

Targeted Threatened Species Surveys

The Biobanking Credit Calculator identified 10 threatened species requiring survey. During the project nine of these species were targeted during survey (Table 8). In discussions with DECC it was agreed that the remaining species, *Gentiana baeuerlenii*, would not occur on site and therefore did not require survey.

The targeted threatened species surveys were conducted throughout the study area in a manner consistent with the draft DECC Threatened Species Survey Guidelines, and occurred between the months of October-May. Full details on the survey undertaken can be seen in Section 2.3.

Table 8: Species Requiring Targeted Survey

Species Name	Common Name	Underwent Targeted Survey
<i>Aprasia parapulchella</i>	Pink-tailed Worm-lizard	Yes
<i>Delma impar</i>	Striped Legless Lizard	Yes
<i>Dodonaea procumbens</i>	Creeping Hop-bush	Yes
<i>Euphrasia scabra</i>	Rough Eyebright	Yes
<i>Gentiana baeuerlenii</i>	Baeuerlen's Gentian	No*
<i>Lophoictinia isura</i>	Square-tailed Kite	Yes
<i>Rutidosia leiolepis</i>	Monaro Golden Daisy	Yes
<i>Swainsona sericea</i>	Silky Swainson-pea	Yes
<i>Thesium australe</i>	Austral Toadflax	Yes
<i>Tympanocryptis pinguicollis</i>	Grassland Earless Dragon	Yes

*Agreed with DECC that species would not occur on site

In addition to the species requiring survey, some fauna species are “predicted” on the site and included in the calculation of ecosystem credits. Although predicted, some species did undergo survey as part of the environmental assessment process. Details can be seen in Appendix 2.

1.1.9 Change in Future Site Value Scores

Each vegetation zone has been split into several management zones reflecting whether the impact of the development is permanent (roads, turbine pads etc) or temporary (areas that will undergo revegetation works including road edges, batching plants and earthworks). For each of these areas several assumptions have been made when determining the future site value score.

During the construction of the wind farm mature trees will be avoided, where possible. While it is recognised that some impact will be unavoidable, the impact will be less than complete clearing of the over-storey and therefore the future site value for over-storey cover has not been reduced to 0. See (Figure 3) for an example of the wind farm footprint avoiding tree cover.

The assumptions are listed below for each of the 10 attributes used to calculate the site value score (Table 9 and Table 10). Note the assumptions made for grassland and woodland areas are slightly different due to the different benchmarks for each of these vegetation types. Additional information on the future site value scores is contained in Appendix 3.

Table 9: Future Site Value Scores- Grasslands

Attribute	Future Site Value-Permanent Loss	Reason	Future Site Value-Temporary Loss	Reason
Native Species Richness	Current score reduced by 2	Impact will be permanent for ground cover, however the development intends to avoid mature trees and these will be retained where possible	Current score reduced by 1	Impact will avoid mature trees, where possible and revegetation will replace some ground cover species
Native Over-Storey	3	Benchmarks include a zero so therefore clearing of over-storey does not reduce future site value. In addition, mature trees are to be avoided where possible which is considered realistic and achievable in a grassland vegetation type with only scattered trees.	3	Benchmarks include a zero so therefore clearing of over-storey does not reduce future site value. In addition, mature trees are to be avoided where possible which is considered realistic and achievable in a grassland vegetation type with only scattered trees.
Native Mid-Storey	0	Will be removed	1	Revegetation will return some mid-storey
Ground Cover-Grasses	0	Will be removed	1	Revegetation will return some ground cover- grasses
Ground Cover-Shrubs	3	Benchmarks include a zero so therefore clearing of shrubs does not reduce future site value	3	Benchmarks include a zero so therefore clearing of shrubs does not reduce future site value
Ground Cover-Other	0	Will be removed	1	Revegetation will return some ground cover- other
Exotic Cover	0	Will be removed	1	Revegetation will reduce exotic cover
Hollows	0	Does not occur in grasslands	0	Does not occur in grasslands
Over-storey Regeneration	0	Will be removed	1	Revegetation will return some over-storey regeneration
Fallen Logs	0	Does not occur in grasslands	0	Does not occur in grasslands

Table 10: Future Site Value Scores- Woodlands

Attribute	Future Site Value-Permanent Loss	Reason	Future Site Value-Temporary Loss	Reason
Native Species Richness	Current score reduced by 2	Impact will be permanent for ground cover, however the development intends to avoid mature trees and these will be retained where possible	Current score reduced by 1	Impact will avoid mature trees, where possible and revegetation will replace some ground cover species
Native Over-Storey	Current score reduced by 1	Mature trees are to be avoided, but some impact may occur	Current score reduced by 1	Mature trees are to be avoided, but some impact may occur
Native Mid-Storey	3	Benchmarks include a zero so therefore clearing of mid-storey does not reduce future site value	3	Benchmarks include a zero so therefore clearing of mid-storey does not reduce future site value
Ground Cover-Grasses	0	Will be removed	1	Revegetation will return some ground cover-grasses
Ground Cover-Shrubs	3	Benchmarks include a zero so therefore clearing of shrubs does not reduce future site value	3	Benchmarks include a zero so therefore clearing of shrubs does not reduce future site value
Ground Cover- Other	0	Will be removed	1	Revegetation will return some ground cover-other
Exotic Cover	0	Will be removed	1	Revegetation will reduce exotic cover
Hollows	Current score reduced by 1	Mature trees are to be avoided, but some impact may occur	Current score reduced by 1	Mature trees are to be avoided, but some impact may occur
Over-storey Regeneration	0	Will be removed	1	Revegetation will return some over-storey regeneration
Fallen Logs	0	Will be removed	1	Fallen logs temporarily removed will be replaced

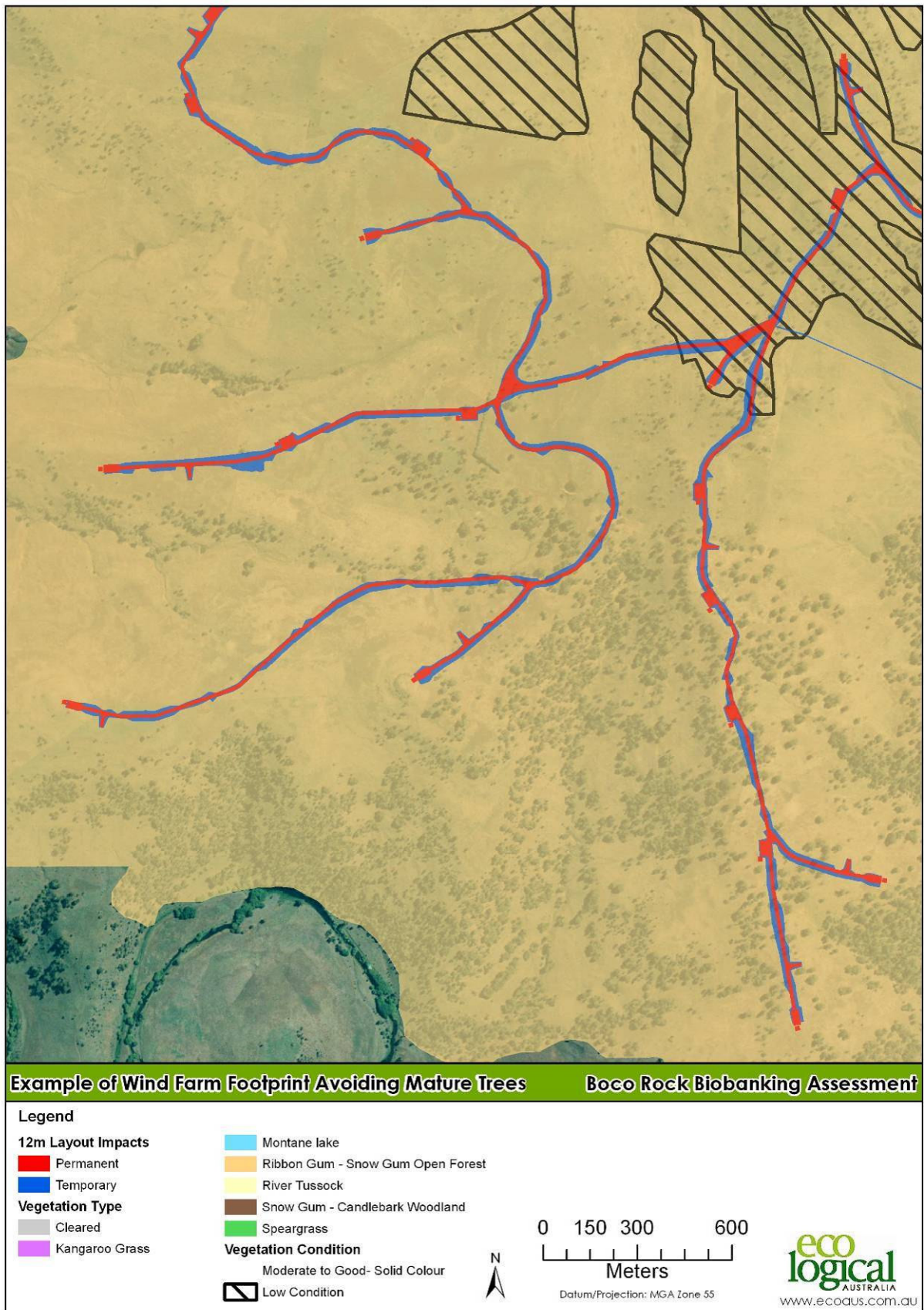


Figure 3: Example of Project Avoiding Mature Trees

1.2 12M ROAD LAYOUT

1.2.1 Threatened Species Sub Zones

Threatened species sub zones, which form the base units of vegetation zones, were mapped for the 12m road layout impact. The threatened species sub zones are the base units entered into the credit calculator, and allow the entry of data such as adjacent remnant area and patch size for individual vegetation polygons (Table 11 and Figure 4).

As the vegetation on and surrounding the site is predominantly in moderate/good condition, and patches are within 100m, the maximum Adjacent Remnant Area and Patch Size (including Low Condition) of 501 hectares has been entered into the credit calculator.

Table 11: Threatened Species Sub Zones- 12m Layout

TS Sub Zone ID	Vegetation Type	Condition	Ancillary Code	Adjacent Remnant Area (ha)	Patch Size incl. Low Condition (ha)	Area (ha)
1	KGST	M/G	G	501	501	2.4
2	KGST	M/G	HG	501	501	9.4
3	RGSG	Low	W	0	501	17.4
4	RGSG	M/G	G	501	501	27.8
5	RGSG	M/G	HG	501	501	46.3
6	RGSG	M/G	W	501	501	5.2
7	RT	M/G	G	501	501	1.6
8	SGCB	M/G	G	501	501	2.7
9	SG	M/G	G	501	501	59.8
10	SG	M/G	HG	501	501	4.4
Total	N/A	N/A	N/A	N/A	N/A	177.0

1.2.2 Management Zones and Site Scores

Management zones combine the mapping of vegetation zones with the final development outcome on site (Figure 5). They enable the assessor to increase, or decrease, the number of credits required depending on the final condition of the vegetation after development. As described in Section 1.1.9 two types of management zones have been identified for the project, including;

- Areas of permanent vegetation removal
- Areas of temporary vegetation removal to be revegetated and managed as native vegetation

Each management zone has received a current site value score calculated out of 100. This score has been determined using the transects/plots undertaken on site. The future scores have then been calculated using the rules outlined in Section 1.1.9. The area of each management zone, the final management outcome and the site values scores allocated are listed in Table 12 below.

Table 12: Management Zone Site Value Scores- 12m Layout

Management Zone ID	Final Management Outcome	Vegetation Zone ID	Area (ha)	Current Site Value	Future Site Value	Loss in Site Value
1	Permanent Loss	1	1.0	45	14	31
2	Temporary Loss	1	1.4	45	28	18
3	Permanent Loss	2	4.5	69	23	46
4	Temporary Loss	2	4.9	69	40	30
5	Permanent Loss	3	8.6	26	11	15
6	Temporary Loss	3	8.8	26	16	10
7	Permanent Loss	4	14.4	42	11	31
8	Temporary Loss	4	13.4	42	23	19
9	Permanent Loss	5	20.9	44	11	33
10	Temporary Loss	5	25.4	44	17	27
11	Permanent Loss	6	2.5	29	11	18
12	Temporary Loss	6	2.7	29	15	15
13	Permanent Loss	7	0.9	69	23	46
14	Temporary Loss	7	0.7	69	40	30
15	Permanent Loss	8	1.7	37	11	26
16	Temporary Loss	8	1	37	21	16
17	Permanent Loss	9	36.6	55	14	41
18	Temporary Loss	9	23.2	55	29	26
19	Permanent Loss	10	3.1	53	14	39
20	Temporary Loss	10	1.3	53	29	24
Total	N/A	N/A	177.0	N/A	N/A	N/A

1.2.3 Threatened Species Habitat

One threatened species requiring species credits was located, and identified as being within the impact area, during survey of the site. The species identified was the Grassland Earless Dragon (*Tympanocryptis pinguicolla*). Once found during survey, the habitat of the Grassland Earless Dragon was mapped. The Grassland Earless Dragon habitat to be removed was calculated for entry into the tool, and included known habitat, high potential habitat and low potential habitat (Table 13). In total 104.7 hectares of mapped habitat is going to be impacted by the development.

