

5 Assessment of Impacts

5.1 Impacts on Native Vegetation and Habitat

5.1.1 Direct Impacts

The development of the Project will result in direct impacts on biodiversity values. Direct impacts include the loss of vegetation and fauna habitats as a result of clearance works and subsequent operation of the wind farm. The Development Corridor contains a range of habitat features (such as hollow-bearing trees, fallen logs and threatened flora species habitat) and species-credit species have been identified to occur within the Development Corridor.

Table 5.1 below outlines the direct impacts on native vegetation, which totals approximately 410.15 hectares. The Indicative Development Footprints are shown in **Figure 1.4**. Avoidance and minimisation measures associated with minimising the impacts of these direct impacts are discussed in **Section 4.0** above.

Table 5.1 Direct Impacts of the Proposed Modification on Biodiversity Features

Ecosystem/Species	Area within the Development Corridor (ha)			Area within the Indicative Development Footprint – Wind Farms (ha)			Area within the Indicative Development Footprint – External Roads (ha)		
	SWS IBRA	SEH IBRA	Total	SWS IBRA	SEH IBRA	Total	SWS IBRA	SEH IBRA	Total
Plant Community Type									
VZ 1 - 289 Mugga Ironbark - Inland Scribbly Gum - Red Box shrub/grass open forest on hills in the upper slopes sub-region of the NSW South Western Slopes Bioregion <i>Moderate to Good</i>	-	-	-	-	-	-	1.07	-	1.07
VZ 2 - 335 Tussock grass - sedgeland fen - rushland - reedland wetland in impeded creeks in valleys in the upper slopes sub-region of the NSW South Western Slopes Bioregion <i>Moderate to Good</i>	12.78	2.66	15.44	7.55	1.60	9.15	-	-	-
VZ 3 - 350 Candlebark - Blakely's Red Gum - Long-leaved Box grassy woodland in the Rye Park to Yass region of the NSW South Western Slopes Bioregion and South Eastern Highland Bioregion <i>Moderate to Good</i>	14.36	21.74	36.10	8.62	10.06	18.68	1.14	-	1.14
VZ 4 - 350 Candlebark - Blakely's Red Gum - Long-leaved Box grassy woodland in the Rye Park to Yass region of the NSW South Western Slopes Bioregion and South Eastern Highland Bioregion <i>Derived Native Grassland</i>	22.34	8.56	30.90	14.81	4.61	19.42	0.25	-	0.25

Ecosystem/Species	Area within the Development Corridor (ha)			Area within the Indicative Development Footprint – Wind Farms (ha)			Area within the Indicative Development Footprint – External Roads (ha)		
	SWS IBRA	SEH IBRA	Total	SWS IBRA	SEH IBRA	Total	SWS IBRA	SEH IBRA	Total
VZ 5 - 351 Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion <i>Moderate to Good</i>	129.11	88.40	217.51	53.06	31.26	84.32	0.98	-	0.98
VZ 6 - 351 Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion <i>Derived Native Grassland</i>	309.16	129.88	439.04	131.66	48.32	179.98	0.20	-	0.20
VZ 7 - 351 Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion <i>Acacia Shrubland</i>	3.94	15.77	19.71	1.91	4.76	6.67	0.09	-	0.09
VZ 8 - 351 Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion <i>Sifton Bush Shrubland</i>	196.97	54.16	251.13	66.44	20.66	87.10	0.49	-	0.49

Ecosystem/Species	Area within the Development Corridor (ha)			Area within the Indicative Development Footprint – Wind Farms (ha)			Area within the Indicative Development Footprint – External Roads (ha)		
	SWS IBRA	SEH IBRA	Total	SWS IBRA	SEH IBRA	Total	SWS IBRA	SEH IBRA	Total
VZ 9 - 351 Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion <i>Argyle Apple Forest</i>	3.79	-	3.79	0.57	-	0.57	0.04	-	0.04
Species-credit Species Habitats									
striped legless lizard <i>Delma impar</i>	13.97	-	13.97	3.58	-	3.58	-	-	-
southern myotis <i>Myotis macropus</i>	-	-	-	-	-	-	0.10	-	0.10
squirrel glider <i>Petaurus norfolcensis</i>	143.47	110.14	253.61	61.68	41.32	103.0	3.19	-	3.19
superb parrot (breeding habitat) <i>Polytelis swainsonii</i>	14.36	21.74	36.1	8.62	10.06	18.68	1.14	-	1.14
golden sun moth <i>Synemon plana</i>	22.32	40.10	62.42	12.31	15.24	27.55	-	-	-

The summary of change in direct impacts associated with the modified project compared with the approved project is presented below in **Table 5.2**.

