

Table 36: Brolga movement rates at different distances from their breeding site

Distance	Number*	Percentage	Movements /hour	No. of flights per 12 hour day
0 - 99	19	43.2	0.06	0.73
100 - 199	4	9.1	0.01	0.16
200 - 399	1	2.3	0.00	0.04
400 - 799	9	20.4	0.03	0.35
800 - 1599	5	11.4	0.02	0.19
1600 - 3200	6	13.6	0.02	0.23
Total	44	100.0	0.14	1.69

Notes: * recorded during observation period

Taking the movement rates from Table 36 and applying them to the breeding sites in Table 35 (i.e. sites monitored within three kilometres of the proposed wind farm site), the number of likely movements of Brolgas over the proposed Stockyard Hill Wind Farm site can be estimated over a 130 day Brolga breeding cycle, allowing for the distance of the breeding site from the edge of the wind farm. This is provided in Table 37. This table shows the estimated number of flights at all heights over the wind farm site by breeding Brolgas during a breeding season, as well as the number of flights at rotor swept area (RSA) height during the same period.

Table 37: Number of estimated flights over the wind farm site by breeding Brolgas

Distance Range (m)	Number of Flights (130 days)			Sum
	800	1500	3000	
Distance to edge*→				
0 - 99	0	0	0	0
100 - 199	0	0	0	0
200 - 399	0	0	0	0
400 - 799	45	0	0	45
800 - 1599	25	25	0	50
1600 - 3200	30	30	30	90
Total	100	55	30	185
Percentage of flights	54.1	29.7	16.2	

Notes: * = the distance away of the three breeding sites within 3 kilometres of the edge of the proposed wind farm; # = based on 2.5% of flights being above 39 metres, i.e. at rotor swept area (RSA) height.

Based on this analysis, 185 Brolga flights per breeding season would pass across that portion of the proposed wind farm site within 3 kilometres of the most recently used breeding sites (i.e. 2007).

A total of 18 breeding pairs were found in the region in 2007, whereas the 58 birds at the flocking site could represent up to 29 breeding pairs, or ten more breeding pairs in the region than were found. These may have been missed due to private land access difficulties. To overcome the limitation of not visiting all wetlands in the survey area in 2007 due to selective access to private land, a targeted survey within 3 kilometres of the wind farm was initiated in August 2008. This found that 18 out of the 89 wetlands within 3 kilometres of the wind farm site had potential to support a breeding pair of Brolgas,

based on their current habitat quality. Eleven Brolgas were seen on these wetlands in 2008, although none were breeding, as wetlands held limited amounts of water.

Approximately 7% of wetlands in the region held breeding Brolgas in 2007. If this proportion is applied to the 89 wetlands within three kilometres of the wind farm, then as many as six breeding pairs may breed within this zone. The observation of 11 birds within the zone in 2008, and the observation that 18 wetlands could be suitable as breeding sites, supports this figure.

Based on six pairs and the same average distance of breeding sites from wind turbines, the potential number of flights over nearby parts of the wind farm rises to 370. This figure is the starting point for breeding season turbine collision risk modelling presented in Smales (2008). This analysis indicated collision risk to breeding Brolga was low and was equivalent to 0.02 Brolga per year.

Breeding season powerline collision risk modelling (Smales 2009) was based on the presence of 24 Brolga breeding sites within three kilometres of the powerlines associated with the project, 17 near the internal powerlines and a further two near the external grid connection powerline. Results from the collision risk modelling also indicated that collision risk was low and equated to 0.0246 potential Brolga fatalities for the whole wind farm.

4.7.2.2 Mitigating Impacts

The principal means of mitigating the potential impacts of the proposed wind farm on Brolgas is through appropriate separation distances between turbines and birds. Turbine exclusion distances have been recommended to ensure that the risk to Brolgas from the proposed wind farm is reduced to negligible levels. These are described below.

- An initial breeding site exclusion zone of 400 metres has been established around each known historical and current breeding site. This will permit movement of breeding birds to pasture areas nearby (breeding Brolgas used pasture more consistently within this distance than beyond it).
- Around historical and current breeding sites, all usable wetlands (i.e. not converted to farming uses) within 3.2 kilometres of each breeding site (the maximum distance breeding Brolgas were observed to move from a breeding site) have been included, together with the above exclusion zone in a full 'breeding home range' exclusion zone.

A further disturbance exclusion zone of 300 metres around the entire 'breeding home range' has been established for each historical (useable) and current known breeding site (Figure 27). This will prevent excessive disturbance from turbines reducing the suitability of the home range for the birds.

4.7.3 Migration Season Impacts and Mitigation

4.7.3.1 Potential Impacts

All available records of Brolgas from the search area were collated from the AVW and DSE databases, and from the current investigation, including sightings, confirmed breeding records and flocking sites. Based on the location of these records, predominantly west and south of the proposed wind farm, most flights between wetlands and recorded flocking sites would occur outside the proposed wind farm site boundaries.

A total of 28% of AVW records of Brolgas in the search region were from sites where movement to the nearest flocking site would take birds across the proposed wind farm site.

