

Appendix B – Plates



Natural Temperate Grassland



Natural Temperate Grassland in flower



NTG / Known Grassland Earless Dragon habitat



Degradation at sheep camps



Looking east from towards
Snow Gum - Candlebark Woodland



Ribbon Gum – Snow Gum Open Forest



Ribbon Gum – Snow Gum Open Forest



Sown Ribbon Gum – Snow Gum Open Forest



Rock walls present across site



Little Whip Snake



Grassland Earless Dragon in spider tube



Spider tube with shelter



Brown snake in snake funnel



European Red Fox in Ribbon Gum –
Snow Gum Open Forest

Appendix C – Director General's Requirements

Table 29: Compliance table for Director General's Requirements dated 12 September 2009 and inputs from relevant agencies

Agency	Requirements	Section
DoP	The EA shall assess the worst case and representative impact for all key issues considering the alternate turbine layouts proposed as relevant	Chapter 5
DoP	Likely impacts of the proposed transmission line must be presented to demonstrate that the cumulative impacts of the development as a whole is acceptable and justified	Chapter 2, Appendix O
DoP	Draft Statement of Commitments detailing measures for environmental mitigation, management and monitoring for the project. A detailed description of how issues which would have cumulative impacts for the project and the connection to the existing 132kV transmission network would be managed including timing and responsibilities	Section 5.3, Appendix N Chapter 2
DoP	An assessment of all project components on flora and fauna and their habitat consistent with the <i>Draft Guidelines for Threatened Species Assessment</i> (DECC 2005), including: - Identifying the extent of existing vegetation and habitat on site The likely extent of disturbance associated with the project (including quantification of the impacts in a local and regional context)	Chapter 5, Appendix L Chapter 4.3 Section 5.4
DoP	Specifically consider impacts to threatened species and EECs listed on the site and surrounding land (including but not limited to NTG and the Grassland Earless Dragon) demonstrating that the impacts on these species and communities have been minimised as far as reasonable and feasible	Chapter 5, Appendix L & Appendix O
DoP	Specifically consider impacts to native vegetation (including fragmentation and impacts to biodiversity corridors) and to significant habitat (including riparian and or instream habitat in the case of disturbance to waterways)	Chapter 5, Appendix L

Agency	Requirements	Section
DoP	<p>Specifically assess the impact of the project on birds and bats from blade strikes, low air pressure zones at the blade tips and alteration to movement patterns, roost sites and nesting areas resulting from the turbines and any above ground transmission lines, including demonstration of how the project has been sited to avoid and/or minimise such impacts.</p> <p>If any of the bat and bird of bat species likely to be impacted by the wind turbines are listed species under State and Commonwealth legislation, then the significance assessment for each of these species must consider impacts from the wind turbines as well as impacts from habitat loss</p>	<p>Chapter 5, Appendix K and Appendix L</p> <p>Chapter 5, Appendix L</p>
DoP	Provide details of how flora and fauna impacts would be managed during construction and operation of all project components, including adaptive management and maintenance protocols and monitoring programs	Section 5.3, Appendix N
DoP	<p>Describe the measures to avoid, mitigate and offset impacts associated with the construction and operation of all project components consistent with 'improve or maintain' principles</p> <p>Sufficient information must be provided to demonstrate the availability of viable and achievable options to offset the impacts of the project</p>	Chapter 5 & 6
DECC	The actions that will be taken to avoid, mitigate and as a last resort offset impacts to the GED	Chapter 5 & 6
DECC	Assessment of impacts on Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy woodlands which are in the process of preliminary listing as an EEC under the TSC Act.	Chapter 5
DECC	Impacts of the project on threatened species and their habitat	Chapter 5, Appendix L, Appendix O
DECC	The environmental impacts of the project	Chapter 5
DECC	Actions that will be taken to avoid or mitigate impacts or compensate to prevent unavoidable impacts	Chapter 5 & 6
DECC	A field survey of the site should be conducted and documented in accordance with the draft ' <i>Guideline for Threatened Species Assessment</i> ' (DECC & DPI 2005)	Chapter 4
DECC	Likely impacts on regionally significant, protected and threatened species and their habitats need to be assessed, evaluated and	Chapter 5, Appendix L

Agency	Requirements	Section
	<p>reported.</p> <p>The assessment should specifically report on the considerations listed in Step 3 of the Draft threatened Species Assessment Guidelines (DECC & DPI 2005)</p>	
DECC	The EA should clearly state whether it meets each of the key thresholds set out in Step 5 of the draft guidelines and describe the actions that will be taken to avoid or mitigate impacts or compensate to prevent unavoidable impacts of the proposal on threatened species, populations, EECs, or their habitats	Chapter 5 & 6, Appendix L
DECC	The EA should clearly outline the extent to which the development footprint will impact on areas of native vegetation.	Section 5.4
DECC	Offsetting of biodiversity and habitat loss would be required as identified in the threatened species guidelines	Chapter 6
DECC	There are formulas associated with the 'maintain and improve' principle of the Government's vegetation reforms that DECC considers should apply	Chapter 6, Appendix M
DECC	An adequate offset must aim to result in a net improvement in biodiversity over time. Enhancement of biodiversity in offset areas is required to be equal to or greater than the loss in biodiversity from the impact site and should be managed in perpetuity	Chapter 6
DECC	The Biodiversity Offset Principle must be met	Chapter 6
DECC	A full description of the action proposed including a description of all associated actions whether they occur on or off the subject site.	Chapter 2 & 5
DECC	The type of proposed action shall be detailed, including the timetable for construction of the proposal. If a staged construction approach is adopted then the timetable shall clearly indicate this.	Chapter 2
DECC	If subsequent development of adjacent land is proposed by the proponent in the future then this shall be identified to the extent that it is known at the time of preparing the EA	Chapter 2
DECC	<p>The vegetation within the study area that is to be retained is to be fully documented, and shown on the relevant plans and maps.</p> <p>The proposed management regimes for such areas are also to be documented.</p>	<p>Chapter 4 & 5, Figure 6</p> <p>Chapter 5.3</p>

Agency	Requirements	Section
DECC	<p>A plan showing the proposal, the location and type of vegetation communities present within the study area, the full extent of the vegetation clearing anticipated and the scale of the plan</p> <p>The plan should also show the location of key habitat resources for threatened species</p> <p>Plan showing the location of any threatened species, population and EECs</p>	<p>Appendix A, Figure 6</p> <p>Appendix A, Figure 11</p> <p>Appendix A, Figure 6, Figure 9</p>
DECC	A general description of the threatened species and populations known or likely to be present in the area that is the subject of the action and any area that is likely to be affected by the action	Chapter 4, Appendix I
DECC	The species listed in Table 1 of the DECC DGRs need to be addressed as subject species	Chapter 4 & 5, Appendix L & I
DECC	Consultation of databases: DECC Atlas of NSW Wildlife and Bionet, as well as databases held by Australian Museum and Royal Botanical Gardens to assist in compiling the list of possible entities to be analysed	Appendix I
DECC	<p>A description of habitats such as frequency of tree hollows, presence of wetlands, density of understorey vegetation, composition of ground cover, soil type, presence of heath and permanent ephemeral swamps</p> <p>Condition of these habitats within the study area should be discussed, including the prevalence of introduced species</p>	Chapter 4
DECC	Any areas which may provide habitat connectivity between the study area and adjacent areas of likely habitat for the target species and EECs to be identified and described	Chapter 4
DECC	Consideration should be given to indirect impacts of the proposed action on species / habitats in and surrounding the subject site.	Section 5.5
DECC	Targeted surveys should be undertaken for all subject species, populations and communities for which potential habitat is present (see Error! Not a valid result for table.).	Section 4.2
DECC	Survey techniques shall be described and a reference given, where available, outlining the survey technique employed.	Chapter 4
DECC	Full AMG grid references for the survey site shall be provided	Section 1.2.1

Agency	Requirements	Section
DECC	Time invested into each survey technique shall be summarised	Chapter 4, Table 12
DECC	<p>Survey conditions from the commencement of each survey technique until its completion shall be noted</p> <p>The effect of season and weather at the time of field survey shall be considered with respect to the adequacy of survey results</p>	Appendix D, Table 10
DECC	Full list of flora and fauna species recoded during the surveys shall be included	Appendix G & H
DECC	For all subject species, populations and communities, the assessment of likely impacts shall consider the matters outlined in Section 4 of the DECC DGRs	Chapter 5, Appendix L
DECC	<p>For threatened species and populations likely to be affected by the proposal the following must be addressed:</p> <ul style="list-style-type: none"> - Other known local populations - Habitat utilisation - Description of vegetation - Corridors 	Chapter 5, Appendix L
DECC	Specific habitat features within the study area shall be described and quantified as well as the density of the understorey and groundcover	Chapter 4
DECC	For the habitats of subject species and populations found in the study area or EECs, a discussion of the distribution and condition of similar habitat within the region shall be included	Chapter 4 & 5
DECC	Reference to the threatening processes that are generally accepted by the scientific community as affecting the subject species, population or ecological community and any approved or draft recovery plans	Section 5.6
DECC	Investigation of feasible alternative turbine locations to avoid impacts on NTG and rocky areas	Section 5.2
DECC	<p>Any measures proposed to mitigate the effect of the proposal on local threatened species and communities</p> <p>The potential effectiveness of any such amelioration in maintaining a viable local population and / or local occurrence in the short, medium and long term shall be discussed.</p>	Section 5.3, Appendix L

Agency	Requirements	Section
DECC	<p>If significant modification of the proposal to minimise impacts on subject species, populations and communities is not possible, then compensatory strategies shall be considered</p> <p>Areas proposed for compensatory strategies must be described in full including a detailed description of their biology</p> <p>Where such proposals involve other lands, landholders, land managers are to be consulted and proposal shall contain evidence of support from these stakeholders and relevant land managers</p> <p>Compensatory benefits likely to result from such measures proposed for alternative sites are to be discussed and evaluated along with a discussion of the mechanisms through which they might best occur</p>	Chapter 6
DECC	<p>Any proposed pre-construction monitoring plans or on-going monitoring of the effectiveness of the mitigation measures shall be outlined in detail, including:</p> <ul style="list-style-type: none"> - Objectives - Methods - Reporting framework - Duration and frequency 	Section 5.3 Appendix N
DECC	An assessment of significance for each subject species, population or community likely to be impacted by the proposal is to be included	Appendix L
DPI	Mitigation measures for managing weeds is required to be particularly detailed as they will most likely be introduced from trucks and any imported soils	Section 5.3
DWE	No adverse impacts to watercourses, riparian corridors, wetlands and Groundwater Dependant Ecosystems	Riparian report & Section 5.4 & 5.5
DWE	Identify wetlands on or adjacent to site and buffer setback widths applied around wetlands (if applicable)	Chapter 4 & Chapter 5

Table 30: DECC Threatened Species and EEC Survey Requirements

Survey Requirements	Species / Community	Section
Threatened Fauna		
Surveys of the subject site and study area shall be undertaken for this species. All rocky slopes should be systematically surveyed. This shall involve rock-rolling and searching under logs and debris. Surveys shall be undertaken between mid-August and the end of October preferably after rain. Daily temperatures should not exceed 25°C during the survey period. Rocks, logs and debris shall be replaced carefully to sustain habitat integrity. Surveys of the <i>locality</i> for habitat of the species shall be undertaken. These shall involve determining the extent of potentially suitable habitat from aerial photographs or other means, and ground-truthing selected sites to validate habitat suitability, condition and extent. The sites sampled shall be used to provide context to the habitat affected by the action proposed.	Pink-tailed Worm-Lizard and Little Whip Snake	Chapter 4 Note a variation to these requirements was negotiated with DECC
Pitfall trapping should be undertaken for <i>Delmar impar</i> should be undertaken for 6 weeks, starting in early to mid November and extending through to mid/late December. Pitfall traps should be placed in suitable habitat being temperate grassland or nearby derived grassland, with a preference for Kangaroo grass <i>Themeda australis</i> or other grassland, including <i>Phalaris</i> . Traps should be positioned in cross-shaped arrays of 5 traps each, 10 metres apart, with a trap at the centre and drift fencing extending 5 metres past the outside traps. Traps must be checked daily. In addition, roof tiles should be placed within likely habitat for at least 4 months prior to checking. Checking of tiles should be undertaken at least fortnightly throughout spring and early summer,	Striped Legless Lizard	Chapter 4 Note a variation to these requirements was negotiated with DECC
Spider- tubes should be used to survey areas of suitable habitat, being natural temperate grassland with a preference to lower, open areas dominated by wallaby grasses. Survey season should be for 10 weeks from February to April with tubes checked twice a week. Density of tubes should be approximate 2/ha and be placed within transects to 10 tubes per transect spaced ten metres apart. Tubes should be left at least two weeks and no longer than one month prior to checking. In areas where grass is dense, grass should be whipper-snipped for a radius of 1 metre around each of tube to facilitate location and use by dragons. All spiders found in tubes should be removed at least 10 metres to reduce chance of recolonisation.	Grassland Earless Dragon	Chapter 4 Note a variation to these requirements was negotiated with DECC
Surveys should be undertaken in locality for termite mounds. In addition, Traps should be laid out randomly scattered in proximity to woodland for a minimum of three weeks in October	Rosenberg's Goanna	Potential habitat not present

Survey Requirements	Species / Community	Section
– November during the breeding season.		
Diurnal bird census shall be undertaken in the early morning and/or late afternoon within the subject site on three occasions each separated by a period of one week. Each census shall comprise observations for birds including call recognition for a period of 45 minutes at a minimum of three locations spread across the subject site. Additional opportunistic bird census shall be employed across the study area and locality during the course of other surveys for the SIS. Surveys can be undertaken at any time of the year, but should avoid high wind or rainy days.	Brown Treecreeper, Diamond Firetail, Hooded Robin, Speckled Warbler	Chapter 4 Note a variation to these requirements was negotiated with DECC
Hand netting during flight periods when they are known to happen. The consultant should discuss these periods with DECC prior to the survey taking place.	Golden Sun Moth	Chapter 4 Note a variation to these requirements was negotiated with DECC
Surveys using anabat recorders and stag watching should aim to identify the number and location of roost sites for the three subject bats and identify important foraging habitat in the study area and the locality. If required, DECC can provide further advice on bat survey techniques to acquire this information. Survey also for hollow bearing trees.	Eastern False Pipistrelle, Eastern Bent-wing bat, Large-footed myotis, Greater broad-nosed bat, Yellow-bellied sheath bat	Chapter 4 Note a variation to these requirements was negotiated with DECC
Diurnal surveys and nesting assessments of stagwatching and listening for calls. Hollow bearing trees with hollows >10cm diameter should be targeted within 50m of area proposed to be disturbed. Potential breeding habitat assessment should be based on number of hollow bearing trees.	Gang-gang Cockatoo	Chapter 4 Note a variation to these requirements was negotiated with DECC
Nocturnal call playback (1 site per 100 ha) with an initial listening period of 10 mins then play the call of each subject species separated by at least a 2 min listening period, then finish with a 10 min listening period. Identify and map all hollow bearing trees in the locality.	Barking Owl	Chapter 4 Note a variation to these requirements was negotiated with DECC

Survey Requirements	Species / Community	Section
Endangered Ecological Communities		
Identify the extent and condition of the EEC in the subject site, study area and locality. This shall involve the use of vegetation surveys in the subject site and the study area. The use of existing datasets held by DECC in combination with ground-truthing of selected sites within areas mapped by DECC as EEC is recommended for the locality. The sites sampled shall be used to provide context to the ECC affected by the action proposed. Survey can be undertaken at any time of the year under varied seasonal conditions.	Natural Temperate Grasslands Montane Peatlands and Swamps Upland Wetlands	Chapter 4 Note a variation to these requirements was negotiated with DECC
Threatened Flora		
Systematic surveys using evenly spaced transects located about 10m apart through all areas of woodland and grassland.	Monaro Golden Daisy <i>Dodonaea procumbens</i>	Chapter 4 Note a variation to these requirements was negotiated with DECC
Systematic surveys using evenly spaced transects located about 10m apart through all areas of wet Kangaroo grass and other damp areas located in the study area. DECC should be consulted to confirm flowering times with known population and seasons and appropriate survey methods.	Austral Toad Flax, Bredbo Gentian	Chapter 4 Note a variation to these requirements was negotiated with DECC
Systematic surveys using evenly spaced transects located about 10m apart through the study area. DECC should be consulted to confirm flowering times with known population and seasons and appropriate survey methods.	Silky Swainson Pea <i>Calotis glandulosa</i>	Chapter 4 Note a variation to these requirements was negotiated with DECC

Table 31: Supplementary Director-Generals Requirements (EPBC Act)

Requirement	Comments	Section
2. Description of the Controlled Action	Further detail provided in the EA	Chapter 2
3. Description of the relevant impacts of the controlled action		Chapter 5, Appendix L & O
a) An assessment of all relevant impacts with reference to the EPBC Act Policy Statement 1.1 <i>Significant Impact Guidelines on Matter of National Environmental Significance</i> (May 2006) that the action has, will have or is likely to have on: Threatened species and threatened ecological communities potentially present and listed under sections 18 and 18A of the EPBC Act, including, but not limited to, the Grassland Earless Dragon and NTG		Section 5.4 & 5.5, Appendix L & O
b) Information must include:		Section 5.4 & 5.5, Appendix L & O
- A description of the relevant impacts of the action on Matters of NES		Section 5.4 & 5.5, Appendix L & O
- A detailed assessment of the nature and extent of the likely short term and long term relevant impacts		Section 5.4 & 5.5, Appendix L & O
- A statement whether any relevant impacts are likely to be unknown, unpredictable or irreversible		Section 5.4 & 5.5, Appendix L & O
- Analysis of the significance of the relevant impacts		Section 5.4 & 5.5, Appendix L & O
- Any technical data and other information used or needed to make a detailed assessment of relevant impacts	References, expert advice, DECCW staff	Chapter 8
c) A description of the relevant impacts on NTG should include direct, indirect, cumulative and facilitative impacts on the:		Chapter 5, Appendix O
- Quality or integrity of the NTG (including but not limited to, assisting invasive species that are harmful to the NTG to become established,; or causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the NTG which kill or inhibit the growth of		

Requirement	Comments	Section
species in the ecological community		
- Extent of the NTG, including connectivity with other areas of NTG		Chapter 5, Appendix O
- The Grassland Earless Dragon at, in or in any way dependent upon, the NTG		Chapter 5, Appendix O
- Composition of the NTG		Chapter 5, Appendix O
- Habitat present on site critical to the survival of the NTG		Chapter 5, Appendix O
- Abiotic (non-living) factors (such as water, nutrients and soil) necessary for the NTG's survival, for example increasing groundwater levels or making the site wetter, soil disturbance or substantial alteration of surface water drainage patterns		Chapter 5, Appendix O
These impacts should be described for the construction and operation phases of the Controlled Action		Chapter 5, Appendix O
A description of the relevant impacts on the Grassland Earless Dragon should include, inter alia, direct, indirect cumulative and facilitative impacts on the:		Chapter 5, Appendix L
- Population of the Grassland Earless Dragon		
• Area of occupancy of the species		Chapter 5, Appendix L
- Habitat critical to the survival of the species		Chapter 5, Appendix L
- Breeding cycle of the population		Chapter 5, Appendix L & N
• Availability or quality of habitat for the species		Chapter 5, Appendix L
4. Proposed safeguards and mitigation measures		Section 5.2 & 5.3, Appendix L & N
A description of feasible mitigation measures, changes to the controlled action or procedures, which have been proposed by the proponent or suggested in public submissions, and which are intended to		Section 5.2 & 5.3, Appendix N

Requirement	Comments	Section
prevent or minimise relevant impacts. Information must include:		
- A description, and an assessment of the expected or predicted effectiveness of, the mitigation measures		Section 5.3, Appendix L & O
1. Any statutory or policy basis for the mitigation measures		N/A
- The cost of mitigation measures		Estimated at least \$1 million
- An outline of an environmental management plan that sets out the framework for continuing management, mitigation and monitoring programs for the relevant impacts of the action, including provisions for independent environmental auditing		Section 5.3
- Name of the agency responsible for endorsing or approving each mitigation measure or monitoring program	Department of Planning through Part 3A application consent	Section 3
- A consolidated list of mitigation measures proposed to be undertaken to prevent, minimise or compensate for the relevant impacts of the action		Section 5.3, Chapter 6

Appendix D – Survey Weather Conditions

	Month / Year	Date	Temps		Rain (mm)	Max wind gust		
			Min °C	Max °C		Direction	Speed (km/h)	Time
Week 1	Nov-08	3	14.0	23.0	0.8	SW	78	12:45:00
		4	5.0	17.0	0	S	46	14:46:00
		5	-0.2	24.0	0			
		6	2.2	24.2	0	SW	65	15:10:00
		7	NA	20.1	0	N	54	21:07:00
		Average:	5.3	21.7	0.2		6.8	

	Month / Year	Date	Temps		Rain (mm)	Max wind gust		
			Min °C	Max °C		Direction	Speed (km/h)	Time
Week 2	Nov-08	10	3.5	28.5	0	ENE	43	17:13
		11	6	28	0	NW	56	14:20
		12	6	29.2	0			
		13	6.5	29.9	0	WNW	43	13:48
		14	10.6	30.1	0	NW	61	11:21
		Average:	6.5	29.1	0.0		50.8	

	Month / Year	Date	Temps		Rain (mm)	Max wind gust		
			Min °C	Max °C		Direction	Speed (km/h)	Time
Week 3	Nov-08	17	5.7	23.5	0	ENE	43	16:45
		18	6.7	21.2	0	S	37	16:01
		19	9.6	19.6	0	NE	41	20:39
		20	10.9	23.4	7.6	W	56	13:30
		21	5.4	20.5	0.1	NW	56	16:11
		Average:	7.7	21.6	1.5		46.6	

Week 4	Month / Year	Date	Temps		Rain (mm)	Max wind gust		
			Min °C	Max °C		Direction	Speed (km/h)	Time
	Nov-08	24	7.4	18	5.8	SW	57	0:11
		25	8	19.3	0	NE	31	18:05
		26	4.5	22.1	0	NE	44	10:38
		27	6.5	27.4	0.6	NNW	43	16:59
28		12.2	27.8	1	WNW	54	14:38	
		Average:	7.7	22.9	1.5		45.8	

Week 5	Month / Year	Date	Temps		Rain (mm)	Max wind gust		
			Min °C	Max °C		Direction	Speed (km/h)	Time
	Dec-08	1	6.9	21	0	WSW	78	14:20
		2	2.2	20.9	0	WSW	54	12:42
		3	9	22.8	0	WSW	52	10:16
		4	6	23	0	NNE	46	15:36
5		13.8	26	0	NNW	54	10:40	
		Average:	7.58	22.74	0.0		56.8	

Week 6	Month / Year	Date	Temps		Rain (mm)	Max wind gust		
			Min °C	Max °C		Direction	Speed (km/h)	Time
	Dec-08	8	8.8	24.6	0	NNW	43	10:55
		9	3.8	27.2	0	NW	44	14:33
		10	10.3	15.7	0	SSW	37	3:32
		11	11	21	0	ENE	46	16:39
12		11.9	22.5	0.1	NNE	48	21:53	
		Average:	9.2	22.2	0.0		43.6	

Week 7	Month / Year	Date	Temps		Rain (mm)	Max wind gust		
			Min °C	Max °C		Direction	Speed (km/h)	Time
	Jan-09	5	10.2	31.3	0	W	57	16:00
		6	3.9	33.5	0	W	57	13:41
		7	8	35.3	0	NW	63	12:50
		8	-0.7	24.3	0	S	46	14:17
9		8.3	20.5	0	NE	50	18:44	
		Average:	5.9	29.0	0.0		54.6	

Week 8	Month / Year	Date	Temps		Rain (mm)	Max wind gust		
			Min °C	Max °C		Direction	Speed (km/h)	Time
	Jan-09	12	8.5	25.5	0	ENE	39	15:27
		13	7.5	33.3	0	SW	50	14:05
		14	11.4	36.2	0	W	52	10:29
		15	15.5	35.2	0	WSW	61	15:47
		16	7.2	28	0	WSW	61	8:42
	Average:		10.0	31.6	0.0		52.6	

Week 9	Month / Year	Date	Temps		Rain (mm)	Max wind gust		
			Min °C	Max °C		Direction	Speed (km/h)	Time
	Jan-09	19	6.5	32.1	0	SSW	44	16:06
		20	9.2	34.3	0	W	63	15:55
		21	15.6	33	14.6	W	57	17:48
		22	17.4	27	0	NW	69	15:08
		23	15.7	30.5	3	NNW	65	14:38
	Average:		12.9	21.4	3.5		59.6	

Week 10	Month / Year	Date	Temps		Rain (mm)	Max wind gust		
			Min °C	Max °C		Direction	Speed (km/h)	Time
	Jan-09	26	10.5	31.5	0	ESE	44	14:01
		27	8.5	35	0	SSW	50	14:19
		28	12.9	35.7	0	NE	41	17:09
		29	12.9	38	0	ENE	46	16:36
		30	12.4	38.5	0	NE	44	15:24
	Average:		11.4	35.7	0.0		45.0	

Week 11	Month / Year	Date	Temps		Rain (mm)	Max wind gust		
			Min °C	Max °C		Direction	Speed (km/h)	Time
	Feb-09	2	14.9	35.6	0	SSE	76	15:47
		3	15.6	26	3.8	S	31	10:00
		4	15.8	31	0	ESE	39	15:22
		5	14.4	36	0.3	SW	50	13:14
		6	13.9	37.8	0	W	57	11:23
	Average:		14.9	33.3	0.8		50.6	

Week 12	Month / Year	Date	Temps		Rain (mm)	Max wind gust		
			Min °C	Max °C		Direction	Speed (km/h)	Time
	Feb-09	9	12.6	18.8	0.4	SSW	41	12:30
		10	10	19.9	0.2	S	46	16:36
		11	9.5	20.9	0	S	44	16:14
		12	10.4	14	5.2	ESE	30	16:54
13		7.8	17.5	4	ENE	43	15:50	
		Average:	10.1	18.2	2.0		40.8	

Week 13	Month / Year	Date	Temps		Rain (mm)	Max wind gust		
			Min °C	Max °C		Direction	Speed (km/h)	Time
	Feb-09	16	8.7	19.9	0	ENE	41	15:00
		17	8	20.6	0.2	ENE	39	14:27
		18	11.5	21.3	0.2	SSE	30	16:48
19		8.2	28.1	0	SSW	52	12:51	
	20	5.8	27	0	SSW	39	10:14	
		Average:	8.4	23.4	0.1		40.5	

Week 14	Month / Year	Date	Temps		Rain (mm)	Max wind gust		
			Min °C	Max °C		Direction	Speed (km/h)	Time
	Feb-09	23	9.4	29.1	0	W	56	10:41
		24	8.3	29.4	0	WNW	74	11:09
		25	5.2	27.2	0	S	46	17:31
		26	6.8	24.6	0	E	39	13:52
27		13.4	30.2	0	SSW	39	14:06	
		Average:	8.6	28.1	0.0		50.8	

Week 15	Month / Year	Date	Temps		Rain (mm)	Max wind gust		
			Min °C	Max °C		Direction	Speed (km/h)	Time
	Mar-09	2	12.9		0	ENE	50	16:48
		3		23.6	0.6	N	46	22:24
		4	13.9	20.1	0	W	65	15:11
		5	8.2	18.5	0	SW	67	10:31
6		1.5	23.1	0	SSW	28	17:04	
		Average:	9.1	21.3	0.1		51.2	

Week 16	Month / Year	Date	Temps		Rain (mm)	Max wind gust		
			Min °C	Max °C		Direction	Speed (km/h)	Time
	Mar-09	9	12.4	25.9	0	ENE	41	15:44
		10	8.5	25.2	0	NNE	46	14:33
		11	11.5	22.5	0.2	NE	44	17:23
12		11.4	27.8	0	WSW	41	15:10	
		13	14	23.9	1.4	ENE	28	12:12
		Average:	11.6	25.1	0.3		40.0	

Week 17	Month / Year	Date	Temps		Rain (mm)	Max wind gust		
			Min °C	Max °C		Direction	Speed (km/h)	Time
	Mar-09	16	2.5	20.3	0	W	44	15:24
		17	1.3	21.8	0	S	43	13:26
		18	2.5	27.2	0	NNW	33	17:28
19		4.5	27.8	0	ENE	33	18:11	
	20	2.5	28.9	0	ENE	41	17:35	
		Average:	2.7	25.2	0.0		38.8	

Week 18	Month / Year	Date	Temps		Rain (mm)	Max wind gust		
			Min °C	Max °C		Direction	Speed (km/h)	Time
	Mar-09	23	6.1	29.3	0	NW	52	11:44
		24	6.2	29.8	0	W	50	12:13
		25	9	25.7	0	NW	61	14:31
26		7.2	26	0	W	50	11:52	
		27	9.5	24.5	0	S	39	15:05
		Average:	7.6	27.1	0.0		50.4	

Week 19	Month / Year	Date	Temps		Rain (mm)	Max wind gust		
			Min °C	Max °C		Direction	Speed (km/h)	Time
	Mar/Apr-09	30	3.3	23.4	0	NE	44	16:08
		31	7.6	20.2	2.8	ENE	43	14:25
		1	12	20	2.7	NE	37	12:23
		2	10.5	22.4	1.2	ENE	43	14:26
3		13.9	27.3	0	WNW	52	18:40	
		Average:	9.5	22.7	1.3		43.8	

Week 20	Month / Year	Date	Temps		Rain (mm)	Max wind gust		
			Min °C	Max °C		Direction	Speed (km/h)	Time
	Apr-09	6	7	16.9	0	S	35	2:30
		7	0.3	17.2	0	SW	48	9:48
		8	0	21	0	ENE	26	18:16
		9	4.3	22.5	0	NNE	37	16:53
10	4.2	22.6	0	NNW	43	13:40		
		Average:	3.2	20.0	0.0		37.8	

Week 21	Month / Year	Date	Temps		Rain (mm)	Max wind gust		
			Min °C	Max °C		Direction	Speed (km/h)	Time
	Apr-09	13	3.1	20.8	0	NE	30	16:33
		14	12	20	22	WSW	26	16:01
		15	3.8	20.6	0	WNW	83	12:27
		16	0	19	0	WNW	43	20:27
17	0	19.5	0	ENE	28	17:37		
		Average:	3.8	20.0	4.4		42.0	

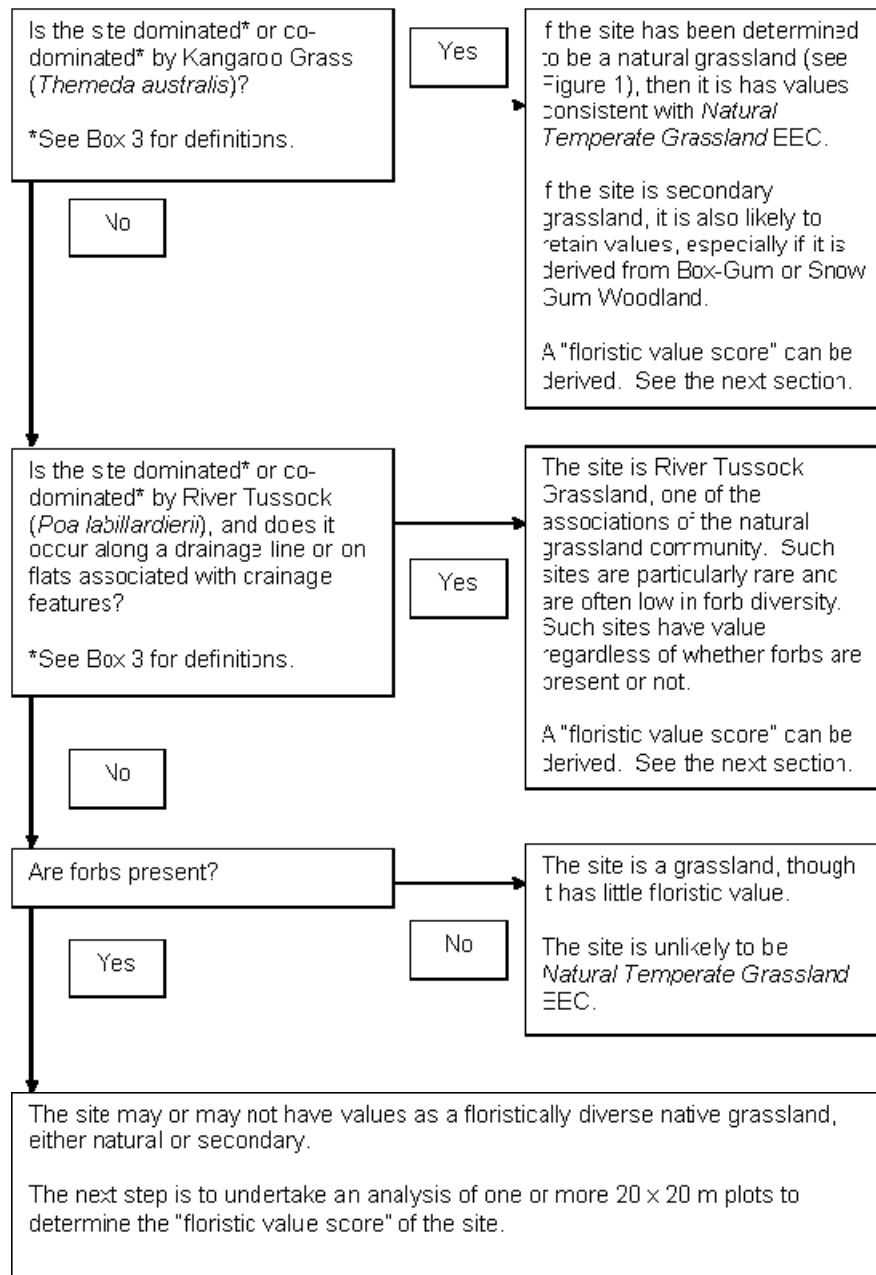
Week 22	Month / Year	Date	Temps		Rain (mm)	Max wind gust		
			Min °C	Max °C		Direction	Speed (km/h)	Time
	Apr-09	20	8.5	15.6	0.8	S	31	15:20
21		5.2	14.8	0	ENE	30	16:00	
22		8.4	15.6	0.1	NE	28	12:50	
23		6.6	17.4	0.4	NNE	37	12:16	
24		3.1	17.3	0	NW	56	14:14	
		Total			1.3			
		Average:	6.4	16.1	0.3		36.4	

Week 23	Month / Year	Date	Temps		Rain (mm)	Max wind gust		
			Min °C	Max °C		Direction	Speed (km/h)	Time
	Apr/May-09	27	0	10.9	0	W	44	12:19
28		-0.2	9.4	0.8	SSW	41	11:49	
29		-2.1	10.2	0	S	22	9:53	
30		-2.9	13.1	0	NE	20	16:17	
1		-2.5	17.1	0	S	20	12:52	
		Total			0.8			
		Average:	-1.5	12.1	0.2		29.4	

