

7 December 2012



James Archdale
Planning Officer, Infrastructure Projects
NSW Department of Planning and Infrastructure
23-33 Bridge Street
Sydney NSW 2000

Dear James,

Sapphire Wind Farm – request for additional ecological impact assessment

Following our discussions and the request for further details on the ecological impacts of the project, I have had our consultants, Eco Logical Australia (ELA), provide an analysis of the proposed modifications in the Preferred Project Report. ELA have also provided further clarification in relation to Supplementary DGR 4(a) and 4(b).

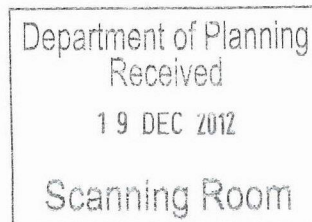
The additional information is attached to this letter, as follows:

Appendix A	It would be useful to have your ecologist to provide a small summary of the changes and explain the differences in the impact. (Emails 28/8/12, 14/11/12 and 29/11/12)
Appendix B	Supplementary DGR 4(a) - A statement of justification must be provided individually for each threatened species that has been considered by the proponent to be unlikely to occur in the study area. (Letter 28/6/12)
Appendix C	Supplementary DGR 4(b) — A more detailed consideration of the risk of migratory and relevant threatened birds colliding with wind turbines is required. This should include consideration of factors such as the likely numbers and the frequency with which the species occurs in the area and how the distribution of its habitat at the landscape-scale may influence its local movement patterns. (Letter 28/6/12)

I hope that attached is satisfactory in meeting your requirements. Please do not hesitate to give me a call if you require further information or clarification on these matters.

Kind regards,

Adrian Maddocks
Senior Development Manager



WIND PROSPECT CWP PTY LTD

PO Box 1708, Suite 2, Level 6, T&G Building, 41-45 Hunter Street, Newcastle NSW 2300

Tel: +61 (0) 2 4013 4640 • Fax: +61 (0) 2 4926 2154

A.B.N. 57 127 205 645 • Email: adrian.maddocks@wpcwp.com.au • Internet: www.windprospect.com.au
SITE CODE SAP 080602

Appendix A

COMMENTS ON PROPOSED INFRASTRUCTURE CHANGES TO SAPPHIRE WIND FARM

Wind Prospect CWP (WPCWP) has invited Eco Logical Australia to comment on the ecological impacts associated with four proposed infrastructure changes to the Sapphire Cluster and one proposed infrastructure change to the Swan Vale Cluster at Sapphire Wind Farm.

WPCWP provided figures illustrating the location of the five proposed changes, along with changes to the area impacted for each vegetation type affected.

The Biometric vegetation types affected by the proposed changes are:

- Manna Gum - Rough-barked Apple – Yellow Box grassy woodland/open forest of the New England Tablelands and North Coast, and
- White Box grassy woodland of the Nandewar and Brigalow Belt South Bioregions.

Condition classes were assigned to all vegetation types (“low” and “moderate to good”) based on the condition criteria outlined in the Biobanking Assessment Methodology (DECC 2009a). Ancillary codes of “native pasture” and “trees” (wooded areas) were also assigned to each Biometric vegetation type in moderate to good condition.

In preparing this additional information, it was determined that Table 19 of the original Ecological Assessment (Sapphire EA, Volume 3:2, Appendix 11) had incorrectly over-calculated the impacts of the 100m wind turbine layout. The corrected table is presented at the end of this report and is the basis for the following assessment.

1.1 SUMMARY OF THE PROPOSED CHANGES AND IMPACTS ON VEGETATION

Table 1 summarises the changes per vegetation type, condition class and ancillary code, whereby a positive number reflects an increased area impacted, and a negative number reflects a decreased area impacted.

Table 1: Area affected by the proposed infrastructure changes per Biometric vegetation type, condition type and ancillary code, whereby a positive number reflects an increased area impacted and a negative number reflects a decreased area impacted.