Assuming that up to 58 birds occur within 20 kilometres of the proposed wind farm boundary and that the rates of movement are similar to those found in the current investigation, and that each bird would move, on average, four times before settling with a large flock at a traditional flocking site, then some 232 Brolga movements would occur during the migration season. Of these 232 movements, 28 percent, or 65 flights, may be through the proposed wind farm site.

The collision risk analysis with the wind turbines (Smales 2008) indicated a low collision risk to Brolga and ranged between 0.09 and 0.137 Brolga for the whole wind farm.

4.7.3.2 Mitigating Impacts

Movements of birds between breeding sites and flocking sites in the migration seasons may be prevented due to a barrier effect if the flocking site lies on the opposite side of the wind farm. Accordingly, migration season movement corridors have been established within the wind farm as described below.

In view of the location of significant flocking sites west of the proposed wind farm, and the presence of breeding sites to the east of it, two movement corridors have been established in the northern part of the wind farm (1.5 kilometres wide) and the southern part of the wind farm (2 kilometres wide) to facilitate Brolga movements between breeding and flocking sites in this part of their range. This is based on observations of European Cranes' reactions to turbines when in flight (i.e. minimum recommended corridor 1.5 kilometres wide; Gerjets 2006).

4.7.4 Flocking Season Impacts and Mitigation

4.7.4.1 Potential Impacts

Based on the results of the flocking season investigation to date, Brolga movements do not appear to occur beyond 3.5 kilometres from the flocking site. Therefore during the flocking season it is unlikely any Brolga would fly through the wind farm as the majority of flocking sites were more than 3.5 kilometres from the wind farm. However, observations by R. Hill (DSE, pers. obs.) have suggested Brolgas move up to five kilometres from their flocking site.

Collision risk with the wind turbines was found to be low (Smales 2008). This ranged between 0.015 and 0.051 Brolga for the whole wind farm.

Collision risk with the proposed powerline was also found to be low and equated to 0.004 Brolga fatalities for the whole wind farm.

4.7.4.2 Mitigation of Impacts

Flocking season exclusion zones have been determined based on the observed maximum five kilometres movement of Brolgas during the day from their traditional flocking sites. A turbine exclusion zone of five kilometres has been established around each traditional flocking site. No such exclusion zone has been established around one-off stopover sites as the negligible risks to birds at these seldom-used sites do not

warrant it. The collision risk modelling incorporates this component of Brolga flocking season behaviour.

4.7.5 Annual Impact on Brolga

The collision risk modelling estimated that across all seasons, the total likely annual collision rate of Brolga with operating wind turbines at the proposed Stockyard Hill Wind Farm was 0.2 birds per year (Smales 2009b). Powerline collisions were estimated at another 0.03 birds per year (Smales 2009b).

PVA modelling (McCarthy 2009) indicates that this order of mortality would result in the loss of an extra one or two birds from the population over 20 years and that an increase of 0.25 birds recruited to the adult population per annum would be sufficient to mitigate this impact.

Therefore, impacts of the proposed Stockyard Hill Wind Farm are considered not to be significant.

4.7.6 Contingency Measures

The separation distances indicated in this section are designed to ensure that the risk to Brolgas from the proposed wind farm is reduced to minimal levels. However, two matters remain that require a response, namely:

- A mitigation plan should Brolgas be found to breed or flock very close to the wind farm once it is constructed; and
- A mitigation plan to ensure that powerline impacts on birds are minimised to acceptable levels.

These are dealt with separately below.

4.7.6.1 Brolga Activity near the Constructed Wind Farm

As rainfall can vary from year to year, wetlands may hold water in some years by not in others. Therefore, the availability and quality of habitat for breeding, migrating and flocking Brolgas may vary near the wind farm. It is possible that in some years, breeding or flocking could occur closer to the wind farm than has been observed in the current investigations, or in recent years (AVW and DSE data).

Should breeding or flocking be found to occur within the separation distances recommended in this report, then a mitigation plan would be triggered. This plan could include but not be limited to supplementary feeding (corn or wheat) at a site or sites within the Brolgas' normal movement range (a distance of up to five kilometres for flocking and up to 800 metres for breeding wetlands). This should be located on the side of the habitat opposite to the wind farm and managed in cooperation with the relevant landowner.

Supplementary feeding has been used to attract often large numbers of cranes to safer habitats and to help support their populations during times of scarce resources (Sutherland *et al.* 2004). As Brolgas have been observed to feed on fallen grain in cropping paddocks (Marchant and Higgins 1993), supplementary feeding is likely to be a feasible means of altering foraging movements from key sites to reduce the risk of birds encountering wind turbines.

4.7.6.2 Mitigating Powerline Impacts

A number of broad powerline route investigation areas have been considered. Based on investigation of route options (see Chapter 6), refinements have been made to the route of the powerlines to minimise risk to the Brolga.

The flight observations during the current investigations, combined with current and historical information on the location of breeding and flocking sites, have enabled powerline routes to be selected to avoid regularly used zones around key sites (i.e. breeding home ranges around most recent and known breeding sites, and a zone within five kilometres of all recently used flocking sites).

The remaining powerline collision risk of possible concern would therefore relate to the migration seasons. Where this was unavoidable then marking may be needed to increase powerline visibility and reduce collision risk.