	Month / Year	Date	Temps		Rain (mm)	Max wind gust		
			Min °C	Max °C		Direction	Speed (km/h)	Time
Week 24	May-09	4	-2.8	17.2	0	S	30	14:16
		5	2	15.6	0	NNE	17	10:24
		6	-1.4	15.7	0	NE	20	11:15
		7	-2.5	15.6	0	SSW	37	13:34
		8	-1.2	15.2	0	SSW	24	0:03
	Average:		-1.2	15.9	0.0		25.6	

	Month / Year	Date	Temps		Rain (mm)	Max wind gust		
			Min °C	Max °C		Direction	Speed (km/h)	Time
Week 25	May-09	11	-1.5	15.1	0	S	26	15:52
		12	0.4	14.9	0	SE	19	12:36
		13	-2.5	15.1	0	W	44	14:56
		14	-1.5	13.9	0	WNW	46	21:31
		15	7.5	14.5	0	WNW	65	22:30
	Average:		0.5	14.7	0.0		40.0	

Appendix E – Decision Chart and EPBC Act Natural Temperate Grassland Criteria (Rehwinkel)



Appendix F – Biobanking Survey Methodology

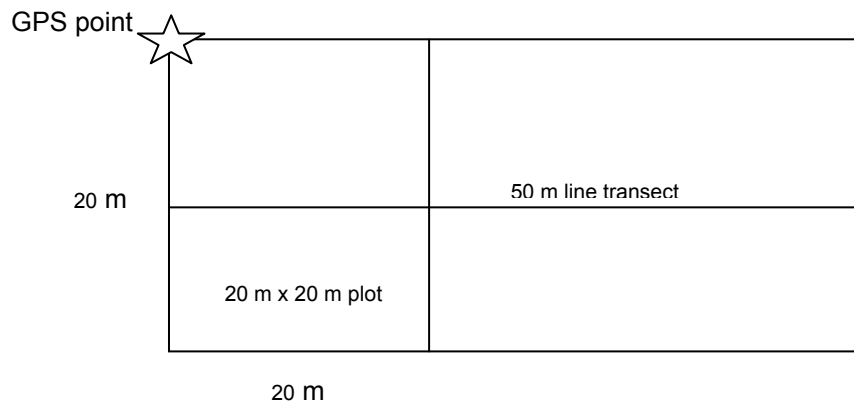


Table 32: Methods for Biometric Surveys

Characteristic	Method
Indigenous Plant Species Richness	<ul style="list-style-type: none"> 20 m x 20 m quadrat within each vegetation type in the same location as the general flora surveys quadrats. Quadrat was traversed and the number of indigenous vascular plant species counted.
Percentage Foliage Cover	<p>Native Over-storey Cover</p> <ul style="list-style-type: none"> Assessed at 10 points at 5 m intervals along a 50 m transect adjacent to the vegetation quadrat. Native over-storey is the tallest woody stratum present (including emergents) above 1 m and includes all species native to New South Wales (i.e. native species not local to the area can contribute to over-storey structure). Over-storey cover is estimated as percent foliage cover, which is equivalent to the amount of shadow that would be cast on the ground if there were a light source directly overhead. Results were summed and then divided by the number of points measured along the transect. <p>Native Mid-storey Cover</p> <ul style="list-style-type: none"> Assessed at 10 points at 5 m intervals along a 50 m transect adjacent to the vegetation quadrat

Characteristic	Method
	<ul style="list-style-type: none"> Native mid-storey contains all vegetation between the over-storey stratum and a height of 1 m (typically tall shrubs, under-storey trees and tree regeneration) and includes all species native to New South Wales (i.e. native species not local to the area can contribute to mid-storey structure). Percentage foliage cover of the mid-storey was estimated. Results were summed and then divided by the number of points measured along the transect. <p>Native Ground Cover (grasses)</p> <ul style="list-style-type: none"> Native ground cover contains all native vegetation below 1 m in height and includes all species native to New South Wales. Native ground cover (grasses) refers to native grasses (i.e. plants belonging to the family Poaceae). Estimates of the percentage foliage cover were taken at 1 m intervals along 50 m transect. Only those species directly underneath the tape measure were counted. The total of 'hits' was divided by the number of points measured along the transect (i.e. 50). <p>Native Ground Cover (shrubs)</p> <ul style="list-style-type: none"> Native ground cover (shrubs) refers to native woody vegetation <1 m. It is measured in the same way as for native ground cover (grasses) <p>Native Ground Cover (other)</p> <ul style="list-style-type: none"> Native ground cover (other) refers to non-woody native vegetation (vascular plants only) <1 m that is not grass (e.g. herbs, ferns). It is measured in the same way as for native ground cover (grasses)
Exotic Plant Cover	<p>Exotic Plant Cover</p> <ol style="list-style-type: none"> Exotic plant cover was measured as total per cent foliage cover of all exotics in all strata. Exotic vascular plants (i.e. not native to Australia) within the each strata was estimated using the same methodologies used for the native over-storey, mid-storey and native groundcover (grasses) as outlined above.
Number of Tree with Hollows	<ol style="list-style-type: none"> All dead and alive hollow-bearing trees within the 20 m x 50 m plot were recorded where they met the following criteria:

Characteristic	Method
	<ol style="list-style-type: none"> 4. Hollow entrance visible; 5. Hollow entrance $\geq 5\text{cm}$ across; 6. Hollow appears to have depth; 7. Hollow at least 1 m above the ground; and 8. The centre of the tree is within the plot (note that the hollow does not need to be within the plot).
Regeneration	<ol style="list-style-type: none"> 9. Proportion of overstorey species present in the entire vegetation zone with a Diameter at Breast Height (DBH) $\leq 5\text{ cm}$ (i.e. regenerating). 10. Total proportion was calculated by dividing the number of regeneration trees by the total number of trees within the plot.
Total Length of Fallen Logs	<ul style="list-style-type: none"> • Length of all logs within the 20 m x 50 m plot with a diameter $\geq 10\text{ cm}$ and that were at least 0.5 m long were measured. • The lengths were then summed to obtain a total length of fallen logs within the plot. • For logs that were not wholly within the plot, only the part of the log that fell within the plot boundaries was measured.
Source and further details: <i>Biobanking Operation Manual (DECC 2009)</i>	

Appendix G – Flora Species List

Table 33: Flora species recorded on Springfield, Yandra and Boco

Family	Scientific Name	Common Name	Native	Springfield							Yandra							Boco						
				Q95	Q53	Q555	Q51	Q60	Q47		Q74	Q115	Q68	Q70	Q87	Q77		Q44	Q38	Q28	Q131	Q127	Q29	Q30
Adiantaceae	<i>Cheilanthes sieberi</i>		Yes																					
Amaranthaceae	<i>Amaranthus powellii</i>	Powell's Amaranth	No																					
Apiaceae	<i>Hydrocotyle laxiflora</i>	Stinking Pennywort	Yes																					
Aspleniaceae	<i>Asplenium flabellifolium</i>		Yes																					
Asteraceae	<i>Brachyscome dentata</i>		Yes														< 5							
Asteraceae	<i>Brachyscome</i> sp.		Yes																					
Asteraceae	<i>Carthamus lanatus</i>	Saffron Thistle	No																					< 5
Asteraceae	<i>Centipeda cunninghamii</i>	Common Sneezeweed	Yes																					
Asteraceae	<i>Chondrilla juncea</i>	Skeleton Weed	No																					
Asteraceae	<i>Chryscephalum apiculatum</i>	Common Everlasting	Yes					<5	<5															
Asteraceae	<i>Cirsium vulgare</i>	Spear Thistle	No							<5		< 5			< 5		< 5		< 5	< 5				
Asteraceae	<i>Cymbonotus lawsonianus</i>	Bears-ear	Yes																					
Asteraceae	<i>Euchiton sphaericus</i>		Yes																					
Asteraceae	<i>Hypochoeris radicata</i>	Catsear	No																					< 5
Asteraceae	<i>Lactuca serriola</i>	Prickly Lettuce	No																					
Asteraceae	<i>Onopordum acanthium</i>	Scotch Thistle	No								< 5					< 5						<5		
Asteraceae	<i>Onopordum</i> sp.		Yes																		< 5			
Asteraceae	<i>Senecio laevis</i>	Variable Groundsel	Yes																					
Asteraceae	<i>Silybum marianum</i>	Variegated Thistle	No																					
Asteraceae	<i>Solenogyne gunnii</i>		Yes																					
Asteraceae	<i>Tragopogon dubius</i>	Goatsbeard	No														< 5			< 5				
Asteraceae	<i>Vittadinia cuneata</i>	Fuzzweed	Yes			<5		<5									5	< 5				< 5	< 5	
Asteraceae	<i>Vittadinia cuneata</i> f. <i>cuneata</i>		Yes																					
Asteraceae	<i>Vittadinia muelleri</i>		Yes						<5									< 5						
Asteraceae	<i>Xanthium spinosum</i>	Bathurst Burr	No																					
Boraginaceae	<i>Cynoglossum suaveolens</i>		Yes																					
Brassicaceae	<i>Capsella bursa-pastoris</i>	Shepherd's Purse	No													< 5							< 5	
Brassicaceae	<i>Hirschfeldia incana</i>	Hairy Brassica	No																					
Brassicaceae	<i>Hirschfeldia</i> sp.		No																		< 5	< 5	< 5	< 5
Campanulaceae	<i>Wahlenbergia communis</i>		Yes																					
Campanulaceae	<i>Wahlenbergia communis</i>		Yes																					
Campanulaceae	<i>Wahlenbergia luteola</i>		Yes																					< 5
Campanulaceae	<i>Wahlenbergia</i> sp.		Yes														< 5	< 5						
Caryophyllaceae	<i>Arenaria serpyllifolia</i>	Thyme-leaved Sandwort	No																					
Caryophyllaceae	<i>Paronychia brasiliensis</i>	Chilean Whitlow Wort	No																					
Caryophyllaceae	<i>Petrophragma nanteuillii</i>		No																					
Caryophyllaceae	<i>Scleranthus dander</i>	Tufted Knawel	Yes	<5				<5	<5								< 5	< 5						
Caryophyllaceae	<i>Scleranthus</i> sp.		Yes																					
Chenopodiaceae	<i>Chenopodium pumilio</i>	Small Crumbweed	Yes	<5			< 5	<5					< 5											< 5
Chenopodiaceae	<i>Convolvulus erubescens</i>		Yes	<5	<5	<5		<5	<5						< 5		< 5	< 5		< 5	< 5			
Chenopodiaceae	<i>Einadia nutans</i>	Climbing Saltbush	Yes	<5	<5	<5		<5	<5	<5				< 5	5		5		< 5					
Chenopodiaceae	<i>Einadia</i> sp.		Yes				< 5				< 5					< 5		5		5	10	< 5	< 5	
Chenopodiaceae	<i>Einadia trigonos</i> subsp. <i>trigonos</i>	Fishweed	Yes																					
Convolvulaceae	<i>Dichondra repens</i>	Kidney Weed	Yes		<5	<5	< 5																	
Cyperaceae	<i>Carex inversa</i>	Knob Sedge	Yes	<5		<5	< 5	<5	<5	30	5	40		10	< 5	10		25	< 5	< 5	< 5			
Cyperaceae	<i>Isolepis hookeriana</i>		Yes																					

Family	Scientific Name	Common Name	Native	Springfield						Yandra						Boco								
				Q95	Q53	QS55	Q51	Q60	Q47	Q74	Q115	Q68	Q70	Q87	Q77	Q44	Q38	Q28	Q131	Q127	Q29	Q30		
Euphorbiaceae	<i>Chamaesyce drummondii</i>	Caustic Weed	Yes						<5															
Fabaceae (Faboideae)	<i>Cullen tenax</i>	Emu-foot	Yes	<5		<5	< 5																	
Fabaceae (Faboideae)	<i>Desmodium varians</i>	Slender Tick-trefoil	Yes					<5								<5								
Fabaceae (Faboideae)	<i>Glycine clandestina</i>		Yes																					
Fabaceae (Faboideae)	<i>Glycine</i> sp.		Yes																					
Fabaceae (Faboideae)	<i>Glycine tabacina</i>		Yes																					
Fabaceae (Faboideae)	<i>Medicago minima</i>	Woolly Burr	No																					
Fabaceae (Faboideae)	<i>Medicago sativa</i>	Lucerne	Yes																					
Fabaceae (Faboideae)	<i>Swainsona behriana</i>		Yes		<5		< 5									< 5								
Fabaceae (Faboideae)	<i>Swainsona monticola</i>		Yes	<5					<5															
Fabaceae (Faboideae)	<i>Swainsona</i> sp.		Yes																					
Fabaceae (Faboideae)	<i>Trifolium arvense</i>	Haresfoot Clover	No																	< 5	< 5			
Fabaceae (Faboideae)	<i>Trifolium glomeratum</i>	Clustered Clover	No																					
Fabaceae (Mimosoideae)	<i>Acacia mearnsii</i>	Black Wattle	Yes																					
Geraniaceae	<i>Erodium cicutarium</i>	Common Storksbill	No	<5		<5	< 5		<5					< 5			< 5			< 5	< 5	< 5	< 5	
Geraniaceae	<i>Geranium molle</i>		No																					
Geraniaceae	<i>Geranium molle</i> subsp. <i>molle</i>	Cranesbill Geranium	No																					
Geraniaceae	<i>Geranium solanderi</i>		Yes																					
Geraniaceae	<i>Geranium solanderi</i> var. <i>solanderi</i>		Yes																					
Geraniaceae	<i>Geranium</i> sp.		Yes																					
Goodeniaceae	<i>Goodenia</i> sp.		Yes																					
Juncaceae	<i>Juncus</i> sp.		Unknown																					
Juncaceae	<i>Juncus usitatus</i>		Yes																					
Lamiaceae	<i>Ajuga australis</i>	Austral Bugle	Yes																					
Lamiaceae	<i>Marrubium vulgare</i>	White Horehound	No																					
Lamiaceae	<i>Salvia verbenaca</i>	Wild Sage	No					<5								< 5	< 5					< 5		
Malvaceae	<i>Malva neglecta</i>	Dwarf Mallow	No	<5	<5			<5		<5			< 5			< 5			15	< 5	< 5	< 5	< 5	
Myrtaceae	<i>Eucalyptus pauciflora</i>	White Sally	Yes																< 5					
Myrtaceae	<i>Eucalyptus rubida</i>	Candlebark	Yes																					
Myrtaceae	<i>Eucalyptus viminalis</i>	Ribbon Gum	Yes																					
Onagraceae	<i>Epilobium billardierianum</i>		Yes																					
Onagraceae	<i>Epilobium billardierianum</i> subsp. <i>cinereum</i>		Yes																					
Onagraceae	<i>Epilobium sarmentaceum</i>	Mountain Willow-herb	Yes																					
Oxalidaceae	<i>Oxalis perennans</i>		Yes			<5	< 5			<5						< 5								
Oxalidaceae	<i>Oxalis</i> sp.		Unknown																					
Plantaginaceae	<i>Plantago debilis</i>		Yes																					
Plantaginaceae	<i>Plantago varia</i>		Yes																					
Poaceae	<i>Austrodanthonia caespitosa</i>	Ringed Wallaby Grass	Yes	50	50	40	40	50	20		40	30		10		5	15			<5	5	5		
Poaceae	<i>Austrodanthonia fulva</i>		Yes			5										10					15	10		
Poaceae	<i>Austrodanthonia racemosa</i>		Yes															25						
Poaceae	<i>Austrodanthonia setacea</i>		Yes																					
Poaceae	<i>Austrodanthonia</i> sp.		Yes																					
Poaceae	<i>Austrodanthonia tenuior</i>		Yes																	< 5				
Poaceae	<i>Austrostipa bigeniculata</i>		Yes			15			5	<5				10	< 5	5		< 5	< 5	5				
Poaceae	<i>Austrostipa nodosa/scabra</i> group		Yes																					
Poaceae	<i>Austrostipa scabra</i>	Speargrass	Yes	<5	5	5	10	20	5			5		< 5		15	20		5		30	50		
Poaceae	<i>Austrostipa scabra</i> subsp. <i>falcata</i>		Yes																					
Poaceae	<i>Austrostipa</i> sp. (smutted)		Yes																					

Family	Scientific Name	Common Name	Native	Springfield						Yandra						Boco							
				Q95	Q53	QS55	Q51	Q60	Q47	Q74	Q115	Q68	Q70	Q87	Q77	Q44	Q38	Q28	Q131	Q127	Q29	Q30	
Poaceae	<i>Bothriochloa macra</i>	Red Grass	Yes																				
Poaceae	<i>Bromus brevis</i>		No																				
Poaceae	<i>Bromus diandrus</i>	Great Brome	No																	<5			
Poaceae	<i>Bromus molliformis</i>	Soft Brome	No																				
Poaceae	<i>Dactylis glomerata</i>	Cocksfoot	No																			< 5	
Poaceae	<i>Dichelachne rara</i>		Yes																				
Poaceae	<i>Elymus scaber</i>		Yes			<5			<5			< 5				< 5				< 5			
Poaceae	<i>Enneapogon nigricans</i>	Niggerheads	Yes																				
Poaceae	<i>Enneapogon</i> sp.		Yes													< 5							
Poaceae	<i>Hordeum glaucum</i>	Northern Barley Grass	No																				
Poaceae	<i>Hordeum vulgare</i>	Barley	No					< 5		40			< 5		20			< 5	< 5	< 5		< 5	
Poaceae	<i>Lachnagrostis filiformis</i>		Yes																				
Poaceae	<i>Lolium perenne</i>	Perennial Ryegrass	No																				
Poaceae	<i>Nassella trichotoma</i>	Serrated Tussock	No	<5	<5				<5					< 5		< 5	< 5	< 5	< 5	5	10	< 5	
Poaceae	<i>Phalaris aquatica</i>	Phalaris	No										60		70				50	50		< 5	
Poaceae	<i>Poa aff. sieberiana</i>		Yes	<5	<5	10	< 5		25	<5		< 5	< 5	10	< 5	40		30		< 5			
Poaceae	<i>Poa labillardierei</i>	Tussock Grass	Yes																				
Poaceae	<i>Poa meionectes</i>		Yes																				
Poaceae	<i>Poa sieberiana</i>		Yes	<5	<5	<5			<5		< 5			< 5		10			< 5				
Poaceae	<i>Sorghum leiocladum</i>	Wild Sorghum	Yes																				
Poaceae	<i>Themeda australis</i>	Kangaroo Grass	Yes			<5																	
Polygonaceae	<i>Acetosella vulgaris</i>	Sorrel	No													< 5							
Polygonaceae	<i>Polygonum aviculare</i>	Wireweed	No																< 5	<5			
Polygonaceae	<i>Rumex brownii</i>		Yes	<5	<5	<5		<5		<5						< 5							
Polygonaceae	<i>Rumex</i> sp.		Yes				< 5							< 5			< 5			<5	< 5	< 5	
Rhamnaceae	<i>Discaria pubescens</i>		Yes																				
Rosaceae	<i>Acaena echinata</i>		Yes			<5																	
Rosaceae	<i>Acaena ovina</i>		Yes													< 5							
Rosaceae	<i>Acaena</i> sp.		Yes	<5	<5				<5														
Rosaceae	<i>Rosa</i> sp.		No																				
Rubiaceae	<i>Asperula conferta</i>	Common Woodruff	Yes	<5	<5	<5		<5	<5							< 5						< 5	
Scrophulariaceae	<i>Verbascum thapsus</i>	Blanket Weed	No						<5							< 5			< 5	< 5			
Thymelaeaceae	<i>Pimelea glauca</i>		Yes																				
Violaceae	<i>Melicytus dentatus</i>	Tree Violet	Yes																				

Table 34: Flora recorded on Sherwins

Family	Scientific Name	Common Name	Native	Sherwin																			
				Q35	Q103	Q25	QE97	Q24	Q114	Q15-117	QN43	QSUB	Q40	Q23	QE25	Q34	Q33	Q43-101	Q20	Q39	Q102	Q109	Q09
Adiantaceae	<i>Chelanthus sieberi</i>		Yes																				
Amaranthaceae	<i>Amaranthus powellii</i>	Powell's Amaranth	No												< 5								
Apiaceae	<i>Hydrocotyle laxiflora</i>	Stinking Pennywort	Yes	< 5	< 5							< 5			< 5								< 5
Aspleniaceae	<i>Asplenium flabellifolium</i>		Yes																				
Asteraceae	<i>Brachyscome dentata</i>		Yes	5	< 5	< 5					< 5						< 5	< 5	< 5		< 5		
Asteraceae	<i>Brachyscome</i> sp.		Yes															< 5					
Asteraceae	<i>Carthamus lanatus</i>	Saffron Thistle	No					< 5															
Asteraceae	<i>Centipeda cunninghamii</i>	Common Sneezeweed	Yes																				
Asteraceae	<i>Chondrilla juncea</i>	Skeleton Weed	No																				
Asteraceae	<i>Chryscephalum apiculatum</i>	Common Everlasting	Yes		< 5					< 5			< 5				< 5	< 5					
Asteraceae	<i>Cirsium vulgare</i>	Spear Thistle	No	< 5	< 5			< 5								< 5		< 5		< 5		< 5	
Asteraceae	<i>Cymbonotus lawsonianus</i>	Bears-ear	Yes																		< 5		
Asteraceae	<i>Euchiton sphaericus</i>		Yes																				
Asteraceae	<i>Hypochoeris radicata</i>	Catsear	No	< 5											< 5			< 5	< 5		< 5		< 5
Asteraceae	<i>Lactuca seriola</i>	Prickly Lettuce	No																		< 5		
Asteraceae	<i>Onopordum acanthium</i>	Scotch Thistle	No										< 5										
Asteraceae	<i>Onopordum</i> sp.		Yes	< 5				30			< 5						< 5					< 5	
Asteraceae	<i>Senecio laevis</i>	Variable Groundsel	Yes																		< 5		
Asteraceae	<i>Silybum marianum</i>	Variegated Thistle	No																				< 5
Asteraceae	<i>Solenogyne gunnii</i>		Yes													< 5							
Asteraceae	<i>Tragopogon dubius</i>	Goatsbeard	No	< 5				< 5			< 5	< 5			< 5		< 5			< 5		< 5	
Asteraceae	<i>Vittadinia cuneata</i>	Fuzzweed	Yes	< 5		5					< 5				< 5			< 5		< 5			
Asteraceae	<i>Vittadinia cuneata</i> f. <i>cuneata</i>		Yes																				
Asteraceae	<i>Vittadinia cuneata</i> var. <i>cuneata</i>		Yes																				
Asteraceae	<i>Vittadinia muelleri</i>		Yes			< 5												< 5					
Asteraceae	<i>Xanthium spinosum</i>	Bathurst Burr	No														< 5	< 5			< 5	< 5	
Boraginaceae	<i>Cynoglossum suaveolens</i>		Yes																				
Brassicaceae	<i>Capsella bursa-pastoris</i>	Shepherd's Purse	No																		< 5		
Brassicaceae	<i>Hirschfeldia incana</i>	Hairy Brassica	No			5																	
Brassicaceae	<i>Hirschfeldia</i> sp.		No					< 5	< 5		< 5					< 5	< 5	< 5			< 5		
Campanulaceae	<i>Wahlenbergia communis</i>		Yes	< 5		< 5																	< 5
Campanulaceae	<i>Wahlenbergia communis</i>		Yes									< 5						< 5					
Campanulaceae	<i>Wahlenbergia luteola</i>		Yes																				
Campanulaceae	<i>Wahlenbergia</i> sp.		Yes		< 5	< 5				< 5	< 5						< 5		< 5	< 5			
Caryophyllaceae	<i>Arenaria serpyllifolia</i>	Thyme-leaved Sandwort	No												< 5								
Caryophyllaceae	<i>Paronychia brasiliensis</i>	Chilean Whitlow Wort	No																				< 5
Caryophyllaceae	<i>Petrohragia nanteuilii</i>		No																				
Caryophyllaceae	<i>Scleranthus diander</i>	Tufted Knawel	Yes	5	< 5	< 5				< 5	< 5	< 5	< 5										
Caryophyllaceae	<i>Scleranthus</i> sp.		Yes															< 5	< 5				
Chenopodiaceae	<i>Chenopodium pumilio</i>	Small Crumbweed	Yes		< 5	< 5	< 5	< 5	< 5	< 5			< 5		< 5	50				60		10	< 5
Chenopodiaceae	<i>Convolvulus erubescens</i>		Yes	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5			< 5	< 5			< 5	< 5	< 5	< 5	< 5	
Chenopodiaceae	<i>Einadia nutans</i>	Climbing Saltbush	Yes		< 5	5				< 5	5	< 5			5		< 5						
Chenopodiaceae	<i>Einadia</i> sp.		Yes	5				5	5						< 5		5		10	< 5	< 5	5	< 5
Chenopodiaceae	<i>Einadia trigonos</i> subsp. <i>trigonos</i>	Fishweed	Yes																				
Convolvulaceae	<i>Dichondra repens</i>	Kidney Weed	Yes	< 5		< 5				< 5	< 5									< 5		< 5	< 5
Cyperaceae	<i>Carex inversa</i>	Knob Sedge	Yes	5		< 5	< 5	< 5	< 5	< 5	< 5				< 5		< 5			5		5	10

Family	Scientific Name	Common Name	Native	Sherwin																				
				Q35	Q103	Q25	QE97	Q24	Q114	Q15-117	QN43	QSUB	Q40	Q23	QE25	Q34	Q33	Q43-101	Q20	Q39	Q102	Q109	Q09	Q41
Cyperaceae	<i>Isolepis hookeriana</i>		Yes																					
Euphorbiaceae	<i>Chamaesyce drummondii</i>	Caustic Weed	Yes		< 5					< 5														
Fabaceae (Faboideae)	<i>Cullen tenax</i>	Emu-foot	Yes	< 5		< 5		< 5	< 5	< 5	< 5			< 5								< 5	< 5	
Fabaceae (Faboideae)	<i>Desmodium varians</i>	Slender Tick-trefoil	Yes		< 5	< 5					< 5													
Fabaceae (Faboideae)	<i>Glycine clandestina</i>		Yes		< 5						< 5												< 5	
Fabaceae (Faboideae)	<i>Glycine</i> sp.		Yes																					
Fabaceae (Faboideae)	<i>Glycine tabacina</i>		Yes																					
Fabaceae (Faboideae)	<i>Medicago minima</i>	Woolly Burr	No																					
Fabaceae (Faboideae)	<i>Medicago sativa</i>	Lucerne	Yes					< 5											5		15			
Fabaceae (Faboideae)	<i>Swainsona behriana</i>		Yes	< 5																	< 5			
Fabaceae (Faboideae)	<i>Swainsona monticola</i>		Yes			< 5				< 5														
Fabaceae (Faboideae)	<i>Swainsona</i> sp.		Yes																					
Fabaceae (Faboideae)	<i>Trifolium arvense</i>	Haresfoot Clover	No				< 5									< 5					5			
Fabaceae (Faboideae)	<i>Trifolium glomeratum</i>	Clustered Clover	No																					
Fabaceae (Mimosoideae)	<i>Acacia mearnsii</i>	Black Wattle	Yes																					
Geraniaceae	<i>Erodium cicutarium</i>	Common Storksbill	No		< 5		5		< 5					< 5	5	< 5					< 5		< 5	
Geraniaceae	<i>Geranium molle</i>		No																					
Geraniaceae	<i>Geranium molle</i> subsp. <i>molle</i>	Cranesbill Geranium	No									< 5										< 5		
Geraniaceae	<i>Geranium solanderi</i>		Yes		< 5	5																		
Geraniaceae	<i>Geranium solanderi</i> var. <i>solanderi</i>		Yes																					
Geraniaceae	<i>Geranium</i> sp.		Yes																					
Goodeniaceae	<i>Goodenia</i> sp.		Yes																					
Juncaceae	<i>Juncus</i> sp.		Unknown																					
Juncaceae	<i>Juncus usitatus</i>		Yes																					
Lamiaceae	<i>Ajuga australis</i>	Austral Bugle	Yes																					
Lamiaceae	<i>Marrubium vulgare</i>	White Horehound	No											20										
Lamiaceae	<i>Salvia verbenaca</i>	Wild Sage	No	< 5			< 5	5				10	< 5					< 5					< 5	
Malvaceae	<i>Malva neglecta</i>	Dwarf Mallow	No				10	< 5	< 5			< 5	< 5	20	< 5				5		10	< 5		5
Myrtaceae	<i>Eucalyptus pauciflora</i>	White Sally	Yes																					
Myrtaceae	<i>Eucalyptus rubida</i>	Candlebark	Yes																					
Myrtaceae	<i>Eucalyptus viminalis</i>	Ribbon Gum	Yes									5												
Onagraceae	<i>Epilobium billardierianum</i>		Yes																					
Onagraceae	<i>Epilobium billardierianum</i> subsp. <i>cinereum</i>		Yes																					
Onagraceae	<i>Epilobium sarmentaceum</i>	Mountain Willow-herb	Yes																					
Oxalidaceae	<i>Oxalis perennans</i>		Yes										< 5									< 5	< 5	< 5
Oxalidaceae	<i>Oxalis</i> sp.		Unknown																					
Plantaginaceae	<i>Plantago debilis</i>		Yes			5																		
Plantaginaceae	<i>Plantago varia</i>		Yes	< 5	< 5														< 5	< 5				
Poaceae	<i>Austrodanthonia caespitosa</i>	Ringed Wallaby Grass	Yes	30	20	15	< 5	< 5	30	10		10	30	< 5		50	10	5		40		25	15	
Poaceae	<i>Austrodanthonia fulva</i>		Yes									10					< 5					5		
Poaceae	<i>Austrodanthonia racemosa</i>		Yes								10				10									
Poaceae	<i>Austrodanthonia setacea</i>		Yes																					
Poaceae	<i>Austrodanthonia</i> sp.		Yes			< 5		< 5																
Poaceae	<i>Austrodanthonia tenuior</i>		Yes																					
Poaceae	<i>Austrostipa bigeniculata</i>		Yes	5	< 5	40	< 5	15	50		10		5	< 5	< 5	< 5	< 5	10		< 5	< 5	< 5	< 5	

Family	Scientific Name	Common Name	Native	Sherwin																				
				Q35	Q103	Q25	QE97	Q24	Q114	Q15-117	QN43	QSUB	Q40	Q23	QE25	Q34	Q33	Q43-101	Q20	Q39	Q102	Q109	Q09	Q41
Poaceae	<i>Austrostipa nodosa/scabra</i> group		Yes																					
Poaceae	<i>Austrostipa scabra</i>	Speargrass	Yes	< 5	< 5				< 5	15		10	30		5		30	10		5		40	< 5	
Poaceae	<i>Austrostipa scabra</i> subsp. <i>falcata</i>		Yes																					
Poaceae	<i>Austrostipa</i> sp. (smutted)		Yes												5	10					< 5			
Poaceae	<i>Bothriochloa macra</i>	Red Grass	Yes										< 5											
Poaceae	<i>Bromus brevis</i>		No																					
Poaceae	<i>Bromus diandrus</i>	Great Brome	No			< 5			< 5				< 5	< 5									< 5	
Poaceae	<i>Bromus molliformis</i>	Soft Brome	No																					
Poaceae	<i>Dactylis glomerata</i>	Cocksfoot	No																					
Poaceae	<i>Dichelachne rara</i>		Yes																					
Poaceae	<i>Elymus scaber</i>		Yes	< 5												5		< 5	< 5				< 5	
Poaceae	<i>Enneapogon nigricans</i>	Niggerheads	Yes			< 5				< 5	< 5													
Poaceae	<i>Enneapogon</i> sp.		Yes																					
Poaceae	<i>Hordeum glaucum</i>	Northern Barley Grass	No																					
Poaceae	<i>Hordeum vulgare</i>	Barley	No				10		< 5			< 5		10	< 5	< 5			15		< 5			5
Poaceae	<i>Lachnagrostis filiformis</i>		Yes																					
Poaceae	<i>Lolium perenne</i>	Perennial Ryegrass	No					5																
Poaceae	<i>Nassella trichotoma</i>	Serrated Tussock	No				< 5				< 5					5	10				< 5			
Poaceae	<i>Phalaris aquatica</i>	Phalaris	No				< 5	40										20			5		< 5	
Poaceae	<i>Poa aff. sieberiana</i>		Yes	50	15	10		< 5	5		30	< 5	5		< 5			70		10		10	20	
Poaceae	<i>Poa labillardierei</i>	Tussock Grass	Yes							10						40	20							
Poaceae	<i>Poa meionectes</i>		Yes																					
Poaceae	<i>Poa sieberiana</i>		Yes	< 5	< 5	5			< 5	5		< 5						< 5		5		< 5	5	
Poaceae	<i>Sorghum leiocladum</i>	Wild Sorghum	Yes																					
Poaceae	<i>Themeda australis</i>	Kangaroo Grass	Yes																					
Polygonaceae	<i>Acetosella vulgaris</i>	Sorrel	No	< 5	< 5	< 5	< 5		< 5			< 5	< 5										< 5	
Polygonaceae	<i>Polygonum aviculare</i>	Wireweed	No				< 5																	
Polygonaceae	<i>Rumex brownii</i>		Yes			< 5					< 5													< 5
Polygonaceae	<i>Rumex</i> sp.		Yes	5	< 5		< 5		< 5	< 5			< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	
Rhamnaceae	<i>Discaria pubescens</i>		Yes																					
Rosaceae	<i>Acaena echinata</i>		Yes	< 5							< 5		< 5					< 5					< 5	
Rosaceae	<i>Acaena ovina</i>		Yes																					
Rosaceae	<i>Acaena</i> sp.		Yes		< 5					< 5		< 5								< 5				
Rosaceae	<i>Rosa</i> sp.		No									< 5												
Rubiaceae	<i>Asperula conferta</i>	Common Woodruff	Yes	< 5	5	5		< 5	< 5	< 5	< 5					< 5	< 5	< 5			< 5		< 5	
Scrophulariaceae	<i>Verbasum thapsus</i>	Blanket Weed	No			< 5		< 5	< 5				< 5	< 5									< 5	
Thymelaeaceae	<i>Pimelea glauca</i>		Yes										< 5											
Violaceae	<i>Melicytus dentatus</i>	Tree Violet	Yes																					