BIOMETRIC VEGETATION TYPE	CONDITION CLASS	AREA (HA)
Manna Gum - Rough-barked Apple – Yellow Box grassy woodland/open forest of the New England Tablelands and North Coast	Low	0.19
	Moderate to good - native pasture	3.9
	Moderate to good – trees	-1.84
White Box grassy woodland of the Nandewar and Brigalow Belt South Bioregions	Low	-1.46
	Moderate to good - trees	-2.66

The net change per Biometric vegetation type, regardless of condition class, is an increased impact to Manna Gum - Rough-barked Apple – Yellow Box grassy woodland/open forest of the New England Tablelands and North Coast (MGRBAYB) of 2.25 ha, and a decreased impact to White Box grassy woodland of the Nandewar and Brigalow Belt South Bioregions of 4.12 ha. Therefore, the revised total impact area for MGRBAYB is 243.11 ha and Box-Gum Woodland is 41.37 ha. The revised total impact for MGRBAYB represents 16.31% of the total present in the study area and 3.11% within the project site. The revised total impact for Box-Gum Woodland represents 11.32% of the total present in the study area and 2.17% within the project site.

MGRBAYB classifies as Ribbon Gum, Mountain Gum, Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion endangered ecological community under the TSC Act.

White Box grassy woodland of the Nandewar and Brigalow Belt South Bioregions classifies as White Box, Yellow Box, Blakely's Red Gum Woodland endangered ecological community under the NSW TSC Act and White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland under the Commonwealth EPBC Act (both communities are referred to as Box-Gum Woodland).

Overall, changes to the layout will retain more woodland vegetation with greater structural complexity, but less native pasture. This includes greater retention of the critically endangered Box-Gum Woodland and wooded areas of MGRBAYB endangered community. Retaining structural complex examples of a vegetation community not only preserves more intact remnant vegetation, but this flows on to benefit fauna in the region (Section 1.1.2).

The proposal does not change the impact on any threatened flora.

1.2 IMPACT OF THE PROPOSED CHANGES ON THREATENED FAUNA

The proposed changes reduce overall impacts to wooded (tree) areas, which benefits a broad array of fauna, including threatened woodland birds (decrease impacts to potential Regent Honeyeater habitat by approximately 5.7 ha), arboreal mammals and Koala, while also likely of retaining habitat features such as tree hollows and vegetation in moderate to good condition. Increased impact to native pasture is more likely to have limited impact to threatened fauna, as many of these species rely on vegetation with greater structural complexity.

There is a general decrease in the impact to potential marginal habitat for Border Thick-tailed Gecko (approximately 2.2 ha) and a slight increase in impact on potential habitat (0.05 ha).

1.3 CHANGES TO OFFSET CALCULATIONS

Changes to the area impacted affects the IoM offset calculations. Table 30 of ELA (2012) indicates the number of credits required per hectare by Biometric vegetation type, condition and ancillary code (Table 2).

Table 2: Credits required per hectare impacted

BIOMETRIC VEGETATION TYPE	CONDITION CLASS	CREDITS/HA
Manna Gum - Rough-barked Apple – Yellow Box grassy woodland/open forest of the New England Tablelands and North Coast	Low	11.66
	Moderate to good - native pasture	13.56
	Moderate to good – trees	28.64
White Box grassy woodland of the Nandewar and Brigalow Belt South Bioregions	Low	7.67
	Moderate to good - trees	26.34

Table 3 summarises the changes to credits required, whereby a positive number reflects additional impact or credits required and a negative number reflects a reduction in the impact or credits required.

Table 3: Credits required according to the proposed infrastructure changes to the Sapphire Wind Farm

BIOMETRIC VEGETATION TYPE	CONDITION CLASS	AREA (HA)	CREDITS REQUIRED
Manna Gum - Rough-barked Apple – Yellow Box grassy woodland/open forest of the New England Tablelands and North Coast	Low	0.19	2
	M to G - native pasture	3.9	53
	M to G – trees	-1.84	-53
TOTAL MGRBAYB		2	
White Box grassy woodland of the Nandewar and Brigalow Belt South Bioregions (Box-Gum Woodland)	Low	-1.46	-11
	M to G - trees	-2.66	-70
TOTAL BGW		-81	

Table 24 in ELA (2011) provides an indicative estimate of the size of the offset required (i.e. a conversion of Biobanking credits required to area of offset). Calculations in Table 24 provides estimates based on moderate to good vegetation (9 credits/ha) and benchmark condition (7 credits/ha). Typically low condition vegetation allows fewer credits/ha in a range similar to benchmark condition.