CHAPTER 5**POWERLINE ROUTE ASSESSMENT****Key Findings**

- Suitable habitat was identified for five EPBC Act and FFG Act listed threatened species: Clover Glycine, Hairy Tails, Large-headed Fireweed, Small Milkwort and Spiny Rice-flower.
- Three EVCs in 12 remnant patches of vegetation were identified in the study area: Plains Grassland (EVC 132) (dominant) and two patches of Creekline Grassy Woodland (EVC 68) and Grassy Woodland (EVC 175).
- Suitable habitat was found for three EPBC Act, FFG Act and DSE Threatened Species Advisory List species: Striped Legless Lizard (EPBC Act), Brolga (FFG Act) and Fat-tailed Dunnart (DSE Advisory List).
- Impacts to Striped Legless Lizard and Fat-tailed Dunnart were assessed as not being significant.
- A collision risk analysis indicated that 0.018 Brolga per year are at risk of colliding with the powerline. However, this is considered to be a very limited impact to the Brolga population.
- Approximately 0.021 hectares (0.009 habitat hectares) of Plains Grassland EVC will need to be removed for the construction of the preferred powerline route.
- Total offsets required for the proposed removal of native vegetation along the preferred route includes 0.019 habitat hectares of Very High Conservation Significance Plains Grassland. As a rule of thumb, based on a 20% improvement of the offset site, an area of 0.1 hectares of Plains Grassland would be required to compensate for this loss. In addition, two large trees are to be protected and 10 new trees are to be recruited to account for the loss of one scattered River Red Gum.
- Significant impacts to species listed under the EPBC Act are not considered to be significant.
- A planning permit is required under Clause 52.17 of the Planning Scheme for the removal of any native vegetation or scattered native flora within the study area. A planning permit would also be required to carry out works under ESO1 and ESO2 in the following areas:
 - Along Dunnedges Road, Stockyard Hill Road and the northern part of Skipton Road; and
 - In the vicinity of Mt Emu Creek.

5.1 INTRODUCTION

Stockyard Hill Wind Farm Pty. Ltd. engaged BL&A to conduct a flora and fauna overview assessment of proposed internal and external powerline routes and the proposed terminal station (where the powerline links to the power grid) for Stockyard Hill Wind Farm.

This investigation was commissioned to provide information on the extent and condition of native vegetation and fauna habitat along both sides of the proposed road reserves along which the powerline would be constructed and the site where the terminal station is proposed (powerline study area) and outline any implications under various Commonwealth, State and local legislation and policies. Of particular focus were any implications of the proposal under the Framework.

This chapter is divided into the following sections:

Section 5.2 describes the sources of information, including the methods used for the field survey.

Section 5.3 provides an overview of the characteristics of the study area.

Section 5.4 presents the investigation results, describing the flora and fauna of the study area.

Section 5.5 discusses the implications of the findings under relevant Commonwealth, state and local legislation and policies.

Section 5.6 provides recommendations to inform the design process and assist the development of a minimum impact proposal.

Wherever appropriate, a precautionary approach has been adopted in the discussion of implications. That is, where insufficient evidence is available on the occurrence or likelihood of occurrence of a species, it is assumed that it could be in an area of habitat, if suitable, and the implications under legislation and policy are considered accordingly.

5.2 SOURCES OF INFORMATION

5.2.1.1 Existing Information

Existing information regarding flora and fauna utilised as part of this investigation is described below. Note that '*powerline study area*' refers to the road reserves along the proposed alternative powerline routes. Existing information has been obtained from a wider area, termed the '*powerline search region*' defined for this assessment as a three kilometre buffered linear area from the approximate centre point of the study area.

5.2.1.2 Flora

Flora records were obtained from the FIS. This database search listed all plant species, including rare and threatened plants, found in the powerline search region.

The likelihood of suitable habitat in the study area for nationally threatened flora species was ascertained through a search of the online *EPBC Act Protected Matters Search Tool* using the same search region. Rare and threatened flora species listed under the *FFG Act* and the *EPBC Act* and occurring or considered likely to occur in the powerline study area are shown in Table 38.

Plant taxonomy used throughout this report follows the FIS standards.

5.2.1.3 Ecological Vegetation Classes

Mapping of estimated pre-1750 (pre-European settlement) vegetation was reviewed, to determine the type of native vegetation likely to occur in the study area. Information on

Ecological Vegetation Classes was obtained from published EVC benchmarks. These sources included:

- Relevant EVC benchmarks for the Victorian Volcanic Plain and Central Victorian Uplands bioregions (DSE 2008a); and
- Biodiversity Interactive Maps (DSE 2008b).

5.2.1.4 Fauna

A list of the fauna species recorded in the powerline search region was obtained from the AVW.

Fauna taxonomy used throughout this report follows the AVW nomenclature, and Christidis and Boles (2008) where appropriate.

The presence or likelihood of occurrence of nationally threatened fauna species in the powerline study area was obtained through the *EPBC Act Protected Matters Search Tool*.

5.2.2 Field Methodology

The field assessment was conducted in early September 2008 (external powerline route) and in October 2008 (internal powerline routes).

Further and more detailed assessment of vegetation to be removed along the external powerline route was undertaken in January 2009.