Table 35: Opportunistic flora records

Family	Scientific Name	Common Name	Native	Vegetation Community				
				NTG	SG	RGOF	SGW	DG
Adiantaceae	<i>Cheilanthes sieberi</i>		Yes	x				
Amaranthaceae	<i>Amaranthus powellii</i>	Powell's Amaranth	No					
Apiaceae	<i>Hydrocotyle laxiflora</i>	Stinking Pennywort	Yes	x				
Aspleniaceae	<i>Asplenium flabellifolium</i>		Yes					x
Asteraceae	<i>Brachyscome dentata</i>		Yes	x	x			x
Asteraceae	<i>Brachyscome</i> sp.		Yes	x	x			x
Asteraceae	<i>Carthamus lanatus</i>	Saffron Thistle	No					
Asteraceae	<i>Centipeda cunninghamii</i>	Common Sneezeweed	Yes					
Asteraceae	<i>Chondrilla juncea</i>	Skeleton Weed	No			x		
Asteraceae	<i>Chrysocephalum apiculatum</i>	Common Everlasting	Yes	x				
Asteraceae	<i>Cirsium vulgare</i>	Spear Thistle	No		x			
Asteraceae	<i>Cymbonotus lawsonianus</i>	Bears-ear	Yes					
Asteraceae	<i>Euchiton sphaericus</i>		Yes	x				
Asteraceae	<i>Hypochoeris radicata</i>	Catsear	No					
Asteraceae	<i>Lactuca serriola</i>	Prickly Lettuce	No					
Asteraceae	<i>Onopordum acanthium</i>	Scotch Thistle	No					
Asteraceae	<i>Onopordum</i> sp.		Yes					
Asteraceae	<i>Senecio laevis</i>	Variable Groundsel	Yes					
Asteraceae	<i>Silybum marianum</i>	Variegated Thistle	No					
Asteraceae	<i>Solenogyne gunnii</i>		Yes				x	
Asteraceae	<i>Tragopogon dubius</i>	Goatsbeard	No	x				
Asteraceae	<i>Vittadinia cuneata</i>	Fuzzweed	Yes		x	x		
Asteraceae	<i>Vittadinia cuneata</i> f. <i>cuneata</i>		Yes	x				
Asteraceae	<i>Vittadinia cuneata</i> var. <i>cuneata</i>		Yes		x			
Asteraceae	<i>Vittadinia muelleri</i>		Yes	x	x			
Asteraceae	<i>Xanthium spinosum</i>	Bathurst Burr	No					
Boraginaceae	<i>Cynoglossum suaveolens</i>		Yes				x	x
Brassicaceae	<i>Capsella bursa-pastoris</i>	Shepherd's Purse	No					
Brassicaceae	<i>Hirschfeldia incana</i>	Hairy Brassica	No		x			
Brassicaceae	<i>Hirschfeldia</i> sp.		No					
Campanulaceae	<i>Wahlenbergia communis</i>		Yes	x	x			
Campanulaceae	<i>Wahlenbergia communis</i>		Yes					
Campanulaceae	<i>Wahlenbergia luteola</i>		Yes		x			x
Campanulaceae	<i>Wahlenbergia</i> sp.		Yes					
Caryophyllaceae	<i>Arenaria serpyllifolia</i>	Thyme-leaved Sandwort	No					
Caryophyllaceae	<i>Paronychia brasiliensis</i>	Chilean Whitlow Wort	No					
Caryophyllaceae	<i>Petrorhagia nanteuilii</i>		No					
Caryophyllaceae	<i>Scleranthus diander</i>	Tufted Knawel	Yes					
Caryophyllaceae	<i>Scleranthus</i> sp.		Yes	x				
Chenopodiaceae	<i>Chenopodium pumilio</i>	Small Crumbweed	Yes					x
Chenopodiaceae	<i>Convolvulus erubescens</i>		Yes	x				
Chenopodiaceae	<i>Einadia nutans</i>	Climbing Saltbush	Yes					
Chenopodiaceae	<i>Einadia</i> sp.		Yes	x	x			
Chenopodiaceae	<i>Einadia trigonos</i> subsp. <i>trigonos</i>	Fishweed	Yes					x
Convolvulaceae	<i>Dichondra repens</i>	Kidney Weed	Yes					
Cyperaceae	<i>Carex inversa</i>	Knob Sedge	Yes		x		x	
Cyperaceae	<i>Isolepis hookeriana</i>		Yes					
Euphorbiaceae	<i>Chamaesyce drummondii</i>	Caustic Weed	Yes	x	x			

Family	Scientific Name	Common Name	Native	Vegetation Community				
				NTG	SG	RGOF	SGW	DG
Fabaceae (Faboideae)	<i>Cullen tenax</i>	Emu-foot	Yes	x				
Fabaceae (Faboideae)	<i>Desmodium varians</i>	Slender Tick-trefoil	Yes	x				
Fabaceae (Faboideae)	<i>Glycine clandestina</i>		Yes	x				
Fabaceae (Faboideae)	<i>Glycine</i> sp.		Yes		x			
Fabaceae (Faboideae)	<i>Glycine tabacina</i>		Yes	x				
Fabaceae (Faboideae)	<i>Medicago minima</i>	Woolly Burr	No				x	
Fabaceae (Faboideae)	<i>Medicago sativa</i>	Lucerne	Yes					x
Fabaceae (Faboideae)	<i>Swainsona behriana</i>		Yes	x				
Fabaceae (Faboideae)	<i>Swainsona monticola</i>		Yes		x			x
Fabaceae (Faboideae)	<i>Swainsona</i> sp.		Yes	x			x	
Fabaceae (Faboideae)	<i>Trifolium arvense</i>	Haresfoot Clover	No					
Fabaceae (Faboideae)	<i>Trifolium glomeratum</i>	Clustered Clover	No		x			
Fabaceae (Mimosoideae)	<i>Acacia mearnsii</i>	Black Wattle	Yes		x			
Geraniaceae	<i>Erodium cicutarium</i>	Common Storksbill	No				x	
Geraniaceae	<i>Geranium molle</i>		No		x			
Geraniaceae	<i>Geranium molle</i> subsp. <i>molle</i>	Cranesbill Geranium	No		x			
Geraniaceae	<i>Geranium solanderi</i>		Yes					
Geraniaceae	<i>Geranium solanderi</i> var. <i>solanderi</i>		Yes	x				
Geraniaceae	<i>Geranium</i> sp.		Yes					x
Goodeniaceae	<i>Goodenia</i> sp.		Yes	x				
Juncaceae	<i>Juncus</i> sp.		Unknown		x			
Juncaceae	<i>Juncus usitatus</i>		Yes	x				
Lamiaceae	<i>Ajuga australis</i>	Austral Bugle	Yes	x				
Lamiaceae	<i>Marrubium vulgare</i>	White Horehound	No					
Lamiaceae	<i>Salvia verbenaca</i>	Wild Sage	No	x	x			
Malvaceae	<i>Malva neglecta</i>	Dwarf Mallow	No					x
Myrtaceae	<i>Eucalyptus pauciflora</i>	White Sally	Yes					
Myrtaceae	<i>Eucalyptus rubida</i>	Candlebark	Yes				x	
Myrtaceae	<i>Eucalyptus viminalis</i>	Ribbon Gum	Yes					
Onagraceae	<i>Epilobium billardierianum</i>		Yes		x			
Onagraceae	<i>Epilobium billardierianum</i> subsp. <i>cinereum</i>		Yes					x
Onagraceae	<i>Epilobium sarmentaceum</i>	Mountain Willow-herb	Yes					
Oxalidaceae	<i>Oxalis perennans</i>		Yes	x				
Oxalidaceae	<i>Oxalis</i> sp.		Unknown					
Plantaginaceae	<i>Plantago debilis</i>		Yes					
Plantaginaceae	<i>Plantago varia</i>		Yes				x	
Poaceae	<i>Austrodanthonia caespitosa</i>	Ringed Wallaby Grass	Yes	x	x	x	x	x
Poaceae	<i>Austrodanthonia fulva</i>		Yes					
Poaceae	<i>Austrodanthonia racemosa</i>		Yes					
Poaceae	<i>Austrodanthonia setacea</i>		Yes					x
Poaceae	<i>Austrodanthonia</i> sp.		Yes	x	x			
Poaceae	<i>Austrodanthonia tenuior</i>		Yes					
Poaceae	<i>Austrostipa bigeniculata</i>		Yes	x	x		x	
Poaceae	<i>Austrostipa nodosa/scabra</i> group		Yes	x				
Poaceae	<i>Austrostipa scabra</i>	Speargrass	Yes	x	x			
Poaceae	<i>Austrostipa scabra</i> subsp. <i>falcata</i>		Yes	x	x	x	x	x
Poaceae	<i>Austrostipa</i> sp. (smutted)		Yes					

Family	Scientific Name	Common Name	Native	Vegetation Community				
				NTG	SG	RGOF	SGW	DG
Poaceae	<i>Bothriochloa macra</i>	Red Grass	Yes	x	x	x		x
Poaceae	<i>Bromus brevis</i>		No		x			
Poaceae	<i>Bromus diandrus</i>	Great Brome	No		x			
Poaceae	<i>Bromus molliformis</i>	Soft Brome	No		x	x		
Poaceae	<i>Dactylis glomerata</i>	Cocksfoot	No					
Poaceae	<i>Dichelachne rara</i>		Yes		x			
Poaceae	<i>Elymus scaber</i>		Yes	x				
Poaceae	<i>Enneapogon nigricans</i>	Niggerheads	Yes				x	
Poaceae	<i>Enneapogon sp.</i>		Yes	x				
Poaceae	<i>Hordeum glaucum</i>	Northern Barley Grass	No	x	x			
Poaceae	<i>Hordeum vulgare</i>	Barley	No					
Poaceae	<i>Lachnagrostis filiformis</i>		Yes					
Poaceae	<i>Lolium perenne</i>	Perennial Ryegrass	No		x			
Poaceae	<i>Nassella trichotoma</i>	Serrated Tussock	No	x				
Poaceae	<i>Phalaris aquatica</i>	Phalaris	No		x		x	
Poaceae	<i>Poa aff. sieberiana</i>		Yes					
Poaceae	<i>Poa labillardierei</i>	Tussock Grass	Yes	x				
Poaceae	<i>Poa meionectes</i>		Yes		x			
Poaceae	<i>Poa sieberiana</i>		Yes	x	x			
Poaceae	<i>Sorghum leiocladum</i>	Wild Sorghum	Yes			x		
Poaceae	<i>Themeda australis</i>	Kangaroo Grass	Yes	x				
Polygonaceae	<i>Acetosella vulgaris</i>	Sorrel	No					
Polygonaceae	<i>Polygonum aviculare</i>	Wireweed	No					x
Polygonaceae	<i>Rumex brownii</i>		Yes	x	x		x	
Polygonaceae	<i>Rumex sp.</i>		Yes	x				
Rhamnaceae	<i>Discaria pubescens</i>		Yes	x				
Rosaceae	<i>Acaena echinata</i>		Yes		x			
Rosaceae	<i>Acaena ovina</i>		Yes		x			
Rosaceae	<i>Acaena sp.</i>		Yes	x				
Rosaceae	<i>Rosa sp.</i>		No					
Rubiaceae	<i>Asperula conferta</i>	Common Woodruff	Yes	x				
Scrophulariaceae	<i>Verbascum thapsus</i>	Blanket Weed	No					
Thymelaeaceae	<i>Pimelea glauca</i>		Yes		x			
Violaceae	<i>Melicytus dentatus</i>	Tree Violet	Yes			x		

Appendix H – Fauna Species List

Table 36: Bats recorded across the study area and their flight character

Scientific Name	Common Name	TSC Act	Flight character
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat		Above canopy & sub canopy
<i>Chalinolobus morio</i>	Chocolate Wattled Bat		Mid canopy to below canopy
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V	Below or near the canopy and along tracks
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing Bat	V	Above canopy and open areas
<i>Nyctophilus</i> spp	A Long-eared Bat		Below canopy
<i>Tadarida australis</i>	White-Striped Freetail Bat		Above canopy
<i>Vespadelus darlingtoni</i>	Large Forest Bat		Below canopy, within canopy and forest floor
<i>Vespadelus regulus</i>	Southern Forest Bat		Below canopy & within canopy
<i>Vespadelus vulturnus</i>	Little Forest Bat		Below canopy
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat**	V	High speeds above canopy but lower in open area
<p>Note: Flight characteristics sourced from Van Dyck & Strahan (2008) or DECC (2009) ** = not recorded within the study area but predicted to occur Bold = recorded within the study area</p>			

Table 37: Diurnal bird records Yandra

Scientific name	Common name	Diurnal surveys																											
		Yandra																											
		11a, 8b	16a	29a, 23b	3a, 3b	19a	26a, 21b	11a, 8b	7a, 6b	7a, 6b	15a, 13b	13a, 10b	26a, 21b	16a	8a, 7b	4a, 4b	21a, 17b	12a, 9b	2a, 2b	16a	19a	17a	29a, 23b	13a, 10b	4b	17a	29a, 23b	8a, 7b	
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill											ow												w					
<i>Acanthiza</i> sp.																		o											
<i>Acanthorhynchus tenuirostris</i>	Eastern Spinebill																							w					
<i>Acridotheres tristis</i>	Common Myna																												
<i>Anas gracilis</i>	Grey Teal																												
<i>Anas rhynchotis</i>	Australasian Shoveler																												
<i>Anas superciliosa</i>	Pacific Black Duck																												
<i>Anthochaera carunculata</i>	Red Wattlebird	o	w		o	o				w	w	w				o	o	w	o	w	o		o	w			o	o	
<i>Anthus novaeseelandiae</i>	Richards Pipit	w		o	w		o	w								o	o						w	w			w		
<i>Aphelocephala leucopsis</i>	Southern Whiteface								ow		ow														o				
<i>Aquila audax</i>	Wedge-tailed Eagle						o																						
<i>Artamus personatus</i>	Masked Woodswallow		o						o																				
<i>Artamus superciliosus</i>	White-browed Woodswallow								ow	ow	ow																	o	
<i>Cacatua galerita</i>	Sulfur-crested Cockatoo	o	o	o	w	w			ow		o	w	ow	o		o	o	o		o		ow	o	o		ow	o	o	
<i>Cacatua roseicapilla</i>	Galah	o			o	w	o		w	w	ow		o	o		o	o	w	o	o	w	o	o	o		o	o	w	
<i>Cacatua sanguinea</i>	Little Corella				o				o																				
<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo																							w					
<i>Calyptorhynchus funereus</i>	Yellow-tailed Black-Cockatoo																						ow				ow		
<i>Chenonetta jubata</i>	Australian Wood Duck																												
<i>Cincloramphus cruralis</i>	Brown Songlark												ow																
<i>Cincloramphus mathewsi</i>	Rufus Songlark																												
<i>Colluricincla harmonica</i>	Grey Shrike-thrush																							o	o				
<i>Colluricincla harmonica</i>	Grey Shrike-thrush																												
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike					o			ow	ow							o						w				w		
<i>Corcorax melanorhamphos</i>	White-winged Chough																							w					
<i>Cormobates leucophaea</i>	White-throated Treecreeper								w								o						w	o			w		
<i>Corvus coronoides</i>	Australian Raven	w	w	o	o	w	o	w	ow		w	w					o			w	w			o				w	
<i>Corvus mellori</i>	Little Raven													w		w		w	w	w	w	ow		w		ow			
<i>Corvus oru</i>	Toriesian Crow																												
<i>Cotumix ypsilophora</i>	Brown Quail																												
<i>Cracticus nigrogularis</i>	Pied Butcherbird																												
<i>Cracticus</i> sp.		w																											
<i>Cuculus pallidus</i>	Pallid Cuckoo	o					o													w	w		ow				ow		
<i>Dacelo novaeguineae</i>	Laughing Kookaburra				w	o			ow					o		o	o		o			o		o		o			
<i>Daphoenositta chrysoptera</i>	Varied Sittella																												
<i>Egretta novaehollandiae</i>	White-faced Heron																												
<i>Eudynamys scolopacea</i>	Common Koel																												
<i>Falco bengora</i>	Brown Falcon																												
<i>Falco cenchroides</i>	Nankeen Kestral	o		o		o										o						o		o		o			
<i>Falco longipennis</i>	Australian Hobby																												

Scientific name	Common name	Diurnal surveys																											
		Yandra																											
		11a, 8b	16a	29a, 23b	3a, 3b	19a	26a, 21b	11a, 8b	7a, 6b	7a, 6b	15a, 13b	13a, 10b	26a, 21b	16a	8a, 7b	4a, 4b	21a, 17b	12a, 9b	2a, 2b	16a	19a	17a	29a, 23b	13a, 10b	4b	17a	29a, 23b	8a, 7b	
<i>Falco peregrinus</i>	Peregrine Falcon																												
<i>Fulca atra</i>	Eurasian Coot																												
<i>Gallinula tenebrosa</i>	Dusky Moorhen																												
<i>Grallina cyanoleuca</i>	Magpie-lark	o				w							o																
<i>Gymnorhina tibicen</i>	Australian Magpie	o	o	o	o	w	o	w	w	w	w	w		o	o	o	o	w	o	w	w	ow	o	o		ow	o	o	
<i>Haliastur sphenurus</i>	Whistling Kite																						o				o		
<i>Hirundo neoxena</i>	Welcome Swallow								ow																				
<i>Hirundo nigricans</i>	Tree Martin														o	o			o					o				o	
<i>Lalage tricolor</i>	White-winged Triller		o			w																							
<i>Lichenostomus chrysops</i>	Yellow-faced Honeyeater				o	o						ow						o	o					w					
<i>Malurus cyaneus</i>	Supurb Fairy-wren											ow						o						w					
<i>Manorina melanocephala</i>	Noisy Minor					o	o										o		w		o			w					
<i>Melithreptus lunatus</i>	White-naped Honeyeater																							ow					
<i>Ninox novaeseelandiae</i>	Southern boobook																												
<i>Ocyphaps lophotes</i>	Crested Pigeon																												
<i>Pachycephala rufiventris</i>	Rufous Whistler																							o					
<i>Pardalotus punctatus</i>	Spotted Pardalote		o		w	w		w		w														ow					
<i>Pardalotus striatus</i>	Striated Pardalote	w						w	w	w	o		o		w			w	o	ow	ow	ow	w		ow	ow			
<i>Petrochelidon nigricans</i>	Tree Martin		o		o	o		o	o	w	o		ow			o					o								
<i>Petroica phoenicea</i>	Flame Robin							o																					
<i>Phaps chalcoptera</i>	Common Bronzewing																												
<i>Platycercus adscitus eximius</i>	Eastern Rosella	o	o			o			ow			ow				o	o		o				o	o			o	o	
<i>Platycercus elegans</i>	Crimson Rosella		o		o	o		o	w		w	w			o	o	o	w	o	o	o	w	o	o		w	o		
<i>Poliocephalus poliocephalus</i>	Hoary-headed Grebe																												
<i>Psephotus haematonotus</i>	Red-rumped Parrot															o													
<i>Rhipidura albiscapa</i>	Grey Fantail																	o		w									
<i>Rhipidura leucophrys</i>	Willie Wagtail											o																	
<i>Sericornis frontalis</i>	White-browed Scrubwren											ow																	
<i>Smicronis brevirostris</i>	Weebill							o								o	o							o					
<i>Stagonopleura guttata</i>	Diamond Firetail																												
<i>Strepera graculina</i>	Pied Currawong					w																							
<i>Strepera versicolor</i>	Grey Currawong															w													
<i>Sturnus vulgaris</i>	Common Starling	o	o	o	o	o	o	o	ow	w	o	ow			o	o			o	o	o		o	o			o	o	
<i>Tachybaptus novaehollandiae</i>	Australasian Grebe																												
<i>Turnix varia</i>	Painted Button-quail																												
<i>Vanellus miles</i>	Masked Lapwing																												
o = observed, w = heard																													

o = observed, w = heard

Table 38: Diurnal records Sherwins, Springfield and Boco

Scientific name	Common name	Diurnal Surveys																					
		Sherwin's								Springfield			Boco										
		121a, 103b	118a, 101b	100a, 88b	121a, 103b	100a, 88b	75b	108a, 92b	100b	47a, 39b	37a, 31b	WoS	76a, 68b	68a, 58b	76a, 68b	78a, 66b	73a, 63b	76a, 68b	77a, 67b	78a, 66b	73a, 63b	68a, 58b	
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill													OW									
<i>Acanthiza</i> sp.																							
<i>Acanthorhynchus tenuirostris</i>	Eastern Spinebill																						
<i>Acridotheres tristis</i>	Common Myna																						
<i>Anas gracilis</i>	Grey Teal																						
<i>Anas rhynchotis</i>	Australasian Shoveler																						
<i>Anas superciliosa</i>	Pacific Black Duck																						
<i>Anthochaera carunculata</i>	Red Wattlebird			W		O						OW		W	W		O	O	O	O	OW		
<i>Anthus novaeseelandiae</i>	Richards Pipit	O	OW		W				OW	W			O				O				O	O	
<i>Aphelocephala leucopsis</i>	Southern Whiteface																						
<i>Aquila audax</i>	Wedge-tailed Eagle									O			O									O	
<i>Artamus personatus</i>	Masked Woodswallow																						
<i>Artamus superciliosus</i>	White-browed Woodswallow				W										OW								
<i>Cacatua galerita</i>	Sulfur-crested Cockatoo	C		OW	OW	W				O				OW	W	W	W			O	OW		
<i>Cacatua roseicapilla</i>	Galah		OW		OW	O				O		OW			OW					O		W	
<i>Cacatua sanguinea</i>	Little Corella																						
<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo										O						W						
<i>Calyptorhynchus funereus</i>	Yellow-tailed Black-Cockatoo																						
<i>Chenonetta jubata</i>	Australian Wood Duck																						
<i>Cincloramphus cruralis</i>	Brown Songlark																						
<i>Cincloramphus mathewsi</i>	Rufus Songlark																						
<i>Colluricincla harmonica</i>	Grey Shrike-thrush																						
<i>Colluricincla harmonica</i>	Grey Shrike-thrush							OW															
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike														OW				O				
<i>Corcorax melanorhamphos</i>	White-winged Chough																						
<i>Cormobates leucophaea</i>	White-throated Treecreeper				OW																		
<i>Corvus coronoides</i>	Australian Raven	O	OW		OW				W			W	O	OW	W							O	
<i>Corvus mellori</i>	Little Raven									W						W			O	O	W		
<i>Corvus orru</i>	Toriesian Crow												O										
<i>Coturnix ypsilophora</i>	Brown Quail																						
<i>Cracticus nigrogularis</i>	Pied Butcherbird																						
<i>Cracticus</i> sp.																							
<i>Cuculus pallidus</i>	Pallid Cuckoo				W									W						O	O		
<i>Dacelo novaeguineae</i>	Laughing Kookaburra													OW			W	O					
<i>Daphoenositta chrysoptera</i>	Varied Sittella											OW						OW					
<i>Egretta novaehollandiae</i>	White-faced Heron							OW															
<i>Eudynamys scolopacea</i>	Common Koel																						
<i>Falco berigora</i>	Brown Falcon																						
<i>Falco cenchroides</i>	Nankeen Kestral	O				O							O	OW									
<i>Falco longipennis</i>	Australian Hobby		O																				
<i>Falco peregrinus</i>	Peregrine Falcon																						
<i>Fulica atra</i>	Eurasian Coot																						
<i>Gallinula tenebrosa</i>	Dusky Moorhen																						

Scientific name	Common name	Diurnal Surveys																				
		Sherwin's								Springfield			Boco									
		121a, 103b	118a, 101b	100a, 88b	121a, 103b	100a, 88b	75b	108a, 92b	100b	47a, 39b	37a, 31b	WoS	76a, 68b	68a, 58b	76a, 68b	78a, 66b	73a, 63b	76a, 68b	77a, 67b	78a, 66b	73a, 63b	68a, 58b
<i>Gallina cyanoleuca</i>	Magpie-lark																					
<i>Gymnorhina tibicen</i>	Australian Magpie	o	ow	ow	ow	wo						w	o		w	w	w	o	o	w	w	
<i>Haliastur sphenurus</i>	Whistling Kite																					
<i>Hirundo neoxena</i>	Welcome Swallow														ow	ow						
<i>Hirundo nigricans</i>	Tree Martin																					
<i>Lalage tricolor</i>	White-winged Triller																					
<i>Lichenostomus chrysops</i>	Yellow-faced Honeyeater							ow														
<i>Makurus cyaneus</i>	Supurb Fairy-wren																					
<i>Manorina melanoccephala</i>	Noisy Minor																					
<i>Melithreptus lunatus</i>	White-naped Honeyeater																					
<i>Ninox novaeseelandiae</i>	Southern boobook																					
<i>Ocyphaps lophotes</i>	Crested Pigeon																					
<i>Pachycephala rufiventris</i>	Rufous Whistler																					
<i>Pardalotus punctatus</i>	Spotted Pardalote																					
<i>Pardalotus striatus</i>	Striated Pardalote	w			w								w	ow	w		o	w	ow	o		
<i>Petrochelidon nigricans</i>	Tree Martin																ow		o			
<i>Petroica phoenicea</i>	Flame Robin																					
<i>Phaps chalcoptera</i>	Common Bronzewing																					
<i>Platycercus adscitus eximius</i>	Eastern Rosella	o											o							o		
<i>Platycercus elegans</i>	Crimson Rosella					o						ow			w		ow	o	o			
<i>Poliiocephalus poliocephalus</i>	Hoary-headed Grebe																					
<i>Psephotus haematonotus</i>	Red-rumped Parrot																					
<i>Rhipidura albiscapa</i>	Grey Fantail															ow						
<i>Rhipidura leucophrys</i>	Willie Wagtail				ow								o				w					
<i>Sericornis frontalis</i>	White-browed Scrubwren																					
<i>Smicromnis brevirostris</i>	Weebill																					
<i>Stagonopleura guttata</i>	Diamond Firetail																					
<i>Strepera graculina</i>	Pied Currawong																					
<i>Strepera versicolor</i>	Grey Currawong							o														
<i>Sturnus vulgaris</i>	Common Starling	o		ow	ow										ow	ow	o		o	o	o	
<i>Tachybaptus novaehollandiae</i>	Australasian Grebe																					
<i>Turnix varia</i>	Painted Button-quail																					
<i>Vanellus miles</i>	Masked Lapwing																					
o = observed, w = heard																						

o = observed, w = heard

Table 39: Opportunistic bird records Yandra and Springfield

Scientific name	Common name	Opportunistic																								
		Yandra																	Springfield							
		11a, 8b	13a, 10b	14a, 11b	26a, 21b	3a,3b	17a, 14b	21a, 17b	Yandra	17a	8a,7b	28a, 25b	19a	16a	18a, 15b	4b	15a, 13b	Yandra	38a, 32b	Spring-field Road	West of Spring-field	30a, 24b	37a, 31b	Dam on Yandra	Pond near Bobundarra Lane	
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill																									
<i>Acanthiza sp.</i>																										
<i>Acanthorhynchus tenuirostris</i>	Eastern Spinebill																									
<i>Acridotheres tristis</i>	Common Myna											o														
<i>Anas gracilis</i>	Grey Teal																		o							
<i>Anas rhynchotis</i>	Australasian Shoveler																						o			
<i>Anas superciliosa</i>	Pacific Black Duck																									
<i>Anthochaera carunculata</i>	Red Wattlebird																									
<i>Anthus novaeseelandiae</i>	Richards Pipit				o						o							o	o							
<i>Aphelocephala leucopsis</i>	Southern Whiteface																									
<i>Aquila audax</i>	Wedge-tailed Eagle																		o	o						
<i>Artamus personatus</i>	Masked Woodswallow																									
<i>Artamus superciliosus</i>	White-browed Woodswallow										o															
<i>Cacatua galerita</i>	Sulfur-crested Cockatoo										o		o	ow					ow							
<i>Cacatua roseicapilla</i>	Galah												o	w												
<i>Cacatua sanguinea</i>	Little Corella																		o							
<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo																									
<i>Calyptorhynchus funereus</i>	Yellow-tailed Black-Cockatoo																									
<i>Chenonetta jubata</i>	Australian Wood Duck																		o				o			
<i>Cincloramphus cruralis</i>	Brown Songlark																									

Scientific name	Common name	Opportunistic																							
		Yandra																	Springfield						
		11a, 8b	13a, 10b	14a, 11b	26a, 21b	3a,3b	17a, 14b	21a, 17b	Yandra	17a	8a,7b	28a, 25b	19a	16a	18a, 15b	4b	15a, 13b	Yandra	38a, 32b	Spring-field Road	West of Spring-field	30a, 24b	37a, 31b	Dam on Yandra	Pond near Bobundarra Lane
<i>Cincloramphus mathewsi</i>	Rufus Songlark																								
<i>Colluricincla harmonica</i>	Grey Shrike-thrush																								
<i>Colluricincla harmonica</i>	Grey Shrike-thrush												OW												
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike				o							o													
<i>Corcorax melanorhamphos</i>	White-winged Chough				o																				
<i>Cormobates leucophaea</i>	White-throated Treecreeper								o																
<i>Corvus coronoides</i>	Australian Raven											o													
<i>Corvus mellori</i>	Little Raven																								
<i>Corvus orru</i>	Toresian Crow																								
<i>Coturnix ypsilophora</i>	Brown Quail							o																	
<i>Cracticus nigrogularis</i>	Pied Butcherbird																								
<i>Cracticus sp.</i>																									
<i>Cuculus pallidus</i>	Pallid Cuckoo																								
<i>Dacelo novaeguineae</i>	Laughing Kookaburra											o													
<i>Daphoenositta chrysoptera</i>	Varied Sittella																								
<i>Egretta novaehollandiae</i>	White-faced Heron																								
<i>Eudynamys scolopacea</i>	Common Koel								o																
<i>Falco berigora</i>	Brown Falcon																		o						
<i>Falco cenchroides</i>	Nankeen Kestrel											o							o					o	
<i>Falco longipennis</i>	Australian Hobby																								

Scientific name	Common name	Opportunistic																									
		Yandra																	Springfield								
		11a, 8b	13a, 10b	14a, 11b	26a, 21b	3a,3b	17a, 14b	21a, 17b	Yandra	17a	8a,7b	28a, 25b	19a	16a	18a, 15b	4b	15a, 13b	Yandra	38a, 32b	Spring-field Road	West of Spring-field	30a, 24b	37a, 31b	Dam on Yandra	Pond near Boudarra Lane		
<i>Falco peregrinus</i>	Peregrine Falcon																										
<i>Fulica atra</i>	Eurasian Coot																							o			
<i>Gallinula tenebrosa</i>	Dusky Moorhen																										
<i>Grallina cyanoleuca</i>	Magpie-lark																										
<i>Gymnorhina tibicen</i>	Australian Magpie									o		o	w	ow													
<i>Haliastur sphenurus</i>	Whistling Kite																										
<i>Hirundo neoxena</i>	Welcome Swallow																		o								
<i>Hirundo nigricans</i>	Tree Martin																										
<i>Lalage tricolor</i>	White-winged Triller																										
<i>Lichenostomus chrysops</i>	Yellow-faced Honeyeater																										
<i>Malurus cyaneus</i>	Supurb Fairy-wren																o										
<i>Manorina melanocephala</i>	Noisy Minor																										
<i>Melithreptus lunatus</i>	White-naped Honeyeater																										
<i>Ninox novaeseelandiae</i>	Southern boobook										o																
<i>Ocyphaps lophotes</i>	Crested Pigeon																										
<i>Pachycephala rufiventris</i>	Rufous Whistler																										
<i>Pardalotus punctatus</i>	Spotted Pardalote								o																		
<i>Pardalotus striatus</i>	Striated Pardalote	o										o	ow														
<i>Petrochelidon nigricans</i>	Tree Martin									o					o												
<i>Petroica phoenicea</i>	Flame Robin																										

Scientific name	Common name	Opportunistic																							
		Yandra																	Springfield						
		11a, 8b	13a, 10b	14a, 11b	26a, 21b	3a,3b	17a, 14b	21a, 17b	Yandra	17a	8a,7b	28a, 25b	19a	16a	18a, 15b	4b	15a, 13b	Yandra	38a, 32b	Spring-field Road	West of Spring-field	30a, 24b	37a, 31b	Dam on Yandra	Pond near Bo bundarra Lane
<i>Phaps chalcoptera</i>	Common Bronzewing																								
<i>Platycercus adscitus eximius</i>	Eastern Rosella									o															
<i>Platycercus elegans</i>	Crimson Rosella		o		o						ow			ow											
<i>Poliiocephalus poliocephalus</i>	Hoary-headed Grebe																							o	
<i>Psephotus haematonotus</i>	Red-rumped Parrot				o																				
<i>Rhipidura albiscapa</i>	Grey Fantail																								
<i>Rhipidura leucophrys</i>	Willie Wagtail																								
<i>Sericornis frontalis</i>	White-browed Scrubwren																								
<i>Smicronis brevirostris</i>	Weebill							o																	
<i>Stagonopleura guttata</i>	Diamond Firetail																								
<i>Strepera graculina</i>	Pied Currawong																								
<i>Strepera versicolor</i>	Grey Currawong																								
<i>Sturnus vulgaris</i>	Common Starling										o			o											
<i>Tachybaptus novaehollandiae</i>	Australasian Grebe																		o						
<i>Turnix varia</i>	Painted Button-quail																					o			
<i>Vanellus miles</i>	Masked Lapwing																		o				o		
o = observed, w = heard																									

Table 40: Opportunistic bird records Boco and Sherwins

Scientific Name	Common Name	Boco								Sherwins										
		Garnock	76a, 68b	64a, 54b	68a, 58b	73a-63b	78a-66b	75a, 65b	Garnock causeway - SW Boco	Bridgewater - creek	122a-104b	104a, 104b	76a, 68b	116a, 99b	126a, 108b	83a, 72b	100b	108a, 92b	75b	0685985, 5914880
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill																			
<i>Acanthiza</i> sp.																				
<i>Acanthorhynchus tenuirostris</i>	Eastern Spinebill																			
<i>Acridotheres tristis</i>	Common Myna																			
<i>Anas gracilis</i>	Grey Teal																			
<i>Anas rhynchotis</i>	Australasian Shoveler																			
<i>Anas superciliosa</i>	Pacific Black Duck	o								o										
<i>Anthochaera carunculata</i>	Red Wattlebird																			
<i>Anthus novaeseelandiae</i>	Richards Pipit	o	o	o				o				o								
<i>Aphelocephala leucopsis</i>	Southern Whiteface																			
<i>Aquila audax</i>	Wedge-tailed Eagle	o			o							o								
<i>Artamus personatus</i>	Masked Woodswallow																ow			
<i>Artamus superciliosus</i>	White-browed Woodswallow																ow			
<i>Cacatua galerita</i>	Sulfur-crested Cockatoo	o													o					
<i>Cacatua roseicapilla</i>	Galah	o	o																	
<i>Cacatua sanguinea</i>	Little Corella	o																		
<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo																			
<i>Calyptorhynchus funereus</i>	Yellow-tailed Black-Cockatoo																			
<i>Chenonetta jubata</i>	Australian Wood Duck																			
<i>Cincloramphus cruralis</i>	Brown Songlark																			