Table 13: GED Habitat Impacted- 12m Layout

Habitat Type	Area Impacted by 12m Layout- Permanent (ha)	Area Impacted by 12m Layout- temporary (ha)	Area Impacted by 12m Layout- Total (ha)
Known	3.6	2.0	5.6
High Potential	39.9	27.5	67.4
Low Potential	16.3	15.4	31.7
Total	59.8	44.9	104.7

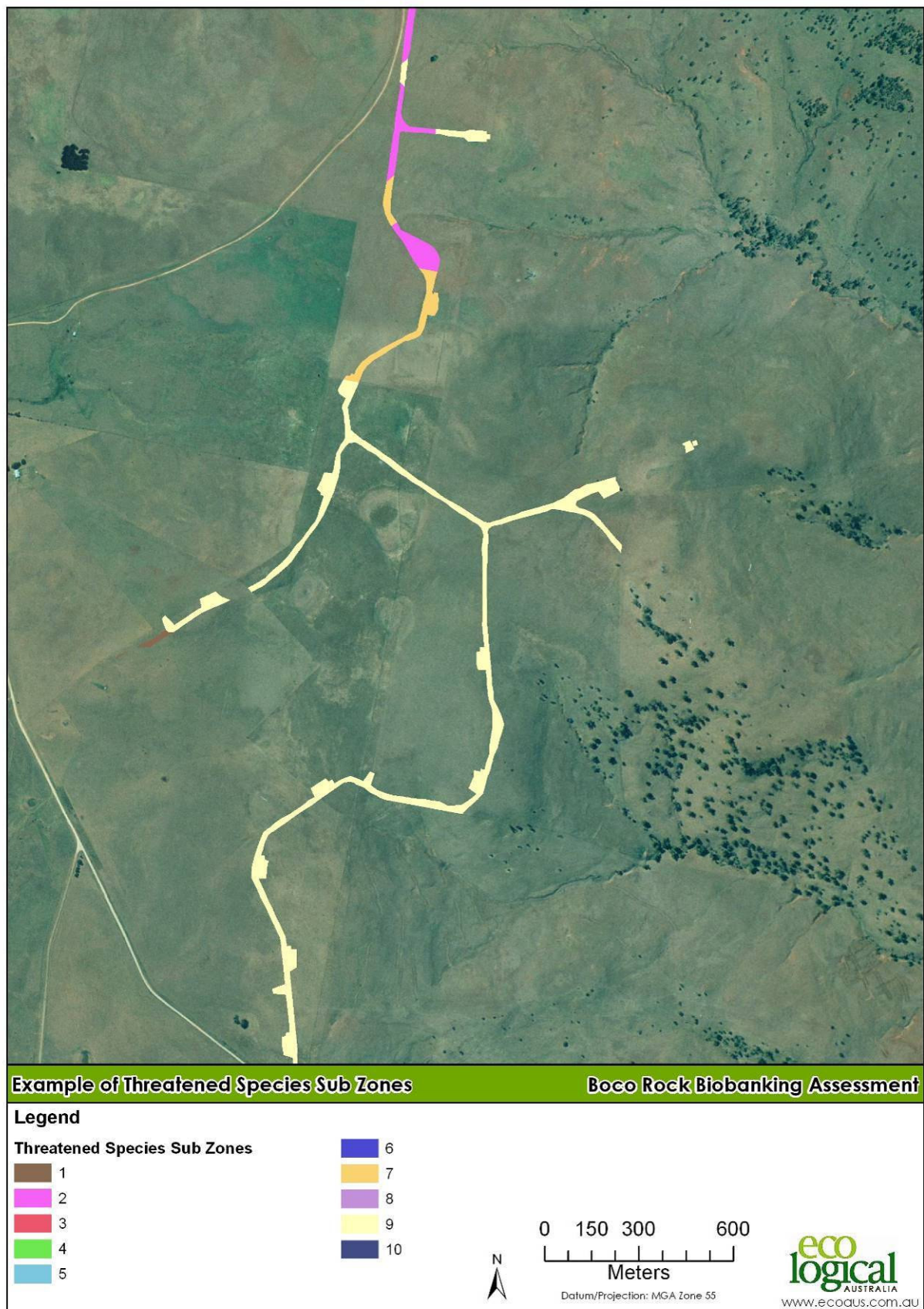


Figure 4: Example of Threatened Species Sub Zones

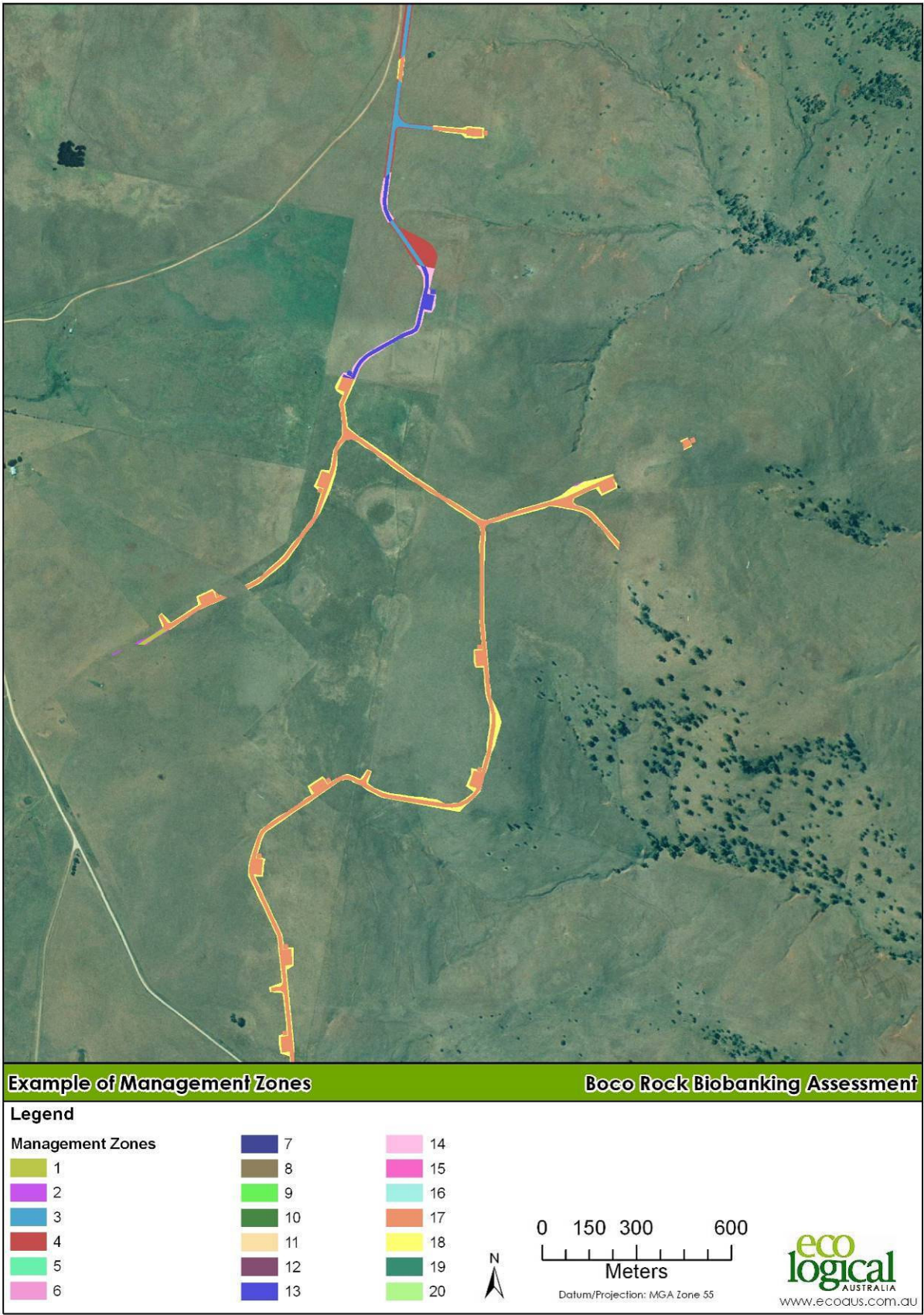


Figure 5: Example of Management Zones

1.2.4 Indirect Impacts

Due to the relatively low impact of the development over the study area, the mitigation measures proposed and the revegetation of some areas with local provenance, significant indirect impacts on the lands surrounding the study site are considered unlikely. Therefore the calculation of additional credits for indirect impacts was not required for the Boco wind farm site.

1.2.5 Red Flags

A red flag is triggered in Biobanking when there is an impact on any of the following:

- A vegetation type >70% cleared in the CMA for which it is mapped (not in Low condition);
- A critically endangered or endangered ecological community (EEC) listed under the TSC Act or EPBC Act (not in Low condition);
- A threatened species that cannot withstand further loss

Significant effort has been made to avoid impacts on vegetation and habitat, particularly in red flag areas resulting in a number of different turbine layouts during the planning phase. Where possible impacts have been moved to cleared land, or areas of lower condition, to minimise the effect of the development, and parts of the development, such as roads and turbine locations, will also be moved to avoid the removal of mature over-storey trees.

Several vegetation types meeting the definition of the Natural Temperate Grassland of the Southern Tablelands (NSW and ACT) EEC listed on the schedules of the EPBC Act in moderate/good condition are impacted by the development, and therefore trigger red flags on site. In addition, both woodland communities are >70% cleared and therefore also trigger red flags.

In total 85.6 hectares of red flagged vegetation is to be permanently cleared by the proposal, with a further 74.0 hectares to be temporarily cleared (Table 14).

The threatened species affected by the development (Grassland Earless Dragon) is not red flagged under Biobanking.

Table 14: Red Flag Vegetation- 12m Layout

Revised Biometric Vegetation Type	Area of Permanent Loss (ha)	Area of Temporary Loss (ha)	Total Area (ha)	Reason for Red Flag
KGST	5.5	6.3	11.8	EEC
RGSG	37.8	41.5	79.3	>70% Cleared
RT	0.9	0.7	1.6	EEC
SGCB	1.7	1	2.7	>70% Cleared
SG	39.7	24.5	64.2	EEC
Total	85.6	74.0	159.6	N/A

1.3 6M ROAD LAYOUT

1.3.1 Threatened Species Sub Zones

Threatened species sub zones, which form the base units of vegetation zones, were mapped for the 6m road layout impact. The threatened species sub zones are the base units entered into the credit calculator, and allow the entry of data such as adjacent remnant area and patch size for individual vegetation polygons (Table 15).

As the vegetation on and surrounding the site is predominantly in moderate/good condition, and patches are within 100m, the maximum Adjacent Remnant Area and Patch Size (including Low Condition) of 501 hectares has been entered into the credit calculator.

Table 15: Threatened Species Sub Zones- 6m Layout

TS Sub Zone ID	Vegetation Type	Condition	Ancillary Code	Adjacent Remnant Area (ha)	Patch Size incl. Low Condition (ha)	Area (ha)
1	KGST	M/G	G	501	501	2.2
2	KGST	M/G	HG	501	501	6.8
3	RGSG	Low	W	0	501	14.6
4	RGSG	M/G	G	501	501	22.7
5	RGSG	M/G	HG	501	501	38.4
6	RGSG	M/G	W	501	501	4.3
7	RT	M/G	G	501	501	1.2
8	SGCB	M/G	G	501	501	2.1
9	SG	M/G	G	501	501	48
10	SG	M/G	HG	501	501	3.6
Total	N/A	N/A	N/A	N/A	N/A	143.9

1.3.2 Management Zones and Site Scores

Management zones combine the mapping of vegetation zones with the final development outcome on site. They enable the assessor to increase, or decrease, the number of credits required depending on the final condition of the vegetation after development. As described in Section 1.1.9 two types of management zones have been identified for the project, including;

- Areas of permanent vegetation removal
- Areas of temporary vegetation removal to be revegetated and managed as native vegetation

Each management zone has received a current site value score calculated out of 100. This score has been determined using the transects/plots undertaken on site. The future scores have then been calculated using the rules outlined in Section 1.1.9. The area of each management zone, the final management outcome and the site values scores allocated are listed in Table 16 below.