5.2.2.1 Flora

Incidental observations of dominant flora species within road reserves were made by car to determine the presence of any remnant patches of native vegetation. Remnant patches of native vegetation are composed of indigenous plant species considered to be part of a clearly definable EVC. Such vegetation includes remnant vegetation with the following attributes:

- Proportion of indigenous understorey species being greater than 25% total understorey cover (excluding bare ground); and/or
- Indigenous canopy trees with at least 20% projected foliage canopy cover (DSE 2007b).

For internal powerline routes, inspection of the routes was undertaken along road reserves by vehicle with selected foot-based inspections undertaken in areas considered prospective for flora and fauna. Areas that were not accessible by road were inspected by binoculars from nearby roads and vantage points to characterise environmental conditions and to determine the likelihood of occurrence of remnant native vegetation.

5.2.2.2 Fauna

The surveys were predominantly undertaken by vehicle, whilst areas potentially supporting fauna habitat were assessed on foot. The purpose of this initial investigation was to assess the quality of fauna habitat and, where possible, to look for evidence of fauna. Fauna habitat types in the powerline study area were characterised and are described in 41. Three categories were used for quality of fauna habitat, based on the criteria detailed below.

The quality of fauna habitat was assessed based on the criteria detailed below and focused on locations within the study area thought likely to contain notable fauna habitat. These criteria have been modified to suit particular vegetation types, such as treeless environments, as necessary. Three quality categories, described below, were used:

- **High:** Fauna habitat components are usually all present (i.e. vegetation intact, old-growth trees and fallen timber and leaf litter) and habitat linkages to other remnant ecosystems in the landscape are intact;
- **Moderate:** Some fauna habitat components are often missing (i.e. vegetation disturbed, old-growth trees, fallen timber and leaf litter), although linkages with other remnant habitats in the landscape are usually intact; and
- **Low:** Many fauna habitat elements in low quality remnants have been lost, including old-growth trees (e.g. due to past timber harvesting) and fallen timber, and tree canopies are often highly fragmented. Remnants may be severely weed-invaded and possess few native structural and floristic components. Habitat linkages with other remnant ecosystems in the landscape have usually been removed by extensive past clearing.

Techniques to detect fauna species inhabiting the study area included:

- Incidental searches for mammal scats, tracks and signs (e.g. diggings, signs of feeding and nests/burrows);
- Turning over logs, rocks and other ground debris for reptiles, frogs and mammals;
- Bird observation during the day; and
- General searches for reptiles and frogs, including listening to frog calls in seasonally wet areas.

5.2.2.3 Limitations of Field Assessment

Flora and fauna field surveys may fail to record all species present for various reasons, including the seasonal absence of some species and short survey duration. Rare or cryptic species may be missed in short surveys.

The flora assessment of alternative powerline routes was carried out in early spring, when some annual and spring-emergent plant species may have been undetectable or lacking essential identification characteristics. The timing of the survey and condition of vegetation were otherwise considered suitable to ascertain the extent of native vegetation along the alternative powerline routes. The external powerline route was inspected in summer. As the exact locations of power poles had not been ascertained, a default score of 0.45 was applied to native vegetation that may be affected by the powerline.

The fauna assessment was undertaken in spring during mild and sunny weather conditions. These conditions were considered suitable for detecting most fauna groups likely to occur in the study area.

Although inspection of all sections of the internal powerline route was not possible due to access difficulties, all areas were inspected from vantage points. Coincidentally, most inaccessible areas were dominated by cropping and improved pasture and lacked intact native vegetation or fauna habitats.

5.3 SITE DESCRIPTION

A detailed description of the proposed Stockyard Hill Wind Farm site has been provided in Chapter 1. The wind farm is bounded on all sides by private property. The internal powerline routes lie within this study area.

The road reserves under investigation for the external powerline route, beyond the study area for the wind farm site and internal powerline routes, comprised the following sections described below (Figure 39):

- The **northern section** started at the junction between Dunnedals and Stockyard Hill Road and then runs south along Stockyard Hill Road until it meets Skipton Road.
- The **central section** consisted of three powerline road options:
 - **Eastern option:** Starts on Stockyard Hill Road and ends at start of Rowlands Road. This proposed route option runs as follows: Stoneleigh Settlement Road – Guthries Road – Chepstowe-Pittong Road – Pittong-Lismore Roads – Crawford Road – Rowlands Road.
 - **Central option:** Starts at Stockyard Hill Road junction with Skipton Road and ends at start of Rowlands Road. This proposed route option runs as follows: Skipton Road – Murray Street – private property – Moreton Hill Road – private property – cross Rokewood-Skipton Road – Rankin Road–Crawford Road–end at start of Rowlands Road.
 - **Western option:** Starts at Stockyard Hill Road junction with Skipton Road and ends at Rowlands Road. This proposed route option runs as follows: Skipton Road – Murray Street – cross Mt Emu Creek – Scott Street –Skipton-Geelong Road – Bute Road – Crawford Road – start of Rowlands Road. The first section (Skipton Road and Murray Street) is common to both the central and the western options of the powerline.
- The **south section** started at Rowlands Road and ends at its linkage point with the high voltage transmission lines south of Four Tree Road. This proposed route runs as follows: Rowlands Road – private property – Frosts Road – Culverts’ Road – cross Lismore-Scarsdale Road – private property – cross Hamilton Highway –private property – ends at transmission line.