Scientific Name	Common Name	Boco									Sherwins									
		Gamock	76a, 68b	64a, 54b	68a, 58b	73a-63b	78a-66b	75a, 65b	Gamock causeway - SW Boco	Bridgewater - creek	122a-104b	104a, 104b	76a, 68b	116a, 99b	126a, 108b	83a, 72b	100b	108a, 92b	75b	0685985, 5914880
<i>Cindoramphus mathewsi</i>	Rufus Songlark																			
<i>Colluricincla harmonica</i>	Grey Shrike-thrush																			
<i>Colluricincla harmonica</i>	Grey Shrike-thrush																			
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike																			
<i>Corcorax melanorhamphos</i>	White-winged Chough																OW			
<i>Cormobates leucophaea</i>	White-throated Treecreeper																			
<i>Corvus coronoides</i>	Australian Raven	o	o																	
<i>Corvus mellori</i>	Little Raven																			
<i>Corvus orru</i>	Toresian Crow																			
<i>Coturnix ypsilophora</i>	Brown Quail												o							
<i>Cracticus nigrogularis</i>	Pied Butcherbird																			
<i>Cracticus sp.</i>																				
<i>Cuculus pallidus</i>	Pallid Cuckoo	o																		
<i>Dacelo novaeguineae</i>	Laughing Kookaburra	o																		
<i>Daphoenositta chrysoptera</i>	Varied Sittella																			
<i>Egretta novaehollandiae</i>	White-faced Heron	o								o										
<i>Eudynamis scolopacea</i>	Common Koel																			
<i>Falco berigora</i>	Brown Falcon											o								
<i>Falco cenchroides</i>	Nankeen Kestral																			
<i>Falco longipennis</i>	Australian Hobby																			
<i>Falco peregrinus</i>	Peregrine Falcon																			o

Scientific Name	Common Name	Boco									Sherwins									
		Gamock	76a, 68b	64a, 54b	68a, 58b	73a-63b	78a-66b	75a, 65b	Gamock causeway - SW Boco	Bridgewater - creek	122a-104b	104a, 104b	76a, 68b	116a, 99b	126a, 108b	83a, 72b	100b	108a, 92b	75b	0685985, 5914880
<i>Fulica atra</i>	Eurasian Coot																			
<i>Gallinula tenebrosa</i>	Dusky Moorhen								o	o										
<i>Grallina cyanoleuca</i>	Magpie-lark								o											
<i>Gymnorhina tibicen</i>	Australian Magpie	o						o	o											
<i>Haliastur sphenurus</i>	Whistling Kite										o									
<i>Hirundo neoxena</i>	Welcome Swallow	o								o										
<i>Hirundo nigricans</i>	Tree Martin																			
<i>Lalage tricolor</i>	White-winged Triller																			
<i>Lichenostomus chrysops</i>	Yellow-faced Honeyeater																			
<i>Malurus cyaneus</i>	Supurb Fairy-wren																			
<i>Manorina melanoccephala</i>	Noisy Minor																			
<i>Melithreptus lunatus</i>	White-naped Honeyeater																			
<i>Ninox novaeseelandiae</i>	Southern boobook																			
<i>Ocyphaps lophotes</i>	Crested Pigeon									o					o					
<i>Pachycephala rufiventris</i>	Rufous Whistler																			
<i>Pardalotus punctatus</i>	Spotted Pardalote																			
<i>Pardalotus striatus</i>	Striated Pardalote						o													
<i>Petrochelidon nigricans</i>	Tree Martin																			
<i>Petroica phoenicea</i>	Flame Robin																			
<i>Phaps chalcoptera</i>	Common Bronzewing									o										
<i>Platycercus adscitus eximius</i>	Eastern Rosella	o																		

Scientific Name	Common Name	Boco								Sherwins										
		Gamock	76a, 68b	64a, 54b	68a, 58b	73a-63b	78a-66b	75a, 65b	Gamock causeway - SW Boco	Bridgewater - creek	122a-104b	104a, 104b	76a, 68b	116a, 99b	126a, 108b	83a, 72b	100b	108a, 92b	75b	0685985, 5914880
<i>Platycercus elegans</i>	Crimson Rosella	o	o																	
<i>Poliiocephalus poliocephalus</i>	Hoary-headed Grebe																			
<i>Psephotus haematonotus</i>	Red-rumped Parrot	o				o			o											
<i>Rhipidura albiscapa</i>	Grey Fantail																			
<i>Rhipidura leucophrys</i>	Willie Wagtail																			
<i>Sericornis frontalis</i>	White-browed Scrubwren																			
<i>Smicronis brevirostris</i>	Weebill																			
<i>Stagonopleura guttata</i>	Diamond Firetail	o																o		
<i>Strepera graculina</i>	Pied Currawong	o																		
<i>Strepera versicolor</i>	Grey Currawong																			
<i>Sturnus vulgaris</i>	Common Starling	o																		
<i>Tachybaptus novaehollandiae</i>	Australasian Grebe																			
<i>Turnix varia</i>	Painted Button-quail																			
<i>Vanellus miles</i>	Masked Lapwing																			
o = observed, w = heard																				

Table 41: Spotlighting, stag watching and call playback records

Scientific name	Common name	Spotlighting		Stag Watching					Call Playback				
		Boco	Yandra	Yandra	Boco				Yandra			Boco	
		77a, 67b	76a, 68b	13a, 10b	28a, 25b	13a, 10b	76a, 68b	73a, 63b	28a, 25b	13a, 10b	18a, 15b	15a, 13b	76a, 68b
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill												
<i>Acanthiza</i> sp.													
<i>Acanthorhynchus tenuirostris</i>	Eastern Spinebill												
<i>Acridotheres tristis</i>	Common Myna												
<i>Anas gracilis</i>	Grey Teal												
<i>Anas rhynchotis</i>	Australasian Shoveler												
<i>Anas superciliosa</i>	Pacific Black Duck												
<i>Anthochaera carunculata</i>	Red Wattlebird												
<i>Anthus novaeseelandiae</i>	Richards Pipit	o											
<i>Aphelocephala leucopsis</i>	Southern Whiteface												
<i>Aquila audax</i>	Wedge-tailed Eagle												
<i>Artamus personatus</i>	Masked Woodswallow												
<i>Artamus superciliosus</i>	White-browed Woodswallow												
<i>Cacatua galerita</i>	Sulfur-crested Cockatoo												
<i>Cacatua roseicapilla</i>	Galah												
<i>Cacatua sanguinea</i>	Little Corella												
<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo												
<i>Calyptorhynchus funereus</i>	Yellow-tailed Black-Cockatoo												
<i>Chenonetta jubata</i>	Australian Wood Duck												
<i>Cinchoramphus curralis</i>	Brown Songlark												
<i>Cinchoramphus mathewsi</i>	Rufous Songlark												
<i>Colluricincla harmonica</i>	Grey Shrike-thrush												
<i>Colluricincla harmonica</i>	Grey Shrike-thrush												
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike												
<i>Corcorax melanorhamphos</i>	White-winged Chough												
<i>Cormobates leucophaea</i>	White-throated Treecreeper												
<i>Corvus coronoides</i>	Australian Raven												
<i>Corvus mellori</i>	Little Raven												
<i>Corvus orru</i>	Toriesian Crow												
<i>Coturnix ypsilophora</i>	Brown Quail												
<i>Cracticus nigrogularis</i>	Pied Butcherbird												
<i>Cracticus</i> sp.													
<i>Cuculus pallidus</i>	Pallid Cuckoo					w							
<i>Dacelo novaeguineae</i>	Laughing Kookaburra												
<i>Daphoenositta chrysoptera</i>	Varied Sittella												
<i>Egretta novaehollandiae</i>	White-faced Heron												
<i>Eudynamys scolopacea</i>	Common Koel												
<i>Falco berigora</i>	Brown Falcon												
<i>Falco cenchroides</i>	Nankeen Kestrel												
<i>Falco longipennis</i>	Australian Hobby												
<i>Falco peregrinus</i>	Peregrine Falcon												
<i>Fulica atra</i>	Eurasian Coot												
<i>Gallinula tenebrosa</i>	Dusky Moorhen												
<i>Gallinula cyanoleuca</i>	Maggie-lark												
<i>Gymnorhina tibicen</i>	Australian Magpie												

Scientific name	Common name	Spotlighting		Stag Watching					Call Playback				
		Boco	Yandra	Yandra	Boco				Yandra			Boco	
		77a, 67b	76a, 68b	13a, 10b	28a, 25b	13a, 10b	76a, 68b	73a, 63b	28a, 25b	13a, 10b	18a, 15b	15a, 13b	76a, 68b
<i>Haliastur spheerurus</i>	Whistling Kite												
<i>Hirundo neoxena</i>	Welcome Swallow												
<i>Hirundo nigricans</i>	Tree Martin												
<i>Lalage tricolor</i>	White-winged Triller												
<i>Lichenostomus chrysops</i>	Yellow-faced Honeyeater												
<i>Malurus cyaneus</i>	Supurb Fairy-wren												
<i>Manorina melanocephala</i>	Noisy Minor												
<i>Melithreptus lunatus</i>	White-naped Honeyeater												
<i>Ninox novaeseelandiae</i>	Southern boobook		o	w	w			w	w	w (3)	w	w	w (2)
<i>Ocyphaps lophotes</i>	Crested Pigeon												
<i>Pachycephala rufiventris</i>	Rufous Whistler												
<i>Pardalotus punctatus</i>	Spotted Pardalote												
<i>Pardalotus striatus</i>	Striated Pardalote												
<i>Petrochelidon nigricans</i>	Tree Martin												
<i>Petroica phoenicea</i>	Flame Robin												
<i>Phaps chalcoptera</i>	Common Bronzewing												
<i>Platycercus adscitus eximius</i>	Eastern Rosella												
<i>Platycercus elegans</i>	Crimson Rosella												
<i>Poliiocephalus poliocephalus</i>	Hoary-headed Grebe												
<i>Psephotus haematonotus</i>	Red-rumped Parrot												
<i>Rhipidura albiscapa</i>	Grey Fantail												
<i>Rhipidura leucophrys</i>	Willie Wagtail								w				
<i>Sericornis frontalis</i>	White-browed Scrubwren												
<i>Smicronis brevirostris</i>	Weebill												
<i>Stagonopleura guttata</i>	Diamond Firetail												
<i>Strepera graculina</i>	Pied Currawong												
<i>Strepera versicolor</i>	Grey Currawong												
<i>Sturnus vulgaris</i>	Common Starling												
<i>Tachybaptus novaehollandiae</i>	Australasian Grebe												
<i>Turnix varia</i>	Painted Button-quail												
<i>Vanellus miles</i>	Masked Lapwing												

o = observed, w = heard

Table 42: Mammal records

Scientific Name	Common Name	Stag Watching Survey	Opportunistic			Funnel Traps	Spotlighting									Rock Rolling	Call Playback
		Yandra	Springfield	Yandra		Sherwin	Yandra					Boco			Sherwin	Yandra	
		19a	Springfield Road	83a, 8b	3a, 3b	87a, 76b	19a	28a, 25b	12a, 9b	15a, 13b	13a, 10b	76a, 68b	73a, 63b	76a, 68b	110a, 94b	12a, 9b	
<i>Trichosurus vulpecula</i>	Common Brushtail Possum	o					o	o	o	o	o			o			
<i>Macropus</i> sp.			o														
<i>Tachyglossus aculeatus</i>	Short-beaked Echidna			o													
<i>Vulpes vulpes</i>	European Fox				o												
<i>Mus musculus</i>	House Mouse					o									o		
<i>Petaurus breviceps</i>	Sugar Glider								o							o	
<i>Felis catus</i>	Domestic Cat						o										
<i>Oryctolagus cuniculus</i>	Rabbit						o					o					
<i>Anthus novaeseelandiae</i>	Richards Pipit											o					
<i>Macropus giganteus</i>	Eastern Grey Kangaroo							o									
<i>Pseudocheirus peregrinus</i>	Common Ringtail Possum										o						
o = observed																	

o = observed

Table 43: Amphibian records

Scientific Name	Common Name	Stag Watching	Spotlighting		Funnel Traps	Opportunistic					Call Playback
		Boco	Yandra	Boco	Sherwins	Yandra		Springfield	Boco	Yandra	Yandra
		76a, 68b	19a	78a, 66b	124a, 106b	18a, 15b	16a	Pond near Bobundarra Lane	Garnock causeway - SW Boco	15a, 13b	13a, 10b
Tree Frogs											
<i>Litoria verreauxii</i>	Verreaux's Frog	w	w	ow	o			o		o	w
Ground Frogs											
<i>Crinia signifera</i>	Common Eastern Froglet					w		o	o		
<i>Limnodynastes dumerilii</i>	Eastern Banjo Frog					w		o			
<i>Limnodynastes peronii</i>	Striped Marsh Frog							o			
<i>Limnodynastes tasmaniensis</i>	Spotted Marsh Frog					w		o	o	o	w
<i>Pseudophryne dendyi</i>	Southern Toadlet										

o = observed, w = heard

Table 44: Targeted reptile records (tiles, funnels and rock rolling)

Scientific Name	Common Name	Tiles			Funnels					Rock Rolling								
		Boco	Sherwins		Sherwins			Springfield		Yandra			Sherwin's				Springfield	
		76a, 68b	121a, 103b	122a, 104b	117a, 100b	124a, 106b	87a, 76b	53a, 45b	38a, 32b	11a, 8b	14a, 11b	7a, 6b	109a, 93b	126a, 108b	110a, 94b	112a, 96b	51a, 43b	52a, 44b
<i>Acritoscincus duperreyi</i>	Three lined skink			o	o	o	o		o	o			o					o
<i>Austrelaps ramsayi</i>	Highland Copperhead																	
<i>Egernia cunninghami</i>					o	o							o	o				
<i>Hemiergis decresiensis</i>	Three-toed Earless Skink																	
<i>Pseudemoia entrecasteauxii</i>	Southern Grass skink	o	o															
<i>Pseudonaja textilis</i>	Eastern brown snake				o	o				o								
<i>Suta flagellum</i>	Little Whip Snake										o							
<i>Suta flagellum</i> (slough)																	o	
<i>Tiliqua nigrolutea</i>	Blotched Blue-tongue				o	o		o							o	o		
<i>Tympanocryptis pinguicollis</i>	Grassland Earless Dragon							o										
o = observed																		

Table 45: Opportunistic reptile records Sherwins and Boco

Scientific Name	Common Name	Sherwins			Boco	Yandra			Springfield
		124a, 106b	123a, 105b	83a, 72b	73a, 63b	11a, 8b	14a, 11b	17a, 14b	Springfield Road
<i>Austrelaps ramsayi</i>	Highland Copperhead								
<i>Egernia cunninghami</i>									
<i>Hemiergis decresiensis</i>	Three-toed Earless Skink							o	
<i>Pseudemoia entrecasteauxii</i>	Southern Grass skink	o							
<i>Pseudonaja textilis</i>	Eastern brown snake		o				o		o
<i>Suta flagellum</i>	Little Whip Snake			o	o				
<i>Suta flagellum</i> (slough)									
<i>Tiliqua nigrolutea</i>	Blotched Blue-tongue								o
<i>Acritoscincus duperreyi</i>	Three lined skink					o			
<i>Austrelaps ramsayi</i>	Highland Copperhead								o
<i>Tympanocryptis pinguicollis</i>	Grassland Earless Dragon								
o = observed									

Appendix I – Threatened Species Likelihood of Occurrence

Table 46: Threatened species likelihood of occurrence

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	RoTAP	Habitat	Likelihood of occurring within study area	Vegetation communities
Flora							
<i>Calotis glandulosa</i>	Mauve Burr Daisy	V	V	3VC-	Found in montane, subalpine, natural temperate grasslands (dominated by <i>Themeda australis</i>) and Snow Gum (<i>Eucalyptus pauciflora</i>) woodlands	Potential	NTG, SG, SGW, RGO, DG
<i>Dodonaea procumbens</i>	Trailing Hop-bush	V	V	3V	Grows in Natural Temperate Grassland or fringing eucalypt woodland of Snow Gum (<i>Eucalyptus pauciflora</i>). Also found in open bare patches of sandy-clay soils and often along roadsides.	Potential	NTG, SG, SGW, RGO, DG
<i>Eucalyptus parvula</i>	Small-leaved Gum	V	V	2VCi	Grows at and above an elevation of 1100m in acidic soil on cold wet grassy flats	No	
<i>Eucalyptus pulverulenta</i>	Silver-leaved Gum	V	V	3V	Grows in shallow soils as an understorey plant in open forests, especially those dominated by Brittle Gum (<i>Eucalyptus mannifera</i>), Red Stringybark (<i>E. macrorhyncha</i>), Broad-leaf Peppermint (<i>E. dives</i>), Silver top Ash (<i>E. sieben</i>) and Apple Box (<i>E. bridgesiana</i>)	No	

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	RoTAP	Habitat	Likelihood of occurring within study area	Vegetation communities
<i>Pomaderris pallida</i>	Pale Pomaderris	V	V	2VCi	Occurs in shrub communities surrounded by Brittle Gum (<i>Eucalyptus mannifera</i>) and Red Stringybark (<i>Eucalyptus macrorhyncha</i>) or <i>Callitris</i> spp. woodland	No	
<i>Prasophyllum canaliculatum</i>		CE			Very highly restricted geographic distribution. In NSW, the species has been recorded in two locations on the Monaro Tableland east of Cooma: a roadside in the Kybeyan area; and south east of Nimmitabel in South East Forests National Park	Unlikely	
<i>Rutidosia leirolepis</i>	Monaro Golden Daisy	V	V	2VC-	Found in the Natural Temperate Grasslands of Munro and in the sub-alpine grasslands in Kosciuszko National Park. Grows on basalt, granite and sedimentary substrates.	Potential	NTG, SG, DG
<i>Swainsona sericea</i>	Silky Swainson-pea	V			Found in Natural Temperate Grassland and Snow Gum <i>Eucalyptus pauciflora</i> Woodland on the Monaro. Found in Box-Gum Woodland in the Southern Tablelands and South West Slopes. Sometimes found in association with cypress-pines <i>Callitris</i> spp.	Potential	NTG, SGW, RGOF, SG
<i>Thesium australe</i>	Austral Toadflax, Toadflax	V	V	3VCi+	Found in grassland or grassy woodland, often in damp sites with Kangaroo Grass (<i>Themeda australis</i>)	Potential	NTG, SG, SGW, RGOF, DG

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	RoTAP	Habitat	Likelihood of occurring within study area	Vegetation communities
<i>Westringia kydrensis</i>	Kydra Westringia	E	E	2KC-	Occurs in heath on rocky areas at Kydra Reefs (SE of Cooma)	No	
Birds							
<i>Accipiter fasciatus</i>	Brown Goshawk		Mar		Found in most timbered habitats.	Potential	SGW, RGOF
<i>Acrocephalus stentoreus</i>	Clamorous Reed-warbler		Mar, Bonn		Reeds, cumbungi, pencil-rush, over water, river red gum regrowth, weeping willows, bamboo, crop near irrigation channels, public gardens	Unlikely	
<i>Anthus novaeseelandiae</i>	Richard's Pipit		Mar		Lives in open country in a variety of habitats including wet heaths to dry shrub lands and open woodland clearings	Yes	NTG, SG, SGW, RGOF, DG
<i>Apus pacificus</i>	Fork-tailed Swift		JAMBA, CAMBA, ROKAMBA		Spends winters south to Australia. Preferred habitats include mountains and human habitations, usually near water.	Unlikely	
<i>Ardea ibis</i>	Cattle Egret		Mar, M JAMBA, CAMBA		Dry grassy habitats. It nests in colonies, often with other wading birds, usually on a platform of sticks in trees or shrubs.	Potential	NTG, SG, SGW, RGOF, DG
<i>Ardea modesta</i>	Great egret		Mar, JAMBA, CAMBA		Prefer shallow water, particularly when flowing, but may be seen on any watered area, including damp grasslands.	Potential	NTG, SG, SGW, RGOF, DG – where water

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	RoTAP	Habitat	Likelihood of occurring within study area	Vegetation communities
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V			Generally found in tall mountain forests and woodlands, particularly heavily timbered and mature wet sclerophyll forests during the summer. During the winter it is found at lower altitudes in drier more open eucalypt forests and woodlands. Also found in urban environments.	Potential	SGW, RGOF
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	V			Found in eucalypt woodlands and dry open forests of the inland slopes and plains. Mainly inhabits woodlands dominated by stringybark and other rough bark eucalypts. Less commonly found in similar environments on the coastal ranges and plains.	Likely	SGW, RGOF
<i>Corvus mellori</i>	Little Raven		Mar		Little raven forage in marginal habitats as well as exploiting any sudden flushes of flood. Also found in well watered agricultural environments. Travel south during the summer to better watered habitats.	Unlikely	
<i>Falco cenchroides</i>	Nankeen Kestrel		Mar		Prefers lightly wooded areas and open agricultural regions.	Yes	NTG, SG, SGW, RGOF, DG
<i>Gallinago hardwickii</i>	Latham's Snipe		Mar, JAMBA, CAMBA ROKAMBA		Any vegetation around wetlands, in sedges, grasses, lignum, reeds and rushes and also in saltmarsh and creek edges on migration. They also use crops and pasture.	Potential / Unlikely	DG

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	RoTAP	Habitat	Likelihood of occurring within study area	Vegetation communities
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle		Mar, CAMBA		Found along the coastline of Australia and also inhabits large river systems and permanent inland water bodies.	Yes	NTG, SG, SGW, RGO, DG
<i>Hirundapus caudacutus</i>	White-throated Needletail		M, Mar JAMBA / CAMBA / ROKAMBA		Arrive in Australia from their breeding grounds in the northern hemisphere in about October each year and leave somewhere between May and August. Birds usually feed in rising thermal currents associated with storm fronts and bushfires and they are commonly seen moving with wind fronts. Feeds on flying insects, such as termites, ants beetles and flies.	Unlikely	
<i>Lathamus discolor</i>	Swift Parrot	E	E, Mar		Found in dry sclerophyll eucalypt forests and woodlands and occasionally in wet sclerophyll forests. Its breeds in Tasmania during the summer and migrates to the mainland during winter.	Unlikely	
<i>Melanodryas cucullata cucullata</i>	Hooded Robin	V			Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses.	Potential	RGO, SGW, RGO

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	RoTAP	Habitat	Likelihood of occurring within study area	Vegetation communities
<i>Merops ornatus</i>	Rainbow Bee-eater		Mar, JAMBA		Open forests, woodlands and shrublands, and cleared areas, usually near water. It will be found on farmland with remnant vegetation and in orchards and vineyards. It will use disturbed sites.	Potential / Unlikely	NTG, SG, SGW, RGOF, DG
<i>Monarcha melanopsis</i>	Black-faced Monarch		Bonn, Mar		Rainforests, eucalypt woodlands, coastal scrub and damp gullies. It may be found in more open woodland when migrating.	Unlikely	
<i>Myiagra cyanoleuca</i>	Satin Flycatcher		Bonn, Mar		Found in tall forests, preferably wet environments such as heavily forested gullies.	Unlikely	
<i>Ninox connivens</i>	Barking Owl	V			Inhabits eucalypt woodland, open forest, swamp woodlands and, especially in inland areas, timber along watercourses. Denser vegetation is used occasionally for roosting. During the day they roost along creek lines, usually in tall understorey trees with dense foliage such as <i>Acacia</i> and <i>Casuarina</i> species, or the dense clumps of canopy leaves in large <i>Eucalypts</i> .	Likely foraging -	SGW, RGOF
<i>Ninox strenua</i>	Powerful Owl	V			Inhabits a range of vegetation types including woodlands and open sclerophyll forests to tall open wet forests and rainforests. Requires large tracks of forests or woodland, but can occur in fragmented landscapes.	Likely	SGW, RGOF

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	RoTAP	Habitat	Likelihood of occurring within study area	Vegetation communities
<i>Oxyura australis</i>	Blue-billed Duck	V			The Blue-billed Duck prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation (DECC 2007). The species is completely aquatic, swimming low in the water along the edge of dense cover (DECC 2007). It will fly if disturbed, but prefers to dive if approached (DECC 2007). Blue-billed Ducks are partly migratory, with short-distance movements between breeding swamps and over-wintering lakes with some long-distance dispersal to breed during spring and early summer (DECC 2007). Young birds disperse in April-May from their breeding swamps in inland NSW to non-breeding areas on the Murray River system and coastal lakes (DECC 2007).	Potential	Man-made dam on Yandra
<i>Pyrrholaemus sagittatus</i>	Speckled Warbler	V			Lives in a wide range of <i>Eucalyptus</i> dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area.	Potential	SGW, RGOF

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	RoTAP	Habitat	Likelihood of occurring within study area	Vegetation communities
<i>Rostratula australis</i>	Australian Painted Snipe	E	V, Mar, CAMBA		Resides in swamps, dams and nearby marshy areas that contain grasses, lignum, low scrub or open timber that provides cover.	Unlikely	
<i>Stagonopleura guttata</i>	Diamond Firetail	V			Found in grassy eucalypt woodlands, open forests, mallee, Natural Temperate Grasslands, riparian areas and sometimes lightly wooded farmlands.	Yes	Recorded in RGOF & SG Potential in NTG and DG
<i>Xanthomyza phrygia</i>	Regent Honeyeater	E	E, JAMBA		This species inhabits dry open forest and woodlands, particularly Box-Ironbark woodland and riparian forests of River Sheoak.	Unlikely	
<i>Zosterops lateralis</i>	Silvereye		Mar		Resides in every habitat that provides them with shelter and areas to forage from rainforests to mallee thicket.	Potential	SGW, RGOF
Amphibians							
<i>Litoria castanea</i>	Yellow-spotted Tree Frog, Yellow-spotted Bell Frog	E	E		Resides in permanent ponds or slow flowing streams with emergent vegetation such as bulrushes	No	

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	RoTAP	Habitat	Likelihood of occurring within study area	Vegetation communities
Mammals							
<i>Dasyurus maculatus maculatus</i> (SE mainland population)	Spot-tail Quoll, Spotted-tail Quoll, Tiger Quoll	V	E		Creates dens out of hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces. Resides in a range of habitat types including rainforest, open forests, woodland, coastal heath and inland riparian forest in a variety of climatic zone (from sub alpine to coastal).	Unlikely	SGW, RGOF
<i>Falsistrellus tasmaniensis</i>	Eastern false pipistrelle	V			Roosts in Eucalypt tree hollows (trees greater than 20m in height) and forages above tree tops in a range of vegetation types including Snow Gum Woodland	Yes	Recorded in SG/SGW
<i>Miniopterus schreibersii oceanensis</i>	Eastern bentwing bat	V			Forages above tree tops in a range of vegetation types including Snow Gum Woodland	Yes	Recorded in SGW, RGOF
<i>Myotis macropus</i> (formally <i>Myotis adversus</i>)	Large-footed Myotis	V			Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, stormwater channels, buildings, under bridges and in dense foliage. Forage over streams and pools catching insects and small fish by raking their feet across the water surface.	Potential	Dams and watercourses

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	RoTAP	Habitat	Likelihood of occurring within study area	Vegetation communities
<i>Petaurus norfolcensis</i>	Squirrel Glider	V			Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey. Require abundant tree hollows for refuge and nest sites.	Yes	SGW, RGOF
<i>Phascolarctos cinereus</i>	Koala	V			Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species.	Potential	SGW, RGOF
<i>Potorous tridactylus tridactylus</i>	Long-nosed Potoroo (SE mainland)	V	V		Found in coastal heaths and dry or wet sclerophyll forests with dense understorey and occasional open areas	No	
<i>Pseudomys fumeus</i>	Koonoom Smoky Mouse	E	E		Occurs in heath on ridge tops and slopes in sclerophyll forests, heathland and open forest along the coast and inland to sub-alpine regions. Occasionally occurs in ferny gullies.	No	

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	RoTAP	Habitat	Likelihood of occurring within study area	Vegetation communities
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheathtail-bat	V			Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory.	Likely	NTG, SG, SGW, RGOF DG
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V			Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings. Forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects; this species has been known to eat other bat species.	Unlikely – generally does not occur at altitudes greater than 500 m.	
Fish							
<i>Maccullochella peelii peelii</i>	Murray Cod, Cod, Goodoo		V		Found in warm water environments such as clear, rocky streams, slow-flowing turbid rivers and billabongs up to 5m deep. Highly dependent on wood debris for protection.	No	

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	RoTAP	Habitat	Likelihood of occurring within study area	Vegetation communities
<i>Macquaria australasica</i>	Macquarie Perch		E		Occurs in deep, rocky holes with considerable cover.	No	
<i>Prototroctes maraena</i>	Australian Grayling		V		Inhabits clear, gravel bottomed streams that alternate between pools and riffles and granite outcrops.	No	
Reptiles							
<i>Aprasia parapulchella</i>	Pink-tailed Worm Lizard	V	V		Inhabits sloping, open woodland areas with predominantly native grassy groundlayers, particularly those dominated by Kangaroo Grass. Sites are typically well-drained, with rocky outcrops or scattered, partially-buried rocks. Commonly found beneath small, partially-embedded rocks and appear to spend considerable time in burrows below these rocks; the burrows have been constructed by and are often still inhabited by small black ants and termites.	Likely	SGW, RGOF, NTG, SG
<i>Delma impar</i>	Striped Legless Lizard	V	V		Found mainly in Natural Temperate Grassland but has also been captured in grasslands that have a high exotic component, secondary grassland near Natural Temperate Grassland and occasionally in open Box-Gum Woodland. Habitat is where grassland is dominated by perennial, tussock-forming grasses such as	Likely	Recorded north of Springfield Road on potential offset site in NTG Potential habitat in

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	RoTAP	Habitat	Likelihood of occurring within study area	Vegetation communities
					Kangaroo Grass, Spear-grasses Poa tussocks and occasionally Wallaby grasses. Sometimes present in modified grasslands with a significant content of exotic grasses. Sometimes found in grasslands with significant amounts of surface rocks, which are used for shelter.		NTG, SG, DG
<i>Suta flagellum</i>	Little Whip Snake	V			Found in Natural temperate Grasslands and grassy woodlands, including those dominated by Snow Gum Eucalyptus pauciflora or Yellow Box E. melliodora. Occurs as a secondary grass in disturbed woodlands. Hides under rocks or logs lying on or partially buried in the soil.	Yes	Recorded in NTG & RGOF Potential habitat is SG, DG
<i>Tympanocryptis pinguicolla</i>	Grassland Earless Dragon	E	E		Restricted to a small number of Natural Temperate Grassland sites dominated by wallaby grasses (<i>Notodanthonia</i> spp.) spear grasses (<i>Austrostipa</i> spp.), Poa Tussock (<i>Poa sieberiana</i>), Red Grass (<i>Bothriochloa macra</i>), and occasionally Kangaroo Grass (<i>Themeda australis</i>). Prefers more open structure, characterized by small patches of bare ground between grasses and herbs.	Yes	Recorded in NTG, SG Potential habitat in DG

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	RoTAP	Habitat	Likelihood of occurring within study area	Vegetation communities
<i>Varanus rosenbergi</i>	Rosenberg's Goanna	V			Found in heath, open forest and woodland. Associated with termites, the mounds of which this species nests in; termite mounds are a critical habitat component. Individuals require large areas of habitat.	Unlikely – no termite mounds recorded	
Invertebrates							
<i>Synemon plana</i>	Golden Sun Moth	E	CE		Occurs in Natural Temperate Grasslands and grassy Box-Gum Woodlands in which groundlayer is dominated by wallaby grasses. Grasslands dominated by wallaby grasses are typically low and open - the bare ground between the tussocks is thought to be an important microhabitat feature for the Golden Sun Moth, as it is typically these areas on which the females are observed displaying to attract males. Habitat may contain several wallaby grass species, which are typically associated with other grasses particularly spear-grasses or Kangaroo Grass.	Unlikely – altitude too high	
<p>Note:</p> <p>TSC Act = <i>Threatened Species Conservation Act 1995</i>; EPBC Act = <i>Environment Protection and Biodiversity Conservation Act 1999</i>.</p> <p>V = Vulnerable, E = Endangered. V = Vulnerable, E = Endangered, CE = Critically Endangered, M = Migratory, Mar = Marine; JAMBA = Japan-Australia Migratory Bird Agreement, CAMBA = China-Australia Migratory Bird Agreement,</p> <p>See Appendix D for explanation of RoTAP codes.</p>							

Appendix J – Dragon Habitat Characteristics

Table 47: Dragon habitat characteristics

Turbine number	Rock (%)	Bare earth (%)	Litter (%)	Approximate tussock height (cm)	Dominant species	Quadrat size
53a	10	20		20	<i>Austrodanthonia</i> spp. (20 %) <i>Poa</i> aff. <i>sieberiana</i> (25%)	20 m x 20 m
53a	15	35	5	20	<i>Poa</i> aff. <i>sieberiana</i> (25%) <i>Austrodanthonia racemosa</i> (5 %) <i>Austrostipa scabra</i> (5 %) (vegetation 45 %)	20 m x 20 m
93a/81b	20 (up to 40)	5 – 10 (more than d8)	15	10	<i>Austrostipa scabra</i> / <i>bigeniculata</i> (15 %) <i>Poa</i> aff. <i>sieberiana</i> (5%) <i>Austrodanthonia</i> (alive) (5 %)	20 m x 20 m
93a/81b	10 (avg. Rock size)	< 5	15 – 20	10	<i>Austrostipa scabra</i> (15%) <i>Poa</i> aff. <i>sieberiana</i> (15%)	20 m x 20 m

Turbine number	Rock (%)	Bare earth (%)	Litter (%)	Approximate tussock height (cm)	Dominant species	Quadrat size
	10 cm)				<i>Austrodanthonia</i> (alive) (< 5 %)	
93a/81b	20	20		10	<i>Austrodanthonia caespitosa</i> (20 %) <i>Austrostipa scabra</i> (15 %) <i>Poa aff. sieberiana</i> (15 %)	20 m x 20 m
121a/103b	5-10	< 5	55 - 60	< 5	Vegetation (30 %)	20 m x 20 m
Offset (site # 6)	30 %	10 %		15 cm	<i>Austrostipa</i> sp. (20 %) <i>Austrodanthonia</i> (10 %) <i>Poa aff. sieberiana</i> (10 %)	20 m x 20 m

Turbine number	Rock (%)	Bare earth (%)	Litter (%)	Approximate tussock height (cm)	Dominant species	Quadrat size
Offset (site # 6)	5- 10 %	5 - 10 %		15 cm	<i>Austrodanthonia</i> (10 %) <i>Poa aff. sieberiana</i> (40 %) <i>Austrostipa</i> sp. (< 5 %)	20 m x 20 m

Appendix K – Bat Collision Risk Matrix

Table 48: Bat collision risk matrix

Scientific name	Common name	Conservation status	Seasonal risks (eg. Migration)	Flight character	Roosting	Foraging	Breeding season	Likelihood of species behaviour resulting in collisions	Collision due to turbines in proximity to roosting habitat	Likelihood of collision with overhead cabling	Overall risk	Mitigation
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat		No	Above canopy & sub canopy	Tree hollows, buildings	Forages up to 11 km from roost sites. Will pass through open paddocks	Mating in late autumn / winter Juveniles fly or December or January	High	Moderate	Low	Moderate	Turbines located at least 30 m from hollow-bearing trees
<i>Chalinolobus morio</i>	Chocolate Wattled Bat		No - individuals in southern Australia do not migrate	Mid canopy to below canopy	Tree hollows, buildings and caves	Range of habitats including treeless regions	Birth in November	Low	Moderate - low	Low	Low	
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V	No	Below or near the canopy and along tracks	Tree hollows and sometimes buildings	Highly mobile, with large foraging range	Females pregnant late spring to early summer Lactation December to mid-January	Moderate	Moderate to high	Low	Moderate - uncommon on ridgetop forests where soil fertility is low.	Turbines located at least 30 m from hollow-bearing trees
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing Bat	V	Yes – travel up to several hundred kilometres to over-wintering roosts	Above canopy and open areas	Caves, disused mines	Fast and direct flight Forested areas opens areas, waterways, street lights and tracks	Mating in early winter Birth in spring /. Summer Juveniles leave cave in march	High	Low	Low	Moderate – may also be attracted to turbine lighting	Turbine lighting should be a form that minimises attraction of insects.

