further planning permit.

4.5.3 Conclusions

In the light of the EES, submissions and the Inquiry report, **it is my Assessment** that:

- The draft CHMPs (as modified during the EES process) represent an appropriate basis for final CHMPs to be approved by OAAV, in the light of consultation with groups representative of relevant Aboriginal traditional owners;
- It would be appropriate for Heritage Victoria to grant consent under the Heritage Act for works affecting the Fasham House Complex, in accordance with normal practice for Heritage Inventory-listed sites
- Other likely effects on historic cultural heritage are low and able to be managed appropriately, with particular attention to minimising adverse effects on dry stone walls, especially substantially intact examples.

4.6 Catchment values

Evaluation objective – *To maintain the functions and values of aquatic environments, surface water and groundwater, including avoiding effects on hydrology and protected beneficial uses.*

Key issues

Submissions on the EES raised issues regarding potential impacts the development of the Project would have on surface water, and the possible effects resulting from establishment and operation of the quarry on the water table, with regard to the regional groundwater resource. Site management to protect water values was also raised.

Discussion and findings

The project will require earthworks across a large area during construction to establish the access road and track network, to construct footings for the WTGs and to establish and operate the quarry. Most of the operational water requirements for the construction phase are proposed to be sourced from groundwater, with the remainder to be harvested from surface water on the Project site.

I note that none of the wind farm, quarry or other works on the wind farm site will affect land within 20 m of a designated waterway. As a result, none of those works will require a licence under the *Water Act 1989* from the Glenelg Hopkins Catchment Management Authority (GHCMA). However, the transmission line route traverses several designated waterways, and works including for the access and maintenance track will be required within 20 m of some of those waterways.

Extraction of groundwater to supply water needs for the Project will require approval from Southern Rural Water (SRW). While the proponent will need to supply information additional to that provided in the EES to support an application, the available information does not suggest it is unlikely that the proponent could satisfy SRW's normal requirements with respect to such an application. I note in particular that the quarry design is not intended to penetrate the water table. I note also that the Inquiry has made detailed recommendations about conditions to be applied to any approval for groundwater extraction.

²⁹ EES p. 17-10

Given the extraction of groundwater is a key element of the implementation of the Project, it would have been preferable for the EES package to have contained all the information necessary to support an application for statutory approval of that Project aspect. However, on the evidence available there are no grounds for a finding that significant impact on groundwater is likely or that the normal requirements for such an approval under the *Water Act 1989* could not be satisfied.

I note that by their nature quarry pits can capture water whether from seepage through the walls or from run-off, which could serve to attract birds if not appropriately managed. An efficient system for transferring water collecting in the quarry pits to an appropriately designed storage dam (see section 4.3.5 above) will be needed to reduce the risk of attracting waterbirds into the area where they would be at risk of collision with WTGs or other wind farm infrastructure.

An appropriate environmental management regime will be required to ensure that risks to surface water and groundwater quality arising from Project works and operation will not lead to unacceptable adverse effects. I expect that standard measures consistent with good environmental management practice should ensure an acceptable outcome over the life of the Project, and in particular during the construction phase.

4.6.1 Conclusions on catchment values

In the light of the EES, submissions and the Inquiry report, it is my **Assessment** that:

- It would be appropriate for the GHCA to grant a licence for works on waterways under the Water Act for transmission line works within 20 m of designated waterways, with appropriate conditions to minimise the extent of works (including micrositing of transmission line poles more than 20 m from designated waterways wherever practicable), prevent erosion and protect waterway health;
- It may be appropriate for SRW to grant approval for groundwater extraction as proposed in the EES, subject to both the further information to be provided by the proponent and conditions consistent with those recommended by the Inquiry to protect beneficial uses and other users of the local groundwater resource.
- The environmental management framework (EMF) for the Project should address ongoing water quality management requirements arising from the construction and operation of the Project.

4.7 Environmental Management Framework

Evaluation objective – *To provide a transparent framework with clear accountabilities for managing environmental effects and hazards associated with construction, operation, decommissioning and rehabilitation phases of the project, in order to achieve acceptable environmental outcomes.*

Key issues

The extent to which the Project causes adverse impacts on the environment will be influenced not only by the terms in which required approvals may be granted, but also by the proponent's rigorous and integrated management of potential environmental effects under an environmental management framework (EMF). The EMF should cover all relevant elements and phases of project implementation.

Discussion and findings

The Project requires statutory approvals under several legislative heads of power. It would be preferable for all approvals to reference the same EMF to ensure fully integrated management of environmental effects in accordance with the various environmental standards that apply.