Table 5.2 Summary of change between approved and modified project

PCT / Species	Original Area of Impact (ha)	Area of Indicative Development Footprint – Wind Farm	Area of Indicative Development Footprint – External Roads	Combined Area of Indicative Development Footprint	Order of Change
Ecosystem					
VZ 1 - 289 Mugga Ironbark - Inland Scribbly Gum - Red Box shrub/grass open forest on hills in the upper slopes sub-region of the NSW South Western Slopes Bioregion <i>Moderate to Good</i>	Not previously assessed	-	1.07	1.07	Vegetation not previously identified or assessed.
VZ 2 - 335 Tussock grass - sedgeland fen - rushland - reedland wetland in impeded creeks in valleys in the upper slopes sub-region of the NSW South Western Slopes Bioregion <i>Moderate to Good</i>	Not previously assessed	9.15	-	9.15	Vegetation not previously identified or assessed.
VZ 3 - 350 Candlebark - Blakely's Red Gum - Long-leaved Box grassy woodland in the Rye Park to Yass region of the NSW South Western Slopes Bioregion and South Eastern Highland Bioregion <i>Moderate to Good</i>	24.9	18.68	1.14	19.82	Avoidance of 5.08 hectares

PCT / Species	Original Area of Impact (ha)	Area of Indicative Development Footprint – Wind Farm	Area of Indicative Development Footprint – External Roads	Combined Area of Indicative Development Footprint	Order of Change
VZ 4 - 350 Candlebark - Blakely's Red Gum - Long-leaved Box grassy woodland in the Rye Park to Yass region of the NSW South Western Slopes Bioregion and South Eastern Highland Bioregion <i>Derived Native Grassland</i>	25.3	19.42	0.25	19.67	Avoidance of 5.63 hectares
VZ 5 - 351 Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion <i>Moderate to Good</i>	87.7	84.32	0.98	85.3	Avoidance of 2.4 hectares
VZ 6 - 351 Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion <i>Derived Native Grassland</i>	71.6	179.98	0.20	180.18	Increase of 108.58 hectares
VZ 7 - 351 Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion <i>Acacia Shrubland</i>	1.3	6.67	0.09	6.76	Increase of 5.46 hectares

PCT / Species	Original Area of Impact (ha)	Area of Indicative Development Footprint – Wind Farm	Area of Indicative Development Footprint – External Roads	Combined Area of Indicative Development Footprint	Order of Change
VZ 8 - 351 Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion <i>Sifton Bush Shrubland</i>	29.6	87.10	0.49	87.59	Increase of 57.99 hectares
VZ 9 - 351 Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion <i>Argyle Apple Forest</i>	0.4	0.57	0.04	0.61	Increase of 0.21 hectares
Non-native Vegetation (incl. roads, tracks and waterbodies)	20.0	136.17	28.35	164.52	Increase of 144.52 hectares
Species					
striped legless lizard <i>Delma impar</i>	49.5	3.58	-	3.58	Avoidance of 45.92 ha
southern myotis <i>Myotis macropus</i>	Not previously recorded	-	0.10	0.10	Species not previously identified or assessed.
squirrel glider <i>Petaurus norfolcensis</i>	Not previously recorded	103.0	3.19	106.19	Species not previously identified or assessed.
golden sun moth <i>Synemon plana</i>	66.94	27.55	-	27.55	Avoidance of 39.39 ha
superb parrot (breeding habitat) <i>Polytelis swainsonii</i>	24.9	18.68	1.14	19.82	Avoidance of 5.08 ha

5.1.1.1 Direct Removal of Hollow Bearing Trees

As per Section 9.1.2.6 of the BAM (OEH 2017) **Table 5.3** presents the number of hollow bearing trees in each vegetation zone that are directly impacted by the Project. As per Section 5.3.4.29 of the BAM (OEH 2017), the number of trees with hollows that are visible from the ground were calculated in the 20 x 50 metre plot as part of the BAM Vegetation Integrity Plot. However, as detailed in **Section 5.5.4**, additional hollow bearing tree surveys were completed specifically for the superb parrot. While **Table 5.3** presents the number of hollow bearing trees recorded for Vegetation Zone 3 within the BAM plots, the average number of HBTs per hectare and total number of HBTs to be removed is based on the outcome of **Section 5.5.4**.