Scientific name	Common name	Conservation status	Seasonal risks (eg. Migration)	Flight character	Roosting	Foraging	Breeding season	Likelihood of species behaviour resulting in collisions	Collision due to turbines in proximity to roosting habitat	Likelihood of collision with overhead cabling	Overall risk	Mitigation
<i>Nyctophilus</i> spp.	A Long-eared Bat		No	Below canopy and often fly close to the ground	Dead trees, exfoliating bark or hollows	Slow, maneuverable, undulating flight through dens canopy Can forage in open areas but most is in dense areas Capable of foraging up to 12 km from their roost – when commuting flight is rapid and direct	Birth October – November Young fly in December or January	Low	Low	Low	Low	
<i>Tadarida australis</i>	White-striped Freetail Bat		Y – migrate to northern regions during winter (non-hibernating species)	Above canopy	Large eucalypts (often in their hollows) Roosts in trees in a range of habitats from forest to open parklands	Fast and direct path High altitude feeding Can commute 50 km between roost and feeding	Birth mid-December to end of January Juveniles weaned by mid-February	High	High	Low	High	Turbines located at least 30 m from hollow-bearing trees Turbines located in north south rather than east west direction to minimise impacts on northern migration activities

Scientific name	Common name	Conservation status	Seasonal risks (eg. Migration)	Flight character	Roosting	Foraging	Breeding season	Likelihood of species behaviour resulting in collisions	Collision due to turbines in proximity to roosting habitat	Likelihood of collision with overhead cabling	Overall risk	Mitigation
<i>Vespadelus darlingtoni</i>	Large Forest Bat		N	Below canopy, within canopy and forest floor	Tree hollows	Cluttered vegetation avoided. Foraging and commuting focused along trails and streams	Birth November – December Juveniles fly from mid-January.	Low	Low	Low	Low	
<i>Vespadelus regulus</i>	Southern Forest Bat		N	Below canopy & within canopy	Tree hollows and roof cavities	Agile, fluttery flight	Birth early summer	Low	Low	Low	Low	
<i>Vespadelus vulturnus</i>	Little Forest Bat		N	Below canopy	Roof cavities and hollows in dead timber	Agile, fluttery flight	Birth early summer	Low	Low	Low	Low	
<i>Saccolaimus flaviventris</i>	Yellow-bellied sheath-tail-bat**	V	Unlikely	Above canopy but lower in open area	Tree hollows and buildings	High and fast over forest canopy	December to mid-March	Moderate	Moderate	Low	Moderate	Turbines located at least 30 m from hollow-bearing trees

Note:
 flight characteristics sourced from Strahan (2008) or DECC (2009)
 ** = not recorded within the study area but predicted to occur

Appendix L – Part 3A Impact Assessment Criteria

NSW Impact Assessment

An assessment of the impacts of the proposal on species, populations and ecological communities listed Schedules 1 and 2 of the TSC Act was undertaken. The proposal will be assessed under Part 3A of the EP&A Act and consequently this impact assessment was undertaken in accordance with the Draft *Guidelines for Threatened Species Assessment* (DECC 2005).

The study area supported extensive areas of native vegetation including the EPBC Act listed Native Temperate Grasslands community and potential and known habitat for a number of threatened flora and fauna species. A full list of species recorded within a 10 km radius of the study area is found in Appendix I, however, not all of these species or their habitat are likely to be impacted by the proposal. Potentially impacted species are listed below in Table 49. Each flora and fauna species has been assessed separately for potential impacts that may result from the proposal.

Table 49: TSC Act listed species known to or with the potential to occur within the study area

Scientific Name	Common Name	Status	Likelihood
Flora			
<i>Calotis glandulosa</i>	Mauve Burr Daisy	V	Potential
<i>Dodonaea procumbens</i>	Trailing Hop-bush	V	Potential
<i>Rutidosia leiopis</i>	Monaro Golden Daisy	V	Potential
<i>Swainsona sericea</i>	Silky Swainson-pea	V	Potential
<i>Thesium australe</i>	Austral Toadflax, Toadflax	V	Potential
Birds			
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V	Potential
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	V	Likely
<i>Melanodryas cucullata cucullata</i>	Hooded Robin	V	Potential
<i>Ninox connivens</i>	Barking Owl	V	Likely - foraging

Scientific Name	Common Name	Status	Likelihood
<i>Ninox strenua</i>	Powerful Owl	V	Likely
<i>Oxyura australis</i>	Blue-billed Duck	V	Potential
<i>Pyrrholaemus sagittatus</i>	Speckled Warbler	V	Potential
<i>Stagonopleura guttata</i>	Diamond Firetail	V	Known

Mammals

<i>Dasyurus maculatus</i> (SE mainland population)	Spot-tail Quoll, Spotted-tail Quoll, Tiger Quoll	V	Potential
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V	Known
<i>Miniopterus schreibersii</i> <i>oceanensis</i>	Eastern Bentwing-bat	V	Known
<i>Myotis macropus</i> (formally <i>Myotis adversus</i>)	Large-footed Myotis	V	Potential
<i>Petaurus norfolcensis</i>	Squirrel Glider	V	Known
<i>Phascolarctos cinereus</i>	Koala	V	Potential
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheathtail-bat	V	Likely

Reptiles

<i>Aprasia parapulchella</i>	Pink-tailed Worm Lizard	V	Likely
<i>Delma impar</i>	Striped Legless Lizard	V	Likely
<i>Suta flagellum</i>	Little Whip Snake	V	Known
<i>Tympanocryptis pinguicolla</i>	Grassland Earless Dragon	E	Known

FLORA

***Calotis glandulosa* - Mauve Burr Daisy**

The Mauve Burr-daisy is a sprawling, branched herb that grows to 20 cm tall and up to 1 m wide. Mauve Burr-daisy's main distribution is in the Monaro and Kosciuszko regions. The Mauve Burr-daisy is found in subalpine grassland (dominated by *Poa* spp.), Natural Temperate Grassland (dominated by *Themeda australis*) and Snow Gum (*Eucalyptus pauciflora*) Woodlands on the Monaro and Shoalhaven area. It appears to be a coloniser of bare patches, and does not persist in heavily-grazed pastures of the Monaro. It flowers in spring and summer (DECC 2005).

How is the proposal likely to affect the lifecycle of a threatened species and/or population?

Potential habitat for the Mauve Burr-daisy is present within the study area. Vegetation surveys and target surveys were conducted across the proposed study area in suitable habitat during December 2008 and January 2009 when the species is known to flower. Results of the surveys found no record of the species on site. Little is known of dormancy, the persistence of seedbanks, and germination mechanisms for this species. However, given only a small area of potential habitat relative to the amount of habitat within the project site is to be cleared it is unlikely that the proposal would impact on the lifecycle of this species if it were present.

The seeds of this species are dispersed by burrs which attach to animals and this method of dispersal is unlikely to be impeded by the proposal. Furthermore, the extensive and long term grazing may have removed this species from the site.

How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

The Mauve Burr-daisy has the potential to occur across the following vegetation types across the study area:

- NTG
- SGW
- RGOF
- DrG

The proposal includes the permanent removal of up to 95.65 ha of habitat (or 90.31 ha for 107 layout) and will temporarily remove 90.31 ha (or 84.56 ha for 107 layout). Vegetation removal will comprise linear strips (for turbines, access tracks and the associated ancillary structures required for the running of the wind farm). The area of vegetation to be cleared is contiguous with other examples of the same vegetation communities in a similar condition within the project site (amounting to approximately 6749.39 ha), and therefore the proposal is unlikely to substantially reduce the amount of habitat for this species within the study area.

Control measures will be implemented to ensure that impacts to habitat for the threatened species are minimised. Weed control measures will also be implemented in areas disturbed by proposed works for a period of 3 years after the completion of construction works.

Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

The Mauve Burr-daisy occurs in the Monaro and Kosciuszko regions and as such its potential occurrence in the study area does not constitute the potential limit of its known distribution (DECC 2005).

How is the proposal likely to affect current disturbance regimes?

Landscape fire is relatively rare in subalpine environments in Australia (Wahren *et al.* 2002) so the threatened species potentially occurring in the study area are likely to be dependent on very low or no fire frequency. The risk of fire with wind farms is inherently low (CFA 2007). A low risk is associated with malfunctioning turbine bearings, inadequate crankcase lubrication, cable damage during rotation, electrical shorting or arcing occurring in transmission and distribution facilities (CFA 2007). A large portion of the study area is grassland and turbines in woodland areas have been located at least 30 m from trees wherever possible, therefore, it is unlikely that the proposal will dramatically alter fire patterns across the study area.

The study area is relatively highly elevated in the landscape and streams in the study area have low potential for flooding. The proposal is not likely to significantly affect flooding regimes for the study area and so will not impact on threatened species dependent on flooding regimes.

The site is grazed primarily by sheep, but cattle are present in some areas. Grazing pressure and management varies across the landscape, and the proposal is considered unlikely to exacerbate over-grazing at the site, but may, in fact, contribute to a more sustainable grazing regime through the mitigation and offset measures proposed in some parts of the site.

Feral animals can have a detrimental impact on threatened species and their habitat. In the case of threatened flora, grazing by feral animals such as the European Rabbit can result in the species being precluded from a site. The proposal is considered unlikely to contribute to increasing feral animal activity across the project site and instead is likely to assist with the management of these species through the proposed mitigation measures to be implemented within the study area and on the proposed offset sites.

How is the proposal likely to affect habitat connectivity?

The proposed project will not result in a significant decrease of habitat connectivity for the Mauve Burr-Daisy due to the availability of approximately 6,935 ha of suitable habitat within the project site. Dispersal agents for this species will not be impeded by the proposal and the linear nature of the proposal means that larger consolidated stands of vegetation would not be removed thereby preventing fragmentation of areas of potential habitat.

The maximum 12 m clearance width for the road construction is unlikely to prevent dispersal and hence unlikely to affect connectivity as it applies to the Mauve Burr-daisy.

How is the proposal likely to affect critical habitat?

Not applicable - critical habitat cannot be declared for vulnerable species.

***Dodonaea procumbens* - Trailing Hop-bush**

The Trailing Hop-bush grows in Natural Temperate Grassland for fringing eucalypt woodland of Snow Gum (*Eucalyptus pauciflora*). It is also found in open bare patches of sandy-clay soils on cold wet grassy flats. It appears to be a coloniser of bare patches, and does not persist in heavily-grazed pastures of the Monaro. It flowers in spring and summer (DECC 2005).

How is the proposal likely to affect the lifecycle of a threatened species and/or population?

Surveys for this species were undertaken across woodland and grassland areas of the study area during December 2008 and January 2009. Results of the target surveys found no record of the species on site. However, given only a small area of potential habitat (90.65 permanent clearance, 90.31 temporary clearance) relative to the amount of habitat within the project site 6935 ha) is to be cleared it is unlikely that the proposal would impact on the lifecycle of this species.

Considering that many flora species are wind and insect pollinated, these processes are unlikely to be significantly impeded by the proposal. The fruit of this species are papery and dispersed by wind and this method of dispersal is unlikely to be impeded by the proposal.

How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

The Trailing Hop-bush has the potential to occur across the following vegetation types across the study area:

- NTG
- SGW
- RGOF
- DrG

The proposal includes the permanent removal of up to 95.65 ha of habitat (or 90.31 ha for 107 layout) and will temporarily remove 90.31 ha (or 84.56 ha for 107 layout). Vegetation removal will comprise linear strips for turbines, access tracks and the associated ancillary structures required for the running of the wind farm. The area of vegetation to be cleared is contiguous with other examples of the same vegetation communities in a similar condition within the project site (amounting to approximately 6749.39 ha), and therefore the proposal is unlikely to substantially reduce the amount of habitat for this species within the study area.

Control measures will be implemented to ensure that impacts to habitat for the threatened species are minimised. Weed control measures will be implemented in areas disturbed by proposed works for a period of 3 years after the completion of construction works, thereby reducing potential impacts of the proposal of potential habitat for this species.

Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

The Trailing Hop-bush occurs on the Monaro between Michelago and Dalgety and therefore if it were present within the study area it would be close to the limits of its known distribution.

How is the proposal likely to affect current disturbance regimes?

Landscape fire is relatively rare in subalpine environments in Australia (Wahren *et al.* 2002) so the threatened species potentially occurring in the study area are likely to be dependent on very low or no fire frequency. The risk of fire with wind farms is inherently low (CFA 2007). A low risk is associated with malfunctioning turbine bearings, inadequate crankcase lubrication, cable damage during rotation, electrical shorting or arcing occurring in transmission and distribution facilities (CFA 2007). The location of wind turbines away from tall vegetation in the study area minimizes the risk of fire. It is unlikely that the proposal will significantly affect the current disturbance regime.

The study area is primarily located on ridge tops and therefore would not be impacted by the surrounding streams. The proposal is not likely to significantly affect flooding regimes for the study area and so will not impact on threatened species dependent on flooding regimes.

The site is grazed primarily by sheep, but cattle are present in some areas. Grazing pressure and management varies across the landscape, and the proposal is considered unlikely to exacerbate over-grazing at the site, but may, in fact, contribute to a more sustainable grazing regime through the mitigation and offset measures proposed in some parts of the site.

Feral animals can have a detrimental impact on threatened species and their habitat. In the case of threatened flora, grazing by feral animals such as the European Rabbit can result in the species being precluded from a site. The proposal is considered unlikely to contribute to increasing feral animal activity across the project site and instead is likely to assist with the management of these species through the proposed mitigation measures to be implemented within the study area and on the proposed offset sites.

How is the proposal likely to affect habitat connectivity?

The proposed project will not result in a significant decrease of habitat connectivity for the Trailing Hop-bush due to the availability of approximately 6935 ha of suitable habitat within the project site. Dispersal agents for this species will not be impeded by the proposal and the linear nature of the proposal means that larger consolidated stands of vegetation would not be removed thereby preventing fragmentation of areas of potential habitat.

The maximum 12 m clearance width for the road construction is unlikely to prevent dispersal and hence unlikely to affect connectivity as it applies to the Trailing Hop-bush.

How is the proposal likely to affect critical habitat?

Not applicable - critical habitat cannot be declared for vulnerable species.

***Rutidosia leirolepis* - Monaro Golden Daisy**

The Monaro Golden Daisy is a low, tufted perennial with a woody root-stock and bright yellow conspicuous flower-heads. The Monaro Golden Daisy is found in Natural Temperate Grasslands on the Monaro and in the sub-alpine grasslands in Kosciuszko National Park. It grows on basalt, granite and sedimentary substrates (DECC 2005).

How is the proposal likely to affect the lifecycle of a threatened species and/or population?

There is potential for the Monaro Golden Daisy to occur within areas of NTG and derived grassland. Vegetation surveys and target surveys were conducted across the proposed study area in suitable habitat during December 2008 and January 2009 when the species is known to flower. Results of the surveys found no record of the species on site.

Little is known of dormancy, the persistence of seed banks, and germination mechanisms for this species. The loss of the potential habitat for this species is unlikely to disrupt the lifecycle of this species. Considering that many flora species are wind and insect pollinated, these processes are unlikely to be significantly impeded by the proposal. The seeds of this species are dispersed by wind and this method of dispersal is unlikely to be impeded by the proposal.

How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

The proposed project will result in the permanent removal of up to 62.13 ha (or 71.75 ha for 107 layout) and temporarily remove up to 41.17 ha (or 61.08 ha for 107 layout) of potential habitat for the Monaro Golden Daisy. Vegetation removal will comprise linear strips for turbines, access tracks and the associated ancillary structures required for the running of the wind farm. The area of vegetation to be cleared is contiguous with other examples of the same vegetation communities in a similar condition within the project site (amounting to approximately 4849.25 ha), and, therefore, the proposal is unlikely to substantially reduce the amount of habitat for this species within the study area.

Control measures will be implemented to ensure that impacts to habitat for the threatened species are minimized. Weed control measures will also be implemented in areas disturbed by proposed works for a period of 3 years after the completion of construction works.

Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

The Monaro Golden Daisy is found in scattered populations on the Monaro, and in low subalpine plains of Kosciuszko National Park (eg. Long Plain and Happy Jacks Plain) (DECC 2005). Therefore, this species would be close to the limits of its distribution if it were to occur within the study area.

How is the proposal likely to affect current disturbance regimes?

Landscape fire is relatively rare in subalpine environments in Australia (Wahren *et al.* 2002) so the threatened species potentially occurring in the study area are likely to be dependent on very low or no fire frequency. The risk of fire with wind farms is inherently low (CFA 2007). A low risk is associated with malfunctioning turbine bearings, inadequate crankcase lubrication, cable damage during rotation, electrical shorting or arcing occurring in transmission and distribution facilities (CFA 2007). The location of wind turbines away from tall vegetation in the study area minimizes the risk of fire. It is unlikely that the proposal will significantly affect the current disturbance regime.

The study area is primarily located on ridge tops and, therefore, would not be impacted by the surrounding streams. The proposal is not likely to significantly affect flooding regimes for the study area and so will not impact on threatened species dependent on flooding regimes.

The site is grazed primarily by sheep, but cattle are present in some areas. Grazing pressure and management varies across the landscape, and the proposal is considered unlikely to exacerbate over-grazing at the site, but may, in fact, contribute to a more sustainable grazing regime through the mitigation and offset measures proposed in some parts of the site.

Feral animals can have a detrimental impact on threatened species and their habitat. In the case of threatened flora, grazing by feral animals such as the European Rabbit can result in the species being precluded from a site. The proposal is considered unlikely to contribute to increasing feral animal activity across the project site and instead is likely to assist with the management of these species through the proposed mitigation measures to be implemented within the study area and on the proposed offset sites.

How is the proposal likely to affect habitat connectivity?

The proposed project will not result in a significant decrease of habitat connectivity for the Monaro Golden Daisy due to the availability of approximately 4911.38 ha of suitable habitat within the project site that will not be cleared and the potentially high dispersal distance of this species. Dispersal agents for this species will not be impeded by the proposal and the linear nature of the proposal means that larger consolidated stands of vegetation would not be removed thereby preventing fragmentation of areas of potential habitat.

The maximum 12 m clearance width for the road construction is unlikely to prevent dispersal and hence unlikely to affect connectivity as it applies to the Monaro Golden Daisy.

How is the proposal likely to affect critical habitat?

Not applicable - critical habitat cannot be declared for vulnerable species.

***Swainsona sericea* - Silky Swainson-pea**

The Silky Swainson-pea is a prostrate or erect perennial, growing to 10 cm tall with purple pea-shaped flowers. Silky Swainson-pea has been recorded from the Northern Tablelands to the Southern Tablelands and further inland on the slopes and plains. Its stronghold is on the Monaro. The Silky Swainson-pea is found in Natural Temperate Grassland and Snow Gum Woodland on the Monaro (DECC 2005).

How is the proposal likely to affect the lifecycle of a threatened species and/or population?

Potential habitat for the Silky Swainson-pea is present within areas of NTG, SGW, RGOF and derived grassland across the project site. Vegetation surveys and target surveys were conducted across the proposed study area in suitable habitat during December 2008 and January 2009 when the species is known to flower. Results of the surveys found no record of the species on site. The species is known to germinate from seed after fire so it is likely that there is some seed dormancy, some persistence of seedbanks, and fire germination mechanisms. Although there is potential for the species to exist in the study area in a soil seed bank, it is unlikely that proposal will affect the lifecycle of this species due to the presence of extensive potential habitat across the project site that will not be developed.

How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

The Silky Swainson-pea has the potential to occur across the following vegetation types across the study area:

- NTG
- SGW
- RGOF
- DrG

The proposal includes the permanent removal of up to 95.65 ha of habitat (or 90.31 ha for 107 layout) and will temporarily remove 90.31 ha (or 84.56 ha for 107 layout). Vegetation removal will comprise linear strips for turbines, access tracks and the associated ancillary structures required for the running of the wind farm. The area of vegetation to be cleared is contiguous with other examples of the same vegetation communities in a similar condition within the project site (amounting to approximately 6749.39 ha), and therefore the proposal is unlikely to substantially reduce the amount of habitat for this species within the study area.

Control measures will be implemented to ensure that impacts to habitat for the threatened species are minimised. Weed control measures will be implemented in areas disturbed by proposed works for a period of 3 years after the completion of construction works, thereby reducing potential impacts of the proposal of potential habitat for this species

Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

The known distribution of the Silky Swainson-pea extends to the northern tablelands and interstate and therefore the study area would not constitute the limit of its distribution (DECC 2005).

How is the proposal likely to affect current disturbance regimes?

Landscape fire is relatively rare in subalpine environments in Australia (Wahren *et al.* 2002) so the threatened species potentially occurring in the study area are likely to be dependent on very low or no fire frequency. The risk of fire with wind farms is inherently low (CFA 2007). A low risk is associated with malfunctioning turbine bearings, inadequate crankcase lubrication, cable damage during rotation, electrical shorting or arcing occurring in transmission and distribution facilities (CFA 2007). The location of wind turbines away from tall vegetation in the study area minimizes the risk of fire. It is unlikely that the proposal will significantly affect the fire regime such that it would have a detrimental impact on the Silky Swainson-pea.

The study area is primarily located on ridge tops and therefore would not be impacted by the surrounding streams. The proposal is not likely to significantly affect flooding regimes for the study area and so will not impact on threatened species dependent on flooding regimes.

The site is grazed primarily by sheep, but cattle are present in some areas. Grazing pressure and management varies across the landscape, and the proposal is considered unlikely to exacerbate over-grazing at the site, but may, in fact, contribute to a more sustainable grazing regime through the mitigation and offset measures proposed in some parts of the site.

Feral animals can have a detrimental impact on threatened species and their habitat. In the case of threatened flora, grazing by feral animals such as the European Rabbit can result in the species being precluded from a site. The proposal is considered unlikely to contribute to increasing feral animal activity across the project site and instead is likely to assist with the management of these species through the proposed mitigation measures to be implemented within the study area and on the proposed offset sites.

How is the proposal likely to affect habitat connectivity?

The proposed project will not result in a significant decrease of habitat connectivity for the Silky Swainson-pea due to the availability of approximately 6935 ha of suitable habitat within the study area that will not be cleared and the potentially high dispersal distance of this species. Dispersal agents for this species are unlikely to be impeded by the proposal and the linear nature of the proposal means that larger consolidated stands of vegetation would not be removed thereby preventing fragmentation of areas of potential habitat.

The maximum 12 m clearance width for the road construction is unlikely to prevent dispersal and hence unlikely to affect connectivity as it applies to the Silky Swainson-pea.

How is the proposal likely to affect critical habitat?

Not applicable - critical habitat cannot be declared for vulnerable species.

***Thesium australe* - Austral Toadflax, Toadflax**

Austral Toadflax is a small, straggling herb to 40 cm tall and is found in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. Austral Toad-flax occurs in grassland or grassy woodland, often in damp sites in association with Kangaroo Grass (*Themeda australis*) (DECC, 2005).

How is the proposal likely to affect the lifecycle of a threatened species and/or population?

There is potential for Austral Toadflax to occur within areas of NTG, RGOF, SGW and derived grassland. Vegetation surveys and target surveys were conducted across the proposed study area in suitable habitat during December 2008 and January 2009 when the species is known to flower. Results of the surveys found no record of the species on site. Little is known of dormancy, the persistence of seedbanks, and germination mechanisms for this species, however, it is unlikely for an important population of Austral Toadflax to exist within the proposed development. The dispersal of seeds of this species is unlikely to be impeded by the proposal and, therefore, detrimental impacts on its lifecycle would not be anticipated.

How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

Vegetation removal is comprised of linear strips (for turbines, access tracks and the associated ancillary structures required for the running of the wind farm). The area of vegetation to be cleared is contiguous with other examples of the same vegetation communities in a similar condition within the project site (amounting to approximately 6749.39 ha), and therefore the proposal is unlikely to substantially reduce the amount of habitat for this species within the study area.

Control measures will be implemented to ensure that impacts to habitat for the threatened species are minimised. Weed control measures will be implemented in areas disturbed by proposed works for a period of 3 years after the completion of construction works, thereby reducing potential impacts of the proposal of potential habitat for this species

Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

The known distribution of the Austral Toadflax extends to the Northern tablelands and interstate and therefore the study area does not constitute the limit of its distribution (DECC 2005).

How is the proposal likely to affect current disturbance regimes?

Landscape fire is relatively rare in subalpine environments in Australia (Wahren *et al.* 2002) so the threatened species potentially occurring in the study area are likely to be dependent on very low or no fire frequency. The risk of fire with wind farms is inherently low (CFA 2007). A low risk is associated with malfunctioning turbine bearings, inadequate crankcase lubrication, cable damage during rotation, electrical shorting or arcing occurring in transmission and distribution facilities (CFA 2007). The location of wind turbines away from tall vegetation in the study area minimizes the risk of fire. It is unlikely that

the proposal will significantly affect the fire regime such that it would have a detrimental impact on the Austral Toadflax.

The study area is primarily located on ridge tops and, therefore, would not be impacted by the surrounding streams. The proposal is not likely to significantly affect flooding regimes for the study area and so will not impact on threatened species dependent on flooding regimes.

The site is grazed primarily by sheep, but cattle are present in some areas. Grazing pressure and management varies across the landscape, and the proposal is considered unlikely to exacerbate over-grazing at the site, but may, in fact, contribute to a more sustainable grazing regime through the mitigation and offset measures proposed in some parts of the site.

Feral animals can have a detrimental impact on threatened species and their habitat. In the case of threatened flora, grazing by feral animals such as the European Rabbit can result in the species being precluded from a site. The proposal is considered unlikely to contribute to increasing feral animal activity across the project site and instead is likely to assist with the management of these species through the proposed mitigation measures to be implemented within the study area and on the proposed offset sites.

How is the proposal likely to affect habitat connectivity?

The proposal is unlikely to impact upon habitat connectivity for the Austral Toadflax due to the availability of approximately 6935 ha of suitable habitat within the study area that will not be cleared and that dispersal mechanisms are unlikely to be impeded. The linear nature of the proposal means that larger consolidated stands of vegetation would not be removed thereby preventing fragmentation of areas of potential habitat.

How is the proposal likely to affect critical habitat?

Not applicable - critical habitat cannot be declared for vulnerable species.

FAUNA

Woodland Birds

Callocephalon fimbriatum - Gang-gang Cockatoo

In New South Wales, the Gang-gang Cockatoo is distributed from the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes. It occurs regularly in the Australian Capital Territory, but is rare at the extremities of its range. In summer, this species is generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, the Gang-gang Cockatoo may occur at lower altitudes in drier more open eucalypt forests and woodlands, and is often found in urban areas. It may also occur in sub-alpine Snow Gum *Eucalyptus pauciflora* woodland and occasionally in temperate rainforests (DECC 2005).

How is the proposal likely to affect the lifecycle of a threatened species and/or population?

There is potential for Gang-gang Cockatoos to occur on site, particularly in the SGW and RGOF. Diurnal bird surveys and opportunistic surveys were conducted across the proposed study area in suitable habitat during December 2008 and January 2009. Results of the surveys found no record of the species on site.

The Gang-gang Cockatoo requires hollows in the trunks or large limbs of large trees in which to breed and favours old-growth attributes for roosting (Gibbons 1999, Gibbons and Lindenmayer 2000). A commitment to avoid hollow-bearing tree wherever practical has been made. Therefore, given hollow-bearing trees are present in abundance across the project site, the removal of a small number of hollow-bearing trees (if required) is unlikely to limit nesting resources for this species such that it would impact on the lifecycle of the species.

The Gang-gang Cockatoo may potentially forage in the SGW and RGOF found in the study area. Removal of this vegetation has been minimised (approximately 22 ha permanent, 23.48 ha). Given extensive areas of foraging habitat are present across the project site, it is unlikely that foraging behaviour for this species will change.

How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

The proposal includes the permanent removal of up to 22 ha of habitat (or 18.52 ha for 107 layout) and will temporarily remove 23.48 ha (or 23.48 ha for 107 layout). Vegetation removal will comprise linear strips for turbines, access tracks and the associated ancillary structures required for the running of the wind farm. The area of vegetation to be cleared is contiguous with other examples of the same vegetation communities in a similar condition within the project site (amounting to approximately 2001.97 ha), and therefore the proposal is unlikely to substantially reduce the amount of habitat for this species within the study area.

Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

The known distribution of the Gang-gang Cockatoo extends north to the Hunter region, and inland to the Central Tablelands and south-west slopes. It occurs regularly in the Australian Capital Territory. The study area does not sit at the limit of the Gang-gang Cockatoo's distribution.

How is the proposal likely to affect current disturbance regimes?

Landscape fire is relatively rare in subalpine environments in Australia (Wahren *et al.* 2002) so the threatened species potentially occurring in the study area are likely to be dependent on very low or no fire frequency. The risk of fire with wind farms is inherently low (CFA 2007). A low risk is associated with malfunctioning turbine bearings, inadequate crankcase lubrication, cable damage during rotation, electrical shorting or arcing occurring in transmission and distribution facilities (CFA 2007). The location of wind turbines away from tall vegetation in the study area minimizes the risk of fire. It is unlikely that the proposal will significantly affect the fire regime such that it would have a detrimental impact on the Gang Gang Cockatoo. Furthermore, a number of mitigation measures will be implemented during construction to prevent accidental fires.

The study area is primarily located on ridge tops and, therefore, would not be impacted by the surrounding streams. The proposal is not likely to significantly affect flooding regimes for the study area and so will not impact on threatened species dependent on flooding regimes.

Feral animals can have a detrimental impact on threatened fauna through predation and destruction of habitat. In the case of woodland birds, impacts are likely to be restricted primarily to predation by feral Cats and the European Red Fox. The proposal is considered unlikely to contribute to increasing feral animal activity across the project site and instead is likely to assist with the management of these species through the proposed mitigation measures to be implemented within the study area and on the proposed offset sites.

How is the proposal likely to affect habitat connectivity?

The proposed project will not result in a significant decrease of habitat connectivity for the Gang-gang Cockatoo due to the availability of approximately 2021.97 ha of suitable foraging habitat across the project site.

The woodland and open forest areas of the project site naturally have large canopy gaps and a very open and more often absent understorey. Given the linear nature of the proposal, the large home range of the species and that limited tree clearance is required it is considered unlikely that the proposal would affect habitat connectivity in terms of use by the Gang Gang Cockatoo. Furthermore, turbines have not been placed between two large consolidated stands of woodland at the site although there is some potential for strike from a small number of turbines should this species be moving from the woodland on Boco to the woodland areas on Yandra or passing through the area.

The landscape within the study area is one of open woodland and, therefore, the proposal is considered unlikely to result in fragmentation of habitat for this species.

How is the proposal likely to affect critical habitat?

Not applicable - critical habitat cannot be declared for vulnerable species.

***Climacteris picumnus victoriae* – Brown Treecreeper**

The eastern subspecies of Brown Treecreeper lives in eastern NSW in dry eucalypt woodlands and forests through the western slopes of NSW and in coastal areas with drier open woodlands such as the Snowy River Valley, Cumberland Plain, Hunter Valley and parts of the Richmond and Clarence Valleys (DECC 2005).

How is the proposal likely to affect the lifecycle of a threatened species and/or population?

There is potential for Brown Treecreeper to occur within the study area in areas of SGW and RGOF. Diurnal bird surveys and opportunistic surveys were conducted across the study area in suitable habitat during December 2008 and January 2009.

The Brown Treecreeper may nest and forage within the areas of potential habitat across the project site. However, tree clearance for the proposal would be minimal and has been avoided wherever possible and extensive areas of habitat are present for this species across the project site. Furthermore, the risk of the Brown Treecreeper colliding with turbines is considered low based on the foraging and flight patterns of this species. Therefore, the proposal is considered unlikely to affect the lifecycle of this species should it be present at the site.

How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

The proposed project will result in the permanent removal of up to 22 ha of potential habitat for this species and will temporarily remove up to 23.48 ha. Given extensive areas of SGW and RGOF are present across the project site, comparatively the area of habitat to be removed is very small and that vegetation removal is to occur in a linear pattern rather than one consolidated stand, it is unlikely that the proposed vegetation clearance would impact on this species such that foraging and nesting resources would become limited within the project site.

Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

The Brown Treecreeper is endemic to eastern Australia and occurs in eucalypt forests and woodlands of inland plains and slopes of the Great Dividing Range. It is less commonly found on coastal plains and ranges (DECC 2005). This species is not at the limit of its distribution within the project site.

How is the proposal likely to affect current disturbance regimes?

Landscape fire is relatively rare in subalpine environments in Australia (Wahren *et al.* 2002) so the threatened species potentially occurring in the study area are likely to be dependent on very low or no fire frequency. The risk of fire with wind farms is inherently low (CFA 2007). A low risk is associated with malfunctioning turbine bearings, inadequate crankcase lubrication, cable damage during rotation, electrical shorting or arcing occurring in transmission and distribution facilities (CFA 2007). A large portion of the study area is grassland and turbines in woodland areas have been located at least 30 m from trees wherever possible, therefore, it is unlikely that the proposal will dramatically alter fire patterns across the study area. Furthermore, a number of mitigation measures will be implemented during construction to prevent accidental fires.

The site is grazed primarily by sheep, but cattle are present in some areas. Grazing pressure and management varies across the landscape, and the proposal is considered unlikely to exacerbate over-grazing at the site, but may, in fact, contribute to a more sustainable grazing regime through the mitigation and offset measures proposed in some parts of the site.

Feral animals can have a detrimental impact on threatened species and their habitat. In the case of grasslands and grassy woodlands, grazing by feral animals such as the European Rabbit can result in loss of species diversity and tussock structure which in turn impacts of potential prey for this species.

Feral animals can also have a detrimental impact on threatened fauna through predation by species such as feral Cats and the European Red Fox. The proposal is considered unlikely to contribute to increasing feral animal activity across the project site and instead is likely to assist with the management of these species through the proposed mitigation measures to be implemented within the study area and on the proposed offset sites.

How is the proposal likely to affect habitat connectivity?