I note that, as is commonly the case for large-scale development projects, some of the detail about how particular issues will be managed has not yet been determined, with such detail to be encompassed in a range of "secondary consent" documents to be prepared to the satisfaction of relevant authorities. **It is my Assessment** that this is an appropriate approach, but I call all such authorities' attention to this Assessment to the extent that it may be relevant to their consideration of satisfaction for any documents submitted under the terms of approvals conditions.

The EMF may provide for particular plans to be prepared and implemented, related either to specific issues such as offsetting of native vegetation to be cleared, or to particular phases of the Project such as construction. The EMF should also include provisions for monitoring of relevant effects, for the reporting of monitoring results and for contingency plans to address adverse monitoring findings which might be foreseeable even if not expected.

I note that the EMF presented in the EES, while addressing potential impacts associated with the construction and operational phases in detail, does not address decommissioning or rehabilitation. However, I am satisfied that such phases will occur sufficiently far into the future that it is not necessary for the EMF to be put in place now to address them.

4.7.1 Conclusions on EMF

It is my Assessment that the EMF outlined in the EES provides a sound basis for a final EMF, with certain elements to be specified as secondary consents under conditions of relevant approvals, and subject to the specific recommendations elsewhere in this Assessment.

4.8 Sustainable development

Evaluation objective – Overall, to ensure that the Dundonnell Wind Farm Project achieves a balance of economic, environmental and social outcomes that contributes to ecologically sustainable development and provides a net community benefit over the short and longer-term.

Key issues

It is common for projects being assessed under the EE Act to be found to have both positive and negative effects. The assessment process seeks to find ways of evaluating those different effects, often across a very diverse range of biophysical, social and economic values, so as to arrive at a conclusion on the net community benefit of the project in question.

As the foregoing discussion of issues confirms, the Dundonnell wind farm Project will have adverse impacts on biodiversity values, including threatened ecological communities and species. It may also have impacts on the environment in terms of landscape, heritage, traffic and economic dimensions.

Discussion and findings

The Project will have a range of impacts on ecological values, especially native vegetation, Brolgas and “least concern” bird and bat species. Effects on native vegetation and Brolgas can be offset in accordance with existing policy guidelines and those measures can be given statutory effect through approvals conditions. Other effects on ecological values can be mitigated to a degree consistent with policy. A monitoring program can be implemented to provide quantitative data to enable the actual effects of the Project to be understood, and to contribute to a broader understanding of the extent, if any, to which the wind energy industry in Victoria constitutes a general risk for particular biodiversity values.

The Project's effects on surface water and groundwater and on Aboriginal and historic cultural heritage can be regulated through relevant statutory approvals. Those effects are considered to be insignificant in the context of the overall sustainability of the Project.

The Project will be highly visible in the sense that project structures, especially WTGs, will be visible for a considerable distance and will constitute a new element in the local and regional landscape. However, the extent to which that impact is positive or negative is highly subjective, and influenced by the values and perspectives of viewers.

The Project represents substantial economic investment in the region and will provide economic benefits, in particular through the creation of employment, especially during the construction phase. While some adverse economic effects might occur, I accept the Inquiry's view that the Project will make a strong positive economic contribution to the region.

Importantly, the Project represents a major investment in renewable energy, which should be considered in the context of its contribution to meeting policy objectives about renewable energy generation and reduction of greenhouse gas emissions. The implication of increased greenhouse gas emissions in climate change means that projects providing for the generation of renewable energy may be seen as part of a multi-faceted climate change response package. This Assessment notes that one of the species of key biodiversity interest with regard to the project, the Brolga, may be at risk from climate change in the future due to predicted reductions in rainfall and run-off which may reduce the availability and suitability of wetlands, especially for breeding, across the range of the Victorian population.

4.8.1 Conclusion on sustainable development

In summary, this Assessment has identified the following key biophysical and socio-economic outcomes:

- The Project will have impacts on biodiversity values, especially threatened species and ecological communities, which are considered to be acceptable subject to appropriate mitigation and offset measures addressed earlier in this Assessment;
- The Project will have impacts on social values, in particular heritage, landscape and amenity, which are considered to be manageable to an acceptable degree;
- The Project will have a strongly positive economic effect at a regional scale, with potential adverse effects such as impacts on the public road network able to be managed through proponent contributions to road upgrades and maintenance; and
- The Project will make a positive contribution towards the achievement of policy objectives directed at combatting climate change.