Therefore, according to the proposed changes, the offset requires an additional 0.3 ha of MGRBAYB vegetation and a reduction of 9.3 ha of Box-Gum Woodland.

1.4 CONCLUSION

The proposed infrastructure changes to Sapphire and Swan Vale Clusters of the Sapphire Wind Farm have been summarised above.

The changes will result in an increase to impacts on MGRBAYB moderate to good (native pasture) and low condition vegetation and a decreased impact to MGRBAYB moderate to good (trees) and Box-Gum Woodland low and moderate to good (trees) vegetation. These changes will retain a greater area of woodland (tree) vegetation, which has flow-on benefits to woodland birds, arboreal mammals and Koalas. There is also a decreased impact to potential marginal habitat for Border Thick-tailed Gecko and no change in impact to threatened flora.

Given the conservation significance of Box-Gum Woodland, and the current size of the offset area required for MGRBAYB, the impact of the proposed changes and the difference in the offset required appears negligible to a more favourable reduced impact and higher offset for Box-Gum Woodland.

Table 19: Estimated clearance of each vegetation type under each layout option (Corrected 29 November 2012).

REVISED BIOMETRIC VEGETATION TYPE	BIOBANKING CONDITION	ANCILLARY CODE	AREA MAPPED WITHIN PROJECT SITE (ha)	AREA MAPPED WITHIN STUDY AREA (ha)	ESTIMATED IMPACT AREA – 80 m LAYOUT*			ESTIMATED IMPACT AREA – 100 m LAYOUT*		
					PERMANENT CLEARANCE (ha)	PERMANENT CLEARANCE FOR POWERLINE (TREES ONLY) (ha)	TEMPORARY CLEARANCE (ha)	PERMANENT CLEARANCE (ha)	PERMANENT CLEARANCE FOR POWERLINE (TREES ONLY) (ha)	TEMPORARY CLEARANCE (ha)
BR110: Black Cypress Pine – Tumbledown Gum – Narrow-leaved Ironbark open forest	Moderate /Good	Trees	11.54	0	0	0	0	0	0	0
		Native Pasture	62.17	12.71	0.86	0	0.45	0.46	0	0.28
BR114: Blakely's Red Gum – Rough-barked Apple – Red Stringybark grassy open forest	Moderate /Good	Trees	34.08	1.7	0	0	0	0	0	0
		Native Pasture	0	0	0	0	0	0	0	0
BR116: Blakely's Red Gum – Yellow Box grassy open forest or woodland	Moderate /Good	Trees	241.58	20.19	0.98	0	0.48	0.86	0	0.5
		Native Pasture	358.71	81.68	6.23	0	4.43	5.97	0	3.83
	Low	-	113.39	17.91	0	0	5.5	0	0	5.5
BR153: Manna Gum – Rough-barked Apple – Yellow Box grassy woodland/open	Moderate /Good	Trees	5397.39	765.66	36.47	32.17	31.9	32.62	32.23	28.36
		Native Pasture	1703.04	499.65	33.28	0	56.59	32.69	0	56.17