The woodland and open forest areas of the project site naturally have large canopy gaps and a very open and more often absent understorey. Given the linear nature of the proposal and that limited tree clearance is required it is considered unlikely that the proposal would create barriers to movement of Brown Treecreepers throughout the project site. Furthermore, given the flight characteristics of this species, it is considered unlikely that they would collide with turbines and hence turbines are unlikely to restrict movement across the project site.

How is the proposal likely to affect critical habitat?

Not applicable - critical habitat cannot be declared for vulnerable species.

***Melanodryas cucullata cucullata* – Hooded Robin**

The south-eastern form of the Hooded Robin is found from Brisbane to Adelaide throughout much of inland NSW, with the exception of the north-west. The species is widespread, found across Australia, except for the driest deserts and the wetter coastal areas - northern and eastern coastal Queensland and Tasmania. This species prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses are required (DECC 2005)

How is the proposal likely to affect the lifecycle of a threatened species and/or population?

There is potential for the Hooded Robin to occur within the study area in areas of SGW and RGOF. Diurnal bird surveys and opportunistic surveys were conducted across the proposed study area in suitable habitat during December 2008 and January 2009 but no individuals were recorded. Territories for this species range from around 10 ha during the breeding season, to 30 ha in the non-breeding season. Although the proposal will result in the removal of 22 ha of potential nesting and foraging habitat for this species, vegetation clearance is linear in nature and, therefore, will not result in large consolidated patches of vegetation clearance. Furthermore, given tree clearance has been avoided wherever possible and the understorey in most areas across the site is absent, it is considered unlikely that the clearance of small sections of grassy understorey for roads and turbines would impact upon the lifecycle of the species.

The Hooded Robin is considered unlikely to fly at height as it is a woodland foraging species and therefore turbine strike where turbines occur throughout open parts of woodland is unlikely. Although flight heights may increase between woodland patches, given the home range of this species and that the most consolidated patches of woodland are on Yandra and are large enough to cover the entire home range for this species, the potential for this species being stuck by turbines due to movement between woodland patches is considered low. Therefore the proposal is considered unlikely to affect the lifecycle of this species should it be present at the site.

How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

The proposed project will result in the permanent removal of up to 22 ha of potential habitat for this species and will temporarily remove up to 23.48 ha. However this habitat removal is unlikely to result in foraging and nesting resources becoming limited within the project site for the following reasons:

- extensive areas of SGW and RGOF are present across the project site;
- comparatively the area of habitat to be removed is very small;
- vegetation removal is to occur in a linear pattern rather than one consolidated stand; and
- the majority of the vegetation clearance in woodland areas will be restricted to groundlayer clearing as trees will be avoided wherever possible.

Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

The Hooded Robin is widespread, found across Australia, except for the driest deserts and the wetter coastal areas - northern and eastern coastal Queensland and Tasmania. (DECC 2005). This species is not at the limit of its distribution within the project site.

How is the proposal likely to affect current disturbance regimes?

Landscape fire is relatively rare in subalpine environments in Australia (Wahren *et al.* 2002) so the threatened species potentially occurring in the study area are likely to be dependent on very low or no fire frequency. The risk of fire with wind farms is inherently low (CFA 2007). A low risk is associated with malfunctioning turbine bearings, inadequate crankcase lubrication, cable damage during rotation, electrical shorting or arcing occurring in transmission and distribution facilities (CFA 2007). A large portion of the study area is grassland and turbines in woodland areas have been located at least 30 m from trees wherever possible, therefore, it is unlikely that the proposal will dramatically alter fire patterns across the study area. Furthermore, a number of mitigation measures will be implemented during construction to prevent accidental fires.

The site is currently grazed primarily by sheep but cattle are present in some areas and light grazing is considered beneficial to some grassland species. Although grazing pressures vary across the landscape, it is considered unlikely that the proposal would exacerbate over-grazing at the site and in fact is likely to contribute to a more sustainable grazing regime through the mitigation and offset measures proposed across some parts of the site.

Feral animals can have a detrimental impact on threatened species and their habitat. In the case of grasslands and grassy woodlands, grazing by feral animals such as the European Rabbit can result in loss of species diversity and tussock structure which in turn impacts on potential prey for this species.

Feral animals can also have a detrimental impact on threatened fauna through predation by species such as feral Cats and the European Red Fox. The proposal is considered unlikely to contribute to increasing feral animal activity across the project site and instead is likely to assist with the management of these species through the proposed mitigation measures to be implemented within the study area and on the proposed offset sites.

How is the proposal likely to affect habitat connectivity?

The woodland and open forest areas of the project site naturally have large canopy gaps and a very open and more often absent understorey. Given the linear nature of the proposal and that limited tree clearance is required it is considered unlikely that the proposal would create barriers to Hooded Robin movement throughout the project site. Furthermore, given the flight characteristics of this species, it is considered unlikely that they would collide with turbines and therefore the wind farm is unlikely to alter Hooded Robin movement across the project site.

The landscape within the study area is one of open woodland and therefore the proposal is considered unlikely to result in fragmentation of habitat for this species.

How is the proposal likely to affect critical habitat?

Not applicable - critical habitat cannot be declared for vulnerable species.

***Pyrrholaemus sagittatus* - Speckled Warbler**

The Speckled Warbler lives in a wide range of *Eucalyptus* dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area (DECC 2005).

How is the proposal likely to affect the lifecycle of a threatened species and/or population?

There is potential for the Speckled Warbler to occur within the study area in areas of SGW and RGOF. Diurnal bird surveys and opportunistic surveys were conducted across the proposed study area in suitable habitat during December 2008 and January 2009 but no individuals were recorded. Territories for this species range from around 10 ha during the breeding season and are slightly larger outside the breeding season. Although the proposal will result in the removal of 22 ha of potential nesting and foraging habitat for this species, vegetation clearance is linear in nature and, therefore, will not result in large consolidated patches of vegetation clearance. Furthermore, given tree clearance has been avoided wherever possible and the understorey in most areas across the site is absent, it is considered unlikely that the clearance of small sections of grassy understorey for roads and turbines would impact upon the lifecycle of the species.

The Speckled Warbler is considered unlikely to fly at height as it is a woodland foraging species and therefore turbine strike where turbines occur throughout open parts of woodland is unlikely. Although flight heights may increase between woodland patches, given the home range of this species and that the most consolidated patches of woodland are on Yandra and are large enough to cover the entire home range for this species, the potential for this species to be stuck by turbines due to movement between woodland patches is considered low. Therefore, the proposal is considered unlikely to affect the lifecycle of this species should it be present at the site.

How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

The proposed project will result in the permanent removal of up to 22 ha of potential habitat for this species and the temporary removal of up to 23.48 ha. However, this habitat removal is unlikely to result in foraging and nesting resources becoming limited within the project site for the following reasons:

- extensive areas of SGW and RGOF are present across the project site,;
- comparatively the area of habitat to be removed is very small;
- vegetation removal is to occur in a linear pattern rather than one consolidated stand; and
- the majority of the vegetation clearance in woodland areas will be restricted to groundlayer clearing as trees will be avoided wherever possible.

Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

The Speckled Warbler has a patchy distribution throughout south-eastern Queensland, the eastern half of NSW and into Victoria, as far west as the Grampians. The species is most frequently reported from the hills and tablelands of the Great Dividing Range, and rarely from the coast (DECC 2005). This species is not at the limit of its distribution within the project site.

How is the proposal likely to affect current disturbance regimes?

Landscape fire is relatively rare in subalpine environments in Australia (Wahren *et al.* 2002) so the threatened species potentially occurring in the study area are likely to be dependent on very low or no fire frequency. The risk of fire with wind farms is inherently low (CFA 2007). A low risk is associated with malfunctioning turbine bearings, inadequate crankcase lubrication, cable damage during rotation, electrical shorting or arcing occurring in transmission and distribution facilities (CFA 2007). A large portion of the study area is grassland and turbines in woodland areas have been located at least 30 m from trees wherever possible, therefore, it is unlikely that the proposal will dramatically alter fire patterns across the study area. Furthermore, a number of mitigation measures will be implemented during construction to prevent accidental fires.

The site is grazed primarily by sheep, but cattle are present in some areas. Grazing pressure and management varies across the landscape, and the proposal is considered unlikely to exacerbate overgrazing at the site, but may, in fact, contribute to a more sustainable grazing regime through the mitigation and offset measures proposed in some parts of the site.

Feral animals can have a detrimental impact on threatened species and their habitat. In the case of grasslands and grassy woodlands, grazing by feral animals such as the European Rabbit impact on species diversity, seed availability and tussock structure which in turn impacts on potential prey / foraging resources for this species.

Feral animals can also have a detrimental impact on threatened fauna through predation by species such as feral Cats and the European Red Fox. The proposal is considered unlikely to contribute to increasing feral animal activity across the project site and instead is likely to assist with the management of these species through the proposed mitigation measures to be implemented within the study area and on the proposed offset sites.

How is the proposal likely to affect habitat connectivity?

The woodland and open forest areas of the project site naturally have large canopy gaps and a very open and more often absent understorey. Given the linear nature of the proposal, the extent of potential habitat across the project site, that limited tree clearance is required, and that this species is unlikely to fly at height, it is unlikely that the proposal would create barriers to Speckled Warbler movement throughout the project site.

The landscape within the study area is one of open woodland and, therefore, the proposal is considered unlikely to result in fragmentation of habitat for this species.

How is the proposal likely to affect critical habitat?

Not applicable - critical habitat cannot be declared for vulnerable species.

***Stagonopleura guttata* - Diamond Firetail**

The Diamond Firetail is found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum (*Eucalyptus pauciflora*) Woodlands. This species also occurs in open forest, mallee, Natural Temperate Grassland, and in derived grassland derived from other communities. It is often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland (DECC 2005).

This species was recorded at three locations across the study area.

How is the proposal likely to affect the lifecycle of a threatened species and/or population?

The Diamond Firetail has been recorded at three locations, one within the study area on Yandra and two within the project site on Boco along Snowy River Way. There is also the potential for this species to inhabit the majority of the site although woodland areas are likely to be preferred habitat. Although the proposal will result in the removal of 95.56 ha of potential nesting and foraging habitat for this species, vegetation clearance is linear in nature and therefore will not result in large consolidated patches of vegetation clearance. Furthermore, given tree clearance has been avoided wherever possible and the understorey in most areas across the site is absent, it is considered unlikely that the clearance of small sections of grassy understorey for roads and turbines would impact upon the lifecycle of the species. Furthermore, extensive areas of potential habitat will remain within the project site.

The Diamond Firetail is considered unlikely to fly at height as it is a woodland, ground foraging species and therefore turbine strike where turbines occur throughout open parts of woodland is unlikely. Although flight heights may increase between woodland patches, given this species appears to be sedentary, though some populations move locally, especially those in the south (DECC 2005), the potential for this species to be stuck by turbines due to movement between woodland patches is considered low. Therefore, the proposal is considered unlikely to affect the lifecycle of this species should it be present at the site.

How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

The proposal will result in the permanent removal of up to 95.65 ha of potential habitat for this species and will temporarily remove up to 90.31 ha. However this habitat removal is unlikely to result in foraging and nesting resources becoming limited within the project site for the following reasons:

- extensive areas of SGW and RGOF are present across the project site;
- this species also inhabits the farmland areas within the project site;
- comparatively the area of habitat to be removed is very small; and
- vegetation removal is to occur in a linear pattern rather than one consolidated stand.

Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

The Diamond Firetail is widely distributed in NSW, with a concentration of records from the Northern, Central and Southern Tablelands, the Northern, Central and South Western Slopes and the North West Plains and Riverina. This species is not commonly found in coastal districts, though there are records from near Sydney, the Hunter Valley and the Bega Valley. This species has a scattered distribution

over the rest of NSW and is also found in the Australian Capital Territory, Queensland, Victoria and South Australia. (DECC 2005). This species is not at the limit of its distribution within the project site.

How is the proposal likely to affect current disturbance regimes?

Landscape fire is relatively rare in subalpine environments in Australia (Wahren *et al* 2002) so the threatened species potentially occurring in the study area are likely to be dependent on very low or no fire frequency. The risk of fire with wind farms is inherently low (CFA 2007). A low risk is associated with malfunctioning turbine bearings, inadequate crankcase lubrication, cable damage during rotation, electrical shorting or arcing occurring in transmission and distribution facilities (CFA 2007). A large portion of the study area is grassland and turbines in woodland areas have been located at least 30 m from trees wherever possible, therefore it is unlikely that the proposal will dramatically alter fire patterns across the study area. Furthermore, a number of mitigation measures will be implemented during construction to prevent accidental fires.

The site is grazed primarily by sheep, but cattle are present in some areas. Grazing pressure and management varies across the landscape, and the proposal is considered unlikely to exacerbate over-grazing at the site, but may, in fact, contribute to a more sustainable grazing regime through the mitigation and offset measures proposed in some parts of the site.

Feral animals can have a detrimental impact on threatened species and their habitat. In the case of grasslands and grassy woodlands, grazing by feral animals such as the European Rabbit impact on species diversity, seed availability and tussock structure which in turn impacts on potential prey / foraging resources for this species.

Feral animals can also have a detrimental impact on threatened fauna through predation by species such as feral Cats and the European Red Fox. The proposal is considered unlikely to contribute to increasing feral animal activity across the project site and instead is likely to assist with the management of these species through the proposed mitigation measures to be implemented within the study area and on the proposed offset sites.

How is the proposal likely to affect habitat connectivity?

The woodland and open forest areas of the project site naturally have large canopy gaps and a very open and more often absent understorey. For the following reasons it is considered unlikely that the proposal would affect habitat connectivity for this species:

- the linear nature of the proposal;
- the extent of potential habitat across the project site;
- this species will forage across disturbed environments;
- limited tree clearance is required; and
- this species is unlikely to fly at height.

The landscape within the study area is one of open woodland and, therefore, the proposal is considered unlikely to result in fragmentation of habitat for this species.

How is the proposal likely to affect critical habitat?

Not applicable - critical habitat cannot be declared for vulnerable species.

Owls

Ninox connivens – Barking Owl

The Barking Owl inhabits eucalypt woodland, open forest, swamp woodlands and, especially in inland areas, timber along watercourses. Denser vegetation is used occasionally for roosting. During the day they roost along creek lines, usually in tall understorey trees with dense foliage such as *Acacia* and *Casuarina* species, or the dense clumps of canopy leaves in large *Eucalypts*. This species lives alone or in pairs. Territories range from 30 to 200 hectares and birds are present all year. Three eggs are laid in nests in hollows of large, old eucalypts including River Red Gum (*Eucalyptus camaldulensis*), White Box (*Eucalyptus albens*), (Red Box) *Eucalyptus polyanthemos* and Blakely's Red Gum (*Eucalyptus blakelyi*) (DECC 2005).

How is the proposal likely to affect the lifecycle of a threatened species and/or population?

The study area provides marginal potential roosting and/or nesting habitat for the Barking Owl. Given the large home range of the species, there is the potential for this species to travel from adjacent areas to forage across the project site. Call playback surveys were conducted across the project site for this species but no individuals were recorded. Although the proposal will result in the removal of 22 ha of potential foraging and roosting / breeding habitat for this species, vegetation clearance is linear in nature and, therefore, will not result in large consolidated patches of vegetation clearance. Furthermore, given tree clearance has been avoided wherever possible, it is considered unlikely that potentially minor tree clearance for roads and turbines would impact upon the lifecycle of the species.

The potential for the Barking Owl to be struck by turbines whilst foraging across the site is considered greatest as they approach the site or leave potential roost / nest sites. Given that most of the turbine lines generally run north – south and that the most consolidated stands of woodland vegetation occur to the east of the wind farm, the potential for turbine strike is considered low. In addition, a buffer of 30 m will be left between turbines and hollow-bearing trees (wherever possible) to reduce the likelihood of owls colliding with turbines as they leave roost / nest sites. Therefore, the proposal is considered unlikely to significantly affect the lifecycle of this species through the loss of individuals to turbine strike.

How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

The proposed project will result in the permanent removal of up to 22 ha of potential habitat for this species and the temporary removal of up to 23.48 ha. However this habitat removal is unlikely to result in foraging or breeding resources becoming limited within the project site for the following reasons:

- extensive areas of SGW and RGO are present across the project site,;
- comparatively the area of habitat to be removed is very small;
- vegetation removal is to occur in a linear pattern rather than one consolidated stand; and
- the majority of the vegetation clearance in woodland areas will be restricted to groundlayer clearing as trees will be avoided wherever possible; and
- tree clearance is expected to be minimal.

Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

The Barking Owl is found throughout Australia except for the central arid regions and Tasmania (DECC 2005). This species is not at the limit of its distribution within the project site.

How is the proposal likely to affect current disturbance regimes?

Landscape fire is relatively rare in subalpine environments in Australia (Wahren *et al.* 2002) so the threatened species potentially occurring in the study area are likely to be dependent on very low or no fire frequency. The risk of fire with wind farms is inherently low (CFA 2007). A low risk is associated with malfunctioning turbine bearings, inadequate crankcase lubrication, cable damage during rotation, electrical shorting or arcing occurring in transmission and distribution facilities (CFA 2007). A large portion of the study area is grassland and turbines in woodland areas have been located at least 30 m from trees wherever possible, therefore, it is unlikely that the proposal will dramatically alter fire patterns across the study area. Furthermore, a number of mitigation measures will be implemented during construction to prevent accidental fires.

Feral animals can also have a detrimental impact on threatened fauna through predation by species such as feral Cats and the European Red Fox. The proposal is considered unlikely to contribute to increasing feral animal activity across the project site and instead is likely to assist with the management of these species through the proposed mitigation measures to be implemented within the study area and on the proposed offset sites.

How is the proposal likely to affect habitat connectivity?

The woodland and open forest areas of the project site naturally have large canopy gaps and a very open and more often absent understorey. Given the linear nature of the proposal, the large home range of the species and that limited tree clearance is required it is considered unlikely that the proposal would affect habitat connectivity in terms of use by the Barking Owl. Furthermore, turbines have not been placed between two large consolidated stands of woodland at the site although there is some potential for strike from a small number of turbines should this species be moved from the woodland on Boco to the woodland areas on Yandra.

The landscape within the study area is one of open woodland and therefore the proposal is considered unlikely to result in fragmentation of habitat for this species.

How is the proposal likely to affect critical habitat?

Not applicable - critical habitat cannot be declared for vulnerable species.

***Ninox strenua* – Powerful Owl**

The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as Turpentine (*Syncarpia glomulifera*), Black She-oak (*Allocasuarina littoralis*), Blackwood (*Acacia melanoxylon*), Rough-barked Apple (*Angophora floribunda*), Cherry Ballart (*Exocarpos cupressiformis*) and a number of eucalypt species (DECC 2005).

How is the proposal likely to affect the lifecycle of a threatened species and/or population?

Potential foraging, roosting and nesting habitat for this species is present within the project site. Given the large home range of this species (400-1450 ha), if it did not roost or nest at the site, there is the potential that it would still forage across the project site. Call playback surveys were conducted across the project site for this species in accordance with minimum survey requirements but no individuals were recorded. Although the proposal will result in the removal of 22 ha of largely potential foraging habitat for this species, vegetation clearance is linear in nature and, therefore, will not result in large consolidated patches of vegetation clearance. Furthermore, given tree clearance has been avoided wherever possible, and that a commitment to avoid hollow-bearing trees has been made wherever practical, it is considered unlikely that the clearance of small sections of grassy understorey for roads and turbines and potentially a small number of trees would impact upon the lifecycle of the species.

The potential for the Powerful Owl to be struck by turbines would increase if it were nesting or roosting on the site. Given this species was not recorded during call playback this is considered unlikely. Therefore, the greatest potential for turbine strike would be when the species is moving between woodland patches. Given that most of the turbine lines generally run north – south and that the most consolidated stands of woodland vegetation occur to the east of the wind farm, the potential for turbine strike is considered low. Although there is the potential for strike from a small number of turbines if the species was travelling between woodland on Yandra and Boco, it is unlikely that the proposal would significantly affect the lifecycle of this species through the loss of individuals to turbine strike.

How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

The proposed project will result in the permanent removal of up to 22 ha of potential habitat for this species and will temporarily remove up to 23.48 ha. However this habitat removal is unlikely to result in foraging or nesting resources becoming limited within the project site for the following reasons:

- extensive areas of SGW and RGOF are present across the project site;
- a commitment to avoid hollow-bearing trees where practical (i.e. potential nesting habitat) through micro-siting has been made;
- comparatively the area of habitat to be removed is very small;
- vegetation removal is to occur in a linear pattern rather than one consolidated stand; and
- the majority of the vegetation clearance in woodland areas will be restricted to groundlayer clearing as trees will be avoided wherever possible.

Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

The Powerful Owl is endemic to eastern and south-eastern Australia, mainly on the coastal side of the Great Dividing Range from Mackay to south-western Victoria. In NSW, it is widely distributed throughout the eastern forests from the coast inland to tablelands, with scattered, mostly historical records on the western slopes and plains. (DECC 2005). This species is not at the limit of its distribution within the project site although records further west are scarce.

How is the proposal likely to affect current disturbance regimes?

Landscape fire is relatively rare in subalpine environments in Australia (Wahren *et al.* 2002) so the threatened species potentially occurring in the study area are likely to be dependent on very low or no fire frequency. The risk of fire with wind farms is inherently low (CFA 2007). A low risk is associated with malfunctioning turbine bearings, inadequate crankcase lubrication, cable damage during rotation, electrical shorting or arcing occurring in transmission and distribution facilities (CFA 2007). A large portion of the study area is grassland and turbines in woodland areas have been located at least 30 m from trees wherever possible, therefore, it is unlikely that the proposal will dramatically alter fire patterns across the study area. Furthermore, a number of mitigation measures will be implemented during construction to prevent accidental fires.

Feral animals can also have a detrimental impact on threatened fauna through predation by species such as feral Cats and the European Red Fox. The proposal is considered unlikely to contribute to increasing feral animal activity across the project site and instead is likely to assist with the management of these species through the proposed mitigation measures to be implemented within the study area and on the proposed offset sites.

How is the proposal likely to affect habitat connectivity?

The woodland and open forest areas of the project site naturally have large canopy gaps and a very open and more often absent understorey. Given the linear nature of the proposal, the large home range of the species and that limited tree clearance is required it is considered unlikely that the proposal would affect habitat connectivity in terms of use by the Powerful Owl. Furthermore, turbines have not been placed between two large consolidated stands of woodland at the site although there is some potential for strike from a small number of turbines should this species be moved from the woodland on Boco to the woodland areas on Yandra.

The landscape within the study area is one of open woodland and therefore the proposal is considered unlikely to result in fragmentation of habitat for this species.

How is the proposal likely to affect critical habitat?

Not applicable - critical habitat cannot be declared for vulnerable species.

Aquatic Bird

Oxyura australis – Blue-billed Duck

The Blue-billed Duck prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation. The species is completely aquatic, swimming low in the water along the edge of dense cover. It will fly if disturbed, but prefers to dive if approached. Blue-billed Ducks are partly migratory, with short-distance movements between breeding swamps and overwintering lakes with some long-distance dispersal to breed during spring and early summer (DECC 2005).

Blue-billed Ducks usually nest solitarily in Cumbungi over deep water between September and February. They will also nest in trampled vegetation in Lignum, sedges or spike-rushes, where a bowl-shaped nest is constructed (DECC 2005).

How is the proposal likely to affect the lifecycle of a threatened species and/or population?

Limited potential habitat for this species is present throughout the project site. The ephemeral wetlands would not provide habitat for this species as permanent wetlands area required. However, there is the potential for this species to inhabit the large dam within the Yandra cluster although habitat is considered marginal. This species has been recorded to the north east of the project site at Lake William (Birds Australia 2009) there is the potential this species may be present in the dam on Yandra and may also use it for breeding, although macrophyte cover is not abundant. This species is known to move short distances between breeding swamps and overwintering lakes and therefore may periodically utilise the dam. Although no impacts on habitat for this species is anticipated from turbines and infrastructure, the dam will be used as a source of water for the construction works. Provided measures are put in place to ensure the depth of the dam does become so low that it no longer provides habitat for this species and that habitat areas (i.e. areas of sedges and rushes) are protected from pumping activities and equipment, it is considered unlikely that the proposal would impact on the lifecycle of this species.

How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

Although no impacts on habitat for this species are anticipated from turbines and infrastructure, the dam will be used as a source of water for the construction works. Provided measures are put in place to ensure the depth of the dam does become so low that it no longer provides habitat for this species and that habitat areas (i.e. areas of sedges and rushes) are protected from pumping activities and equipment, the impacts on habitat for this species are likely to be minimal. Furthermore, the habitat within the dam is likely to be marginal for this species and the proposal would not impact on areas of high quality habitat within the locality.

Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

The Blue-billed Duck is endemic to south-eastern and south-western Australia. It is widespread in NSW, but most common in the southern Murray-Darling Basin area (DECC 2005). This species is not at the limit of its distribution within the project site.

How is the proposal likely to affect current disturbance regimes?

Landscape fire is relatively rare in subalpine environments in Australia (Wahren *et al.* 2002) so the threatened species potentially occurring in the study area are likely to be dependent on very low or no fire frequency. The risk of fire with wind farms is inherently low (CFA 2007). A low risk is associated with malfunctioning turbine bearings, inadequate crankcase lubrication, cable damage during rotation, electrical shorting or arcing occurring in transmission and distribution facilities (CFA 2007). A large portion of the study area is grassland and turbines in woodland areas have been located at least 30 m from trees wherever possible, therefore, it is unlikely that the proposal will dramatically alter fire patterns across the study area. Furthermore, a number of mitigation measures will be implemented during construction to prevent accidental fires.

Feral animals can also have a detrimental impact on threatened fauna through predation by species such as feral Cats and the European Red Fox. The proposal is considered unlikely to contribute to increasing feral animal activity across the project site and instead is likely to assist with the management of these species through the proposed mitigation measures to be implemented within the study area and on the proposed offset sites.

How is the proposal likely to affect habitat connectivity?

Given the dam is located on the western side of the Yandra cluster, turbines will occur between Lake William and the dam and, therefore, there is the potential for this species to be struck by turbines if moving between Lake William and the dam. The dam is considered to provide marginal habitat and the low frequency with which this species is likely to move between areas means, the risks of the proposal impacting on this species is considered low.

How is the proposal likely to affect critical habitat?

Not applicable - critical habitat cannot be declared for vulnerable species.

Microchiropteran Bats

Falsistrellus tasmaniensis - Eastern False Pipistrelle

The Eastern False Pipistrelle prefers moist habitats, with trees taller than 20 m. This species generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings (DECC 2005). This species was recorded within the study area on the edge of SGW / derived grassland. It is known to forage over large distances and its limited manoeuvrability means that it forages below or near the canopy and usually in forest with an open structure (Law *et al.* 2008).

How is the proposal likely to affect the lifecycle of a threatened species and/or population?

A number of turbines are present within the RGOF in the eastern portion of the site. Where possible, the removal of trees, hollow-bearing or otherwise, has been avoided and will be further avoided through micro-siting. Nevertheless, the removal of a small number of trees may be unavoidable. A calculation of the number of trees to be impacted / removed cannot be made at this stage as micro-siting decisions are still to be determined at the detailed construction design phase of the project. However, the proposal will be working on the principal of avoiding tree removal and in particular hollow-bearing trees. Any tree removal would result in a small decrease in potential roosting habitat for the Eastern False Pipistrelle. However, given the large number of hollow-bearing trees across the study area, it is unlikely that a loss of a small number of trees would result in roosting resources for this species becoming limited and hence affect the lifecycle of this species.

Tree removal within the area of SGW where this species was recorded is unlikely as the majority of works in the Sherwins cluster are within areas of NTG on the ridgetop. Furthermore, any trees present in this area could be avoided through micro-siting due to the very low numbers.

Impacts from the proposal on this species are likely to be greater during operation than construction. Based on the risk matrix included in Appendix K of this report, the collision potential for this species was considered moderate as this species forages widely and roosts in hollows. Hollow-bearing trees are extensive throughout woodland and open forest areas of the site. Although it is not realistic to completely remove the threat of collisions with turbines, a commitment to placing turbines at least 30 m away from hollow-bearing trees has been made in an attempt to reduce the likelihood of collisions at or near potential roost sites. Furthermore, the open nature of the landscape is such that it is unlikely that the turbines would create cleared areas that would be used as fly ways by this species.

Given the turbines on the western portion of the project site are primarily located in grassland or derived grassland, impacts on this species on the western side are anticipated to be minimal. However, there is the potential for strikes from bats when dispersing to nearby feeding areas should they be roosting in the adjacent SGW. To minimise the potential for impacts of bats leaving potential roost sites, turbines will be placed at least 30 m from any hollow-bearing trees. Therefore it is unlikely that the proposal would affect the lifecycle of this species such that the local population would be placed at risk of extinction.

How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

The proposed project will result in the permanent removal of up to 22 ha of potential habitat for this species and the temporary removal of up to 23.48 ha. However this habitat removal is unlikely to result in foraging or roosting resources becoming limited within the project site for the following reasons:

- extensive areas of SGW and RGOF are present across the project site;
- a commitment to avoid hollow-bearing trees where possible (i.e. potential roosting habitat) through micro-siting has been made;
- comparatively the area of habitat to be removed is very small;
- vegetation removal is to occur in a linear pattern rather than one consolidated stand;
- the majority of the vegetation clearance in woodland areas will be restricted to groundlayer clearing as trees will be avoided wherever possible; and
- this species is known to forage over a wide area.

Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

The Eastern False Pipistrelle is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania. (DECC 2005). This species is not at the limit of its distribution within the project site.

How is the proposal likely to affect current disturbance regimes?

Landscape fire is relatively rare in subalpine environments in Australia (Wahren *et al.* 2002) so the threatened species potentially occurring in the study area are likely to be dependent on very low or no fire frequency. The risk of fire with wind farms is inherently low (CFA 2007). A low risk is associated with malfunctioning turbine bearings, inadequate crankcase lubrication, cable damage during rotation, electrical shorting or arcing occurring in transmission and distribution facilities (CFA 2007). A large portion of the study area is grassland and turbines in woodland areas have been located at least 30 m from trees wherever possible, therefore it is unlikely that the proposal will dramatically alter fire patterns across the study area. Furthermore, a number of mitigation measures will be implemented during construction to prevent accidental fires.

Feral animals can also have a detrimental impact on threatened fauna through predation by species such as feral Cats and the European Red Fox. The proposal is considered unlikely to contribute to increasing feral animal activity across the project site and instead is likely to assist with the management of these species through the proposed mitigation measures to be implemented within the study area and on the proposed offset sites.

How is the proposal likely to affect habitat connectivity?

The woodland and open forest areas of the project site naturally have large canopy gaps and a very open and more often absent understorey. Given the linear nature of the proposal, the large home range of the species and that limited tree clearance is required, it is considered unlikely that the proposal would affect habitat connectivity in terms of use by the Eastern False Pipistrelle. Furthermore, turbines have not been placed between two large consolidated stands of woodland at the site although there is

some potential for strike from a small number of turbines should this species be moving from the woodland on Boco to the woodland areas on Yandra.

The landscape within the study area is one of open woodland and therefore the proposal is considered unlikely to result in fragmentation of habitat for this species which forages through open areas and fly ways.

How is the proposal likely to affect critical habitat?

Not applicable - critical habitat cannot be declared for vulnerable species.

***Miniopterus schreibersii oceanensis* - Eastern Bentwing-bat**

The Eastern Bentwing-bat hunts in forested areas and roost primarily in caves although derelict mines, storm-water tunnels, buildings and other man-made structures are also used. This species forms discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Breeding or roosting colonies can number from 100 to 150,000 individuals (DECC 2005). Females leave the maternity roost in February and juveniles depart a month later. Both may travel long distances to over-wintering sites, with juveniles known to travel up to several hundred kilometres. Roost sites outside the breeding period depend on the sex and age of individuals. This species has a fast direct flight, foraging in open areas and above the tree canopy as well as along tracks and waterways (Hoye and Hall 2008).

A number of records of the Eastern Bentwing-bat were recorded across the study area primarily in woodland areas or on the fringes of woodland

How is the proposal likely to affect the lifecycle of a threatened species and/or population?

A number of turbines are present within the RGOF in the eastern portion of the site. Where possible, the removal of trees, hollow-bearing or otherwise, has been avoided and will be further avoided through micro-siting. Nevertheless, the removal of a small number of trees may be unavoidable. A calculation of the number of trees to be impacted / removed cannot be made at this stage as micro-siting decisions to be determined at the detailed construction design phase of the project are still to be undertaken. However, the proposal will be working on the principal of avoiding tree removal and in particular hollow-bearing tree removal. Any tree removal would result in a small decrease in potential foraging habitat for the Eastern Bentwing-bat. However the proposed vegetation clearance is unlikely to limit foraging resources for this species such that it would affect the lifecycle of this species and suitable potential roosting habitat for this species is not present within the study area.

Tree removal within the area of SGW on Sherwins where this species was recorded is unlikely as the majority of works in the Sherwins cluster are within areas of NTG on the ridgetop. Furthermore, any trees present in this area could be avoided through micro-siting due to the very low numbers.

Impacts from the proposal on this species are likely to be greater during operation than construction. Based on the risk matrix included in Appendix K of this report, the collision potential for this species was considered moderate as this species forages above the canopy and is migratory. Given the open nature of the landscape it is unlikely that the string of turbines would create cleared areas that would be used as fly ways by this species. Furthermore, the location of a wind farm in primarily open areas means that bats have large unobstructed areas through which to move throughout the study area and are therefore less likely to come in contact with turbines than they would be in cluttered landscapes.

This species is known to be attracted to lighting and therefore measures such as turbines without lighting, where safety requirements permits, and the use of lighting that minimises insect attraction in any areas where they are required for safety reasons will assist in reducing the likelihood of collisions.

Given the turbines on the western portion of the project site are primarily located in grassland or derived grassland, impacts on this species on the western side are anticipated to be minimal and roosting habitat is unlikely to be present within the study area, it is unlikely that the proposal would affect the lifecycle of this species such that the local population would be placed at risk of extinction.

Given the Eastern Bentwing-bat does not roost in hollows, collisions when leaving roost sites is unlikely as they would be a distance from the study area. However, given this species forages above the canopy and is migratory there is the potential for strike during these activities. Whilst it is not possible to completely prevent potential strikes, the following factors reduce the likelihood that strikes will occur:

- The open nature of the landscape means that species are not funnelled through the fly ways as they would be in a landscape where turbine construction has created breaks in woodlands;
- The proposal involves linear clusters of turbines rather than one long string of turbines and therefore the number of turbines potentially occurring along a flight path are reduced; and
- Unless required for safety reasons, turbine lighting will not be used. Where it is required for safety reasons, lighting that minimises insect attraction will be used.