Table 5.3 Hollow bearing trees recorded per vegetation zone

Vegetation Zone / PCT / Condition	BAM Integrity Plots	Total No. HBTs Recorded	Average No. HBTs per ha ¹	Total HBTs to be Removed ^{1, 2}
VZ 1 - 289 Mugga Ironbark - Inland Scribbly Gum - Red Box shrub/grass open forest on hills in the upper slopes sub-region of the NSW South Western Slopes Bioregion <i>Moderate to Good</i>	1	1	10	10
VZ 2 - 335 Tussock grass - sedgeland fen - rushland - reedland wetland in impeded creeks in valleys in the upper slopes sub-region of the NSW South Western Slopes Bioregion <i>Moderate to Good</i>	3	0	0	0
VZ 3 - 350 Candlebark - Blakely's Red Gum - Long-leaved Box grassy woodland in the Rye Park to Yass region of the NSW South Western Slopes Bioregion and South Eastern Highland Bioregion <i>Moderate to Good</i>	n/a	n/a	10.7 ³	212 ³
VZ 4 - 350 Candlebark - Blakely's Red Gum - Long-leaved Box grassy woodland in the Rye Park to Yass region of the NSW South Western Slopes Bioregion and South Eastern Highland Bioregion <i>Derived Native Grassland</i>	5	0	1 [#]	19
VZ 5 - 351 Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion <i>Moderate to Good</i>	7	28	40	3,410
VZ 6 - 351 Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion <i>Derived Native Grassland</i>	6	1	1.7	306

Vegetation Zone / PCT / Condition	BAM Integrity Plots	Total No. HBTs Recorded	Average No. HBTs per ha ¹	Total HBTs to be Removed ^{1, 2}
VZ 7 - 351 Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion <i>Acacia Shrubland</i>	3	3	10	70
VZ 8 - 351 Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion <i>Sifton Bush Shrubland</i>	5	0	0	0
VZ 9 - 351 Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion <i>Argyle Apple Forest</i>	2	6	30	20
Non-native Vegetation (incl. roads, tracks and waterbodies)	5	0	0	0

¹ Averages are rounded up or down to the nearest whole number.

² Averages are calculated based on the total area of the vegetation zone in the Indicative Development Footprints (Wind Farm and External Roads).

³ average number of HBTs per hectare and total number of HBTs to be removed is based on the outcome of **Section 5.5.4**.

Consistent with the Biodiversity Assessment Addendum (NGH Environmental 2016), despite not recording any Hollow Bearing Trees in the BAM Integrity Plots for Vegetation Zone 4 1 hollow bearing tree per hectare has been assumed in recognition of scattered trees occurring throughout.

5.1.1.2 Direct Partial Impacts

RPRE confirmed through Transgrid the easement specifications required for the project for the future operation of the proposed transmission lines, including 132kV and 33kV. Transgrid is the operator of the grid in this part of NSW, however it has not been confirmed that they will be building the transmission line for the Project.

Transgrid confirmed that a 40 metre wide easement would be required for 132kV and a 20 metre wide easement would be required for 30kV within vegetation that is currently, or can grow equal to or greater than, 4 metres tall. For vegetation zones that meet these characteristics, partial direct impacts have been calculated within the 40 metre wide or 20 metre wide easement (excluding the pole and string locations) as per Section 9.1.2.3 of the BAM [OEI 2017]). This means that the future vegetation integrity score for these applicable areas are not reduced to the default score of 0 (no biodiversity value).

Within these easements, a proportion of biodiversity values will remain within select vegetation zones. Canopy species, understorey and ground stratum flora species persist in these environments and also provide substantial cover. The following vegetation zones were assessed against partial impact parameters where they occurred within the transmission lines:

- 8.99 hectares of VZ 3, comprising 4.27 hectares in SWS IBRA and 4.72 hectares in SEH IBRA.
- 17.72 hectares of VZ 5, comprising 9.61 hectares in SWS IBRA and 8.11 hectares in SEH IBRA.
- 2.81 hectares of VZ 7, comprising 2.81 hectares in SEH IBRA.