Both the northern and southern sections are common to the three central options.

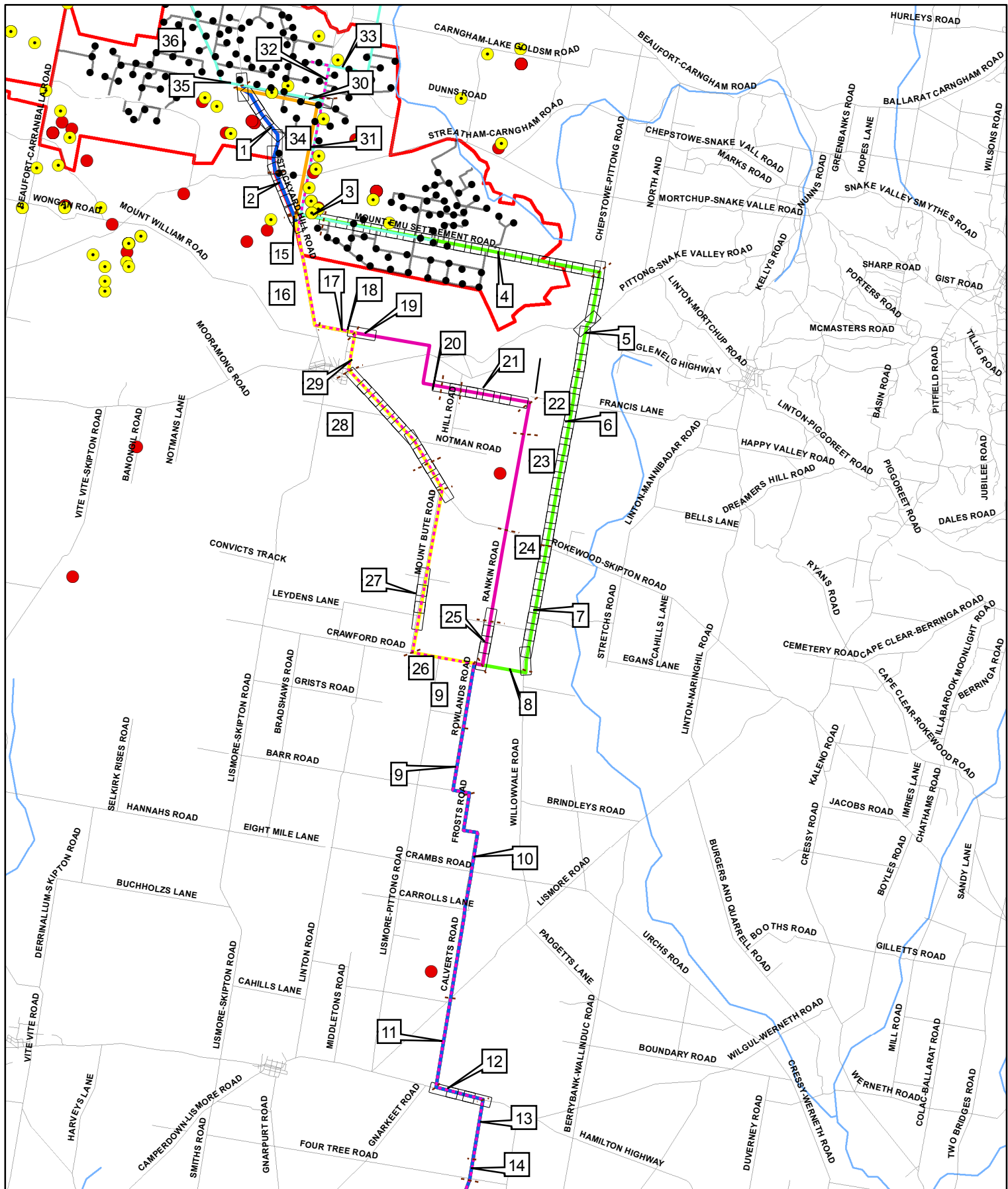
The local landscape is flat to gently undulating. Low stony rises, including surface and embedded rock, are common in some limited parts of the study area, especially in the northern section of the powerline.

The potential powerline route options are surrounded by agricultural land used mainly for cropping and livestock grazing.

The proposed terminal station site is dominated by exotic vegetation (pasture and crops) as a consequence of past agricultural development and does not support habitat suitable for native flora and fauna species of significance.

No major wetlands were found either directly abutting the boundaries or within the powerline study area. However, several smaller wetlands, including freshwater meadows and shallow freshwater marshes and farm dams are scattered within 100 metres of the

powerline study area, in addition to creeks which traverse the site, such as Mt Emu Creek.