Table 16: Management Zone Site Value Scores- 6m Layout

Management Zone ID	Final Management Outcome	Vegetation Zone ID	Area (ha)	Current Site Value	Future Site Value	Loss in Site Value
1	Permanent Loss	1	0.6	45	14	31
2	Temporary Loss	1	1.6	45	28	18
3	Permanent Loss	2	2.5	69	23	46
4	Temporary Loss	2	4.3	69	40	30
5	Permanent Loss	3	5.4	26	11	15
6	Temporary Loss	3	9.2	26	16	10
7	Permanent Loss	4	9.5	42	11	31
8	Temporary Loss	4	13.2	42	23	19
9	Permanent Loss	5	13	44	11	33
10	Temporary Loss	5	25.4	44	17	27
11	Permanent Loss	6	1.5	29	11	18
12	Temporary Loss	6	2.8	29	15	15
13	Permanent Loss	7	0.6	69	23	46
14	Temporary Loss	7	0.6	69	40	30
15	Permanent Loss	8	1.1	37	11	26
16	Temporary Loss	8	1	37	21	16
17	Permanent Loss	9	24	55	14	41
18	Temporary Loss	9	24	55	29	26
19	Permanent Loss	10	2.1	53	14	39
20	Temporary Loss	10	1.5	53	29	24
Total	N/A	N/A	143.9	N/A	N/A	N/A

1.3.3 Threatened Species Habitat

One threatened species requiring species credits was located, and identified as being within the impact area, during survey of the site. The species identified was the Grassland Earless Dragon (*Tympanocryptis pinguicolla*). Once found during survey, the habitat of the Grassland Earless Dragon was mapped. The Grassland Earless Dragon habitat to be removed was calculated for entry into the tool, and included known habitat, high potential habitat and low potential habitat (Table 17). In total 83.6 hectares of mapped habitat is going to be impacted by the development.

Table 17: GED Habitat Impacted- 6m Layout

Habitat Type	Area Impacted by 6m Layout- Permanent (ha)	Area Impacted by 6m Layout- temporary (ha)	Area Impacted by 6m Layout- Total (ha)
Known	2.4	2.3	4.7
High Potential	25.6	27.6	53.3
Low Potential	10.4	15.2	25.6
Total	38.4	45.1	83.6

1.3.4 Indirect Impacts

Due to the relatively low impact of the development over the study area, the mitigation measures proposed and the revegetation of some areas with local provenance, significant indirect impacts on the lands surrounding the study site are considered unlikely. Therefore the calculation of additional credits for indirect impacts was not required for the Boco wind farm site.

1.3.5 Red Flags

A red flag is triggered in Biobanking when there is an impact on any of the following:

- A vegetation type >70% cleared in the CMA for which it is mapped (not in Low condition);
- A critically endangered or endangered ecological community (EEC) listed under the TSC Act or EPBC Act (not in Low condition);
- A threatened species that cannot withstand further loss

Significant effort has been made to avoid impacts on vegetation and habitat, particularly in red flag areas resulting in a number of different turbine layouts during the planning phase. Where possible impacts have been moved to cleared land, or areas of lower condition, to minimise the effect of the development, and parts of the development, such as roads and turbine locations, will also be moved to avoid the removal of mature over-storey trees.

Several vegetation types meeting the definition of the Natural Temperate Grassland of the Southern Tablelands (NSW and ACT) EEC listed on the schedules of the EPBC Act in moderate/good condition are impacted by the development, and therefore trigger red flags on site. In addition, both woodland communities are >70% cleared and therefore also trigger red flags.

In total 54.9 hectares of red flagged vegetation is to be permanently cleared by the proposal, with a further 74.4 hectares to be temporarily cleared (Table 18).

The threatened species affected by the development (Grassland Earless Dragon) is not red flagged under Biobanking.

Table 18: Red Flag Vegetation- 6m Layout

Revised Biometric Vegetation Type	Area of Permanent Loss (ha)	Area of Temporary Loss (ha)	Total Area (ha)	Reason for Red Flag
KGST	3.1	5.9	9	EEC
RGSG	24	41.4	65.4	>70% Cleared
RT	0.6	0.6	1.2	EEC
SGCB	1.1	1	2.1	>70% Cleared
SG	26.1	25.5	51.6	EEC
Total	54.9	74.4	129.3	N/A

2 Credits Required

Provided below are the results of the credit calculations, including the number of credits required and credit profile information.

2.1 12M ROAD LAYOUT

2.1.1 Ecosystem Credits

A total of 4,991 ecosystem credits are required for the 12m road layout option. Table 19 provides a summary of the credits required. In general credits can be obtained from a wide variety of CMA Subregions and vegetation types for the Kangaroo Grass, Ribbon Gum, River Tussock and Speargrass communities. The Snow Gun community, however, it quite restricted in terms of offsetting. The actual credit profile can be seen in Appendix 4.

Table 19: Ecosystem Credits Required and Credit Profile- 12m Layout

Vegetation Zone	Number of Credits Required	Minimum % Surrounding Vegetation	Minimum Patch Size (ha)	CMA Subregions able to receive offset	Vegetation Types able to receive offset (by CMA)
1	24	10%	5ha	Lachlan Crookwell	Kangaroo Grass - Redleg Grass - Speargrass dry grasslands of the South Eastern Highlands
				Murrumbidgee Monaro Murrumbatemen	Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands Snow Grass - Acaena ovina grassland on undulating basalt plateaux, South Eastern Highlands Speargrass grassland of the South Eastern Highlands Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands
				Southern Rivers Bungonia Monaro (Part A) Monaro (Part B) Monaro (Part C)	Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands Snow Grass - Acaena ovina grassland on undulating basalt plateaux, South Eastern Highlands Speargrass grassland of the South Eastern Highlands Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands

Vegetation Zone	Number of Credits Required	Minimum % Surrounding Vegetation	Minimum Patch Size (ha)	CMA Subregions able to receive offset	Vegetation Types able to receive offset (by CMA)
2	254	10%	5ha	Lachlan Crookwell	Kangaroo Grass - Redleg Grass - Speargrass dry grasslands of the South Eastern Highlands
				Murrumbidgee Monaro Murrumbatemen	Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands Snow Grass - Acaena ovina grassland on undulating basalt plateaux, South Eastern Highlands Speargrass grassland of the South Eastern Highlands Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands
				Southern Rivers Bungonia Monaro (Part A) Monaro (Part B) Monaro (Part C)	Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands Snow Grass - Acaena ovina grassland on undulating basalt plateaux, South Eastern Highlands Speargrass grassland of the South Eastern Highlands Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands
3	865	30%	100ha	Central West Bathurst Capertee Hill End Oberon Wollemi	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands
				Southern Rivers Monaro (Part C)	Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands

Vegetation Zone	Number of Credits Required	Minimum % Surrounding Vegetation	Minimum Patch Size (ha)	CMA Subregions able to receive offset	Vegetation Types able to receive offset (by CMA)
4	1,644	30%	100ha	Central West Bathurst Capertee Hill End Oberon Wollemi Southern Rivers Monaro (Part C)	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands
5	123	30%	100ha	Central West Bathurst Capertee Hill End Oberon Wollemi Southern Rivers Monaro (Part C)	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands
6	198	30%	100ha	Central West Bathurst Capertee Hill End Oberon Wollemi Southern Rivers Monaro (Part C)	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands

Vegetation Zone	Number of Credits Required	Minimum % Surrounding Vegetation	Minimum Patch Size (ha)	CMA Subregions able to receive offset	Vegetation Types able to receive offset (by CMA)
7	20	0%	0ha	Southern Rivers Bateman Bungonia Burraborang East Gippsland Lowlands (Part A) East Gippsland Lowlands (Part B) East Gippsland Lowlands (Part C) Ettrema Illawarra Jervis Kybeyan - Gourock (Part A) Kybeyan - Gourock (Part B) Monaro (Part A) Monaro (Part B) Monaro (Part C) Moss Vale New South Wales Alps South East Coastal Plains South East Coastal Ranges (Part A) South East Coastal Ranges (Part B) South East Coastal Ranges (Part C)	River Tussock - Tall Sedge - Kangaroo Grass moist grasslands of the South Eastern Highlands Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands
8	86	30%	100ha	Southern Rivers Bungonia Monaro (Part A) Monaro (Part C)	Snow Gum - Candlebark Woodland on Broad Valley Flats of the Tablelands and Slopes, South-Eastern Highlands

Vegetation Zone	Number of Credits Required	Minimum % Surrounding Vegetation	Minimum Patch Size (ha)	CMA Subregions able to receive offset	Vegetation Types able to receive offset (by CMA)
9	1,691	10%	5ha	Lachlan Crookwell	Kangaroo Grass - Redleg Grass - Speargrass dry grasslands of the South Eastern Highlands
				Murrumbidgee Monaro Murrumbatemen	Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands Snow Grass - Acaena ovina grassland on undulating basalt plateaux, South Eastern Highlands Speargrass grassland of the South Eastern Highlands Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands
				Southern Rivers Bungonia Monaro (Part A) Monaro (Part B) Monaro (Part C)	Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands Snow Grass - Acaena ovina grassland on undulating basalt plateaux, South Eastern Highlands Speargrass grassland of the South Eastern Highlands Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands

Vegetation Zone	Number of Credits Required	Minimum % Surrounding Vegetation	Minimum Patch Size (ha)	CMA Subregions able to receive offset	Vegetation Types able to receive offset (by CMA)
10	86	10%	5ha	Lachlan Crookwell Murrumbidgee Monaro Murrumbatemen Southern Rivers Bungonia Monaro (Part A) Monaro (Part B) Monaro (Part C)	Kangaroo Grass - Redleg Grass - Speargrass dry grasslands of the South Eastern Highlands Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands Snow Grass - Acaena ovina grassland on undulating basalt plateaux, South Eastern Highlands Speargrass grassland of the South Eastern Highlands Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands Snow Grass - Acaena ovina grassland on undulating basalt plateaux, South Eastern Highlands Speargrass grassland of the South Eastern Highlands Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands
Total	4,991	N/A	N/A	N/A	N/A

Further analysis has been conducted into the number of credits required for each vegetation type per hectare of impact, which can be viewed in (Table 20). The minimum number of credits required per hectare is 12.8, while the maximum is 31.8.

Table 20: Number of Credits Required Per Hectare- 12m Layout

Revised Biometric Vegetation Type	Total Loss (ha)	Credits Required	Credits Required/ha
KGST	11.8	277	23.5
RGSG	96.7	2830	29.3
RT	1.6	20	12.8
SGCB	2.7	85	31.8
SG	64.2	1777	27.7
Total	177.0	4991	28.2

2.1.2 Species Credits

In total, 1,396 Grassland Earless Dragon (GED) species credits are required for the 121.8 hectares of habitat impact. These credits can be further displayed by the area of habitat type (Table 21).

Table 21: Number of GED Species credits Required- 12m Layout

Habitat Type	Area Impacted by 12 m Layout (ha)	Credits Required
Known	5.6	74.7
High Potential	67.4	898.7
Low Potential	31.7	422.7
Total	104.7	1,396

2.2 6M ROAD LAYOUT

2.2.1 Ecosystem Credits

A total of 3,898 ecosystem credits are required for the 6m road layout option. Table 22 provides a summary of the credits required. In general credits can be obtained from a wide variety of CMA Subregions and vegetation types for the Kangaroo Grass, Ribbon Gum, River Tussock and Speargrass communities. The Snow Gun community, however, is quite restricted in terms of offsetting. The actual credit profile can be seen in Appendix 5.