For vegetation zones < 4 metres tall, direct impacts have been calculated for the transmission line poles and string lines specifically (i.e. not the easement) and the future vegetation integrity score has been reduced to the default of 0.

The values used for partial impacts are presented below in **Table 5.4**.

Table 5.4 Partial Impact Values

Attribute	CCS	SCS	FCS
Tree	Same as original	5 per cent of original	
Shrub	Same as original	25 per cent of original	
Grass and Grass Like	50 per cent of original	50 per cent of original	
Forb	50 per cent of original	5 per cent of original	
Fern	50 per cent of original	5 per cent of original	
Other	50 per cent of original	5 per cent of original	
Number of Large Trees			Default
Litter Cover			Same as original
Coarse Woody Debris			Same as original
Stem Size Class			1
Regeneration stems <5cm DBH			Present
High Threat Weed Cover			Same as original

Full detail of the partial assessment for each of the applicable vegetation zones is presented below, initially for those that occur within the NSW Southern West Slopes IBRA Region (**Table 5.5**) and then for those that occur within the South East Highlands IBRA Region (**Table 5.6**).

Table 5.5 Current and future score for partial impacts in transmission (SWS IBRA)

	VZ 3		VZ 5	
	Current Score	Future Score	Current Score	Future Score
CCS				
Tree	2.4	2.4	3.7	3.7
Shrub	1	1	3.6	3.6
Grass and Grass Like	8.3	4.2	6.1	3.1
Forb	3.9	1.9	3	1.5
Fern	0	0	0	0
Other	0.4	0.2	0.6	0.3
SCS				
Tree	31.1	1.5	42.9	2.1
Shrub	5.3	1.3	9.3	2.3
Grass and Grass Like	31.6	15.8	34.6	17.3
Forb	2.3	0.1	2.5	0.1

	VZ 3		VZ 5	
	Current Score	Future Score	Current Score	Future Score
Fern	0	0	0	0
Other	0.9	0	0.8	0
FCS				
Number of Large Trees	1.7	0	2	0
Litter Cover	59.1	59.1	56.2	56.2
Coarse Woody Debris	48.1	48.1	122.6	122.6
Stem Size Class	3.1	1	3.7	1
Regeneration stems <5cm DBH	1	1	1	1
High Threat Weed Cover	0.2	0.2	0	0

Table 5.6 Current and future score for partial impacts in transmission (SEH IBRA)

	VZ 3		VZ 5		VZ 7	
	Current Score	Future Score	Current Score	Future Score	Current Score	Future Score
CCS						
Tree	2.4	2.4	3.7	3.7	1	1
Shrub	1	1	3.6	3.6	4.7	4.7
Grass and Grass Like	8.3	4.2	6.1	3.1	7	3.5
Forb	3.9	2	3	1.5	4	2
Fern	0	0	0	0	1	0.5
Other	0.4	0.2	0.6	0.3	0.7	0
SCS						
Tree	31.1	1.6	42.9	2.1	30	1.5
Shrub	5.3	1.3	9.3	2.3	14.9	3.7
Grass and Grass Like	31.6	15.8	34.6	17.3	52.4	26.2
Forb	2.3	0.1	2.5	0.1	1.2	0.1
Fern	0	0	0	0	0.4	0
Other	0.9	0	0.8	0	0.2	0
FCS						
Number of Large Trees	1.7	0	2	0	0.3	0
Litter Cover	59.1	59.1	56.2	56.2	32.5	32.5

	VZ 3		VZ 5		VZ 7	
	Current Score	Future Score	Current Score	Future Score	Current Score	Future Score
Coarse Woody Debris	48.1	48.1	122.6	122.6	24.7	24.7
Stem Size Class	3.1	1	3.7	1	2.3	1
Regeneration stems <5cm DBH	1	1	1	1	1	1
High Threat Weed Cover	0.2	0.2	0	0	0	0

5.1.2 Indirect Impacts

The Project is likely to result in additional indirect impacts on biodiversity values of surrounding lands. In particular:

- erosion
- dust pollution
- noise, vibration and activity during construction works
- pollution risks associated with use of concrete, fuels and lubricants and construction chemicals
- weed and feral animal encroachment.