How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

The proposed project will result in the permanent removal of up to 22 ha of potential habitat for this species and the temporary removal of up to 23.48 ha. However this habitat removal does not include roosting habitat and is unlikely to result in foraging resources becoming limited within the project site for the following reasons:

- extensive areas of SGW and RGOF are present across the project site;
- a commitment to avoid tree clearance through micro-siting has been made;
- comparatively the area of habitat to be removed is very small;
- vegetation removal is to occur in a linear fingers within clusters rather than one consolidated stand;
- the majority of the vegetation clearance in woodland areas will be restricted to groundlayer clearing as trees will be avoided wherever possible; and
- this species is known to forage over a wide area.

Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

Eastern Bent-wing Bats occur along the east and north-west coasts of Australia. (DECC 2005). This species is not at the limit of its distribution within the project site.

How is the proposal likely to affect current disturbance regimes?

Landscape fire is relatively rare in subalpine environments in Australia (Wahren *et al.* 2002) so the threatened species potentially occurring in the study area are likely to be dependent on very low or no fire frequency. The risk of fire with wind farms is inherently low (CFA 2007). A low risk is associated with malfunctioning turbine bearings, inadequate crankcase lubrication, cable damage during rotation, electrical shorting or arcing occurring in transmission and distribution facilities (CFA 2007). A large portion of the study area is grassland and turbines in woodland areas have been located at least 30 m from trees wherever possible, therefore it is unlikely that the proposal will dramatically alter fire patterns across the study area. Furthermore, a number of mitigation measures will be implemented during construction to prevent accidental fires.

The site is currently grazed primarily by sheep but cattle are present in some areas and light grazing is

Feral animals can also have a detrimental impact on threatened fauna through predation by species such as feral Cats and the European Red Fox. The proposal is considered unlikely to contribute to increasing feral animal activity across the project site and instead is likely to assist with the management of these species through the proposed mitigation measures to be implemented within the study area and on the proposed offset sites.

How is the proposal likely to affect habitat connectivity?

The woodland and open forest areas of the project site naturally have large canopy gaps and a very open and more often absent understorey. Given the linear nature of the proposal, the large home range of the species and that limited tree clearance is required it is considered unlikely that the proposal would affect habitat connectivity in terms of use by the Eastern Bentwing-bat. Furthermore, turbines have not been placed between two large consolidated stands of woodland at the site although there is some potential for strike from a small number of turbines should this species be moving from the woodland on Boco to the woodland areas on Yandra.

The landscape within the study area is one of open woodland and therefore the proposal is considered unlikely to result in fragmentation of habitat for this species.

How is the proposal likely to affect critical habitat?

Not applicable - critical habitat cannot be declared for vulnerable species.

***Saccolaimus flaviventris* - Yellow-bellied Sheathtail-bat**

The Yellow-bellied Sheathtail-bat forages in most habitats across its very wide range, with and without trees and appears to defend an aerial territory. When foraging for insects, this species flies high and fast over the forest canopy, but lower in more open country. This species roosts singularly or in groups of up to six, in tree hollows and buildings and in treeless areas they are known to utilise mammal burrows. Seasonal movements are unknown but there is speculation about a migration to southern Australia in late summer and autumn (DECC 2005).

How is the proposal likely to affect the lifecycle of a threatened species and/or population?

The Yellow-bellied Sheathtail-bat has the potential to forage across all parts of the study area and roost in the hollow-bearing trees within areas of RGOF and SGW. A number of turbines are present within the RGOF in the eastern portion of the site. Where possible, the removal of trees, hollow-bearing or otherwise, has been avoided and will be further avoided through micro-siting. Nevertheless, the removal of a small number of trees may be unavoidable. A calculation of the number of trees to be impacted / removed cannot be made at this stage as micro-siting decisions to be determined at the detailed construction design phase of the project is still to be made. However, the proposal will be working on the principal of avoiding tree removal and in particular hollow-bearing tree removal. Any tree removal would result in a small decrease in potential foraging habitat for the Yellow-bellied Sheathtail-bat and if hollow-bearing trees are removed, potential roosting habitat would be lost. The proposed vegetation clearance is unlikely to limit resources for this species such that it would affect the lifecycle of this species as suitable breeding and foraging habitat is extensive both throughout the study area and surrounding lands.

Impacts from the proposal on this species are likely to be greater during operation than construction. Based on the risk matrix included in Appendix K of this report, the collision potential for this species was considered moderate as this species forages above the canopy and has the potential to roost within the hollow-bearing trees at the site. The location of the wind farm in primarily open areas means that bats have large unobstructed areas through which to move and are therefore less likely to come in contact with turbines than they would in cluttered landscapes. The potential for collision is also likely to decrease in the western portion of the study area where the vegetation is extremely open, much of which is comprised of NTG, as this species is known to fly lower in open areas and therefore is more likely to avoid blade strikes. To minimise the potential for impacts of bats leaving potential roost sites in woodland areas, turbines will be placed at least 30 m from any hollow-bearing trees. Given the extent of habitat for this species, that roost sites do not contain large numbers of individuals and that hollow-bearing trees will be avoided through micro-siting, it is unlikely that the proposal would affect the lifecycle of this species such that the local population would be placed at risk of extinction.

How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

The proposed project will result in the permanent removal of up to 22 ha of potential habitat for this species and the temporary removal of up to 23.48 ha. However this habitat removal is unlikely to result in foraging or roosting resources becoming limited within the project site for the following reasons:

- extensive areas of SGW and RGOF are present across the project site and this species will also forage across the large areas of NTG;
- a commitment to avoid hollow-bearing trees where possible (i.e. potential roosting habitat) through micro-siting has been made;
- comparatively the area of habitat to be removed is very small;
- vegetation removal is to occur in a linear fingers within clusters rather than one consolidated stand;
- the majority of the vegetation clearance in woodland areas will be restricted to groundlayer clearing as trees will be avoided wherever possible; and
- this species is known to forage over a wide area.

Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

The Yellow-bellied Sheathtail-bat is a wide-ranging species found across northern and eastern Australia. In the most southerly part of its range - most of Victoria, south-western NSW and adjacent South Australia - it is a rare visitor in late summer and autumn. There are scattered records of this species across the New England Tablelands and North West Slopes. (DECC 2005). This species is close to the limit of its distribution at the project site.

How is the proposal likely to affect current disturbance regimes?

Landscape fire is relatively rare in subalpine environments in Australia (Wahren *et al.* 2002) so the threatened species potentially occurring in the study area are likely to be dependent on very low or no fire frequency. The risk of fire with wind farms is inherently low (CFA 2007). A low risk is associated with malfunctioning turbine bearings, inadequate crankcase lubrication, cable damage during rotation, electrical shorting or arcing occurring in transmission and distribution facilities (CFA 2007). A large portion of the study area is grassland and turbines in woodland areas have been located at least 30 m from trees wherever possible, therefore it unlikely that the proposal will dramatically alter fire patterns across the study area. Furthermore, a number of mitigation measures will be implemented during construction to prevent accidental fires.

Feral animals can also have a detrimental impact on threatened fauna through predation by species such as feral Cats and the European Red Fox. The proposal is considered unlikely to contribute to increasing feral animal activity across the project site and instead is likely to assist with the management of these species through the proposed mitigation measures to be implemented within the study area and on the proposed offset sites.

How is the proposal likely to affect habitat connectivity?

The woodland and open forest areas of the project site naturally have large canopy gaps and a very open and more often absent understorey. Given the proposal consists of small linear strips of turbines within a cluster, the large home range of the species, that limited tree clearance is required and that this species has the potential to forage through open and wooded areas, it is considered unlikely that the proposal would affect habitat connectivity in terms of use by the Yellow-bellied Sheathtail-bat. Furthermore, turbines have not been placed between two large consolidated stands of woodland at the site although there is some potential for strike from a small number of turbines should this species be

moving from the woodland on Boco to the woodland areas on Yandra or when travelling between general foraging areas.

The landscape within the study area is one of open woodland and therefore the proposal is considered unlikely to result in fragmentation of habitat for this species.

How is the proposal likely to affect critical habitat?

Not applicable - critical habitat cannot be declared for vulnerable species.

***Myotis macropus* (formally *Myotis adversus*) - Large-footed Myotis**

The Large-footed Myotis forages over streams and pools catching insects and small fish by raking their feet across the water surface. This species generally roosts in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, stormwater channels, buildings, under bridges and in dense foliage (DECC 2005).

How is the proposal likely to affect the lifecycle of a threatened species and/or population?

The Large-footed Myotis has the potential to forage along the MacLaughlin River. This species may also forage over the dam on Yandra and a number of smaller dams adjacent to the project site. Potential roosting habitat in the form of hollow-bearing trees is present throughout areas of RGOF and SGW. Yandra and Boco are the clusters most likely to support roosting Large-footed Myotis should they occur within the study area as these are the clusters in closest proximity to suitable waterbodies. Anabat surveys were undertaken across the project site although this species was not detected.

Given no waterbodies are present within the proposed impact areas and mitigation measures will be implemented to ensure these areas are protected from indirect impacts such as runoff, impacts on foraging habitat for this species is unlikely. Furthermore, the pumping of water from the dam on Yandra for construction works is considered unlikely to impact on this species provided water levels are not reduced to a level that would impact on prey species for the Large-footed Myotis.

A number of turbines are present within the RGOF in the eastern portion of the site and only a very small number within the forest on Boco. Where possible, the removal of trees, hollow-bearing or otherwise, has been avoided and will be further avoided through micro-siting. Nevertheless, the removal of a small number of trees may be unavoidable. A calculation of the number of trees to be impacted / removed cannot be made at this stage as micro-siting decisions to be determined at the detailed construction design phase of the project are still to be made. However, the proposal will be working on the principal of avoiding tree removal and in particular hollow-bearing tree removal. Any hollow-bearing tree removal would result in a small decrease in potential roosting habitat for the Large-footed Myotis. The proposed vegetation clearance is unlikely to limit resources for this species such that it would affect the lifecycle of this species as suitable breeding is extensive both throughout the study area and surrounding lands and potential foraging habitat would not be directly impacted.

Impacts from the proposal on this species are also likely during operation. Given the dam that provides potential foraging habitat for this species is located to the west of the Yandra and the MacLaughlin River occurs between the Boco and Yandra, the most likely time for bats to strike blades would be if moving from a roost site (hollow-bearing tree) within the woodland areas to the waterbodies. However, given this species was not recorded at the site and should it be present, does not commonly fly at height, the likelihood of collision is considered low. Furthermore, the location of the wind farm in primarily open areas means that bats have large unobstructed areas through which to move throughout the study area and are therefore are less likely to come in contact with turbines than they would in cluttered landscapes.

To minimise the potential for impacts of bats leaving potential roost sites in woodland areas, turbines will be placed at least 30 m from any hollow-bearing trees. Given the location of habitat for this species throughout the project site, hollow-bearing trees will be avoided through micro-siting wherever possible and the foraging behaviours of this species, it is unlikely that the proposal would affect the lifecycle of this species such that the local population would be placed at risk of extinction.

How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

The proposed project will result in the permanent removal of up to 22 ha of SGW and RGOF. However given a commitment has been made to avoid hollow-bearing trees through micro-siting, impacts on potential roosting habitat for this species is likely to be minimal. Furthermore, the clearance for the proposal is unlikely to result in foraging or roosting resources becoming limited within the project site for the following reasons:

- extensive areas of SGW and RGOF are present across the project site;
- comparatively the area of habitat to be removed is very small;
- the majority of the vegetation clearance in woodland areas will be restricted to groundlayer clearing as trees will be avoided wherever possible; and
- foraging habitat for this species will not be directly impacted.

Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

The Large-footed Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers. (DECC 2005). This species is close to the limit of its distribution at the project site.

How is the proposal likely to affect current disturbance regimes?

Landscape fire is relatively rare in subalpine environments in Australia (Wahren *et al.* 2002) so the threatened species potentially occurring in the study area are likely to be dependent on very low or no fire frequency. The risk of fire with wind farms is inherently low (CFA 2007). A low risk is associated with malfunctioning turbine bearings, inadequate crankcase lubrication, cable damage during rotation, electrical shorting or arcing occurring in transmission and distribution facilities (CFA 2007). A large portion of the study area is grassland and turbines in woodland areas have been located at least 30 m from trees wherever possible, therefore it unlikely that the proposal will dramatically alter fire patterns across the study area. Furthermore, a number of mitigation measures will be implemented during construction to prevent accidental fires.

Feral animals can also have a detrimental impact on threatened fauna through predation by species such as feral Cats and the European Red Fox. The proposal is considered unlikely to contribute to increasing feral animal activity across the project site and instead is likely to assist with the management of these species through the proposed mitigation measures to be implemented within the study area and on the proposed offset sites.

How is the proposal likely to affect habitat connectivity?

The woodland and open forest areas of the project site naturally have large canopy gaps and a very open and more often absent understorey. Given this species forages along watercourses it is unlikely that the proposal would impact on habitat connectivity as turbines have not been placed directly between the foraging areas on Boco and Yandra and no turbines are present directly adjacent to waterbodies. Furthermore, the turbines present throughout the woodland areas are unlikely to impact on habitat connectivity or affect the use of these areas by the Large-footed Myotis as vegetation

throughout the landscape is currently very open and turbines can be placed within the landscape without significant alterations to habitat connectivity.

How is the proposal likely to affect critical habitat?

Not applicable - critical habitat cannot be declared for vulnerable species.

Mammals

Phascolarctos cinereus – Koala

Koalas inhabit eucalypt woodlands and forests feeding on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. Their home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size. This species is generally solitary, but they have complex social hierarchies based on a dominant male with a territory overlapping several females and sub-ordinate males on the periphery (DECC 2005).

How is the proposal likely to affect the lifecycle of a threatened species and/or population?

Potential habitat for the Koala is present within areas of RGOF and SGW across the site. Although this species has been recorded on the Monaro, it was not recorded during the surveys. Calculation of the number of trees to be impacted / removed for the proposal cannot be made at this stage as micro-siting decisions to be determined at the detailed construction design phase of the project are still to be undertaken. However, the proposal will be working on the principal of avoiding tree removal. Given the extent of RGOF and SGW across the project site (2023.97 ha), that only a very small number of trees have the potential to be removed for the proposal and that areas of habitat for this species would not become isolated, it is unlikely that the proposal would affect the lifecycle of this species.

How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

The proposal will result in the permanent removal of up to 22 ha of SGW and RGOF. However given a commitment has been made to avoid tree removal through micro-siting impacts on this species are likely to be minimal. Furthermore, the clearance for the proposal is unlikely to result in foraging resources becoming limited within the project site for the following reasons:

- extensive areas of SGW and RGOF are present across the project site;
- comparatively the area of habitat to be removed is very small; and
- the majority of the vegetation clearance in woodland areas will be restricted to groundlayer clearing as trees will be avoided wherever possible.

Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

The Koala has a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In NSW it mainly occurs on the central and north coasts with some populations in the western region. It was historically abundant on the south coast of NSW, but now occurs in sparse and possibly disjunct populations. Koalas are also known from several sites on the southern tablelands. (DECC 2005). This species is not at the limit of its distribution at the project site.

How is the proposal likely to affect current disturbance regimes?

Landscape fire is relatively rare in subalpine environments in Australia (Wahren *et al.* 2002) so the threatened species potentially occurring in the study area are likely to be dependent on very low or no

fire frequency. The risk of fire with wind farms is inherently low (CFA 2007). A low risk is associated with malfunctioning turbine bearings, inadequate crankcase lubrication, cable damage during rotation, electrical shorting or arcing occurring in transmission and distribution facilities (CFA 2007). A large portion of the study area is grassland and turbines in woodland areas have been located at least 30 m from trees wherever possible, therefore it is unlikely that the proposal will dramatically alter fire patterns across the study area. Furthermore, a number of mitigation measures will be implemented during construction to prevent accidental fires.

Feral animals can also have a detrimental impact on threatened fauna through predation by species such as feral Cats and the European Red Fox. The proposal is considered unlikely to contribute to increasing feral animal activity across the project site and instead is likely to assist with the management of these species through the proposed mitigation measures to be implemented within the study area and on the proposed offset sites.

How is the proposal likely to affect habitat connectivity?

The woodland and open forest areas of the project site naturally have large canopy gaps and a very open and more often absent understorey. Therefore it is likely that if present at the project site, this species would commonly take to the ground to move between trees. Given the proposal involves narrow bands of primarily groundlayer clearance (up to 6 m for roads) and does not involve clearing of large consolidated stands of vegetation, it is unlikely to affect habitat connectivity for this species.

How is the proposal likely to affect critical habitat?

Not applicable - critical habitat cannot be declared for vulnerable species.

Reptiles

***Aprasia parapulchella* - Pink-tailed Worm Lizard**

Inhabits sloping, open woodland areas with predominantly native grassy groundlayers, particularly those dominated by Kangaroo Grass (*Themeda australis*). Sites are typically well-drained, with rocky outcrops or scattered, partially-buried rocks. This species is commonly found beneath small, partially-embedded rocks and appears to spend considerable time in burrows below these rocks; the burrows have been constructed by and are often still inhabited by small black ants and termites. It is thought that this species lays two eggs inside the ant nests during summer; the young first appear in March (DECC 2005). This species is extremely difficult to detect because of its cryptic behaviour and is most often detected beneath rocks when they more regularly come to the surface following rain.

How is the proposal likely to affect the lifecycle of a threatened species and/or population?

Potential habitat for this species is present within areas of NTG and derived grassland across the site. Although this species was not recorded at the site potential habitat is present. The proposal will remove 135.78 ha (61.08 ha of temporary and 62.13 ha of permanent) of potential habitat for this species. However, a number of mitigation measures have been put in place to relocate threatened fauna from the construction area prior to clearing and these measures would encompass the Pink-tailed Worm-lizard. Measures include:

- pre-clearance surveys in areas of NTG in the two weeks leading up to clearing and will include pitfall tubes and rock rolling; and
- construction in areas of potential habitat on Springfield and Sherwins will not be conducted from November – January (breeding season); and
- reticulation trenches (each section will only be open for short periods) will be checked daily for any trapped fauna and any fauna found will be released back onsite site into adjacent areas.

Furthermore, the proposed vegetation clearance is small (135.78 ha) compared to the amount of habitat present for this species present across the project site (4911.38 ha). The scope and extent of the proposal is such that it will not permanently alter the ground surface in such a way as to create barriers to movement of the species and, therefore, will not prevent dispersal of the species across the site. Whilst the species ecology and a detailed understanding of its lifecycle are not fully understood, the proposal will have minimal impact when compared to the scale of the landscape across which potential habitat for this species occurs. Its primarily fossorial existence is unlikely to be affected such that the proposal would affect the lifecycle of this species.

How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

The proposed project will result in the permanent removal of up to 61.08 ha and temporary removal of 62.13 ha of potential habitat for this species. The proposed habitat clearance is small with respect to the amount of habitat present within the project site (4911.38 ha, 2.8 %). Furthermore, no areas of known habitat would be impacted.

It is unlikely that the proposal would limit the amount of potential habitat for this species at the project site or prevent dispersal throughout the overall project site as vegetation clearance and wider foraging resources are unlikely to become limited as:

- extensive areas of potential habitat are present across the project site;
- comparatively the area of habitat to be removed is very small (2.8 %); and
- weeds will be managed for a period of 3 years following construction to minimise the potential for edge effects on adjacent habitat; and
- 500 ha of potential habitat will be protected under an in perpetuity covenant.

Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

The Pink-tailed Worm Lizard is only known from the Central and Southern Tablelands, and the South Western Slopes. There is a concentration of populations in the Canberra/Queanbeyan Region. Other populations have been recorded near Cooma, Yass, Bathurst, Mudgee, Albury, West Wyalong and near Bylong in Goulburn River National Park. This species is also found in the Australian Capital Territory. (DECC 2005). This species is not at the limit of its distribution at the project site.

How is the proposal likely to affect current disturbance regimes?

Current disturbance regimes include: sheep grazing, a lesser amount of cattle grazing, feral herbivores contributing to additional grazing pressures especially during drought and feral predator impacts. Grassland fires are another factor in the disturbance of the project site but these are patchy in their extent and occurrence.

Landscape fire is relatively rare in subalpine environments in Australia (Wahren *et al.* 2002) so the threatened species potentially occurring in the study area are likely to be dependent on very low or no fire frequency. The risk of fire with wind farms is inherently low (CFA 2007). A low risk is associated with malfunctioning turbine bearings, inadequate crankcase lubrication, cable damage during rotation, electrical shorting or arcing occurring in transmission and distribution facilities (CFA 2007). A large portion of the study area is grassland and turbines in woodland areas have been located at least 30 m from trees wherever possible, therefore it is unlikely that the proposal will dramatically alter fire patterns across the study area. Furthermore, a number of mitigation measures will be implemented during construction to prevent accidental fires.

The site is currently grazed primarily by sheep but cattle are present in some areas and light grazing is considered beneficial to some grassland species. Although grazing pressures vary across the landscape, it is considered unlikely that the proposal would exacerbate over-grazing at the site and in fact is likely to contribute to a more sustainable grazing regime through the commercial benefits that the wind farm will provide as well as through the mitigation and offset measures proposed across some parts of the site.

Feral animals can have a detrimental impact on threatened species and their habitat. In the case of grasslands and grassy woodlands, grazing by feral animals such as the European Rabbit impact on species diversity, seed availability and tussock structure which in turn impacts on potential foraging and sheltering resources for this species.

Feral animals can also have a detrimental impact on threatened fauna through predation by species such as feral Cats and the European Red Fox. The proposal is considered unlikely to contribute to increasing feral animal activity across the project site and instead is likely to assist with the management of these species through the proposed mitigation measures to be implemented within the study area and on the proposed offset sites.

How is the proposal likely to affect habitat connectivity?

Although the proposal involves the clearance of potential habitat for this species, vegetation clearance will occur as narrow fingers (up to 12 m wide) throughout each cluster with the exception of the turbine footprints where clearance will be 50 m by 25 m and 15 m by 15 m. It is unlikely that the proposal would affect habitat connectivity for this species for the following reasons:

- the proposal does not involve the clearance of large consolidated stands of vegetation;
- turbines are separated by approximately 300 m and the roads will be revegetated such that the cleared area would comprise only a 6 m wide track;
- this species is known to occur in disturbed areas provided that tussock structure remains and, therefore, it is anticipated that, if present, this species would not be deterred from crossing narrow informal tracks with very low traffic volume and would be expected to move with little, if any, restriction between areas of habitat.

How is the proposal likely to affect critical habitat?

Not applicable - critical habitat cannot be declared for vulnerable species.

***Delma impar* - Striped Legless Lizard**

This species is found mainly in Natural Temperate Grassland but has also been captured in grasslands that have a high exotic component. Also found in derived grassland near Natural Temperate Grassland and occasionally in open Box-Gum Woodland. Habitat for this species includes grassland dominated by perennial, tussock-forming grasses such as *Themeda australis* (Kangaroo Grass), *Austrostipa* spp., *Poa* spp. and occasionally *Austrodanthonia* spp. This species is also sometimes present in modified grasslands with a significant content of exotic grasses and grasslands with significant amounts of surface rocks, which are used for shelter (DECC 2005).

How is the proposal likely to affect the lifecycle of a threatened species and/or population?

Potential habitat for this species is present within areas of NTG and derived grassland. Although this species is known to also occur in areas where there is a significant cover of exotic grasses, most of areas of exotic grassland across the project site do not support significant amounts of surface rock or tussock structure as they have been ploughed and sown and therefore potential habitat in these areas is limited.

Although this species was not recorded at the site it was recorded on land approximately 2 km to the north west of the project site and therefore has the potential to also be present on site. The proposal will remove 135.78 ha (61.08 ha of temporary and 62.13 ha of permanent) of potential habitat for this species. However, a number of mitigation measures have been put in place to remove threatened fauna from the construction area prior to clearing and these measures would encompass the Striped Legless Lizard. Measures include:

- pre-clearance surveys in areas of NTG in the two weeks leading up to clearing and will include pitfall tubing (primarily targeting the Grassland Earless Dragon although this species has been caught using the same technique), rock rolling and endoscopy; and
- construction in areas of potential habitat on Springfield and Sherwins will not be conducted from November – January (mating and laying period); and
- reticulation trenches (each section will only be open for short periods) will be checked daily for any trapped fauna and any fauna found will be released back onsite site into adjacent areas with suitable habitat and cover.

Furthermore, the proposed vegetation clearance is small (135.78) compared to the amount of potential habitat present for this species within the subject site (4911.38 ha) and the proposal would not prevent dispersal of the species across the site. Therefore it is unlikely that the proposal would affect the lifecycle of this species.

How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

The proposed project will result in the permanent removal of up to 62.13 ha and temporary removal of 61.08 ha of potential habitat for this species. The proposed habitat clearance is small with respect to the amount of potential habitat present within the overall project site (4911.38 ha, 2.8 %). Furthermore, no areas of known habitat will be impacted.

It is unlikely that the proposal would limit the amount of potential habitat for this species at the project site or prevent dispersal throughout the site as foraging resources are unlikely to become limited for the following reasons:

- extensive areas of potential habitat is present across the project site;
- comparatively the area of habitat to be removed is very small (2.8 %); and
- weeds will be managed for a period of 3 years following construction to minimise the potential for edge effects to impact on or degrade adjacent potential habitat;
- some areas of NTG where rocks have been removed will be re-rocked as part of the proposal thereby increasing the quality of habitat for this species in those areas; and
- 500 ha of land, potentially including known habitat (if offset area 5 selected as part of the offset package), will be protected under an in perpetuity covenant.

Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

The Striped Legless Lizard occurs in the Southern Tablelands, the South Western Slopes and possibly in the Riverina. Populations are known in the Goulburn, Yass, Queanbeyan, Cooma and Tumut areas. It also occurs in the ACT, Victoria and south-eastern South Australia (DECC 2005). This species is not at the limit of its distribution at the project site.

How is the proposal likely to affect current disturbance regimes?

Current disturbance regimes include: sheep grazing, a lesser amount of cattle grazing, feral herbivores contributing to additional grazing pressures especially during drought and feral predator impacts. Grassland fires are another factor in the disturbance of the project site but these are patchy in their extent and occurrence.

Landscape fire is relatively rare in subalpine environments in Australia (Wahren *et al.* 2002) so the threatened species potentially occurring in the study area are likely to be dependent on very low or no fire frequency. The risk of fire with wind farms is inherently low (CFA 2007). A low risk is associated with malfunctioning turbine bearings, inadequate crankcase lubrication, cable damage during rotation, electrical shorting or arcing occurring in transmission and distribution facilities (CFA 2007). A large portion of the study area is grassland and turbines in woodland areas have been located at least 30 m from trees wherever possible, therefore it unlikely that the proposal will dramatically alter fire patterns across the study area. Furthermore, a number of mitigation measures will be implemented during construction to prevent accidental fires.

The site is currently grazed primarily by sheep but cattle are present in some areas and light grazing is considered beneficial to some grassland species. Although grazing pressures vary across the landscape, it is considered unlikely that the proposal would exacerbate over-grazing at the site and in fact is likely to contribute to a more sustainable grazing regime through the commercial benefits that the wind farm will provides as well as through the mitigation and offset measures proposed across some parts of the site.

Feral animals can have a detrimental impact on threatened species and their habitat. In the case of grasslands and grassy woodlands, grazing by feral animals such as the European Rabbit impact on species diversity, seed availability and tussock structure which in turn impacts on potential foraging and sheltering resources for this species.

Feral animals can also have a detrimental impact on threatened fauna through predation by species such as feral Cats and the European Red Fox. The proposal is considered unlikely to contribute to

increasing feral animal activity across the project site and instead is likely to assist with the management of these species through the proposed mitigation measures to be implemented within the study area and on the proposed offset sites.

How is the proposal likely to affect habitat connectivity?

Although the proposal involves the clearance of potential habitat for this species, vegetation clearance will occur as narrow fingers (up to 12 m) throughout each cluster with the exception of the turbine footprints where clearance will be 50 m by 25 m and 15 m by 15 m. It is unlikely that the proposal would affect habitat connectivity for this species for the following reasons:

- the proposal does not involve the clearance of large consolidated stands of vegetation;
- turbines are separated by approximately 300 m and the roads will be revegetated such that the cleared area would comprise a 6 m wide track;
- this species is known to occur in disturbed areas provided that tussock structure remains and, therefore, it is anticipated that, if present, this species would not be deterred from crossing narrow informal tracks with very low traffic volume and would be expected to move with little, if any, restriction between areas of potential habitat.

How is the proposal likely to affect critical habitat?

Not applicable - critical habitat cannot be declared for vulnerable species.

***Suta flagellum* - Little Whip Snake**

The Little Whip Snake occurs in Natural Temperate Grasslands and grassy woodlands, including those dominated by *Eucalyptus pauciflora* (Snow Gum) or *Eucalyptus melliodora* (Yellow Box). This species occurs in derived grasslands where clearing of woodland has occurred. It is also found on well-drained hillsides, mostly associated with scattered loose rocks. Most specimens have been found under rocks or logs lying on, or partially embedded in the soil. Little is known about the habits of this small snake as it is primarily nocturnal. Up to seven live young are born between September and February (DECC 2005).

The Little Whip Snake was recorded at four locations across the project site, Springfield (x2), Yandra and Sherwins North and was also recorded north of Springfield Road outside the project site. This species was recorded under large rocks in areas of NTG and derived grassland / SGW.

How is the proposal likely to affect the lifecycle of a threatened species and/or population?

Potential habitat for this species is present across the majority of the project site including in areas of NTG, derived grassland, SGW and RGOF. This species was recorded in areas of NTG and on the boundary of SGW / derived grassland. The proposal will remove 185.96 ha of potential habitat for this species (90.31 ha of temporary and 95.65 ha of permanent).

A number of mitigation measures have been put in place to remove the Little Whip Snake should individuals be present within the proposed construction area. Measures include:

- pre-clearance surveys in areas of potential habitat in the two weeks leading up to clearing and will include rock rolling;
- individuals found during the pre-clearance surveys will be collected and relocated to adjacent areas where suitable microhabitat features occur;
- reticulation trenches (each section will only be open for short periods) will be checked daily for any trapped fauna and any fauna found will be released back onsite into adjacent areas where suitable microhabitat features occur; and
- A Threatened Species Management Plan will be prepared for the site and will provide details for the relocation and management of this species on site, including creation, provision of microhabitat features.

Furthermore, the proposed vegetation clearance is small (185.96 ha) compared to the amount of habitat present for this species present within the project site (6749.39 ha) and the proposal would not prevent dispersal of the species across the site. Therefore it is unlikely that the proposal would affect the lifecycle of this species.

How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

The proposal will result in the permanent removal of up to 95.65 ha and temporary removal of 90.31 ha of potential habitat for this species. The proposed habitat clearance is small with respect to the amount of habitat present within the project site (6749.39 ha, 2.8 %).

It is unlikely that the proposal would limit the amount of potential habitat for this species at the project site given the extent of habitat across the project site. Furthermore it is unlikely to prevent dispersal

throughout the site and is unlikely to result in foraging resources becoming limited for the following reasons:

- extensive areas of potential present across the project site;
- comparatively the area of habitat to be removed is very small (2.8 %); and
- weeds will be managed for a period of 3 years following construction to minimise the potential for edge effects on adjacent habitat;
- some areas of NTG where rocks have been removed will be re-rocked as part of the proposal thereby increasing the quality of habitat for this species in those areas ;and
- 500 ha of potential habitat and potentially areas of known habitat, depending on the offset sites selected, will be protected under an 'in perpetuity' covenant.

Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

The Little Whip Snake is found within an area bounded by Crookwell in the north, Bombala in the south, Tumbarumba to the west and Braidwood to the east (DECC 2005). This species is not at the limit of its distribution at the project site but is close to the southern limit at Bombala.

How is the proposal likely to affect current disturbance regimes?

Current disturbance regimes include: sheep grazing, a lesser amount of cattle grazing, feral herbivores contributing to additional grazing pressures especially during drought and feral predator impacts. Grassland fires are another factor in the disturbance of the project site but these are patchy in their extent and occurrence.

Landscape fire is relatively rare in subalpine environments in Australia (Wahren *et al.* 2002) so the threatened species potentially occurring in the study area are likely to be dependent on very low or no fire frequency. The risk of fire with wind farms is inherently low (CFA 2007). A low risk is associated with malfunctioning turbine bearings, inadequate crankcase lubrication, cable damage during rotation, electrical shorting or arcing occurring in transmission and distribution facilities (CFA 2007). A large portion of the study area is grassland and turbines in woodland areas have been located at least 30 m from trees wherever possible, therefore it unlikely that the proposal will dramatically alter fire patterns across the study area. Furthermore, a number of mitigation measures will be implemented during construction to prevent accidental fires.

The site is currently grazed primarily by sheep but cattle are present in some areas and light grazing is considered beneficial to some grassland species. Although grazing pressures vary across the landscape, it is considered unlikely that the proposal would exacerbate over-grazing at the site and in fact is likely to contribute to a more sustainable grazing regime through the commercial benefits that the wind farm will provides as well as through the mitigation and offset measures proposed across some parts of the site.

Feral animals can have a detrimental impact on threatened species and their habitat. In the case of grasslands and grassy woodlands, grazing by feral animals such as the European Rabbit impact on species diversity, seed availability and tussock structure which in turn impacts on potential foraging and sheltering resources for this species.

Feral animals can also have a detrimental impact on threatened fauna through predation by species such as feral Cats and the European Red Fox. The proposal is considered unlikely to contribute to increasing feral animal activity across the project site and instead is likely to assist with the management of these species through the proposed mitigation measures to be implemented within the study area and on the proposed offset sites.

How is the proposal likely to affect habitat connectivity?

Although the proposal involves the clearance of potential habitat for this species, vegetation clearance will occur as narrow fingers (up to 12 m) throughout each cluster with the exception of the turbine footprints where clearance will be 50 m by 25 m and 15 m by 15 m. It is unlikely that the proposal would affect habitat connectivity for this species for the following reasons:

- the proposal does not involve the clearance of large consolidated stands of vegetation;
- turbines are separated by approximately 300 m and the roads will be revegetated such that the cleared area would comprise of a 6 m wide track; and
- it is anticipated that this species would not be deterred from crossing narrow informal tracks with very low traffic volume and would be expected to move with little, if any, restriction between areas of habitat.

How is the proposal likely to affect critical habitat?

Not applicable - critical habitat cannot be declared for vulnerable species.

***Tympanocryptis pinguicollis* - Grassland Earless Dragon**

The Grassland Earless Dragon is restricted to a small number of NTG sites dominated by wallaby grasses (*Notodanthonia* spp.), spear grasses (*Austrostipa* spp.), Poa Tussock (*Poa sieberiana*), Red Grass (*Bothriochloa macra*), and occasionally Kangaroo Grass (*Themeda australis*). Introduced pasture grasses occur at many of the sites supporting this species, which has also been captured in derived grassland. Within its habitat, this species apparently prefers areas with a more open structure, characterised by small patches of bare ground between the grasses and herbs. In addition to tussocks, partially embedded surface rocks, and spider and insect holes are used for shelter. This species tends to be inactive beneath rocks or in arthropod burrows during the winter months and lays up to five eggs in shallow nests or burrows, (sometimes those dug by spiders or other arthropods), between late spring and late summer (DECC 2005).