Table 22: Ecosystem Credits Required and Credit Profile- 6m Layout

Vegetation Zone	Number of Credits Required	Minimum % Surrounding Vegetation	Minimum Patch Size (ha)	CMA Subregions able to receive offset	Vegetation Types able to receive offset (by CMA)
1	20	10%	5ha	Lachlan Crookwell Murrumbidgee Monaro Murrumbatemen Southern Rivers Bungonia Monaro (Part A) Monaro (Part B) Monaro (Part C)	Kangaroo Grass - Redleg Grass - Speargrass dry grasslands of the South Eastern Highlands Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands Snow Grass - Acaena ovina grassland on undulating basalt plateaux, South Eastern Highlands Speargrass grassland of the South Eastern Highlands Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands Snow Grass - Acaena ovina grassland on undulating basalt plateaux, South Eastern Highlands Speargrass grassland of the South Eastern Highlands Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands

Vegetation Zone	Number of Credits Required	Minimum % Surrounding Vegetation	Minimum Patch Size (ha)	CMA Subregions able to receive offset	Vegetation Types able to receive offset (by CMA)
2	176	10%	5ha	Lachlan Crookwell	Kangaroo Grass - Redleg Grass - Speargrass dry grasslands of the South Eastern Highlands
				Murrumbidgee Monaro Murrumbatemen	Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands Snow Grass - Acaena ovina grassland on undulating basalt plateaux, South Eastern Highlands Speargrass grassland of the South Eastern Highlands Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands
				Southern Rivers Bungonia Monaro (Part A) Monaro (Part B) Monaro (Part C)	Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands Snow Grass - Acaena ovina grassland on undulating basalt plateaux, South Eastern Highlands Speargrass grassland of the South Eastern Highlands Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands
3	679	30%	100ha	Central West Bathurst Capertee Hill End Oberon Wollemi	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands
				Southern Rivers Monaro (Part C)	Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands

Vegetation Zone	Number of Credits Required	Minimum % Surrounding Vegetation	Minimum Patch Size (ha)	CMA Subregions able to receive offset	Vegetation Types able to receive offset (by CMA)
4	1,314	30%	100ha	Central West Bathurst Capertee Hill End Oberon Wollemi Southern Rivers Monaro (Part C)	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands
5	99	30%	100ha	Central West Bathurst Capertee Hill End Oberon Wollemi Southern Rivers Monaro (Part C)	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands
6	159	30%	100ha	Central West Bathurst Capertee Hill End Oberon Wollemi Southern Rivers Monaro (Part C)	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands

Vegetation Zone	Number of Credits Required	Minimum % Surrounding Vegetation	Minimum Patch Size (ha)	CMA Subregions able to receive offset	Vegetation Types able to receive offset (by CMA)
7	15	0%	0ha	Southern Rivers Bateman Bungonia Burraborang East Gippsland Lowlands (Part A) East Gippsland Lowlands (Part B) East Gippsland Lowlands (Part C) Ettrema Illawarra Jervis Kybeyan - Gourock (Part A) Kybeyan - Gourock (Part B) Monaro (Part A) Monaro (Part B) Monaro (Part C) Moss Vale New South Wales Alps South East Coastal Plains South East Coastal Ranges (Part A) South East Coastal Ranges (Part B) South East Coastal Ranges (Part C)	River Tussock - Tall Sedge - Kangaroo Grass moist grasslands of the South Eastern Highlands Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands
8	64	30%	100ha	Southern Rivers Bungonia Monaro (Part A) Monaro (Part C)	Snow Gum - Candlebark Woodland on Broad Valley Flats of the Tablelands and Slopes, South-Eastern Highlands

Vegetation Zone	Number of Credits Required	Minimum % Surrounding Vegetation	Minimum Patch Size (ha)	CMA Subregions able to receive offset	Vegetation Types able to receive offset (by CMA)
9	1,306	10%	5ha	Lachlan Crookwell	Kangaroo Grass - Redleg Grass - Speargrass dry grasslands of the South Eastern Highlands
				Murrumbidgee Monaro Murrumbatemen	Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands Snow Grass - Acaena ovina grassland on undulating basalt plateaux, South Eastern Highlands Speargrass grassland of the South Eastern Highlands Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands
				Southern Rivers Bungonia Monaro (Part A) Monaro (Part B) Monaro (Part C)	Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands Snow Grass - Acaena ovina grassland on undulating basalt plateaux, South Eastern Highlands Speargrass grassland of the South Eastern Highlands Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands

Vegetation Zone	Number of Credits Required	Minimum % Surrounding Vegetation	Minimum Patch Size (ha)	CMA Subregions able to receive offset	Vegetation Types able to receive offset (by CMA)
10	66	10%	5ha	Lachlan Crookwell	Kangaroo Grass - Redleg Grass - Speargrass dry grasslands of the South Eastern Highlands
				Murrumbidgee Monaro Murrumbatemen	Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands Snow Grass - Acaena ovina grassland on undulating basalt plateaux, South Eastern Highlands Speargrass grassland of the South Eastern Highlands Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands
				Southern Rivers Bungonia Monaro (Part A) Monaro (Part B) Monaro (Part C)	Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands Snow Grass - Acaena ovina grassland on undulating basalt plateaux, South Eastern Highlands Speargrass grassland of the South Eastern Highlands Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands
Total	3,898	N/A	N/A	N/A	N/A

Further analysis has been conducted into the number of credits required for each vegetation type per hectare of impact, which can be viewed in (Table 23). The minimum number of credits required per hectare is 12.5, while the maximum is 30.6.

Table 23: Number of Credits Required Per Hectare- 6m Layout

Revised Biometric Vegetation Type	Total Loss (ha)	Credits Required	Credits Required/ha
KGST	8.9	196	21.8
RGSG	80.1	2251	28.1
RT	1.2	15	12.5
SGCB	2.1	64	30.6
SG	51.5	1371	26.6
Total	143.9	3898	27.1

2.2.2 Species Credits

In total, 1,115 Grassland Earless Dragon (GED) species credits are required for the 102.8 hectares of habitat impact. These credits can be further displayed by the area of habitat type (Table 24).

Table 24: Number of GED Species credits Required- 6m Layout

Habitat Type	Area Impacted by 6 m Layout (ha)	Credits Required
Known	4.7	62.7
High Potential	53.3	710.9
Low Potential	25.6	341.4
Total	83.6	1,115

3 Offsets Required

Several offset scenarios have been developed to estimate the size of the offset required for each of the layouts. Average increases in site value, using the Biobanking Assessment Methodology, are provided below for both ecosystem and species credits to determine the size of offset required for potential Biobank sites in either moderate-good condition or within benchmark condition. Note that field work or on site assessment has not been undertaken for any Biobank sites at this stage and the offset estimates below have been calculated through a desktop approach only but provide an accurate indication of the area required. A number of potential offset sites have been identified and the relevant landowners have expressed interest in registering Biobank Agreements on their properties. Further details of these Biobank site opportunities are provided in the Environment Impact Assessment report (ELA 2009).

3.1 12M ROAD LAYOUT

3.1.1 Ecosystem Credits

The 12m layout requires 4,991 credits to offset the impact on the five impacted vegetation types. Two offset scenarios have been tested, including an offset site in benchmark condition and an offset site in moderate/good condition. Table 25 outlines our findings, with between 499-713 hectares of offset required to fully offset the impact of the 12m layout.

Table 25: Estimated Ecosystem Credit Offset- 12m Layout

Vegetation Type Name	Credits Req.	Area (ha)	Credits/ha	Average No. Credits Generated/ha - M/G Site	Offset Required (ha)	Average No. Credits Generated/ha - Benchmark Site	Offset Required (ha)
KGSG	277	11.8	23.5	10	27.7	7	39.6
RGSG	2830	96.7	29.3	10	283.0	7	404.3
RT	20	1.6	12.8	10	2.0	7	2.9
SGCB	85	2.7	31.8	10	8.6	7	12.3
SG	1777	64.2	27.7	10	177.7	7	253.9
Total	4991	177	28.2	10	499.1	7	713.0

3.1.2 Species Credits

In addition to the 499-713 hectares of offset required for the ecosystem credits, approximately 230 hectares of offset is required for the Grassland Earless Dragon habitat impacted by the proposal. Under Biobanking these credits can be obtained from the same Biobank site as the ecosystem credits, or a different Biobank site should that be required. The results can be seen in Table 26.

Table 26: Estimated Species Credit Offset- 12m Layout

Habitat Type	Area Impacted by 12 m Layout (ha)	Credits Required	Average No. Credits Generated/ha	Offset Required (ha)
Known	5.6	74.7	6	12.4
High Potential	67.4	898.7	6	149.8
Low Potential	31.7	422.7	6	70.4
Total	104.7	1,396	6	232.7

3.2 6M ROAD LAYOUT

3.2.1 Ecosystem Credits

The 6m layout requires 3,898 credits to offset the impact on the five impacted vegetation types. Two offset scenarios have been tested, including an offset site in benchmark condition and an offset site in moderate/good condition. Table 27 outlines our findings, with between 390-557 hectares of offset required to fully offset the impact of the 6m layout.

Table 27: Estimated Ecosystem Credit Offset- 6m Layout

Vegetation Type Name	Credits Req.	Area (ha)	Credits/ha	Average No. Credits Generated/ha- M/G Site	Offset Required (ha)	Average No. Credits Generated/ha- Benchmark Site	Offset Required (ha)
KGSG	196	9	21.8	10	19.6	7	28.1
RGSG	2251	80	28.1	10	225.1	7	321.6
RT	15	1.2	12.5	10	1.5	7	2.1
SGCB	64	2.1	30.6	10	6.4	7	9.2
SG	1371	51.6	26.6	10	137.2	7	195.9
Total	3898	143.9	27.1	10	389.9	7	556.9

3.2.2 Species Credits

In addition to the 390-557 hectares of offset required for the ecosystem credits, approximately 185 hectares of offset is required for the Grassland Earless Dragon habitat impacted by the proposal. Under Biobanking these credits can be obtained from the same Biobank site as the ecosystem credits, or a different Biobank site should that be required. The results can be seen in Table 28.

Table 28: Estimated Species Credit Offset- 6m Layout

Habitat Type	Area Impacted by 6m Layout (ha)	Credits Required	Average No. Credits Generated/ha	Offset Required (ha)
Known	4.7	62.7	6	10.4
High Potential	53.3	710.9	6	118.5
Low Potential	25.6	341.4	6	56.9
Total	83.6	1,115	6	185.8

References

DECC (2008). BioBanking Assessment Methodology and Credit Calculator Operational Manual. Department of Environment and Climate Change (NSW), Sydney.

ELA (2009). Boco Rock Wind Farm Ecological Assessment. Report prepared for Wind Prospect CWP Pty Ltd.

Appendix 1: Plots

Vegetation Zone: 1

Vegetation Type: Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands

Condition: M/G Ancillary Code: Grazed

Plot Name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL	Longitude	Latitude	Zone
QE25	8	0	0	0	0	44	10	0	0	0	5945257	686061	55

Vegetation Zone: 2

Vegetation Type: Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands

Condition: M/G Ancillary Code: Heavily Grazed

Plot Name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL	Longitude	Latitude	Zone
Q15-117	19	0	0	58	0	4	0	0	0	0	5948168	686355	55
Q103	21	0	0	52	0	18	0	0	0	0	5948773	685901	55
QN43	16	0	0	54	0	6	0	0	0	0	5949405	686623	55

Vegetation Zone: 3

Vegetation Type: Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands

Condition: Low Ancillary Code: Weedy

Plot Name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL	Longitude	Latitude	Zone
Q131	9	1	0	2	0	0	68	0	0	10	5947864	695735	55
Q74	6	0	0	10	0	18	22	0	0	17	5953459	697319	55
Q77	4	0	0	0	0	0	60	0	0	5	5954491	698577	55

Vegetation Zone: 4

Vegetation Type: Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands

Condition: M/G Ancillary Code: Grazed

Plot Name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL	Longitude	Latitude	Zone
Q60	12	0	0	74	0	8	0	0	0	0	5951668	691395	55
Q87	9	0	0	30	0	12	0	0	0	0	5954970	694601	55
QSUB	12	3	0	40	0	0	8	0	0	27	5950100	690249	55

Vegetation Zone: 5

Vegetation Type: Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands

Condition: M/G Ancillary Code: Heavily Grazed

Plot Name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL	Longitude	Latitude	Zone
Q28	5	5	0	14	0	44	2	1	0	55	5947073	696671	55
Q115	4	0	0	54	0	2	0	0	0	0	5950972	698533	55
Q68	6	0	0	16	0	34	0	0	0	0	5951298	697338	55

Vegetation Zone: 6

Vegetation Type: Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands

Condition: M/G Ancillary Code: Weedy

Plot Name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL	Longitude	Latitude	Zone
Q70	2	2	2	0	0	2	68	0	0	30	5952591	696818	55