These potential impacts on biodiversity will vary depending on the type of impact, the duration and frequency of the impact and the ability of the biodiversity features to respond to these changes. However, these indirect impacts are considered to be manageable with appropriate management and mitigation measures that would be formalised through the required management plans, many of which are described above in **Section 4.0**.

Given the extensive spread of the project design (some 36 kilometres in length from the northern to southern tip) the indirect impacts listed above are likely to be of low magnitude temporally and spatially.

This position remains consistent with the original assessment of indirect and peripheral impacts considered as part of the original Biodiversity Assessment (NGH Environmental 2014) and Biodiversity Assessment Addendum (NGH Environmental 2016). Despite the Project undergoing a modification, the components of indirect and peripheral impacts remain unchanged in nature and extent.

Further detail on the indirect impacts is provided below, and in the Modification Application Report where relevant.

5.1.2.1 Erosion

The extent of works proposed as part of the Project has the potential to result in indirect impacts to biodiversity values through erosion. Such indirect impacts can be adequately managed through the implementation of a detailed Biodiversity Management Plan that will be required prior to construction. The proposed changes to the Project as part of the modification do not present an increased risk of these indirect impacts.

The extent and risk of indirect impacts from erosion associated with the Project is considered to be consistent with those presented, discussed and assessed as part of the original approval, including Biodiversity Assessment (NGH Environmental 2014) and Biodiversity Assessment Addendum (NGH Environmental 2016).

5.1.2.2 Dust Pollution

The extent of works proposed as part of the Project has the potential to result in indirect impacts from dust pollution. Such indirect impacts can be adequately managed through the implementation of a detailed Biodiversity Management Plan that will be required prior to construction. The proposed changes to the Project as part of the modification do not present an increased risk to biodiversity values from dust pollution.

The extent and risk of indirect impacts from the dust pollution associated with the Project is considered to be consistent with those presented, discussed and assessed as part of the original approval, including Biodiversity Assessment (NGH Environmental 2014) and Biodiversity Assessment Addendum (NGH Environmental 2016).

5.1.2.3 Noise, Vibration and Activity During Construction

The extent of works proposed as part of the Project has the potential to result in indirectly impact fauna that may be nesting, foraging or migrating through noise, vibration and activity during construction. Such indirect impacts can be adequately managed through the implementation of a detailed Biodiversity Management Plan that will be required prior to construction. The proposed changes to the Project as part of the modification do not present an increased risk of such indirect impacts.

The extent and risk of indirect impacts from the noise, vibration and activity during construction associated with the Project is considered to be consistent with those presented, discussed and assessed as part of the original approval, including Biodiversity Assessment (NGH Environmental 2014) and Biodiversity Assessment Addendum (NGH Environmental 2016).

5.1.2.4 Pollution

The extent of works proposed as part of the Project has the potential to result in indirect impacts to biodiversity values through the inadvertent or accidental pollution of concrete, fuels, lubricants and other construction chemicals and materials. Such indirect impacts can be adequately managed through the implementation of a detailed Biodiversity Management Plan that will be required prior to construction. The proposed changes to the Project as part of the modification do not present an increased risk of indirect impacts from pollution.

The extent and risk of indirect impacts from pollutions of chemicals and materials associated with the Project is considered to be consistent with those presented, discussed and assessed as part of the original approval, including Biodiversity Assessment (NGH Environmental 2014) and Biodiversity Assessment Addendum (NGH Environmental 2016).

5.1.2.5 Weed and Feral Animal Encroachment

New weed species could be inadvertently brought into the Indicative Development Footprints on construction vehicles and machinery, within imported materials, or could invade naturally through removal of native vegetation. The presence of weed species within the Indicative Development Footprints has the potential to decrease the value of extant vegetation to native species, however we note a large number of pasture weeds (including forbs and grasses) already occur throughout the Indicative Development Footprints as a result of the historical land use. Mitigation measures outlined in **Section 4.0** will be implemented to minimise the potential for weed encroachment into areas surrounding the Indicative Development Footprints.

Populations of feral fauna species such as foxes, rabbits and cats can increase and quickly populate new areas as a result of disturbance. Clearing, thinning of vegetation and the creation of tracks have the ability to assist the establishment and spread of feral fauna species. However, foxes, rabbits and wild dogs already occur throughout the Indicative Development Footprints as a result of the historical land use. Mitigation measures outlined in **Section 4.0** will minimise the potential for feral animal spread and impacts into surrounding areas around the Indicative Development Footprints.