Legend

- Alternative Northern Route
- Common North/South
- Western Option
- Central Option
- Eastern Option
- External Powerlines
- Internal Powerlines
- Study Area

Brolga Records

- Sighting
- Breeding
- Proposed Turbines
- Access Tracks
- Powerline Section Break
- Native Vegetation
- Powerline Section



Figure 39: Transmission Line Route Options		
Project: Proposed Stockyard Hill Wind Farm		
Client: Stockyard Hill Wind Farm Pty. Ltd.		
Project No.: 7132	Date: 24/09/2009	Created by: J. Sullivan / Syahrudin
Brett Lane & Associates Pty. Ltd. Ecological Research & Management		
<ul style="list-style-type: none"> ● Experience ● Knowledge ● Solutions 	605 Nicholson Street PO Box 592, Carlton North VIC 3054 Australia	ph (03) 9387 5008 fax (03) 9387 6115 blane@ecologicalresearch.com.au www.ecologicalresearch.com.au

5.4 FLORA AND FAUNA OF THE POWERLINE STUDY AREA

5.4.1 Vegetation Assessment

5.4.1.1 Flora

The field assessment recorded 29 species of plants, 15 (52%) of which were indigenous and 14 (48%) of which were introduced (including non-indigenous native) in origin. These are listed in Appendix 23.

Records from the *FIS* and the *EPBC Act Protected Matters Search Tool* indicate that within the powerline search region there are records of, or there occurs potential habitat for, 21 rare or threatened flora species. No rare or threatened flora species were detected during the current field survey.

The likelihood of occurrence in the study area of rare or threatened species listed under the *FFG Act* or the *EPBC Act* is detailed in Table 38. These species are either known to occur in the broader search region or suitable habitat has been identified in the broader search region using the *EPBC Act Protected Matters Search Tool*.

This analysis indicates that suitable habitat occurs in native grassland vegetation within the powerline study area for Clover Glycine, Hairy Tails, Large-Headed Fireweed, Small Milkwort and Spiny Rice-flower.

It is therefore considered that five flora species listed under the *EPBC Act* and *FFG Act* have the potential to occur within patches of Plains Grassland in the powerline study area. None are likely to occur at the terminal station site.

Table 38: FFG Act and EPBC Act-Listed Flora Species and Likelihood of Occurrence

Common Name	Scientific Name	Habitat	FFG status	EPBC status	Potential to occur in study area
Adamson's Blown-grass	<i>Lachnagrostis adamsonii</i>	Known only from the type specimen. Slightly saline, seasonally wet area on and near the volcanic plain (Walsh 1994a).	f	E	No suitable habitat recorded – unlikely to occur
Basalt Peppercross	<i>Lepidium hyssopifolium</i>	Basalt Plains. Rarely recorded from western Vic and only known from two populations N and NE of Melbourne (Entwisle 1996b).	f	E	No suitable habitat recorded – unlikely to occur
Clover Glycine	<i>Glycine latrobeana</i>	Grasslands and grassy woodlands (Jeanes 1996a).	f	V	Some suitable habitat recorded – potential to occur
Hairy Tails	<i>Ptilotus erubescens</i>	Occasional on relatively fertile soils of grasslands and woodlands in northern and western Victoria (Walsh 1996)	f		Some suitable habitat recorded – potential to occur
Large-headed Fireweed	<i>Senecio macrocarpus</i>	Themeda grasslands on basalt (Walsh 1999c).	f	V	Some suitable habitat recorded – potential to occur
Purple Blown-grass	<i>Lachnagrostis punicea</i> subsp. <i>filifolia</i>	Scattered in the SW of Vic., known from coastal environments in Tasmania (Walsh 1994a)	f		No suitable habitat recorded – unlikely to occur
Salt-lake Tussock-grass	<i>Poa sallacustris</i>	Margins of brackish to salt lakes (Walsh 1994a).	f	V	No suitable habitat recorded – unlikely to occur
Small Milkwort	<i>Comesperma polygaloides</i>	Heavy soils supporting grasslands and grassy woodlands (Walsh 1999a).	f		Some suitable habitat recorded – potential to occur
Southern Shepherd's Purse	<i>Ballantinia antipoda</i>	Dry, stony areas of west-central Victoria and near Castlemaine (Entwisle 1996b).	f	E	No suitable habitat recorded – unlikely to occur
Spiny Rice-flower	<i>Pimelea spinescens</i>	Grasslands on basalt derived soils (Entwisle 1996a).	f	C	Some suitable habitat recorded – potential to occur

Common Name	Scientific Name	Habitat	FFG status	EPBC status	Potential to occur in study area
	<i>subsp. spinescens</i>				
Swamp Everlasting	<i>Xerochrysum palustre</i>	Occurs in lowland swamps, usually on black cracking clay soils, scattered from near South Australian Border north-west of Portland to Bairnsdale, but rare due to habitat depletion (Jeanes 1999). Lowland swamps, usually on cracking clays (Flann 1999).	f	V	No suitable habitat recorded – unlikely to occur
White Sunray	<i>Leucochrysum albicans subsp. albicans var. tricolor</i>	Western Victoria in dry, open situations (Marriott & Marriott 1998; Lunt <i>et. al.</i> 1998). Very rare in Vic. Roadside verges (Short 1999).		E	No suitable habitat recorded – unlikely to occur

Notes: EPBC – Status under the EPBC Act; C – Critically Endangered; E – Endangered; V – Vulnerable; FFG (f) – Listed as threatened under the FFG Act.