Vegetation Zone: 7

Vegetation Type: River Tussock - Tall Sedge - Kangaroo Grass moist grasslands of the South Eastern Highlands

Condition: M/G Ancillary Code: Grazed

Plot Name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL	Longitude	Latitude	Zone
Q33	17	0	0	68	0	6	0	0	0	0	5947768	686255	55

Vegetation Zone: 8

Vegetation Type: Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands

Condition: M/G Ancillary Code: Grazed

Plot Name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL	Longitude	Latitude	Zone
Q109	15	0	0	42	0	2	6	0	0	0	5943908	686009	55
Q114	11	0	0	62	0	10	2	0	0	0	5944124	686057	55

Vegetation Zone: 9

Vegetation Type: Speargrass grassland of the South Eastern Highlands

Condition: M/G Ancillary Code: Grazed

Plot Name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL	Longitude	Latitude	Zone
Q25	24	0	0	62	0	30	4	0	0	0	5945319	685956	55
Q35	22	0	0	74	0	18	0	0	0	0	5946821	686605	55
Q34	9	0	0	60	0	36	2	0	0	0	5947522	686163	55
Q44	22	0	0	80	0	4	0	0	0	0	5948563	696449	55
Q43-101	18	0	0	80	0	4	0	0	0	0	5949520	687325	55
Q30	9	0	0	44	0	8	2	0	0	0	5949561	694703	55
Q47	16	0	0	54	0	4	0	0	0	0	5952732	689724	55
QS55	18	0	0	50	0	8	0	0	0	0	5953568	691881	55
Q09	17	0	0	62	0	6	0	0	0	0	5943199	685455	55
Q39	7	0.5	0	50	0	20	0	1	0	19	5949065	687954	55
Q29	7	0	0	52	0	8	0	0	0	0	5949778	695390	55
Q53	10	0	0	62	0	4	0	0	0	0	5953559	690867	55
Q40	13	0	0	64	0	4	0	0	0	0	5941026	685404	55

Vegetation Zone: 10

Vegetation Type: Speargrass grassland of the South Eastern Highlands

Condition: M/G Ancillary Code: Heavily Grazed

Plot Name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL	Longitude	Latitude	Zone
Q38	9	0	0	42	0	0.1	0	0	0	0	5948744	693274	55
Q95	14	0	0	34	0	2	0	0	0	0	5952332	689434	55
Q51	10	0	0	54	0	2	0	0	0	0	5954069	690330	55

Appendix 2: Species Predicted on Site

Common Name	Scientific Name	Surveyed on Site?	Found on Site?
Diamond Firetail	<i>Stagonopleura guttata</i>	Y	Y
Little Whip Snake	<i>Suta flagellum</i>	Y	Y
Barking Owl	<i>Ninox connivens</i>	Y	N
Eastern Bentwing-bat	<i>Miniopterus schreibersii oceanensis</i>	Y	Y
Eastern False Pipistrelle	<i>Falsistrellus tasmaniensis</i>	Y	Y
Hooded Robin (south-eastern form)	<i>Melanodryas cucullata cucullata</i>	Y	N
Koala	<i>Phascolarctos cinereus</i>	N	N
Speckled Warbler	<i>Pyrrholaemus sagittatus</i>	Y	N
Spotted-tailed Quoll	<i>Dasyurus maculatus</i>	N – marginal habitat	N
Yellow-bellied Glider	<i>Petaurus australis</i>	N – no suitable habitat	N
Brown Treecreeper (eastern subspecies)	<i>Climacteris picumnus victoriae</i>	Y	N
Eastern Pygmy-possum	<i>Cercartetus nanus</i>	N – no suitable habitat	N

Appendix 3: Site Value Scores

Vegetation Zone: 1

Vegetation Type: Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands

Condition: M/G Ancillary Code: Grazed

Site Attribute	Current Score	Score for Permanent Loss Areas	Score for Temporary Loss Areas
Native plant species richness	2	0	1
Native over-storey cover	3	3	3
Native mid-storey cover	0	0	0
Native ground cover (grasses)	0	0	0
Native ground cover (shrubs)	3	3	3
Native ground cover (other)	2	0	1
Exotic plant cover	2	0	1
Number of trees with hollows	0	0	0
Over-storey regeneration	0	0	0
Total length of fallen logs	0	0	0
Site Value	45	14	28

Vegetation Zone: 2

Vegetation Type: Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands

Condition: M/G Ancillary Code: Heavily Grazed

Site Attribute	Current Score	Score for Permanent Loss Areas	Score for Temporary Loss Areas
Native plant species richness	3	1	2
Native over-storey cover	3	3	3
Native mid-storey cover	0	0	0
Native ground cover (grasses)	3	0	1
Native ground cover (shrubs)	3	3	3
Native ground cover (other)	3	0	1
Exotic plant cover	3	0	1
Number of trees with hollows	0	0	0
Over-storey regeneration	0	0	0
Total length of fallen logs	0	0	0
Site Value	69	23	40

Vegetation Zone: 3

Vegetation Type: Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands

Condition: Low Ancillary Code: Weedy

Site Attribute	Current Score	Score for Permanent Loss Areas	Score for Temporary Loss Areas
Native plant species richness	1	0	0
Native over-storey cover	0	0	0
Native mid-storey cover	3	3	3
Native ground cover (grasses)	2	0	1
Native ground cover (shrubs)	3	3	3
Native ground cover (other)	3	0	1
Exotic plant cover	0	0	0
Number of trees with hollows	0	0	0
Over-storey regeneration	0	0	0
Total length of fallen logs	1	0	1
Site Value	26	11	16

Vegetation Zone: 4

Vegetation Type: Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands

Condition: M/G Ancillary Code: Grazed

Site Attribute	Current Score	Score for Permanent Loss Areas	Score for Temporary Loss Areas
Native plant species richness	2	0	1
Native over-storey cover	0	0	0
Native mid-storey cover	3	3	3
Native ground cover (grasses)	3	0	1
Native ground cover (shrubs)	3	3	3
Native ground cover (other)	3	0	1
Exotic plant cover	3	0	1
Number of trees with hollows	0	0	0
Over-storey regeneration	0	0	0
Total length of fallen logs	1	0	1
Site Value	42	11	23

Vegetation Zone: 5

Vegetation Type: Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands

Condition: M/G Ancillary Code: Heavily Grazed

Site Attribute	Current Score	Score for Permanent Loss Areas	Score for Temporary Loss Areas
Native plant species richness	1	0	0
Native over-storey cover	1	0	0
Native mid-storey cover	3	3	3
Native ground cover (grasses)	3	0	1
Native ground cover (shrubs)	3	3	3
Native ground cover (other)	3	0	1
Exotic plant cover	3	0	1
Number of trees with hollows	1	0	0
Over-storey regeneration	0	0	0
Total length of fallen logs	2	0	1
Site Value	44	11	17

Vegetation Zone: 6

Vegetation Type: Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands

Condition: M/G Ancillary Code: Weedy

Site Attribute	Current Score	Score for Permanent Loss Areas	Score for Temporary Loss Areas
Native plant species richness	1	0	1
Native over-storey cover	1	0	1
Native mid-storey cover	3	3	3
Native ground cover (grasses)	0	0	0
Native ground cover (shrubs)	3	3	3
Native ground cover (other)	1	0	1
Exotic plant cover	0	0	0
Number of trees with hollows	0	0	0
Over-storey regeneration	0	0	0
Total length of fallen logs	3	0	3
Site Value	29	11	29

Vegetation Zone: 7

Vegetation Type: River Tussock - Tall Sedge - Kangaroo Grass moist grasslands of the South Eastern Highlands

Condition: M/G Ancillary Code: Grazed

Site Attribute	Current Score	Score for Permanent Loss Areas	Score for Temporary Loss Areas
Native plant species richness	3	1	2
Native over-storey cover	3	3	3
Native mid-storey cover	0	0	0
Native ground cover (grasses)	3	0	1
Native ground cover (shrubs)	3	3	3
Native ground cover (other)	3	0	1
Exotic plant cover	3	0	1
Number of trees with hollows	0	0	0
Over-storey regeneration	0	0	0
Total length of fallen logs	0	0	0
Site Value	69	23	40

Vegetation Zone: 8

Vegetation Type: Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands

Condition: M/G Ancillary Code: Grazed

Site Attribute	Current Score	Score for Permanent Loss Areas	Score for Temporary Loss Areas
Native plant species richness	2	0	1
Native over-storey cover	0	0	0
Native mid-storey cover	3	3	3
Native ground cover (grasses)	3	0	1
Native ground cover (shrubs)	3	3	3
Native ground cover (other)	3	0	1
Exotic plant cover	2	0	1
Number of trees with hollows	0	0	0
Over-storey regeneration	0	0	0
Total length of fallen logs	0	0	0
Site Value	37	11	21

Vegetation Zone: 9

Vegetation Type: Speargrass grassland of the South Eastern Highlands

Condition: M/G Ancillary Code: Grazed

Site Attribute	Current Score	Score for Permanent Loss Areas	Score for Temporary Loss Areas
Native plant species richness	2	0	2
Native over-storey cover	3	3	3
Native mid-storey cover	0	0	0
Native ground cover (grasses)	3	0	3
Native ground cover (shrubs)	3	3	3
Native ground cover (other)	3	0	3
Exotic plant cover	3	0	3
Number of trees with hollows	0	0	0
Over-storey regeneration	0	0	0
Total length of fallen logs	0	0	0
Site Value	55	14	29

Vegetation Zone: 10

Vegetation Type: Speargrass grassland of the South Eastern Highlands

Condition: M/G Ancillary Code: Heavily Grazed

Site Attribute	Current Score	Score for Permanent Loss Areas	Score for Temporary Loss Areas
Native plant species richness	2	0	1
Native over-storey cover	3	3	3
Native mid-storey cover	0	0	0
Native ground cover (grasses)	3	0	1
Native ground cover (shrubs)	3	3	3
Native ground cover (other)	1	0	1
Exotic plant cover	3	0	1
Number of trees with hollows	0	0	0
Over-storey regeneration	0	0	0
Total length of fallen logs	0	0	0
Site Value	53	14	29

Appendix 4: 12m Credit Report



Biobanking Credit Report

This report identifies the number and type of credits required at a DEVELOPMENT SITE.

Date of report: 29/09/2009 Time: 17:29 Tool Version: 1.1

Development Details

Proposal ID: 0032/2008/D001
Development Name: Boco Rock Wind Farm- 12m Road Layout
Development Location: Run 28/09/2009
Development Address:

CMA: Southern Rivers
Proponent Name: Wind Prospect Group
Proponent Address: PO Box 1708 Newcastle NSW 2300
Proponent Phone:
Assessor Name: Darren James
Assessor Address: PO Box 12 Sutherland NSW 1499
Assessor Phone: 02 8536 8618
Assessor Accreditation Number: 0032

The following information is required to be submitted with this BioBanking Statement (where ticked)

☐ Local reference data is required for the following vegetation zones

☐ An Expert Report for the following species

☒ The minimum number of plots were not entered for the following vegetation zones

Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands

Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands

Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands

Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands



Improving or maintaining biodiversity values

An application for a red flag determination is required for the following red flag areas:

Red Flag	Reason
Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands	Vegetation type contains an endangered ecological community;
Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands	Vegetation type being > 70% cleared;
River Tussock - Tall Sedge - Kangaroo Grass moist grasslands of the South Eastern Highlands	Vegetation type being > 70% cleared; Vegetation type contains an endangered ecological community;
Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands	Vegetation type being > 70% cleared;
Speargrass grassland of the South Eastern Highlands	Vegetation type contains an endangered ecological community;

The application for a red flag determination should address the criteria set out in section 2.3 of the BioBanking Assessment Methodology. A BioBanking Statement cannot be issued unless the determination is approved.