There will be no substantial change to impacts from weeds or feral animals, given that the Project is located within, and adjacent to, a landscape exposed to historical and current agricultural land uses. Any additional impacts resulting from weeds or feral animals are not expected to be of any level of significance in relation to threatened species, populations and communities.

In conclusion, the indirect impacts to weed and feral animal encroachment that will result from the Project are not considered to be different to those that were presented, discussed and assessed as part of the original approval, including Biodiversity Assessment (NGH Environmental 2014) and Biodiversity Assessment Addendum (NGH Environmental 2016).

5.2 Impacts on Threatened Ecological Communities

Despite a range of avoidance and minimisation measures (refer to **Section 4.0**) the Project will impact a total of 38.96 hectares of *White Box Yellow Box Blakely's Red Gum Woodland EEC* under the BC Act within Vegetation Zones 3 (19.39 hectares) and 4 (19.57 hectares); and 37.27 hectares of *White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC* within Vegetation Zones 3 (18.76 hectares) and 4 (18.51 hectares). See **Figure 3.2. Table 5.7** presents a summary of these impacts in relation to the applicable vegetation zones, which IBRA region it occurs in (necessary for offsetting purposes) and proportion of TECs within the Development Corridor and Indicative Development Footprints (Wind Farm and External Roads).

Impact to the EEC under the BC Act is less (**11.14 hectares**) than the impact threshold of 50.2 hectares for this TEC as identified in Consent Condition 19(a) of the existing State Approval. While the Project does impact on the EEC, it has successfully avoided 11.14 hectares of EEC threshold. Approximately 67.00 hectares of *White Box Yellow Box Blakely's Red Gum Woodland EEC* under the BC Act was identified within the wider Development Corridor. Therefore, 28.04 hectares of the EEC in the Development Corridor has been avoided by the Project and considerable amounts of the EEC occur beyond the Development Corridor in the local region.

Impacts to the CEEC under the EPBC Act is 27.77 hectares more than the impact threshold of 9.5 hectares for this TEC as identified in Condition 3 of the existing Federal Approval (EPBC 2014/7163). It is noted that 65.61 hectares of *White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC* under the EPBC Act was identified within the Development Corridor. Therefore, 28.34 hectares of the CEEC has been avoided by the Project and will persist within the wider Development Corridor, and considerable amounts of the CEEC occur beyond the Development Corridor in the local region.

Table 5.7 Summary of Threatened Ecological Communities

	Area of White Box Yellow Box Blakely's Red Gum Woodland EEC (ha)	Area of White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC (ha)
SWS IBRA		
Vegetation Zone 3		
Development Corridor	14.36	14.36
Indicative Development Footprint – Wind Farm	8.62	8.62
Indicative Development Footprint – External Roads	0.72	0.10
Vegetation Zone 4		
Development Corridor	22.34	21.86
Indicative Development Footprint – Wind Farm	14.81	14.46
Indicative Development Footprint –External Roads	0.15	0.09
SEH IBRA		
Vegetation Zone 3		
Development Corridor	21.74	21.71
Indicative Development Footprint – Wind Farm	10.06	10.04
Indicative Development Footprint –External Roads	-	-
Vegetation Zone 4		
Development Corridor	8.56	7.68
Indicative Development Footprint – Wind Farm	4.6	3.95
Indicative Development Footprint –External Roads	-	-

5.3 Prescribed Impacts

Consistent with the Biodiversity Assessment and Biodiversity Assessment Addendum (NGH Environmental 2014 and 2016) no prescribed impacts are expected to occur to threatened ecological community habitat as none of those which occur within the Indicative Development Footprints are associated with karst, caves, crevices, cliffs and other geological features of significance, rocks or human-made structures. Furthermore, no prescribed impacts are expected to occur to threatened species associated with karsts, crevices, cliffs and other geological features of significance, rocks or human-made structures as these do not occur within the Indicative Development Footprints.

Consistent with the Biodiversity Assessment and Biodiversity Assessment Addendum (NGH Environmental 2014 and 2016) no impacts on water quality or hydrological processes that sustain threatened species and threatened ecological communities are likely to occur.