REVISED BIOMETRIC VEGETATION TYPE	BIOBANKING CONDITION	ANCLLARY CODE	AREA MAPPED WITHIN PROJECT SITE (ha)	AREA MAPPED WITHIN STUDY AREA (ha)	ESTIMATED IMPACT AREA – 80 m LAYOUT*			ESTIMATED IMPACT AREA – 100 m LAYOUT*		
					PERMANENT CLEARANCE (ha)	PERMANENT CLEARANCE FOR POWERLINE (TREES ONLY) (ha)	TEMPORARY CLEARANCE (ha)	PERMANENT CLEARANCE (ha)	PERMANENT CLEARANCE FOR POWERLINE (TREES ONLY) (ha)	TEMPORARY CLEARANCE (ha)
forest	Low	-	730.15	225.48	14.3	0	36.15	13.68	0	33.2
BR227: Tenterfield Woollybutt – Silvertop Stringybark open forest	Moderate/ Good	Trees	109.27	12.46	0.57	0	0.54	0.57	0	0.6
		Native Pasture	3.53	0	0	0	0	0	0	0
BR240: White Box grassy woodland	Moderate /Good	Trees	537.25	94.78	5.17	0	4.19	4.82	0	2.61
		Native Pasture	471.81	105.79	7.91	0	6.34	7.19	0	4.69
	Low	-	181.29	44.98	2.78	0	1.48	2.05	0	1.05
TOTAL			9955.2	1882.99	108.55	32.17	148.05	100.91	32.23	136.79

Note: * All calculations are based on a worst case scenario (i.e. 12 m road layout with cut and fill)

Appendix B

Supplementary DGR 4 (a) – A statement of justification must be provided individually for each threatened species that has been considered by the proponent to be unlikely to occur in the study area.

Justification has been added to the table below as to why species were determined to be unlikely to occur on site.

SPECIES	EPBC ACT	HABITAT REQUIREMENTS	LIKELIHOOD OF OCCURRENCE	JUSTIFICATION
<i>Boronia granitica</i> Granite Boronia	E	Bright pink flowers 6 - 10 mm long appear from July to October. Granite Boronia occurs in scattered localities on the New England Tablelands and North West Slopes north from the Armidale area to the Stanthorpe district in southern Queensland. Grows on granitic soils amongst rock outcrops, often in rock crevices, and in forests and woodlands on granite scree and shallow soils. At Severn River it grows on deep red soils.	Unlikely	Suitable habitat for the species was not present on site. It was not identified during site surveys
<i>Callistemon pungens</i>	V	Flowers in summer. Grows in or near rocky watercourses, usually in sandy creek beds on granite or sometimes on basalt; from near Inverell to the eastern escarpment at New England N.P. NSW subdivisions: NT, NWS. Other Australian states: Qld.	Unlikely	Suitable habitat for the species was not present on site. It was not identified during site surveys

SPECIES	EPBC ACT	HABITAT REQUIREMENTS	LIKELIHOOD OF OCCURRENCE	JUSTIFICATION
<i>Lepidium peregrinum</i> Wandering Pepper-cress	E	Thought to be extinct until recently rediscovered in NSW and Queensland. Targeted searches conducted in 2001 confirmed the species occurs in scattered refugia in north-eastern NSW (near Tenterfield) and south-eastern Queensland. This species flowers from January to April. The largest population of Wandering Pepper Cress occurs in an open riparian forest on the banks of the Tenterfield creek at Clifton. Sandy alluvium is the main soil type at the site. Associated species at the Clifton site are dominated by <i>Eucalyptus camaldulensis</i> and <i>Casuarina cunninghamiana</i> , with a variably dense shrubby understorey of <i>Hymenanthera dentata</i> , <i>Bursaria spinosa</i> , <i>Acacia fimbriata</i> , <i>Acacia floribunda</i> , <i>Callistemon viminalis</i> and <i>Leptospermum brachyandrum</i> . <i>Lepidium peregrinum</i> was most abundant in the tussock grassland fringe of the riparian open forest, comprising <i>Poa</i> species, <i>Lomandra longifolia</i> and <i>Paspalum dilatatum</i> (DECCW 2011b).	Unlikely	Suitable habitat for the species was not present on site. It was not identified during site surveys
<i>Micromyrtus grandis</i> Severn River Heath-myrtle	E	Severn River Heath-myrtle grows in heath and low woodland in crevices of acid volcanic rocky outcrops and in the shallow soil of surrounding areas, at altitudes of 600 to 750 m. It occurs in open and exposed sites. Restricted to Severn River Nature Reserve and an adjacent property, about 60km north-west of Glen Innes on the New England Tablelands. (DECCW 2011b)	Unlikely	Outside the species known distribution. It was not identified during site surveys.