Ecosystem Credits

Vegetation Type	Area (ha)	Credits Required	Red Flag
Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands [SR562]	2.4	24	Yes
Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands [SR562]	9.4	254	Yes
Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands [SR603]	27.8	865	Yes
Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands [SR603]	46.3	1,644	Yes
Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands [SR603]	5.2	123	Yes
Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands [SR603]	17.4	198	No
River Tussock - Tall Sedge - Kangaroo Grass moist grasslands of the South Eastern Highlands [SR610]	1.6	20	Yes
Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands [SR637]	2.7	86	Yes
Speargrass grassland of the South Eastern Highlands [SR639]	59.8	1,691	Yes
Speargrass grassland of the South Eastern Highlands [SR639]	4.4	86	Yes

Credit Profiles

Group: 1 Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands

Ecosystem credits: 24 credits

Total area of vegetation(s): 2.4 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
<p>Description: Minimum surrounding vegetation cover in which the credits must be obtained.</p> <p>Minimum percent cover: 10%</p>	<p>Description: Minimum area of contiguous vegetation in which credits must be obtained.</p> <p>Minimum area: 5 ha</p>



3. CMA subregion & vegetation types

Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Lachlan**CMA Sub-Region(s)**

Crookwell

Veg Type(s)

Kangaroo Grass - Redleg Grass - Speargrass dry grasslands of the South Eastern Highlands (LA155)

Murrumbidgee**CMA Sub-Region(s)**

Monaro

Murrumbateman

Veg Type(s)

Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands (MR569)

Snow Grass - Acaena ovina grassland on undulating basalt plateaux, South Eastern Highlands (MR626)

Speargrass grassland of the South Eastern Highlands (MR631)

Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands (MR638)

Southern Rivers**CMA Sub-Region(s)**

Bungonia

Monaro (Part A)

Monaro (Part B)

Monaro (Part C)

Veg Type(s)

Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands (SR562)

Snow Grass - Acaena ovina grassland on undulating basalt plateaux, South Eastern Highlands (SR636)

Speargrass grassland of the South Eastern Highlands (SR639)

Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands (SR659)

Group: 2 Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands**Ecosystem credits: 254 credits**

Total area of vegetation(s): 9.4 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. Minimum percent cover: 10%	Description: Minimum area of contiguous vegetation in which credits must be obtained. Minimum area: 5 ha

3. CMA subregion & vegetation types

Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Lachlan**CMA Sub-Region(s)**

Crookwell

Veg Type(s)

Kangaroo Grass - Redleg Grass - Speargrass dry grasslands of the South Eastern Highlands (LA155)



Murrumbidgee**CMA Sub-Region(s)**

Monaro

Murrumbateman

Veg Type(s)

Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands (MR569)

Snow Grass - Acaena ovina grassland on undulating basalt plateaux, South Eastern Highlands (MR626)

Speargrass grassland of the South Eastern Highlands (MR631)

Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands (MR638)

Southern Rivers**CMA Sub-Region(s)**

Bungonia

Monaro (Part A)

Monaro (Part B)

Monaro (Part C)

Veg Type(s)

Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands (SR562)

Snow Grass - Acaena ovina grassland on undulating basalt plateaux, South Eastern Highlands (SR636)

Speargrass grassland of the South Eastern Highlands (SR639)

Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands (SR659)

Group: 3 Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands

Ecosystem credits: 865 credits

Total area of vegetation(s): 27.8 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. Minimum percent cover: 30%	Description: Minimum area of contiguous vegetation in which credits must be obtained. Minimum area: 100 ha

3. CMA subregion & vegetation types

Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Central West**CMA Sub-Region(s)**

Bathurst

Capertee

Hill End

Oberon

Wollemi

Veg Type(s)

Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands (CW102)

Southern Rivers**CMA Sub-Region(s)**

Monaro (Part C)

Veg Type(s)

Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands (SR603)



Group: 4 Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands

Ecosystem credits: 1,644 credits

Total area of vegetation(s): 46.3 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. Minimum percent cover: 30%	Description: Minimum area of contiguous vegetation in which credits must be obtained. Minimum area: 100 ha

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Central West

CMA Sub-Region(s)

Bathurst

Capertee

Hill End

Oberon

Wollemi

Veg Type(s)

Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands (CW102)

Southern Rivers

CMA Sub-Region(s)

Monaro (Part C)

Veg Type(s)

Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands (SR603)

Group: 5 Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands

Ecosystem credits: 123 credits

Total area of vegetation(s): 5.2 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. Minimum percent cover: 30%	Description: Minimum area of contiguous vegetation in which credits must be obtained. Minimum area: 100 ha



3. CMA subregion & vegetation types

Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Central West**CMA Sub-Region(s)**

Bathurst
Capertee
Hill End
Oberon
Wollemi

Veg Type(s)

Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands (CW102)

Southern Rivers**CMA Sub-Region(s)**

Monaro (Part C)

Veg Type(s)

Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands (SR603)

Group: 6 Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands

Ecosystem credits: 198 credits

Total area of vegetation(s): 17.4 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
<p>Description: Minimum surrounding vegetation cover in which the credits must be obtained.</p> <p>Minimum percent cover: 30%</p>	<p>Description: Minimum area of contiguous vegetation in which credits must be obtained.</p> <p>Minimum area: 100 ha</p>

3. CMA subregion & vegetation types

Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Central West**CMA Sub-Region(s)**

Bathurst
Capertee
Hill End
Oberon
Wollemi

Veg Type(s)

Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands (CW102)

Southern Rivers**CMA Sub-Region(s)**

Monaro (Part C)

Veg Type(s)

Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands (SR603)



Group: 7 River Tussock - Tall Sedge - Kangaroo Grass moist grasslands of the South Eastern Highlands

Ecosystem credits: 20 credits

Total area of polygon(s): 1.6 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
<p>Description: Minimum surrounding vegetation cover in which the credits must be obtained.</p> <p>Minimum percent cover: 0%</p>	<p>Description: Minimum area of contiguous vegetation in which credits must be obtained.</p> <p>Minimum area: 0 ha</p>
3. CMA subregion & vegetation types	
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:	

Southern Rivers

CMA Sub-Region(s)

Bateman
 Bungonia
 Burragorang
 East Gippsland Lowlands (Part A)
 East Gippsland Lowlands (Part B)
 East Gippsland Lowlands (Part C)
 Ettrema
 Illawarra
 Jervis
 Kybayan - Gourock (Part A)
 Kybayan - Gourock (Part B)
 Monaro (Part A)
 Monaro (Part B)
 Monaro (Part C)
 Moss Vale
 New South Wales Alps
 South East Coastal Plains
 South East Coastal Ranges (Part A)
 South East Coastal Ranges (Part B)
 South East Coastal Ranges (Part C)
 Southern Rivers - marine zone

Veg Type(s)

River Tussock - Tall Sedge - Kangaroo Grass moist grasslands of the South Eastern Highlands (SR610)
 Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands (SR659)

Group: 8 Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands

Ecosystem credits: 86 credits

Total area of vegetation(s): 2.7 ha



Southern Rivers**CMA Sub-Region(s)**

Bungonia

Monaro (Part A)

Monaro (Part B)

Monaro (Part C)

Veg Type(s)

Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands (SR562)

Snow Grass - Acaena ovina grassland on undulating basalt plateaux, South Eastern Highlands (SR636)

Speargrass grassland of the South Eastern Highlands (SR639)

Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands (SR659)

Group: 10 Speargrass grassland of the South Eastern Highlands**Ecosystem credits: 86 credits**

Total area of vegetation(s): 4.4 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. Minimum percent cover: 10%	Description: Minimum area of contiguous vegetation in which credits must be obtained. Minimum area: 5 ha

3. CMA subregion & vegetation types

Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Lachlan**CMA Sub-Region(s)**

Crookwell

Veg Type(s)

Kangaroo Grass - Redleg Grass - Speargrass dry grasslands of the South Eastern Highlands (LA155)

Murrumbidgee**CMA Sub-Region(s)**

Monaro

Murrumbateman

Veg Type(s)

Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands (MR569)

Snow Grass - Acaena ovina grassland on undulating basalt plateaux, South Eastern Highlands (MR626)

Speargrass grassland of the South Eastern Highlands (MR631)

Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands (MR638)

Southern Rivers**CMA Sub-Region(s)**

Bungonia

Monaro (Part A)

Monaro (Part B)

Monaro (Part C)

Veg Type(s)

Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands (SR562)

Snow Grass - Acaena ovina grassland on undulating basalt plateaux, South Eastern Highlands (SR636)

Speargrass grassland of the South Eastern Highlands (SR639)

Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands (SR659)

Species Credits

Species credits are required for 1 species.

Grassland Earless Dragon	<i>Tympanocryptis pinguicolla</i>
Number of species credits required:	1,396
Extent of impact:	104.7 ha
Identification method:	Survey
Impact on red flag area?	No
Reason for red flag area:	



Appendix 5: 6m Credit Report



Biobanking Credit Report

This report identifies the number and type of credits required at a DEVELOPMENT SITE.

Date of report: 29/09/2009 Time: 17:38 Tool Version: 1.1

Development Details

Proposal ID: 0032/2008/D002
Development Name: Boco Rock Wind Farm- 6m Road Layout
Development Location: Run 28/09/2009
Development Address:

CMA: Southern Rivers
Proponent Name: Wind Prospect Group
Proponent Address: PO Box 1708 Newcastle NSW 2300
Proponent Phone:
Assessor Name: Darren James
Assessor Address: PO Box 12 Sutherland NSW 1499
Assessor Phone: 02 8536 8618
Assessor Accreditation Number: 0032

The following information is required to be submitted with this BioBanking Statement (where ticked)

- ☐ Local reference data is required for the following vegetation zones
- ☐ An Expert Report for the following species
- ☒ The minimum number of plots were not entered for the following vegetation zones
- Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands
 - Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands
 - Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands
 - Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands



Improving or maintaining biodiversity values

An application for a red flag determination is required for the following red flag areas:

Red Flag	Reason
Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands	Vegetation type contains an endangered ecological community;
Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands	Vegetation type being > 70% cleared;
River Tussock - Tall Sedge - Kangaroo Grass moist grasslands of the South Eastern Highlands	Vegetation type being > 70% cleared; Vegetation type contains an endangered ecological community;
Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands	Vegetation type being > 70% cleared;
Speargrass grassland of the South Eastern Highlands	Vegetation type contains an endangered ecological community;

The application for a red flag determination should address the criteria set out in section 2.3 of the BioBanking Assessment Methodology. A BioBanking Statement cannot be issued unless the determination is approved.



Ecosystem Credits

Vegetation Type	Area (ha)	Credits Required	Red Flag
Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands [SR562]	2.2	20	Yes
Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands [SR562]	6.8	176	Yes
Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands [SR603]	22.7	679	Yes
Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands [SR603]	38.4	1,314	Yes
Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands [SR603]	4.3	99	Yes
Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands [SR603]	14.6	159	No
River Tussock - Tall Sedge - Kangaroo Grass moist grasslands of the South Eastern Highlands [SR610]	1.2	15	Yes
Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands [SR637]	2.1	64	Yes
Speargrass grassland of the South Eastern Highlands [SR639]	48.0	1,306	Yes
Speargrass grassland of the South Eastern Highlands [SR639]	3.6	66	Yes

Credit Profiles

Group: 1 Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands

Ecosystem credits: 20 credits

Total area of vegetation(s): 2.2 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
<p>Description: Minimum surrounding vegetation cover in which the credits must be obtained.</p> <p>Minimum percent cover: 10%</p>	<p>Description: Minimum area of contiguous vegetation in which credits must be obtained.</p> <p>Minimum area: 5 ha</p>



3. CMA subregion & vegetation types

Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Lachlan**CMA Sub-Region(s)**

Crookwell

Veg Type(s)

Kangaroo Grass - Redleg Grass - Speargrass dry grasslands of the South Eastern Highlands (LA155)

Murrumbidgee**CMA Sub-Region(s)**

Monaro

Murrumbateman

Veg Type(s)

Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands (MR569)

Snow Grass - Acaena ovina grassland on undulating basalt plateaux, South Eastern Highlands (MR626)

Speargrass grassland of the South Eastern Highlands (MR631)

Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands (MR638)

Southern Rivers**CMA Sub-Region(s)**

Bungonia

Monaro (Part A)

Monaro (Part B)

Monaro (Part C)

Veg Type(s)

Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands (SR562)

Snow Grass - Acaena ovina grassland on undulating basalt plateaux, South Eastern Highlands (SR636)

Speargrass grassland of the South Eastern Highlands (SR639)

Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands (SR659)

Group: 2 Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands**Ecosystem credits: 176 credits**

Total area of vegetation(s): 6.8 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. Minimum percent cover: 10%	Description: Minimum area of contiguous vegetation in which credits must be obtained. Minimum area: 5 ha

3. CMA subregion & vegetation types

Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Lachlan**CMA Sub-Region(s)**

Crookwell

Veg Type(s)

Kangaroo Grass - Redleg Grass - Speargrass dry grasslands of the South Eastern Highlands (LA155)