5.4.1.2 Ecological Vegetation Classes

Mapping of estimated pre-European vegetation (DSE 2008a) indicates that the powerline study area and surrounds would have supported several EVCs including Plains Grassland, Grassy Woodland and Creekline Grassy Woodland prior to European settlement. EVC mapping is based on modelling of factors including rainfall, aspect, soils and remaining vegetation.

Evidence on site, including floristic composition, suggested that most of the native vegetation recorded within the road reserves was low quality Plains Grassland (EVC 132). In addition, one small patch of Creekline Grassy Woodland (EVC 68) and one small patch of Grassy Woodland (EVC 175) were recorded within the study area. No native vegetation occurs at the terminal station site.

The benchmarks for these EVCs are detailed in Appendix 2.

Along all route options assessed, a total of twelve remnant patches comprising the above described EVCs were identified in the powerline study area. The location of these patches is shown in Figure 39. Vegetation descriptions are provided in Table 39 and native vegetation descriptions are provided in Table 40. The preferred route that has been adopted (the western option) has effectively responded to most of the recommendations provided in Section 3.5.

Along the preferred (Western) route, two remnant patches comprising Plains Grassland were identified south of Skipton.

5.4.1.3 Conservation Significance According to the Framework

The conservation significance of all remnant patches within the powerline study area was either High or Very High, according to the Framework. These significance levels were based on the endangered Bioregional Conservation Status of the recorded EVCs, in combination with their possible habitat score, consistent with the Framework methodology.

Table 39: Vegetation and Fauna Habitat Descriptions

Powerline Section	Location	Vegetation description	Fauna habitat & significance	Implications/ Recommendations
1	Stockyard Hill Road (Dunnets Road to Streatham Road)	Nature Reserve both sides – Sections of Plains Grassland (EVC 132). Kangaroo Grass- dominated grassland with scattered herbs including Cotton Fireweed. High cover of introduced pasture grasses. Some planted Blackwoods.	Possible Striped Legless Lizard; Fat-tailed Dunnart. Mod.-high	Use alternative route (Dunnets Road-Skipton Road) if possible. (See Sections 30 and 31.
2	Stockyard Hill Road (Streatham Road to Stoneleigh Settlement Road)	East side of road reserve cropped -no native vegetation. Plains Grassland (EVC 132) on west side dominated by Kangaroo Grass and Spear Grass.	Striped Legless Lizard; FD; Possible Brolga on west side of road in Slater Lake. Mod.	Use eastern side of road reserve.
3	Stoneleigh Settlement Road	Thin road reserve dominated by introduced pasture grasses. Native vegetation to north outside road reserve.	North side dry swamp; possible Striped Legless Lizard and Brolga if inundated with water. Low	Use southern side of road reserve if possible.
4	Stoneleigh Settlement Road	Creepline Grassy Woodland (EVC 68) restricted to Mt Emu Creek crossing. Remainder of road does not support native vegetation. Planted pines along road reserve.	Foraging Brolga at Mt Emu Creek. Low-mod.	Avoid native vegetation at Mt Emu Creek crossing. Follow current powerline where possible.
5	Pittong-Lismore Road (Stoneleigh Settlement Road to Glenelg Hwy)	Cropped.	Low	No restraints.
6	Pittong-Lismore Road (Glenelg Hwy to Skipton Road)	Plains Grassland (EVC 132) to east. Scattered Kangaroo Grass and Spear Grass on west. High weed cover.	Farm dams on both sides of road; possible foraging Brolgas. Low-mod.	Use western side of road reserve.

Powerline Section	Location	Vegetation description	Fauna habitat & significance	Implications/ Recommendations
7	Pittong-Lismore Road (Skipton Road to Crawford Road)	Plains Grassland (EVC 132) on east side only. Willowal Dam further east. Scattered Kangaroo Grass and Spear Grass on both sides. High weed cover.	Large dam-wetland on east side of road; possible Brolga breeding site. Mod.	Use western side of road reserve.
8	Crawford Road (Pittong-Lismore Road to Rowlands Road)	Dominated by introduced pasture grasses. Some planted Blackwoods and Sugar Gums.	Low	No restraints.
9	Rowlands Road (Crawford Road to private land)	Dominated by introduced pasture grasses.	Low	No restraints.
10	Frosts Road and Calverts Road (to Lismore Road)	Dominated by introduced pasture grasses. Planted Sugar Gums on both sides of road reserve.	Two large farm dams at end of road stretch; not suitable for Brolga. Low	No restraints.
11	Calverts Road (Lismore Road to Hamilton Hwy)	Dominated by introduced pasture grasses. Planted Sugar Gums on west side of road reserve.	Low	No restraints.
12	Hamilton Hwy (Calverts Road to McLeans Road)	Plains Grassland (EVC 132) dominated by Wallaby Grass with scattered patches of Kangaroo Grass on northern side of road reserve only. Planted Sugar Gums to south.	Low	No restraints.
13	McLeans Road (Hamilton Hwy to private land)	Dominated by introduced pasture grasses. Some planted Sugar Gums.	Low	No restraints.
14	McLeans Road (private land)	Cropped. No native vegetation.	Low	No restraints.
15	Stockyard Hill Road (Stoneleigh Settlement Road to Skipton Road)	Plains Grassland (EVC 132) dominated by Kangaroo Grass on west side of road reserve only. Cropped on east side.	Possible Striped Legless Lizard. Low	Use eastern side of road reserve to avoid native vegetation on west side.