SPECIES	EPBC ACT	HABITAT REQUIREMENTS	LIKELIHOOD OF OCCURRENCE	JUSTIFICATION
<i>Rutidosia heterogama</i> Heath Wrinklewort	V	A small perennial herb up to 30cm. The flowers are yellow and up to 2 cm wide and flowering time is chiefly in Autumn (Harden 1992). Scattered coastal locations between Wyong and Evans Head, and on the New England Tablelands from Torrington and Ashford south to Wandsworth southwest of Glen Innes. Grows in heath on sandy soils and moist areas in open forest, and has been recorded along disturbed roadsides (DECCW 2011b).	Unlikely	Suitable habitat for the species was not present on site. It was not identified during site surveys
<i>Tylophora linearis</i>	E	Grows in dry scrub and open forest. Recorded from low-altitude sedimentary flats in dry woodlands of <i>Eucalyptus fibrosa</i> , <i>Eucalyptus sideroxylon</i> , <i>Eucalyptus albens</i> , <i>Callitris endlicheri</i> , <i>Callitris glaucophylla</i> and <i>Allocasuarina luehmannii</i> . Also grows in association with <i>Acacia hakeoides</i> , <i>Acacia lineata</i> , <i>Melaleuca uncinata</i> , <i>Myoporum</i> species and <i>Casuarina</i> species. Flowers in spring, with flowers recorded in November or May with fruiting probably 2 to 3 months later (DECCW 2011b).	Unlikely	Suitable habitat for the species was not present on site. It was not identified during site surveys
<i>Zieria ingramii</i> Keith's Zieria	E	Flowers in spring. Grows in dry sclerophyll forest on light sandy soils. NSW subdivisions: CWS. Known only from Goonoo Goonoo State Forest, about 40 km north-east of Dubbo. Mostly from gentle slopes in red-brown and yellow-brown sandy loams, often with a rocky surface.	Unlikely	Outside the species known distribution. It was not identified during site surveys.

SPECIES	EPBC ACT	HABITAT REQUIREMENTS	LIKELIHOOD OF OCCURRENCE	JUSTIFICATION
FISH				
Murray Cod <i>Mucullochella peelii peelii</i>	E	Widespread throughout the Murray-Darling system originally being found in virtually all waterways of that system. Habitat varies greatly, from quite small clear, rocky, upland streams with riffle and pool structure on the upper western slopes of the Great Dividing Range to large, meandering, slow-flowing, often silty rivers in the alluvial lowland reaches of the Murray-Darling Basin. Prefer deep holes with cover in the form of large rocks, fallen trees, stumps, clay banks and overhanging vegetation.	Unlikely	There are no permanent river systems known to be inhabited by Murray Cod in the study area
FROGS				
Booroolong Frog <i>Litoria booroolongensis</i>	E	The Booroolong Frog is restricted to NSW and north-eastern Victoria, predominantly along the western-flowing streams of the Great Dividing Range. It has disappeared from the Northern Tablelands and is now rare throughout most of the remainder of its range. Most recent records are from the south-west slopes of NSW. Live along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses. Adults occur on or near cobble banks and other rock structures within stream margins. Shelter under rocks or amongst vegetation near the ground on the stream edge. Sometimes bask in the sun on exposed rocks near flowing water during summer. Breeding occurs in spring and early summer and tadpoles metamorphose in late summer to early autumn. Eggs are laid in submerged rock crevices and tadpoles grow in slow-flowing connected or isolated pools.	Unlikely	Habitat suitable for Booroolong Frog was not present on site.

SPECIES	EPBC ACT	HABITAT REQUIREMENTS	LIKELIHOOD OF OCCURRENCE	JUSTIFICATION
Yellow Spotted Tree Frog <i>Litoria castanea</i>	E	Ponds, wetlands and slowly moving streams with abundant marginal growth of bulrushes and other vegetation (DECCW 2011b). The southern population has been noted to occur in both woodland and improved pastoral areas (DECCW 2011b). The species has not been recorded in the wild since the 1970s.	Unlikely	The species has declined substantially across its range and has not been recorded since the 1970's.