Murrumbidgee**CMA Sub-Region(s)**

Monaro

Murrumbateman

Veg Type(s)

Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands (MR569)

Snow Grass - Acaena ovina grassland on undulating basalt plateaux, South Eastern Highlands (MR626)

Speargrass grassland of the South Eastern Highlands (MR631)

Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands (MR638)

Southern Rivers**CMA Sub-Region(s)**

Bungonia

Monaro (Part A)

Monaro (Part B)

Monaro (Part C)

Veg Type(s)

Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands (SR562)

Snow Grass - Acaena ovina grassland on undulating basalt plateaux, South Eastern Highlands (SR636)

Speargrass grassland of the South Eastern Highlands (SR639)

Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands (SR659)

Group: 3 Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands

Ecosystem credits: 679 credits

Total area of vegetation(s): 22.7 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. Minimum percent cover: 30%	Description: Minimum area of contiguous vegetation in which credits must be obtained. Minimum area: 100 ha

3. CMA subregion & vegetation types

Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Central West**CMA Sub-Region(s)**

Bathurst

Capertee

Hill End

Oberon

Wollemi

Veg Type(s)

Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands (CW102)

Southern Rivers**CMA Sub-Region(s)**

Monaro (Part C)

Veg Type(s)

Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands (SR603)



Group: 4 Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands

Ecosystem credits: 1,314 credits

Total area of vegetation(s): 38.4 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. Minimum percent cover: 30%	Description: Minimum area of contiguous vegetation in which credits must be obtained. Minimum area: 100 ha

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Central West

CMA Sub-Region(s)

Bathurst
Capertee
Hill End
Oberon
Wollemi

Veg Type(s)

Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands (CW102)

Southern Rivers

CMA Sub-Region(s)

Monaro (Part C)

Veg Type(s)

Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands (SR603)

Group: 5 Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands

Ecosystem credits: 99 credits

Total area of vegetation(s): 4.3 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. Minimum percent cover: 30%	Description: Minimum area of contiguous vegetation in which credits must be obtained. Minimum area: 100 ha



3. CMA subregion & vegetation types

Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Central West**CMA Sub-Region(s)**

Bathurst

Capertee

Hill End

Oberon

Wollemi

Veg Type(s)

Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands (CW102)

Southern Rivers**CMA Sub-Region(s)**

Monaro (Part C)

Veg Type(s)

Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands (SR603)

Group: 6 Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands**Ecosystem credits: 159 credits**

Total area of vegetation(s): 14.6 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. Minimum percent cover: 30%	Description: Minimum area of contiguous vegetation in which credits must be obtained. Minimum area: 100 ha

3. CMA subregion & vegetation types

Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Central West**CMA Sub-Region(s)**

Bathurst

Capertee

Hill End

Oberon

Wollemi

Veg Type(s)

Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands (CW102)

Southern Rivers**CMA Sub-Region(s)**

Monaro (Part C)

Veg Type(s)

Ribbon Gum - Snow Gum grassy open forest on flats and undulating hills of the eastern tableland, South Eastern Highlands (SR603)



Group: 7 River Tussock - Tall Sedge - Kangaroo Grass moist grasslands of the South Eastern Highlands

Ecosystem credits: 15 credits

Total area of polygon(s): 1.2 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. Minimum percent cover: 0%	Description: Minimum area of contiguous vegetation in which credits must be obtained. Minimum area: 0 ha

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Southern Rivers

CMA Sub-Region(s)

Bateman
Bungonia
Burraborang
East Gippsland Lowlands (Part A)
East Gippsland Lowlands (Part B)
East Gippsland Lowlands (Part C)
Ettrema
Illawarra
Jervis
Kybayan - Gourock (Part A)
Kybayan - Gourock (Part B)
Monaro (Part A)
Monaro (Part B)
Monaro (Part C)
Moss Vale
New South Wales Alps
South East Coastal Plains
South East Coastal Ranges (Part A)
South East Coastal Ranges (Part B)
South East Coastal Ranges (Part C)
Southern Rivers - marine zone

Veg Type(s)

River Tussock - Tall Sedge - Kangaroo Grass moist grasslands of the South Eastern Highlands (SR610)
Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands (SR659)

Group: 8 Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands

Ecosystem credits: 64 credits

Total area of vegetation(s): 2.1 ha



1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. Minimum percent cover: 30%	Description: Minimum area of contiguous vegetation in which credits must be obtained. Minimum area: 100 ha

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Southern Rivers**CMA Sub-Region(s)**

Bungonia

Monaro (Part A)

Monaro (Part C)

Veg Type(s)

Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands (SR637)

Group: 9 Speargrass grassland of the South Eastern Highlands**Ecosystem credits: 1,306 credits**

Total area of vegetation(s): 48 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. Minimum percent cover: 10%	Description: Minimum area of contiguous vegetation in which credits must be obtained. Minimum area: 5 ha

3. CMA subregion & vegetation types
Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Lachlan**CMA Sub-Region(s)**

Crookwell

Veg Type(s)

Kangaroo Grass - Redleg Grass - Speargrass dry grasslands of the South Eastern Highlands (LA155)

Murrumbidgee**CMA Sub-Region(s)**

Monaro

Murrumbateman

Veg Type(s)

Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands (MR569)

Snow Grass - Acaena ovina grassland on undulating basalt plateaux, South Eastern Highlands (MR626)

Speargrass grassland of the South Eastern Highlands (MR631)

Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands (MR638)



Southern Rivers**CMA Sub-Region(s)**

Bungonia

Monaro (Part A)

Monaro (Part B)

Monaro (Part C)

Veg Type(s)

Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands (SR562)

Snow Grass - Acaena ovina grassland on undulating basalt plateaux, South Eastern Highlands (SR636)

Speargrass grassland of the South Eastern Highlands (SR639)

Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands (SR659)

Group: 10 Speargrass grassland of the South Eastern Highlands**Ecosystem credits: 66 credits**

Total area of vegetation(s): 3.6 ha

1. Surrounding vegetation cover	2. Patch size, including low condition
Description: Minimum surrounding vegetation cover in which the credits must be obtained. Minimum percent cover: 10%	Description: Minimum area of contiguous vegetation in which credits must be obtained. Minimum area: 5 ha

3. CMA subregion & vegetation types

Credits must be obtained in any one or more of the following CMA Sub-regions and vegetation types:

Lachlan**CMA Sub-Region(s)**

Crookwell

Veg Type(s)

Kangaroo Grass - Redleg Grass - Speargrass dry grasslands of the South Eastern Highlands (LA155)

Murrumbidgee**CMA Sub-Region(s)**

Monaro

Murrumbateman

Veg Type(s)

Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands (MR569)

Snow Grass - Acaena ovina grassland on undulating basalt plateaux, South Eastern Highlands (MR626)

Speargrass grassland of the South Eastern Highlands (MR631)

Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands (MR638)

Southern Rivers**CMA Sub-Region(s)**

Bungonia

Monaro (Part A)

Monaro (Part B)

Monaro (Part C)

Veg Type(s)

Kangaroo Grass - Snowgrass tussock grassland on slopes and ridges of the tablelands, South Eastern Highlands (SR562)

Snow Grass - Acaena ovina grassland on undulating basalt plateaux, South Eastern Highlands (SR636)

Speargrass grassland of the South Eastern Highlands (SR639)

Wallaby Grass - Redleg Grass low grassland of the South Eastern Highlands (SR659)

Species Credits

Species credits are required for 1 species.

Grassland Earless Dragon	<i>Tympanocryptis pinguicolla</i>
Number of species credits required:	1,115
Extent of impact:	83.6 ha
Identification method:	Survey
Impact on red flag area?	No
Reason for red flag area:	



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Appendix N – Threatened Species Relocation Strategy

This Draft Threatened Species Relocation Strategy has been designed in consultation with Grassland Earless Dragon National Recovery Team member Dr Will Osborne from the University of Canberra. Whilst it is inevitable that some Grassland Earless Dragons are likely to be lost as a consequence of the proposal due to the cryptic nature of the species making them difficult to detect, the methods outlined in this strategy have been designed to increase the likelihood that individuals would be detected prior to construction should they be present within the proposed construction area. A focus on the long-term protection of the population and not only individuals has been maintained for the proposal as some loss is inevitable.

Given the uncertainty surrounding the likely success of relocating of the Grassland Earless Dragon due to the absence of past studies, the provision of a large and long-term viable offset site supporting the Grassland Earless Dragon is imperative for this project. However, the proposed strategy has been designed to increase the likelihood that relocated dragons would survive and relocation monitoring studies are recommended to assess the success of the relocations. Details of a likely monitoring program are also outlined below.

Details of the proposed pre-construction surveys have been included below as they form part of the overall relocation methodology as they will be used to detect the individuals that will require.

This document is a working draft and will be finalised in consultation with DECC following project approval.

Pre-construction Surveys

Pre-construction fencing

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 should be partially fenced off with smooth plastic fencing to deter individuals from nearby grassland moving back into the area. Fencing will be placed around the construction area in stages in accordance with the development schedule.

Pre-construction surveys for Grassland Earless Dragon

To minimise the likelihood of direct loss of Grassland Earless Dragon individuals, pre-clearance surveys for the species will occur within the construction area boundaries where located within known or high potential Grassland Earless Dragon habitat. These surveys will occur within three weeks of the proposed construction activities commencing.

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 Dragons 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). No surveys are proposed during sensitive lifecycle stages (November to early January). During the period between May and October only, rock rolling, tussock searches and endoscopes will be used to search for Grassland Earless Dragons. Any individuals detected will be relocated to areas immediately outside the construction area.

Pitfall traps

Pitfall traps would be made from the outer case of the artificial spider tubes normally used for surveying for the Grassland Earless Dragon. The end will be stopped to prevent individuals digging out. The removal of the inner tube will mean that individuals will not be able to escape from the tubes once they enter. Pitfall traps will be installed in all areas of potential and known habitat during the three week period leading up to construction of an area. Pitfall trapping will be undertaken in sections throughout the cluster being developed to ensure that pre-clearance surveys and relocations take place in the three weeks immediately prior to construction of each area. It is estimated that an area of approximately 1 km – 2km will be surveyed at a time ahead of the construction schedule.

Pitfall traps will be placed at 10 m intervals along a transect approximately following the centre of the proposed road alignment. Where a transect intersects a turbine location, three lines of tubes will be run perpendicular to the transect to cover the area of the proposed turbine footprint. Pitfall traps will be checked daily for three weeks and any individuals trapped will be relocated and monitored in accordance with the methods outlined below in point 5.

Installation of pitfall traps in all areas of potential and known habitat is proposed initially. However, if no specimens are caught in areas of high potential habitat after six consecutive lines (approximately 6 km), 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.

Rock rolling, tussock searches and endoscope

Systematic searches of tussocks, rolling of all rocks with a diameter greater than 20 cm and the use of an endoscope to search spider burrows for the Grassland Earless Dragon will be undertaken across the construction area in the three week period leading up to construction for those areas to be constructed between May and the end of October. Any individuals caught during this period will be relocated in accordance with the methods outlined below.

Relocation

Relocation of Grassland Earless Dragon to adjacent areas

In the event that a Grassland Earless Dragon is recorded during the construction phase, relocation is proposed. In the absence of literature and research specifically investigating relocation of Grassland Earless Dragons, a detailed approach to movement of the species has been prepared by Dr. Will Osborne in consultation with Associate Professor Stephen Sarre, Dr David Hunter and Peter Robertson - three members of the National Grassland Earless Dragon Recovery Team.

Measures to be implemented as part of the relocation strategy are outlined below and further detail provided in the attached supporting statement from Dr Will Osborne:

- Grassland Earless Dragon will be moved to adjacent areas (i.e. outside construction boundaries) within 150 m to 200 m of the construction area;
- Relocation sites will support habitat similar to that of where the individual was caught or if this is not possible, within an area currently mapped as potential habitat. Given habitat features for the Grassland Earless Dragon are similar across much of the site, it is likely that all individuals would be able to be relocated into areas of similar habitat.
- Individuals caught in pitfall traps will be left in the pitfall traps and moved immediately to the relocation site and placed within one of the three proposed artificial burrows to be installed for each relocated individual. A replacement pitfall will be installed at the pre-clearance survey site.
- If individuals are caught during winter, they will be placed in a cloth bag and transported immediately to the release site. They will then be placed in one of the artificial burrows. Individuals in torpor should be warmed slightly to assist in getting them to enter the burrow and a flat stone placed over the burrow for protection.
- Individuals found active during the warmer months of the year should be placed in cloth bags and immediately transported to the release site where they will be released into a grass sward.
- A selection of relocated individuals will be monitored using radio-tracking.