Powerline Section	Location	Vegetation description	Fauna habitat & significance	Implications/ Recommendations
16	Skipton Road (Stockyard Hill Road to Murray Road)	Wide road reserve dominated by introduced pasture grasses. Sugar Gums along east side.	Two large dams c. 100 metres from road, possible Brolga foraging area. Low-mod.	No restraints.
17	Murray Road (Skipton Road to Pett St)	Dominated by introduced pasture grass. No native vegetation. Current power line on south side.	Low	No restraints.
18	Murray Road (Pett St to private land)	Mt Emu Creek crossing. Scattered River Red Gums along creek.	Avoid eucalypts along Mt Emu Creek; important for local fauna. Low-mod.	Avoid vegetation along Mt Emu Creek.
19	Private land	Grazed farmland.	Mod.	No restraints.
20	Moreton Hill Road (to Hill Road)	Plains Grassland (EVC 132) consisting of Kangaroo Grass on both sides of road reserve.	Possible Striped Legless Lizard, but no surface rock Low-mod.	Avoid native vegetation where possible.
21	Moreton Hill Road (Hill Road to Rankin Road)	Grassy Woodland (EVC 175): Twenty-five metre wide treed vegetation consisting of dense eucalypts, acacias and Banksias. Cropped farmland to north of road reserve.	Significant woodland remnant for local fauna. Low-mod.	Avoid patch of Grassy Woodland. Use alternative route.
22	Rankin Road (Moreton Hill Road to private land)	Dominated by introduced pasture grass. No native vegetation. Planted trees along eastern side of road reserve.	Large swamp on east side, c. 200 metres from road; possible Brolga habitat. Low	No restraints.
23	Private land	Dominated by introduced pasture grass.	Low	No restraints.
24	Rankin Road (near Skipton Road)	Dominated by introduced pasture grass. Some scattered Kangaroo Grass and Spear Grass. Planted Pines eastern side of road reserve.	Low	No restraints.

Powerline Section	Location	Vegetation description	Fauna habitat & significance	Implications/ Recommendations
25	Rankin Road (near Crawford Road)	Plains Grassland (EVC 132) dominated by Kangaroo Grass and Poa within road reserve. Cropped farmland outside road reserve.	Possible Striped Legless Lizard. Low-mod.	Avoid road reserve if possible.
26	Crawford Road (Rowlands Road to Mt Bute Road)	Dominated by introduced pasture grass and various weeds.	Low	No restraints.
27	Mt Bute Road (Crawford Road to Skipton Road)	Dominated by introduced pasture grass and various weeds. Planted Pines, Sugar Gums and acacias on eastern side.	Low	No restraints.
28	Skipton Road (Mt Bute Road to Glenelg Hwy)	Plains Grassland (EVC 132) on northern side of road reserve dominated by Kangaroo Grass. Remnant native eucalypts, planted eucalypts and pines along northern side also. Narrow area dominated by introduced pasture grasses on southern side of road.	Large dam with aquatic vegetation on south side of road; Broilga observed feeding on the dam. Mod.	Use southern side of road reserve avoiding the dam.
29	Park St (Glenelg Hwy to Murray Road)	Dominated by introduced pasture grass. Planted pines on both sides of road reserve.	Low	No restraints.
30	Dunnets Road (Stockyard Hill Road to Skipton Road)	Dominated by introduced pasture grass, primarily Onion Grass. Small patch of Plains Grassland (EVC 132) at eastern end of Dunnets Road. Scattered Blackwoods within road reserve.	Low	Avoid Blackwoods. Avoid disturbance to small patch of Plains Grassland at eastern end of Dunnets Road.
31	Skipton Road (Dunnets to Skipton Road)	Dominated by introduced pasture grasses. No native vegetation.	Low	No restraints.

Powerline Section	Location	Vegetation description	Fauna habitat & significance	Implications/ Recommendations
32	Oddies Road (Unnammed road and Mr. George's property)	Dominated by introduced pasture grasses. No native vegetation	Low	No restraints.
33	Private Land (Mr. George's property)	Dominated by introduced pasture grasses. No native vegetation.	Low	No restraints
34	Skipton Road (Mr. George's property to Dunnets Road)	Dominated by introduced pasture grasses (Toowoomba Canary Grass). No native vegetation.	Low	No restraints
35	Unnamed road west of Stockyard Hill Road (extension of Dunnets Road)	Native Plains Grassland to the north of fenceline and introduced grasses south of fenceline including unnamed road reserve. The native vegetation habitat is dominated by spear-grasses.	Low	Powerline to run south of fenceline (unnamed road) avoiding all native vegetation to the north.
36	Private land running north-south in continuation of section 35.	Laneway supports Plains Grassland dominated by spear-grass with some Kangaroo-grass. Plains grassland is also found to the east of laneway and introduced grasses to the west.	Low	Powerline to run west of laneway within private land and avoiding all native grassland.