Consistent with the Biodiversity Assessment and Biodiversity Assessment Addendum (NGH Environmental 2014 and 2016) a number of prescribed impacts have been considered for the Project, being impacts of threatened microbat species associated with caves (**Section 5.3.1**), impacts from risk of vehicle strike (**Section 5.3.2**), impacts of turbine strikes (**Section 5.3.3**) and the interruption and fragmentation to connectivity of native vegetation and associated habitat corridors (**Section 5.3.4**).

5.3.1 Threatened Microbat Species Associated With Caves

Umwelt completed extensive surveys across the Development Corridor to facilitate the preparation of the Bird and Bat Adaptive Management Plan. This scope of works included the deployment of Anabat recorders across the Development Corridor, at ground level as well as at height (installed on the existing meteorological masts). These surveys were completed across the four seasons of the year, with the timing of one of the survey programs selected in consultation with BCD to capture the northern migration of the large bent-wing bat from their known breeding cave in Wee Jasper, NSW (approximately 70 kilometres south-west of the Development Corridor).

Umwelt used this package of bird and bat survey work, along with the extensive surveys and associated results that were captured by NGH Environmental (2014 and 2016) as part of the existing approval process, to facilitate the preparation of an updated Bird and Bat Risk Assessment for the Project (refer to **Appendix E**).

This assessment addressed four species of microbat recorded either by Umwelt or previously by NGH Environmental (2014 and 2016), being large bent-wing bat (*Miniopterus orainae oceanensis*), eastern false pipistrelle (*Falsistrellus tasmaniensis*), yellow-bellied sheath-tail bat (*Saccolaimus flaviventris*) and southern myotis (*Myotis macropus*). Profiles for each of these species were reviewed on the TBDC (BCD 2020b), confirming that just one of these species is associated with caves, being the large bent-wing bat. The other three species are not considered further in this section of Prescribed Impacts, they are discussed further in **Section 5.3.3**.

No caves, or cave like structures, were recorded within the Indicative Development Footprints. However, an old mine shaft was recorded in proximity to the Indicative Development Footprint – Wind Farm (see **Figure 2.1**). The project will have no impact on this old mine shaft. It is expected however to provide habitat consistent with a cave and therefore supports likely habitat for the large bent-wing bat.

Umwelt visited the old mine shaft on multiple occasions during our field surveys, there was no visible sign of recent or current usage by bats, based on bats or bat droppings being visible, or odour from bat droppings. Furthermore, Anabat detectors did not suggest the old mine shaft was being used for roosting or breeding purposes by any species. The entry/exit point to the old mine shaft was surveyed over five

nights with an Anabat detector in February 2018. The results of this analysis determined there was no roosting or breeding numbers of individuals for any species.

It is recognised that other threatened species of microbat in NSW use caves and cave like structures for breeding or roosting habitat. However, none of these species were recorded as part of the extensive surveys for the Bird and Bat Adaptive Management Plan, or previously through the extensive surveys completed by NGH Environmental (2014 and 2016). Thus, none of these species have been considered further.

In summary prescribed impacts associated with threatened microbat species associated with caves remains consistent with the Biodiversity Assessment and Biodiversity Assessment Addendum (NGH Environmental 2014 and 2016).

5.3.2 Impacts from Increased Risk of Vehicle Strike

The Project will result in an increase of vehicle activity within the Indicative Development Footprints through construction of a network of internal access tracks, predominantly between turbine locations but also within transmission lines for servicing purposes. These internal access tracks will not be open for public use as they are restricted to the private properties of landholders involved with the Project. Use of these access tracks will be restricted to landholders, wind farm employees and associated contractors. Internal access tracks will have enforced speed restrictions to adequately reduce the risk of interaction between animals and vehicles.

No new public roads will be constructed for the Project, however multiple sections of public roads will be upgraded for the Project. The upgrade works will be the responsibility of RPRES but have been designed in consultation with BCD and relevant LGAs.

Due to the disturbed condition of the Indicative Development Footprints, it is unlikely that any threatened species or animals that are part of a TEC would be adversely impacted by the increase in vehicle movement in the Indicative Development Footprints.

In summary prescribed impacts associated with impacts from increased risk of vehicle strike remains consistent with the Biodiversity Assessment and Biodiversity Assessment Addendum (NGH Environmental 2014 and 2016).