REPTILES

Collared Delma <i>Delma torquata</i>	V	<p>In general, the species occurs on rocky hillsides on basalt and lateritic soils supporting open eucalypt and <i>Acacia</i> woodland with a sparse understorey of shrubs and tussocks or semi-evergreen vine thicket. The holotype was collected on a small grassy hill with few trees which was grazed by cattle (Low in Kluge 1974).</p> <p>The population at Mount Crosby occurs in an area with many small, scattered loose rocks and some exposed bedrock. The vegetation consists of open, dry eucalypt woodland with an understorey of native and introduced grasses and some open shrubby species. The substrate is covered by 5 - 20 mm of dry leaf litter (Porter 1998).</p> <p>Specimens are usually found beneath rocks, logs and mats of leaf litter. At Mount Crosby, lizards showed a preference for rocks larger than the mean rock size available (preferred mean 172 cm) and vegetation cover lower than that available (preferred mean 31%). Pitfall trapping captured lizards in vegetation some distance from rocky outcrops, suggesting the species is not totally reliant on rocky habitat (Porter 1998).</p>	Unlikely	There are no records of this species on the Inverell and Glen Innes (1:100,000) map sheets DECCW (2011a) database records.
---	---	--	----------	--

SPECIES	EPBC ACT	HABITAT REQUIREMENTS	LIKELIHOOD OF OCCURRENCE	JUSTIFICATION
Bell's Turtle <i>Eelseya belli</i>	V	Found only in the upper reaches of the Namoi, Gwydir and MacDonald Rivers on the North West Slopes of NSW. Shallow to deep pools in upper reaches or small tributaries of major rivers in granite country. Usually found in narrow stretches of river 30 - 40 m wide, running through grazing land	Unlikely	Outside of the species known range.

BIRDS

Black-throated Finch (southern subspecies) <i>Poephila cincta cincta</i>	E	A small stocky bird with a distinctive black throat that forms a large bib. Once found from southern Cape York in Queensland to the Inverell district in northern NSW. It is now very rare in NSW. <i>Eucalypt</i> woodland and riverside vegetation, including paperbark and wattle shrubland. Areas close to water with a dense understorey of seeding grass and shrubs are favoured.	Unlikely	Species virtually extinct in NSW. It was not identified during site surveys.
Painted Snipe (Australian subspecies) <i>Rostratula benghalensis australis</i>	E	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber (DECCW 2011b). Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds (<i>ibid.</i>). Breeding is often in response to local conditions; generally occurs from September to December (DECCW 2011b). Roosts during the day in dense vegetation (DECCW 2011b). Forages nocturnally on mud-flats and in shallow water (DECC 2007). Feeds on worms, molluscs, insects and some plant-matter (<i>ibid.</i>).	Unlikely	Suitable habitat for the species was not recorded on site. It was not identified during site surveys.

MAMMALS

Brush-tailed Rock-wallaby <i>Petrogale penicillata</i>	V	Rocky areas in a variety of habitats, typically north facing sites with numerous ledges, caves and crevices (Strahan 1995).	Unlikely	Suitable habitat for the species was not recorded on site. It was not identified during site surveys.
---	---	---	----------	---