The Grassland Earless Dragon has been recorded on both the Springfield and Sherwins clusters. Targeted surveys for this species recorded them in a number of locations across the project site and also on adjacent lands to the north of Springfield Road (Figure 10).

How is the proposal likely to affect the lifecycle of a threatened species and/or population?

Potential and known habitat for this species is present across a large portion of project site including in areas of NTG and derived grassland. This species was recorded primarily in areas of NTG with one record in derived grassland on Sherwins. The proposal will remove 5.64 ha of known habitat (2.04 ha of temporary and 3.60 ha of permanent) and 99.09 ha of potential habitat for this species (42.91 ha of temporary and 56.18 ha of permanent). The proposed layout has been modified to avoid impacts on the cluster of dragons recorded in the west of the Sherwins cluster through the removal of two turbines (93a/81b, 92a/80b) previously located in the area where a number of dragons were detected.

Given that the further removal of turbines from the project (other than the two proposed) will decrease the economic feasibility and energy production of the proposal, turbine micro-siting will be used to avoid other known locations of Grassland Earless Dragon, such as those within in the Springfield and the south of the Sherwins clusters (see Figure 10). For these individuals alterations to the road, reticulation and turbine design is proposed to allow for a minimum 50 m buffer from the recorded Grassland Earless Dragon location.

In addition, to minimise impacts of the proposal on sensitive lifecycle stages of the Grassland Earless Dragon (i.e. mating, laying and incubation period), development will not occur on the Sherwin and Springfield clusters during the period when reproductive components of the species lifecycle occur (November – January). The Sherwins and Springfield clusters are considered the most likely areas to support the Grassland Earless Dragon.

A number of mitigation measures will also be put in place to prevent the proposal having impacts on key lifecycle stages of the Grassland Earless Dragon and hence threaten the survival of this important population across the study area. It is not possible to avoid all areas of potential habitat for the Grassland Earless Dragon due to the extent of potential habitat across the project site and micro-siting of the turbines can only be completed during the detailed design phase of the project. Consequently, it is proposed to relocate any Grassland Earless Dragon should they be detected within the construction area immediately prior to and during construction. A relocation strategy has been prepared and is included in Appendix N and a summary of the proposed approach has been included below.

Pre-clearance surveys

- Pre-clearance surveys for the species will occur within the construction area boundaries where located within known or potential Grassland Earless Dragon habitat. These surveys will occur within three weeks of the proposed construction activities commencing and will include:
 - Spider tube-sized pitfall traps will be installed as part of pre-clearance surveys which will be undertaken between late January and April (or until the onset of cold weather) as this would increase the likelihood that any Grassland Earless Dragon present within the proposed construction area would be detected. Pitfall traps are not proposed during May to early January as during this period Grassland Earless Dragons are normally less active or in torpor (winter), or are mating and females may be laying eggs (early summer). Further details regarding survey methodology is provided Section 5.3 and Appendix N.
 - During the period between May and October only, rock rolling, tussock searches and endoscopes will be used to search for the Grassland Earless Dragon. Any individuals detected will be relocated to areas immediately outside the construction area.
 - During the summer months (January to April) in areas where Grassland Earless Dragon habitat (both known and potential) occurs within turbine construction areas, the development zone will be partially fenced off with hessian or plastic gutter guard to deter individuals from nearby grassland moving back into the area. It obviously will only be possible to fence out some sides of the area where machinery and vehicle access is not required. Fencing will not be required along roads as these areas will no longer support any potential Grassland Earless Dragon habitat and lizards are very unlikely to sit on the open road surface (Dr Will Osborne, UC, 2009, pers. comm.).
- Individuals found during the pre-clearance surveys will be collected and relocated to the proposed relocation sites.
- Initially, pitfall traps will be installed in all areas of potential and known habitat. However, if no specimens are caught in the areas of potential habitat after six consecutive pitfall lines (approximately 6 km of survey area), the option to reduce the survey effort for areas of potential habitat across the remainder of the cluster will be investigated in consultation with DECC / DEWHA and Dr. Will Osborne. Areas of known habitat will continue to be surveyed using pitfall traps throughout the remainder of the cluster.

Mitigation measures

Mitigation measures to be implemented immediately prior to and during the construction phase of the proposal are outlined in more detail in Section 5.3 of this report and summarised here:

- In order to have the opportunity to implement adaptive management based on findings and lessons from the initial relocations, WPCWP will construct Springfield and Sherwins clusters separately. This would mean that the proposed relocation method could be adapted (if necessary) to allow the lessons learnt from one cluster to be implemented in the second cluster should Grassland Earless Dragon relocations be required;
- Although it may be necessary, for mobilisation reasons, to construct the Yandra and Springfield clusters simultaneously. In this instance it will be necessary for a small section in the northern portion of the Sherwins cluster to be constructed at this time, primarily to provide access to the substation and also to allow construction of a minimum of five turbines from within this area for economic reasons. This area is shown in Figure 3 as the 'substation cluster.' However, to protect the Grassland Earless Dragon this area would also be subject to the same constraints as Springfield and therefore construction would not take place between November and January;

- An Environmental Compliance Manager will be onsite during the civil works phase (including cable trenching and laying) to conduct regular inspections in trenches and excavated areas and manage any incidental Grassland Earless Dragon encounters (each section will be open for no more than a few days);
- A trained field officer or post graduate research student will be onsite a minimum of two days per week and on call to assist in the management of any findings by construction personnel;
- A Threatened Species Management Plan will be prepared for the site and will provide details for the relocation and management of this species on site;
- Rocks removed from the construction area will be scattered throughout areas of NTG where past rock removal has been undertaken, during the rehabilitation phase of the track verges;
- In perpetuity protection of up to 500 ha of known habitat for this species.

Provided the aforementioned avoidance, pre-clearance and mitigation measures are implemented for the proposal and given the proposed vegetation clearance is small (59.78 ha) compared to the amount of potential habitat present for this species present within the project site (4042.38 ha), it is unlikely that the proposal would affect the lifecycle of this species.

How is the proposal likely to affect the habitat of a threatened species, population or ecological community?

For known, high and low potential habitat the proposed permanent vegetation clearance is small with respect to the amount of habitat present within the project site (3.5 %, 3.0 % and 1.9 % respectively).

It is unlikely that the proposal would limit the amount of potential habitat for this species at the project site given the extent of habitat across the project site and that the following measures will be implemented:

- weeds will be managed for a period of 3 years following construction to minimise the potential for edge effects on adjacent habitat;
- some areas of NTG where rocks have been removed will be re-rocked as part of the proposal thereby increasing the quality of habitat for this species in those areas ;and
- Up to 500 ha of known habitat will be protected under an in perpetuity covenant.

A summary of the proposed impacts on the Grassland Earless Dragon has been included below:

Earless Dragon Habitat	Area (ha)	107 Layout				125 Layout			
		Permanent clearance (ha)		Temporary clearance (ha)		Permanent clearance (ha)		Temporary clearance (ha)	
		6 m Road	12 m Road	6 m Road	12 m Road	6 m Road	12 m Road	6 m Road	12 m Road
Known Habitat									
Within total site area	160.31	-	-	-	-	-	-	-	-
Within study area / development envelope	42.21	-	-	-	-	-	-	-	-
To be impacted by the proposal	-	2.36	3.60	2.30	2.04	2.36	3.60	2.30	2.04
Percentage within study area to be impacted	-	5.59 %	8.53%	5.45 %	4.83%	5.59 %	4.83%	5.45 %	4.83%
Percentage within project site to be impacted	-	1.47 %	2.25%	1.43 %	1.27%	1.47 %	1.27%	1.43 %	1.27%
High Potential									
Within total site area	2234.46	-	-	-	-	-	-	-	-
Within study area / development envelope	574.73	-	-	-	-	-	-	-	-
To be impacted by the proposal	-	24.29	38.62	25.97	26.60	25.64	39.92	27.63	27.51
Percentage within study area to be impacted	-	4.23 %	6.72%	4.52 %	4.83%	4.46 %	6.95%	4.81 %	4.79%
Percentage within project site to be impacted	-	1.89 %	1.73%	1.16 %	1.19%	1.15 %	1.79%	1.24%	1.23%
Low Potential									
Within total site area	1647.61	-	-	-	-	-	-	-	-
Within study area / development envelope	273.84	-	-	-	-	-	-	-	-
To be impacted by the proposal	-	10.16	16.05	14.89	15.30	10.37	16.26	15.20	15.40
Percentage within study area to be impacted	-	3.71 %	5.86%	5.44 %	1.94%	3.79 %	5.94%	5.55 %	5.62%
Percentage within project site to be impacted	-	0.62%	0.97%	0.90%	0.32%	0.63%	0.99%	0.92%	0.93%

Does the proposal affect any threatened species or populations that are at the limit of its known distribution?

Historically, the Grassland Earless Dragon ranged from Bathurst to Cooma, including the ACT region. The only populations now known are in the ACT and adjacent NSW at Queanbeyan, and on the Monaro between Cooma and south-west of Nimmitabel. It was also formerly known from Victoria, though there are no recent records (DECC 2005). The records of this species on site are the southern most currently known records for this species. Therefore this species is at the limit of its distribution at the site and is an important population.

How is the proposal likely to affect current disturbance regimes?

Current disturbance regimes include: sheep grazing, a lesser amount of cattle grazing, feral herbivores contributing to additional grazing pressures especially during drought and feral predator impacts. Grassland fires are another factor in the disturbance of the project site but these are patchy in their extent and occurrence.

Landscape fire is relatively rare in subalpine environments in Australia (Wahren *et al.* 2002) so the threatened species potentially occurring in the study area are likely to be dependent on very low or no fire frequency. The risk of fire with wind farms is inherently low (CFA 2007). A low risk is associated with malfunctioning turbine bearings, inadequate crankcase lubrication, cable damage during rotation, electrical shorting or arcing occurring in transmission and distribution facilities (CFA 2007). A large portion of the study area is grassland and turbines in woodland areas have been located at least 30 m from trees wherever possible, therefore it is unlikely that the proposal will dramatically alter fire patterns across the study area. Furthermore, a number of mitigation measures will be implemented during construction to prevent accidental fires.

The site is currently grazed primarily by sheep but cattle are present in some areas and light grazing is considered beneficial to some grassland species. Although grazing pressures vary across the landscape, it is considered unlikely that the proposal would exacerbate over-grazing at the site and in fact is likely to contribute to a more sustainable grazing regime through the commercial benefits that the wind farm will provide as well as through the mitigation and offset measures proposed across some parts of the site.

Feral animals can have a detrimental impact on threatened species and their habitat. In the case of grasslands and grassy woodlands, grazing by feral animals such as the European Rabbit impact on species diversity, seed availability and tussock structure which in turn impacts on potential foraging and sheltering resources for this species.

Feral animals can also have a detrimental impact on threatened fauna through predation by species such as feral Cats and the European Red Fox. The proposal is considered unlikely to contribute to increasing feral animal activity across the project site and instead is likely to assist with the management of these species through the proposed mitigation measures to be implemented within the study area and on the proposed offset sites.

How is the proposal likely to affect habitat connectivity?

Although the proposal involves the clearance of potential habitat for this species, vegetation clearance will occur as narrow fingers (up to 12 m) throughout each cluster with the exception of the turbine footprints where clearance will be 50 m by 25 m and 15 m by 15 m. It is unlikely that the proposal would affect habitat connectivity for this species for the following reasons:

- the proposal does not involve the clearance of large consolidated stands of vegetation;
- turbines are separated by approximately 300 m and the roads will be revegetated such that the cleared area would consist of a 6 m wide track; and
- it is anticipated that this species would not be deterred from crossing current and future informal tracks with very low traffic volume and would be expected to disperse to adjacent areas (Dr Will Osborne, UC, 2009, pers. comm.).

How is the proposal likely to affect critical habitat?

To date, no critical habitat has been declared for the Grassland Earless Dragon under the TSC Act.

Appendix M – Biobanking Report



Boco Rock Wind Farm

Indicative Biobanking Assessment Report

Prepared for
Wind Prospect CWP Pty Ltd

23 October 2009



Boco Rock Wind Farm

Indicative Biobanking Assessment Report

PREPARED FOR	Wind Prospect CWP Pty Ltd
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PROJECT NO	0295-0002
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DATE	October 2009
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1 Biobanking Assessment

Two indicative Biobanking Assessments have been conducted for the proposed Boco Rock wind farm. While not a formal application for a Biobanking Statement, the approach has utilised the Biobanking Assessment Methodology (and the associated DECC Improve or Maintain (IoM) principle) to calculate the area required to offset the ecological impact of the proposed Boco wind farm.

The two Biobanking Assessments include:

- An assessment of the 12m road layout for the 125 turbine option; and,
- An assessment of the 6m road layout for the 125 turbine option.

The options assessed represent the 'worst case' scenarios in terms of ecological impact caused by the various wind farm options.

The data used to undertake the indicative assessment is outlined below. Any assumptions made have been clearly identified and the credits required calculated. Due to the large geographic area of the proposal, and the relatively small area of vegetation impacted, the demonstration of vegetation zones, threatened species sub zones and management zones using maps within this report could not be completed effectively. Therefore only example maps of a sub section of the impact area have been provided. Eco Logical Australia can provide all data and the shapefiles created for DECCW to review the information contained in this report should they be required.

Although not an official application for a Biobanking Statement, the assessment has been conducted by an accredited Biobanking Assessor and follows the Biobanking Assessment Methodology and Credit Calculator Operational Manual (DECC 2008) other than for the number of "Landscape Value Assessment" circles and four of the 10 vegetation zones not having enough condition plots.

The Boco Rock wind farm proposal will be assessed under Part 3A of the *Environment Planning & Assessment* Act 1979 as Critical Infrastructure. A Environmental Impact Assessment Report (ELA 2009) has been prepared in accordance with the Director-General's Requirements issued for the project which state that if any offsets are being proposed for the project, they must be consistent with "improve or maintain" principles. Wind Prospect CWP has therefore elected to use the Biobank Assessment Methodology, which incorporates a quantitative assessment of the "improve or maintain" principles, to estimate the size of the required offsets. The EA report provides further details of available and viable options to achieve these offset requirements.

The accredited assessor details are as follows:

Assessor Name: Darren James

Accreditation Number: 0032

1.1 GENERIC ASSESSMENT INFORMATION

Although two indicative assessments have been completed, some of the information used in the assessments is identical. This section provides detail on the data which is common to both indicative assessments.

1.1.1 Impact Area

The impact area for the wind farm was divided into two broad categories, those with permanent loss and those areas with temporary loss (Figure 1). Areas of permanent loss include:

- Turbine footings
- Facilities building
- Substation
- Six metre wide roads
- Crane hardstands
- Loss of vegetation due to the construction of overhead powerlines within a thirty metre easement. As the impact in the easement will be minimal the loss of vegetation within these areas has been calculated as 5% of the total easement area.

Areas of temporary loss are those areas that are to be cleared, but then revegetated with local provenance and managed, and include:

- A three metre buffer on each side of the 6m wide roads (12m road layout only)
- Concrete batching plants
- Site office and construction compound
- Road earthworks
- Underground reticulation areas

Different reductions in future site value score are recorded for both the permanent and temporary loss scenarios. These can be seen in Section 1.1.9. Where possible impact on large mature trees is to be avoided in both permanent and temporary impact areas. This objective is reflected in the future site value scores allocated to those areas.

The statement of commitments for the impact assessment will indicate that a final credit assessment will be undertaken once the final layout is known, the number of turbines confirmed and any micro siting of turbines is finalised.

1.1.2 Vegetation Types

The vegetation mapped on site was converted to the revised Biometric vegetation types which are mandatory when applying the Biobanking Methodology. Full details of the previous vegetation mapping and the ground truthing of vegetation undertaken for the project is provided in the Environment Assessment report for the proposal (ELA 2009).

Five revised Biometric vegetation types are impacted by the proposal, shown below in Table 1. These vegetation types have been stratified into 10 vegetation zones for both the 12m and 6m road layout

options (see Section 1.1.7). Due to the long names associated with Biometric vegetation types, the following abbreviations will be used throughout the report for each vegetation type:

- KGST- Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands
- RGSG- Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands
- RT- River Tussock - Tall Sedge - Kangaroo Grass moist grasslands of the South Eastern Highlands
- SGCB- Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands
- SG- Speargrass grassland of the South Eastern Highlands

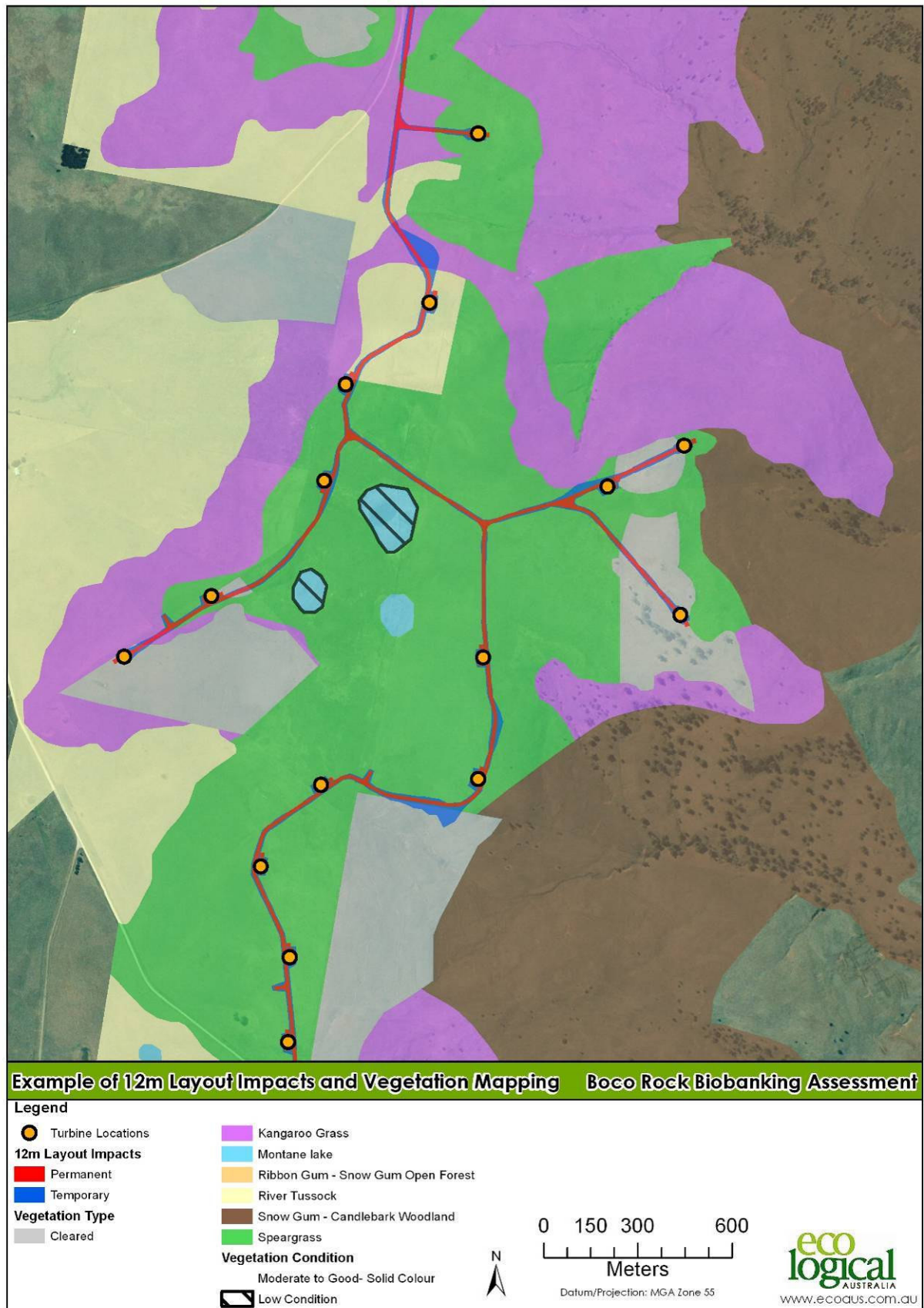


Figure 1: Example of 12m Layout Impacts and Vegetation Mapping

Table 1: Revised Biometric Vegetation Types and Impact

Revised Biometric Vegetation Type	12m Road Layout			6m Road Layout		
	Area of Permanent Loss (ha)	Area of Temporary Loss (ha)	Total Loss (ha)	Area of Permanent Loss (ha)	Area of Temporary Loss (ha)	Total Loss (ha)
KGST	5.6	6.2	11.8	3.2	5.7	8.9
RGSG	46.5	50.2	96.7	29.5	50.6	80.1
RT	0.9	0.6	1.6	0.6	0.6	1.2
SGCB	1.7	1.1	2.7	1.1	1.0	2.1
SG	39.7	24.5	64.2	26.1	25.4	51.5
Total	94.3	82.6	177.0	60.4	83.4	143.9

1.1.3 CMA Region, CMA Subregion and Mitchell Landscape

The site occurs wholly within the **Southern Rivers** CMA region and the **Monaro (Part C)** CMA subregion.

The study site, as it is long and linear, straddles several Mitchell Landscapes. The dominant Mitchell Landscape on site, where the majority of impact is occurring, is **Monaro Plains Basalts and Sands**. The Mitchell Landscapes Version 3 data layer was used for this assessment.

1.1.4 Assessment Circles

In a standard Biobanking Assessment enough 1000ha assessment circles (and associated 100ha assessment circles) are required to completely cover the development impact area, although DECCW are considering an amendment to this methodology for long, linear projects such as wind farms and roads (John Seidel pers. comm.).

Due to the indicative nature of this assessment, the extremely large geographic extent of this proposal (and the potential to require up to 12 assessment circles and the resulting additional threatened species sub zones) and the relatively small impact of the proposal within each circle, only one assessment circle has been entered into the credit calculator for this preliminary report. The assessment circle entered represents an average native vegetation cover within 1000ha and 100ha assessment circles across the study area.

The average vegetation cover for the 1000ha and 100ha assessment circles was estimated using a GIS at random sites across the study area. It is noted that the process is extremely difficult as much of the vegetation within the circles is outside the study area, and it is difficult to determine if this vegetation is native, and if native whether the vegetation is a natural grassland or derived grassland community (which affects the calculation of vegetation cover within the circles).

For the purposes of these assessments it has been estimated that the 1000ha and 100ha circles currently contain **30-40%** native vegetation cover (including a “discount” for vegetation being below benchmark). As the level of clearing is very small across the circles, and a loss is only recorded if the

vegetation in the circle crosses a 10% increment, it has been estimated that the vegetation cover will remain at **30-40%** for both circles after clearing (Table 2).

Table 2: Area of Vegetation in Each Assessment Circle

Circle	Native Vegetation Cover Class- Before Development (%)	Native Vegetation Cover Class- After Development (%)
100ha Circle	30-40%	30-40%
1000ha Circle	30-40%	30-40%

1.1.5 Connectivity Assessment

A connectivity assessment was conducted for the proposal using the technique outlined in the Biobanking Methodology. The following aspects were considered:

- The width of the current and future connecting link
- The condition of the current and future connecting link (over-storey and mid-storey/ground cover)

As the proposed development is contiguous, and any assessment circles would overlap, the Biobanking Methodology stipulates that only one connectivity assessment be conducted for the proposal.

Vegetated connections run off the site in all directions, and are extremely difficult to assess due to the lack of over-storey. In general, the connectivity value of the site appears to be minimal with much of the over-storey vegetation removed from woodland areas. The understorey, however, is generally in moderate/good condition as defined by the Biobanking Methodology.

Below is a description of the connectivity width assessment and connectivity condition assessment.

Connectivity Width Assessment

Although much of the over-storey vegetation has been removed from the site, field survey has confirmed that most of the vegetation remains in moderate/good condition due to the abundance of a native under-storey.

Due to the large extent of moderate/good vegetation, the current corridor width (before development) has been measured to the maximum width of **>500m**. This width occurs across the site.

The proposed development, with an average impact width of approximately 20m, does not break any connection as defined by the Biobanking Methodology (ie all connected vegetation remains within 100m of another patch). Therefore the connectivity width remains unchanged at **>500m** after development (Table 3).

Table 3: Connectivity Width Classes Before and After Development

	Width Class (Before Development)	Width Class (After Development)
Connectivity Value (Width)	>500m	>500m

Connectivity Condition Assessment

The connectivity condition assessment was undertaken on woody vegetation as woody vegetation types dominate the site. Two measures were used to assess the condition of the connection;

1. The condition of over-storey vegetation before and after development
2. The condition of ground cover vegetation before and after development

Over-storey vegetation has been cleared over much of the site and surrounding areas, however some areas of tree cover do remain. The average condition of the over-storey has therefore been assessed as **"PFC <25% of lower benchmark"**. The impact on the condition of the over-storey vegetation on site will be minimal. It is therefore expected that the average over-storey condition after development will remain the same at **"PFC <25% of lower benchmark"**.

Ground cover vegetation across the site and surrounding areas for the woody vegetation types is in better condition than the over-storey, with significant native ground cover identified. From the field surveys the average condition of the ground cover has been measured as **"PFC mid-storey/ground cover >25% of lower benchmark"**. Again, the impact of the development will be minimal and the ground cover will remain at **"PFC mid-storey/ground cover >25% of lower benchmark"** after development (Table 4).

Table 4: Condition Classes Before and After Development

Storey	Condition Class (Before Development)	Condition Class (After Development)
Connectivity Value (Over-storey Condition)	PFC <25% of lower benchmark	PFC <25% of lower benchmark
Connectivity Value (/Ground Cover Condition)	PFC mid-storey/ground cover >25% of lower benchmark	PFC mid-storey/ground cover >25% of lower benchmark

1.1.6 Geographic and Habitat Features

The following questions were asked in Step 2 of the calculator (Table 5). The default answer for these questions is "Yes", however an answer of "No" was given when confirmed after a field visit.

Table 5: Geographic and Habitat Questions and Answers

Question	Answer
Does any part of the development impact on:	
coastal headlands, grassland, grassy open forest or woodland on fertile or moderately fertile soils	Yes
land containing caves or similar structures	No
land containing loose surface rock, cracking surface soils or tussock clumps	Yes
land containing seepage areas or seasonally wet areas with short herbfield/grassland	Yes
land containing surface rocks (embedded or loose)	Yes
land within 100 m of emergent aquatic or riparian vegetation	No
land within 40 m of gullies in eucalypt forests	No

Question	Answer
Does any part of the development impact on:	
swamps, wetlands or wetland margins	Yes
land north of Eucumbene in New South Wales Alps CMA subregion	No

1.1.7 Vegetation Zones

Vegetation zones are defined as areas of the same vegetation type and condition within the development area, and have been mapped for the study area. The area of each vegetation zone was determined by intersecting the broader study area vegetation zone data layer with the two impact options derived from information provided by Wind Prospect CWP Pty Ltd.

ELA have assigned condition categories to all vegetation, with vegetation being assessed as “moderate/good” or “low” as per the Biobanking Methodology. In addition, the ancillary codes of “Weedy”, “Grazed” and “Heavily Grazed” have been used to further stratify the site and differentiate areas of differing vegetation cover. In total 10 vegetation zones have been identified for both options, with the area of each vegetation zone and its condition detailed in Table 6 and Figure 2.

Table 6: Vegetation Zones within Impact Area for each Option

Veg Zone ID	Vegetation Type	Legal Cond.*	Ancillary Code**	12m Road Layout			6m Road Layout		
				Area of Permanent Loss (ha)	Area of Temporary Loss (ha)	Total	Area of Permanent Loss (ha)	Area of Temporary Loss (ha)	Total
1	KGST	M/G	G	1	1.4	2.4	0.6	1.6	2.2
2	KGST	M/G	HG	4.5	4.9	9.4	2.5	4.3	6.8
3	RGSG	Low	W	8.6	8.8	17.4	5.4	9.2	14.6
4	RGSG	M/G	G	14.4	13.4	27.8	9.5	13.2	22.7
5	RGSG	M/G	HG	20.9	25.4	46.3	13	25.4	38.4
6	RGSG	M/G	W	2.5	2.7	5.2	1.5	2.8	4.3
7	RT	M/G	G	0.9	0.7	1.6	0.6	0.6	1.2
8	SGCB	M/G	G	1.7	1	2.7	1.1	1	2.1
9	SG	M/G	G	36.6	23.2	59.8	24	24	48
10	SG	M/G	HG	3.1	1.3	4.4	2.1	1.5	3.6
N/A	N/A	N/A	N/A	94.2	82.8	177.0	60.3	83.6	143.9

*M/G- Moderate/Good

**G- Grazed, HG- Heavily Grazed, W- Weedy

1.1.8 Site Survey

The Biobanking Methodology requires field survey to be undertaken on-site to accurately calculate credits. Field survey consists of:

- Transects/plots to sample vegetation zones
- Targeted threatened species survey for species identified by the credit calculator

Eco Logical Australia performed a number of transects/plots and targeted threatened species surveys. The details of these surveys can be found in the main body of the impact assessment report (ELA 2009).

Vegetation Plots

In total 33 plots were undertaken within the vegetation zones being impacted by the proposal, while a total of 28 are required for the 12m layout and 27 for the 6m layout (Table 7). At least one plot was conducted within each vegetation zone, making it possible to calculate credits for all vegetation zones, however the number of plots collected for some vegetation zones does not satisfy the requirements as outlined in the Biobanking Assessment Methodology. This is due to the footprint changing for the wind farm several times, which has changed the area of each vegetation zone being impacted and therefore the number of plots required for each zone. As this is an indicative assessment the additional plots have not been undertaken.

In summary, 6 vegetation zones equalled or exceeded the number of plots required, while 4 vegetation zones did not receive the required number. The figures recorded for each plot are outlined in Appendix 1.

It is important to recognise that many of the plots have not been undertaken within the actual impact area of the wind farm, but have been undertaken within the broader vegetation zone mapped in the study area. It was not possible to undertake all plots within the wind farm footprint due to constant changes in the footprint. This approach was confirmed with DECCW during the course of the project and is consistent with large projects where the actual impact site is adjusted regularly during the planning phase (Figure 2).

Table 7: Number of Plots Required

Veg Zone ID	Vegetation Type	Legal Cond.	Ancill. Code	12m Layout Total (ha)	Plots Req.	Plots Collected	6m Layout Total (ha)	Plots Req.	Plots Collected
1	KGST	M/G	G	2.4	2	1	2.2	2	1
2	KGST	M/G	HG	9.4	3	3	6.8	3	3
3	RGSG	Low	W	17.4	2	3	14.6	2	3
4	RGSG	M/G	G	27.8	4	3	22.7	4	3
5	RGSG	M/G	HG	46.3	4	3	38.4	4	3
6	RGSG	M/G	W	5.2	3	1	4.3	3	1
7	RT	M/G	G	1.6	1	1	1.2	1	1
8	SGCB	M/G	G	2.7	2	2	2.1	2	2
9	SG	M/G	G	59.8	5	13	48	4	13
10	SG	M/G	HG	4.4	2	3	3.6	2	3
N/A	N/A	N/A	N/A	177.0	28	33	143.9	27	33

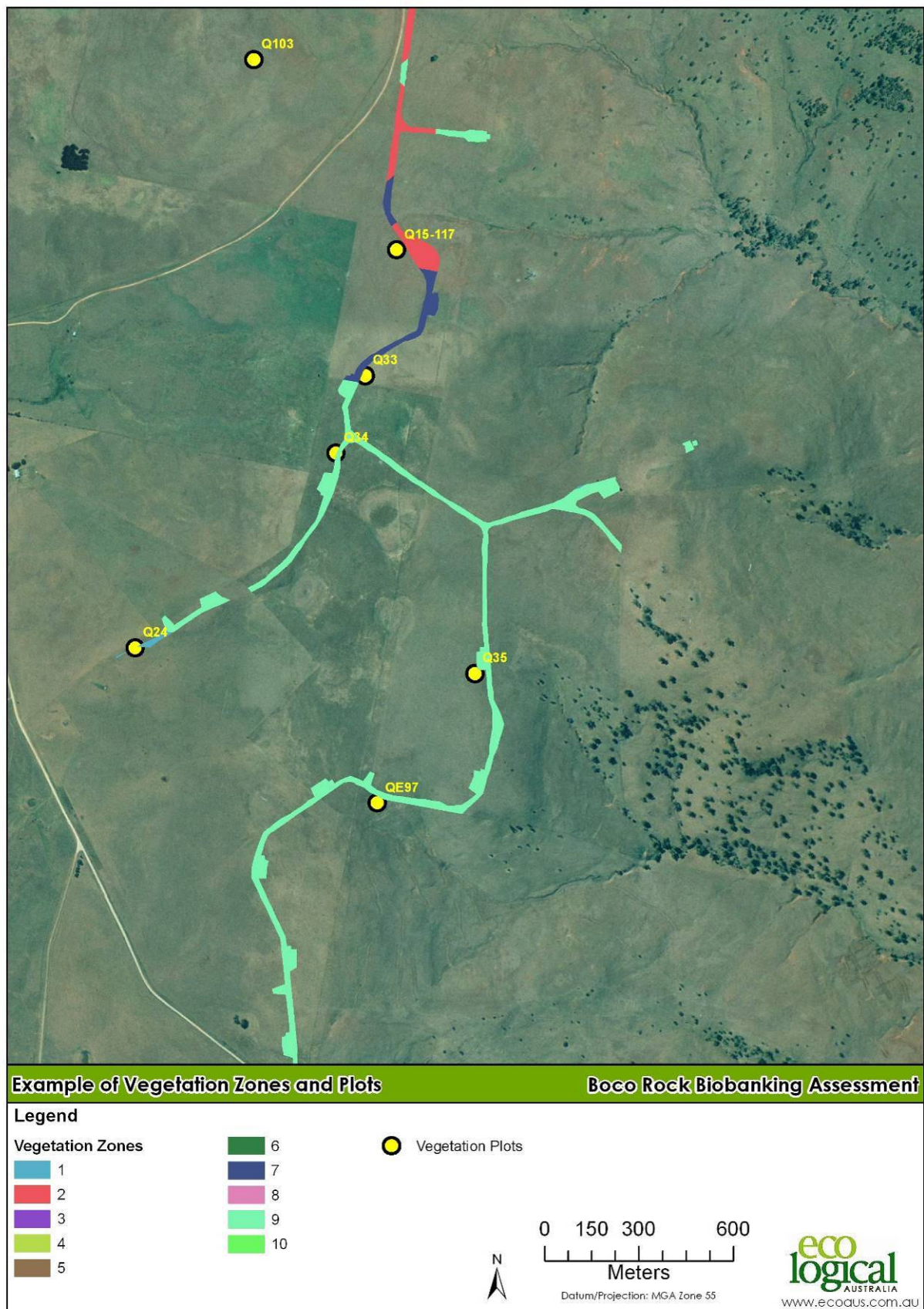


Figure 2: Example of Vegetation Zones and Plots