4.9 Overall Conclusions

Having regard to the EES, the Inquiry Report and matters raised in submissions, **it is my overall assessment** that:

- In relation to both the relevant legislation and policy framework and the Project's overall benefits, the Dundonnell Wind Farm Project can be delivered so as to provide a net community benefit and an ecologically sustainable outcome;
- Approvals which are required for the Project to proceed, including those required under the EPBC Act, the AH Act, the P&E Act, the MRSD Act and the Water Act, may be granted with appropriate conditions to control the potential adverse effects within acceptable limits;
- The detailed framing of approvals conditions should have regard to the specific findings and recommendations included within this Assessment, including this Assessment's response to the specific Recommendations of the Inquiry (see Section 5 below), which should be read as relevant in the context of the Report of the Inquiry.



RICHARD WYNNE MP
Minister for Planning

- 7 FEB 2016

5 RESPONSE TO INQUIRY RECOMMENDATIONS

Table 2. Inquiry's recommendations (in the left column) and the Minister for Planning's general response to the recommendations (in the right column), together with any relevant references to findings within sections of this Assessment.

INQUIRY RECOMMENDATION		RESPONSE
1.	The environment effects of the Dundonnell Wind Farm project can be managed to an acceptable level and the relevant project approvals should be granted subject to the recommendations in this report.	Agreed, subject to the specific qualifications and variations included below and in the body of this Assessment.
Biodiversity		
2.	The Department of Environment, Land, Water and Planning establish a region-wide biodiversity monitoring program for threatened bird and bat species that are known to be susceptible to colliding with wind turbine blades, and publicly report on the results.	Agreed in principle, subject to determining the utility of a region wide monitoring program and noting the need for cooperation by other relevant parties to enable collection and collation of data.
3.	Include a new mitigation measure (in Table 25-8 or 25-9 of the Environment Effects Statement) that ensures the water storage dam, if one is needed, will be designed with advice from an ecologist to minimise its attractiveness to waterbirds.	Agreed. This matter should be addressed through the EMF, and might also be addressed in the quarry work plan under the MRSD Act.
4.	The project be modified in accordance with Figure 2-3 – Indicative Alternate Site Layout Plan and modified further to show: <ul style="list-style-type: none"> • The removal of turbines T073, T081 and T084 • A breeding site turbine free buffer applied to wetland 117 in accordance with the Brett Lane and Associates methodology. 	Accepted in part. The removal of WTGs T073, T081 and T084 is not supported. The proposed permanent wind monitoring mast from the south-west corner of the windfarm should be relocated to a point outside the turbine-free flightpath between wetlands 585 and 139. The application of a breeding site turbine-free buffer for wetland 117 is supported, in accordance with the IBG default buffer or the methodology applied to derive site-specific buffers for the rest of the project, subject to DELWP agreement. Any relocation of turbines within the remainder of the wind farm footprint should be conducted so as to avoid any additional adverse effects, in particular with respect to biodiversity, relative to those of the wind farm layout in the exhibited EES.
5.	The full extent of home ranges for the five breeding sites within 3.2 kilometres and the seven non-breeding sites within 5 kilometres of the wind farm site be mapped clearly showing the turbine free areas and made publicly available through the project website.	Agreed. However, the published mapping need not identify the breeding and flock roost sites as points within the turbine-free home ranges.

INQUIRY RECOMMENDATION		RESPONSE
6.	The Department of Environment, Land, Water and Planning coordinate a regional response to Brolga habitat planning, restoration and management to ensure the species survival in Victoria, including the coordinated mapping of Brolga turbine free buffer areas.	Agreed in principle, noting that the Action Statement for the Brolga under the FFG Act already outlines a regional response to Brolga habitat planning.
7.	Adopt the alternative transmission line layout (Proposed transmission line layout comparison plan dated 16 October 2015) in the vicinity of Boonerah Estate Road to minimise the removal of mature River Red Gums.	Agreed. Note that this Assessment also recommends a change to the transmission line alignment to avoid passing through wetland 612 near the corner of Mortlake-Ararat Road and North Station North Road.
8.	The strategy to avoid the Spiny Rice-flower population as described on Page 2 of the BL&A letter dated 16 October 2015 (Attachment to Document 61) be investigated with a view to adoption.	Agreed.
Geoscience		
9.	Include specific reference to the specific findings and recommendations in Section 7.1.1 – 7.1.26 of the report Proposed Dundonnell Wind Farm Geoscience Features of Significance and Sensitivity Assessment August 2014 and the correspondence dated 30 September 2015 (Document 14 in the hearing) in the mitigation measures in Table 25-4 of the Environmental Management Framework.	Agreed.
Noise and Air Emissions		
10.	Include the requirement for a Construction Noise Management Plan in the planning permit conditions for the wind farm.	Noted. There may be appropriate alternative ways of addressing construction noise within the context of the EMF.
11.	That when the final turbine model is selected noise predictions be repeated using data specific to that model to assess any change in noise sensitive locations.	Agreed.
12.	That the Work Plan include an assessment of air emissions for quarry operations under EPA Publication 1191 <i>A Protocol for Environmental Management for the Mining and Extractive Industry</i> .	Agreed, noting that the Project quarry would warrant assessment at Level 3 at highest under the Protocol.
Surface Water and Groundwater		
13.	That the Glenelg Hopkins Catchment Management Authority consider the following when issuing permits for works on waterways: <ul style="list-style-type: none"> • Include conditions to ensure the protection of wetland and waterway habitat within and adjacent to the wind farm site. • Include conditions to ensure the protection of wetlands and waterway habitat within and 	Agreed.