SPECIES	EPBC ACT	HABITAT REQUIREMENTS	LIKELIHOOD OF OCCURRENCE	JUSTIFICATION
Grey-headed Flying-Fox <i>Pteropus poliocephalus</i>	V	Inhabits a wide range of habitats including rainforest, mangroves, paperbark forests, wet and dry sclerophyll forests and cultivated areas (Churchill 1998, Eby 1998). Camps are often located in gullies, typically close to water, in vegetation with a dense canopy (Churchill 1998).	Unlikely	The EPBC listing only concerns breeding camps. No breeding camps were identified during site surveys.
Large-eared Pied Bat <i>Chalinolobus dwyeri</i>	V	The Large-eared Pied Bat has been recorded in a variety of habitats, including dry sclerophyll forests, woodland, sub-alpine woodland, edges of rainforests and wet sclerophyll forests (Churchill 1998; DECCW 2011b). This species roosts in caves, rock overhangs and disused mine shafts and as such is usually associated with rock outcrops and cliff faces (Churchill 1998; DECCW 2011b).	Unlikely	Suitable habitat for the species was not recorded on site. It was not identified during site surveys.
Long-nosed Potoroo <i>Potorous tridactylus</i> (EPBC Act lists only the SE Mainland Population)	V	Associated with dry coastal heath and dry and wet sclerophyll forests (Strahan 1998) with dense cover for shelter and adjacent more open areas for foraging (Menkhorst & Knight 2004).	Unlikely	Suitable habitat for the species was not recorded on site. It was not identified during site surveys.
New Holland Mouse <i>Pseudomys novaehollandiae</i>	V	Recorded from Queensland to Tasmania, though with a sporadic and patchy distribution. Most records are coastal, though a population has recently been recorded up to 400km inland. The species includes heathlands, woodlands, open forest and paperbark swamps and on sandy, loamy or rocky soils. In coastal populations the species seems to have a preference for sandy substrates, a heathy understorey of legumes less than one metre high and sparse ground litter. Recolonisation of regenerating burnt areas occurs after one or two years and rehabilitated sand-mined areas after four to five years.	Unlikely	Suitable habitat for the species was not recorded on site. It was not identified during site surveys.

Appendix C

Supplementary DGR 4 (b) – A more detailed consideration of the risks of migratory and relevant threatened birds colliding with wind turbines is required. This should include consideration of factors such as likely numbers and the frequency with which the species occurs in the area and how the distribution of its habitat at the landscape-scale may influence its local movement patterns.

Consultation with SEWPAC was undertaken regarding this DGR. Constraints in terms of identifying the likely numbers and frequencies with which the species occur in the area were discussed. These include:

- Limited availability of data for the area in terms of frequency and distribution data for each species;
- The potential for an inaccurate assessment of frequency and distribution to be made if database records, such as Office of Environment and Heritage (OEH) records are relied upon as the absence of records in regional areas may be a reflection of limited survey effort rather than species absence or infrequent use;
- Vegetation mapping for the region is patchy and in some cases inaccurate. Habitat mapping across the project site has been undertaken for key species (e.g. Regent Honeyeater) although it is not possible to produce accurate landscape scale maps for all species; and
- Some species, in particular the Regent Honeyeater, are irregular in their seasonal movements, utilising areas in response to seasonal flowering. Therefore, many surveys over a large number of years would be required to accurately predict the frequency with which these species utilise the project site.

In the absence of detailed data for likely numbers and frequencies of species using the area, it was agreed that a risk matrix incorporating those Matters of NES with the potential to utilise the study area be prepared (see attached). Consultation with experts was also undertaken for key species such as the Regent Honeyeater in order to assess the likely impacts of the wind farm on key risk species. This is summarised below.

Consultation with OEH was undertaken regarding the likelihood of Regent Honeyeaters using the site and colliding with turbines. It was acknowledged that little is known about the height at which they fly or the distance they would cover if they were undertaking a long foraging foray throughout a day from the breeding area. The Regent Honeyeater is an arboreal species which forages mainly in the crowns of flowering trees (DSEWPAC 2011b), therefore, while foraging within woodland areas within the study area, collision with turbines is unlikely. However, this species is known to fly at heights of approximately 50 m above the canopy when moving in groups between foraging areas and may be at risk at this time. This species is considered most at risk when moving between woodland patches.