Clusters of individuals

Whilst Dr. Will Osborne is of the opinion that it would be unlikely that large numbers of dragon would be found in one location, in areas where a group of individuals are recorded the same approach as that used for individuals would be used. However, a greater density of artificial burrows will be established (1000 burrows within a 150 m zone).

Monitoring using radio-tracking will accompany relocations to provide information to inform future Grassland Earless Dragon relocations. Whilst it is recognised that the period between relocations of Grassland Earless Dragons on one cluster may not provide comprehensive feedback for implementation on other clusters, it may provide some information that will enable relocations to be undertaken more effectively elsewhere throughout the site. In addition the information collected for this project can be used to inform management options and the likely success of relocations for other projects in areas where the Grassland Earless Dragon is present.

Appendix O – EPBC Natural Temperate Grassland Impact Assessment

A formal assessment of impacts from the proposal, in accordance with the Part 3A impact assessment criteria, has been undertaken for those threatened species and endangered ecological communities known or considered to have the potential to occur within the study area and that are listed under both the TSC and EPBC Act. These are included in Chapter 5 and Appendix L. However, given NTG is not listed as an endangered ecological community under the NSW TSC Act, this community has not been captured in these detailed impact assessments. Therefore in order to meet the supplementary DGRs relating to Matters of NES, an assessment of potential impacts of the proposal on NTG, in accordance with the DGRs, has been included below.

NATURAL TEMPERATE GRASSLAND

Impacts of the action on Matters of NES

The proposal involves the permanent removal of up to 43 ha of NTG. Only a relatively small proportion of the NTG present within the project site is impacted by the proposal (1.8 %).

In NSW, at least 7000 ha in moderate to good condition NTG is known to exist on publicly owned land and an additional similar amount is thought to exist on private land (Environment ACT 2005). Therefore assuming approximately 14,000 ha of moderate to good condition NTG remains and that the proposal is impacting on areas of moderate to good NTG, the proposal would result in the removal of 0.3% of the total remaining NTG in NSW.

An additional area of temporary clearance for roads and reticulation is also proposed. At this stage the road layout has not been finalised and impacts will vary depending on whether the 6m or 12 m road option is selected. Temporary clearance areas for NTG for each layout and road option are outlined below in Table 50. Although some revegetation of these areas is proposed, it is acknowledged that it would be difficult to revegetate these areas to back to their natural state. Nevertheless, as recommended by the SRCMA, revegetation using an aggressive native grass species such as *Austrostipa* spp. will be undertaken and weed invasion managed for a period of 3 years to prevent disturbed areas from becoming invaded by exotic species. Furthermore, this management period will greatly assist the potential for native species to naturally recolonise the previous disturbed area.

Revegetation of disturbed area will be timed to maximise success. Average rainfall is steady throughout the year with a slightly higher average number of rain days in spring. With spring being the typical growth period of many flora, revegetation is likely to be undertaken at this time. The CEMP will include provide Key Performance Indicators to measure the success of the revegetation process and adaptive responses will be applied relative to the observed success. Further details about revegetation techniques and considerations regarding timing will be provided in a CEMP.

Table 50: NTG Removal

Vegetation community	Condition	Estimated impact area – 107 layout		Estimated impact area – 125 layout		
		Permanent (ha)	Temporary (ha)	Permanent (ha)	Temporary (ha)	
12 m Road Layout						
Natural Temperate Grassland	Moderate to good	41.65	28.76	43.00	29.66	
6 m Road Layout						
Natural Temperate Grassland	Moderate to good	26.33	28.48	27.01	30.15	

A detailed assessment of the nature and extent of the likely short term and long term relevant impacts

Short term impacts from the proposal include:

- Temporary removal of areas of NTG and hence habitat for the proposed roads and reticulation installation
- Temporary increase in surface water due to dust suppression and other management measures during construction works
- Soil disturbance

Potential long term impacts of the proposal on NTG include:

- Permanent removal of up to 43 ha (1.8 % of the NTG within the project site) of NTG and hence potential habitat for threatened species associated with NTG
- Increased weed invasion / edge effects and hence decrease in integrity of adjacent grassland areas if management measures are not implemented
- A 0.3 % reduction in the amount of NTG present throughout NSW
- Minor NTG fragmentation due to the road although this is considered unlikely to fragment areas to such an extent that seed dispersal mechanisms and fauna related movements would be impeded

Further detail regarding these impacts has been included in Chapter 5. A number of mitigation measures to minimise and where possible prevent impacts from the proposal on NTG have also been included. Offsets have been proposed for those impacts that cannot be impacted (eg. permanent NTG clearance) and include the protection and enhancement of large areas of NTG on the Monaro that would otherwise have the potential to be subject to intensive agricultural practices and in some cases legal clearance over time.

A statement whether any relevant impacts are likely to be unknown, unpredictable or irreversible

Irreversible impacts from the proposal include the removal of NTG for roads and turbines locations.

The likely success of the proposed revegetation is unknown as revegetation success of grasslands on the Monaro in the past has often been poor. Although an attempt will be made to at least revegetate temporary disturbance areas to such an extent that weed invasion and soil erosion will be minimised, the decreased condition of the revegetated areas of NTG has been taken into consideration in the proposed offset calculations.

Analysis of the significance of the relevant impacts

The proposal will result in the permanent removal of up to 43 ha of NTG and the temporary removal of up to 30.15 ha. However, this constitutes a relatively small proportion (3 %) of the NTG which covers an extensive area across the project site (2385.41 ha).

The proposed vegetation removal is comprised of linear strips (for turbines, access tracks and the associated ancillary structures required for the running of the wind farm) rather than one large consolidated stand and therefore significant fragmentation is unlikely. Furthermore the area of vegetation to be cleared is contiguous with other areas of NTG in a similar condition and therefore the proposal is unlikely to substantially reduce the amount of NTG present within the project site.

Furthermore, control measures will be implemented to ensure that indirect impacts are minimised and offsets will be provided for permanent impacts on NTG that cannot be mitigated.

Any technical data and other information used or needed to make a detailed assessment of relevant impacts

Areas of Natural Temperate Grassland (NTG) were determined using the Rehwinkel (2007) method as outlined in *A Method to Assess Grassy Ecosystem Sites: Using floristic information to assess a site's quality* (a detailed description of the Rehwinkel methods and steps of classifying NTG can be viewed in Appendix E). This method has been widely used throughout the Monaro and provides a method by which a sites floristic value can be determined and hence provide an indication as to whether the site is likely to meet the criteria for listing as NTG under the EPBC Act.

In addition to the identification of vegetation as NTG, we have classified the relative condition of NTG into condition classes (Figure 6). A NTG grassland community classified as low condition has the characteristics mentioned below. If native vegetation is not in low condition, it is in moderate to good condition.

A description of the relevant impacts on NTG should include direct, indirect, cumulative and facilitative impacts on the:

a) 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 species in the ecological community)

The proposal has the potential to result in a number of impacts on NTG. However, impacts have been avoided and will be mitigated wherever possible and for those impacts that cannot be mitigated, offsets will be provided. Potential impacts include:

- Permanent removal of up to 43 ha (1.8 % of the NTG within the project site) of NTG and hence potential habitat for threatened species associated with NTG
- Temporary removal of areas of NTG and hence habitat for the proposed roads and reticulation installation
- Soil disturbance
- A 0.3 % reduction in the amount of NTG present throughout NSW
- Minor NTG fragmentation due to the road although this is considered unlikely to fragment an areas to such an extent that dispersal mechanisms would be impeded
- Increased weed invasion / edge effects and hence decrease in integrity of adjacent grassland areas if management measures are not implemented
- Temporary increase in surface water due to dust suppression and other management measures during construction works

Additional clearance of NTG will be required for the construction of the powerline to connect the wind farm to the power grid. However, this is addressed in a separate assessment. Impacts on NTG for the powerline are not expected to be extensive and are primarily comprised of small clearance areas where the power poles are erected.

No other facilitated actions are expected as a consequence of building the wind farm.

b) Extent of the NTG, including connectivity with other areas of NTG

The proposed vegetation removal is comprised of linear strips (for turbines, access tracks and the associated ancillary structures required for the running of the wind farm) rather than one large consolidated stand and therefore significant fragmentation is unlikely. The clearance for the roads and reticulation are unlikely to inhibit natural dispersal mechanisms. Furthermore the vegetation to be cleared is contiguous with other areas of NTG much of which is in a similar condition (Figure 6) and therefore the proposal is unlikely to substantially reduce the amount of NTG present within the project site.

c) The Grassland Earless Dragon at, in or in any way dependant upon, the NTG

Grassland Earless Dragon

Potential and known habitat for the Grassland Earless Dragon 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 adjacent to NTG on Sherwins. The proposal will remove up to 5.64 ha of known habitat (3.60 ha of temporary and 2.04 ha of permanent) and 67.43 ha of potential habitat for this species (39.92 ha of temporary and 27.51 ha of permanent) a large proportion of which is comprised of NTG. The proposed layout has been modified to avoid impacts on the cluster of dragons and high quality NTG recorded in the west of the Sherwins cluster through the removal of two turbines (93a/81b, 92a/80b) previously located in known dragon habitat.

Although the proposal involves the clearance of potential habitat for this species in the form of NTG, 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 throughout areas of NTG 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
- this species is likely to travel across the current and future tracks throughout the study area to disperse to adjacent areas (Dr Will Osborne, UC, 2009, pers comm.).

Striped Legless Lizard

Potential habitat for this species is also present within areas of NTG and derived grassland. Although this species is known to 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.

d) Composition of the NTG

Revegetation of the proposed temporary clearance areas for NTG is proposed. However, revegetation of these areas back to their natural state is likely to be difficult and past revegetation attempts across the Monaro have had poor success (Allison Treweek, DECCW, pers comm. 2009). Therefore, it is likely that the composition of these areas of NTG (up to 29.66 ha) would be altered as a consequence of the proposal. In order to prevent these areas becoming invaded by exotic species and hence adjacent areas of NTG, a combination of revegetation with an aggressive native grass species such as *Austrostipa* spp. and the implementation of a stringent weed management plan for a period of 3 years is proposed.

Revegetation of disturbed area will be timed to maximise success. Average rainfall is steady throughout the year with a slightly higher average number of rain days in spring. With spring being the typical growth period of many flora, revegetation is likely to be undertaken at this time. The CEMP will include provide Key Performance Indicators to measure the success of the revegetation process and adaptive responses will be applied relative to the observed success. Further details about revegetation techniques and considerations regarding timing will be provided in a CEMP.

This approach will assist the potential for native species to naturally recolonise the previous disturbed area and increase the likelihood that the disturbed areas would become more similar over time to their pre-disturbed state.

The implementation of a variety of mitigation measures to prevent potential indirect impacts of the proposal on NTG such as soil disturbance, runoff and weed management, will assist in the prevention of changes in species composition in adjacent areas of NTG. Furthermore, construction areas will be clearly marked to prevent construction works breaching the boundaries and impacting on adjacent areas of NTG.

e) Habitat present on site critical to the survival of the NTG

NTG is extensively distributed across the western part of the site (approximately 2385.41 ha). Although the proposal will result in the removal and disturbance of up to 72.66 ha of NTG, this represents a small proportion of the total NTG within the project site (3 %). In addition, management measures will be implemented to prevent indirect impact from the proposal on NTG. Given the amount of NTG present within the project site relative to the proposed impacts and that large areas of NTG are also present outside the project site, it is considered unlikely that the NTG removed for the proposal would threaten the survival of NTG on the Monaro. Furthermore, the protection and management of up to 500 ha of NTG as part of the proposed offsets would contribute to the conservation of a large area of NTG that would otherwise be subject to unregulated grazing regimes and potentially legal clearance in parts over time.

f) 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

The proposal will result in a short-term increase in surface water during construction. Water will be sprayed for dust suppression during the construction phase. However, this increase in runoff will be temporary and therefore is unlikely to have detrimental impacts on the NTG. Furthermore, mitigation measures will be implemented during construction to control runoff and erosion from the proposal thereby preventing impacts on the adjacent NTG.

Changes to groundwater levels are not anticipated as a consequence of the proposal and the management of runoff will prevent the spread of nutrients, mobilised due to soil disturbance and dust suppression activities, from impacting on areas of NTG outside the construction area.

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