INQUIRY RECOMMENDATION		RESPONSE
	adjacent to the transmission line route.	
14.	<p>In considering an application for the extraction of groundwater, Southern Rural Water, should develop conditions that:</p> <ul style="list-style-type: none"> • Ensure the protection of spring discharges and their contribution to groundwater dependent ecosystems in and adjacent to the wind farm site. • Ensure that existing registered groundwater supply bores are not impacted by groundwater abstraction by the proposed wind farm project. • Require the establishment of an appropriate monitoring program for both existing groundwater supply bores and groundwater dependent ecosystems and develop thresholds to provide early warning of incipient impacts. • Require the establishment of a contingency plan and mitigation measures to limit potential impacts on other groundwater users and groundwater dependent ecosystems. 	Agreed.
Fire		
15.	Include the additional consultation and fire planning measures recommend in paragraph 4.4 of the expert witness statement of Mr John Nicholson dated 23 September 2015 in the development of the Fire Prevention and Emergency Response Plan for the project.	Agreed in principle.
Planning Permit Applications		
16.	Issue planning permit 2015/23858 for the Dundonnell Wind energy facility subject to the application of permit conditions as shown in Appendix E of the Inquiry Report.	Agreed, subject to the prior approval of the required CHMP under the AH Act and subject to variations to the conditions reflecting the points where this Assessment has departed from the specific findings and recommendation of the Inquiry.
17.	Issue planning permit PL 15/075 for the Dundonnell Wind Farm transmission line subject to the application of permit conditions as shown in Appendix E of the Inquiry Report.	Agreed, subject to the prior approval of the required CHMP under the AH Act and subject to variations to the conditions reflecting the points where this Assessment has departed from the specific findings and recommendation of the Inquiry, in particular the variation to the transmission line route to avoid crossing wetland 612.
18.	Issue planning permit PL 15/074 for the Dundonnell Wind Farm off-site substation subject to the application of permit conditions as shown in Appendix E of the Inquiry Report.	Agreed, subject to the prior approval of the required CHMP under the AH Act and subject to variations to the conditions reflecting the points where

INQUIRY RECOMMENDATION	RESPONSE
	this Assessment has departed from the specific findings and recommendation of the Inquiry.

Appendix A

References

As is normally the case for Minister's Assessments under the EE Act, this Assessment draws heavily on the exhibited EES and on the report of the Inquiry. In addition, the following published references were consulted to provide an authoritative basis for particular elements of the Assessment, especially with regard to Brolga issues.

Department of Sustainability and Environment (2003). *Action Statement No. 119, Flora and Fauna Guarantee Act 1988 for the Brolga *Grus rubicunda**. Department of Sustainability and Environment, East Melbourne.

Department of Sustainability and Environment (2012). *Interim guidelines for the Assessment, Avoidance, Mitigation and Offsetting of Potential Wind Farm Impacts on the Victorian Brolga Population 2011: Revision 1* February 2012. Department of Sustainability and Environment, Melbourne.

Goldstraw, P W and P B du Guesclin (1991). *Bird casualties from collisions with a 500 kv transmission line in southwestern Victoria, Australia*. In: *Proceedings from the 1987 International Crane Workshop*, pp. 219-224.

Herring, M (2004). *Dancing Brolgas*. *Wingspan*, Volume 14, No. 4, pp. 20-21.

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Marchant, S & P J Higgins (1993). *Handbook of Australian, New Zealand and Antarctic Birds, Volume 2: Raptors to Lapwings*. Oxford University Press, Melbourne.

Reardon, M (2007). *Brolga Country*, Allen & Unwin, Crows Nest, NSW.

Sheldon, R, 2004: *Characterisation and modelling of Brolga (*Grus rubicundus*) flocking habitat in south-western Victoria*. Bachelor of Applied Science Honours Thesis, School of Science and Engineering, University of Ballarat.