Consultation with Dean Ingwersen (BirdLife Australia) was undertaken regarding the likelihood that the Regent Honeyeater would breed and / or forage across the wind farm. During breeding the Regent Honeyeater forages within approximately 2 km of the nest. During local movements they are suspected to fly about 10 – 15 m above the canopy but when migrating are estimated to fly at a height of about 50 m above the canopy (pers comm. Dean Ingwersen, Bird Australia). Regent Honeyeaters are thought to be most at risk during migration, outside the breeding season (breeding season is between August and November) although this is speculative in the absence of detailed information and studies (people have used information from studies on other honeyeaters (eg. Yellow-faced Honeyeater and White-naped Honeyeater) to infer what the Regent Honeyeater is likely to do). There has been minimal tracking of foraging and migration heights for Regent Honeyeater and, therefore, the risk of strike cannot be accurately predicted (pers comm. Dean Ingwersen, BirdLife Australia).

The likelihood that honeyeaters would actively avoid the wind farm is also unknown. In the absence of sufficient studies or information, the likelihood of Regent Honeyeaters being struck cannot be accurately predicted. Therefore a commitment to monitor strike across Sapphire Wind Farm has been made. This will include the preparation of a bird and bat monitoring program prior to operation of the wind farm that, in consultation with OEH and SEWPAC, will identify the frequency of monitoring and reporting, the thresholds at which impacts are considered unacceptable and the adaptive management approaches which are acceptable.

Whilst it is not possible to completely eliminate the risks of birds colliding with turbines, a number of mitigation measures have been proposed to minimise the likelihood of the wind farm impacting on Matters of NES and important populations. A bird and bat adaptive management plan will be prepared prior to construction in a manner similar to that required by the recently-consented (10 July 2012) White Rock Wind Farm, and will:

- Set out monitoring requirements in order to assess the impact of the project on bird and bat populations, including survey locations, parameters to be measured, frequency of surveys and analyses and reporting. The monitoring program must be capable of detecting any changes to the population of birds and/or bats that can reasonably be attributed to the operation of the project;
- Incorporate a decision-making framework that sets out specific actions and when they may be required to be implemented to reduce any impacts on birds and bat populations;
- Identify at risk bird and bat groups, seasons and areas within the project site that may attract high levels of mortality and include monthly mortality assessments and periodic local population census' and bird utilisation surveys;
- Identify potential mitigation measures and implementation strategies in order to reduce impacts on birds and bats such as minimising the availability of raptor perches, swift carcass removal, pest control, sector management including switching off turbines that are predicted to, or have had an unacceptable impact on bird/bat mortality at certain times; and
- Identify matters to be addressed in periodic reports in relation to the outcomes of monitoring, the application of the decision-making framework, the mitigation measures identified, progress with the implementation of such measures and their success.

Reports will be prepared annually for the first five years to the Director-General and OEH, then every two years, thereafter.

Attachment 1 – Collision matrix

SCIENTIFIC NAME	COMMON NAME	CONSERVATION STATUS (EPBC Act)	RECORDS ON SITE	FLIGHT CHARACTERISTICS	MIGRATORY	DISTRIBUTION ACROSS SITE	RISK OF COLLISION WITH TURBINES	RISK OF COLLISION WITH OVERHEAD POWERLINES
EPBC Listed Birds								
<i>Anthochaera phrygia</i>	Regent Honeyeater	E, M	No	Canopy and 5 m – 50 m above canopy	Yes	Woodlands and paddock trees	Moderate - High	Low
<i>Lathamus discolor</i>	Swift Parrot	E	No	Canopy and above	Yes	Woodlands and paddock trees	Moderate - High	Moderate
<i>Apus pacificus</i>	Fork-tailed Swift	M	No	Canopy and above	Yes	Woodlands & grassland	Moderate - High	Low
<i>Hirundapus caudacutus</i>	White-throated Needletail	M	No	Canopy and above	Yes	Woodlands	Moderate - High	Low
<i>Merops ornatus</i>	Rainbow Bee-eater	M	Likely (previously recorded in Kings Plains NP)	Moderate to above canopy	Yes	Woodlands & grassland	Moderate	Low
<i>Ardea alba</i>	Great Egret	M	No	Moderate to high when moving long distances	Yes	Grassland	Moderate	Low
<i>Ardea ibis</i>	Cattle Egret	M	No	Moderate to high when moving long distances	Yes	Grassland	Moderate	Low