5.3.3 Impacts from Turbine Strikes

The impact of wind turbines is applicable to this project. Through the original assessment and approval process for the Project, a detailed assessment of fauna collision risk specific to the Project was assessed (NGH Environmental 2014 and 2016). As a result of this modification, Umwelt have prepared an updated operational bird and bat impact assessment to analyse the difference in impacts between the original assessment and the proposed relevant modifications to the project, being less turbines and larger blade lengths. This revised impact assessment is provided in full in **Appendix E**. However a summary of the assessment is provided in the Section below.

In the case of this Project, uncertain prescribed impacts are considered to be cumulative impacts associated with other wind farms in the region, of which there are a number of wind farms in operation, construction or within the approval process. The Project may contribute to cumulative impacts associated with the construction and operational phases, this includes but is not limited to vegetation and habitat clearance, operational bird and bat risks, interruptions to connectivity and fragmentation.

There are currently three wind farms in operation within approximately 50 kilometres of this Project, which remains unchanged since cumulative impacts were assessed through the existing Approval Process (NGH Environmental 2014, NGH Environmental 2016). These include Cullerin Range Wind Farm, Gunning Wind Farm and Crookwell Wind Farm. Bango Wind Farm, approximately 10 kilometres to the west, is currently in its construction phase. While Conroys Gap and Yass Valley Wind Farms are proposed projects west of Yass. Rugby Wind Farm, north of Rye Park, is not actively being considered by any proponent. All of these projects were known about and considered as part of the original Biodiversity Assessment (NGH Environmental 2014) and Biodiversity Assessment Addendum (NGH Environmental 2016).

As described previously, the modification proposes a larger turbine blade width. The prescribed impacts associated with this change in comparison against the Approved Project is described in full within **Appendix E** and summarised below.

A detailed assessment of the impacts associated with the proposed modification compared with those that were previously assessed for the approved project has been completed by Umwelt. The proposed modification is very likely to increase the risk of blade strike for certain species which regularly occur above 30m AGL in the Development Corridor. Wedge-tailed eagle, little eagle, black falcon, white-throated needletail and white-striped free-tailed bat in particular are likely to be placed at greater risk of blade strike as a result of the 49 per cent increase in the total RSA of the wind farm under the proposed modification. Other highly aerial species or groups of species such as white-browed woodswallow, masked woodswallow, rainbow bee-eater and all raptors present in the Development Corridor are also likely to be at higher risk of blade strike under the proposed modification.

Threatened species known to occasionally or regularly occur above 30m AGL in the Development Corridor such as superb parrot, dusky woodswallow and white-fronted chat are likely to be at higher risk of blade strike under the proposed modification. A suite of non-threatened migrants, partial migrants and sedentary species including silveryeye, spotted pardalote, striated pardalote, yellow-faced honeyeater, galah, sulphur-crested cockatoo, Australian magpie and Australian raven are also likely to be negatively impacted by the 49 per cent increase in total RSA to the extent that this factor will likely outweigh the reduction in risk resulting from the removal of 12 turbines.

Gould's wattled bat, inland free-tailed bat, southern free-tailed bat and inland broad-nosed bat are likely to be at greater risk of blade strike under the proposed modification whilst the level of risk of blade strike to large bent-winged bat, yellow-bellied sheath-tail bat, chocolate wattled bat and little forest bat may be similar or slightly higher than the level of risk posed by the current design.

For threatened species which rarely occur above 20m AGL such as hooded robin, diamond firetail, brown treecreeper and speckled warbler or species that occasionally do such as varied sittella, flame robin, scarlet robin, painted honeyeater the difference in blade strike risk between the existing design and the proposed modification is likely to be negligible as there is a very low risk of blade strike under both scenarios.

Overall the changes in the components of the wind farm design and/or turbine specifications which differentiate the proposed modification from the existing design are likely to generally influence the risk of blade strike as follows:

- the reduction in the number of turbines will reduce the risk to species that occur at such locations and fly at RSA height
- the 3 metre increase in minimum RSA height is likely to have a negligible or minor effect on the risk of blade strike to species which occur both above and below this height
- the increase in maximum RSA height will increase the vertical range in which a few highly aerial species, particularly wedge-tailed eagle and white-throated needletail, are at risk of blade strike, and

- the 49 per cent increase in the total RSA of the wind farm is likely to increase risk to a certain suite of species which either occur occasionally, regularly or almost exclusively above 30m AGL.

The proposed modification is unlikely to increase the risk of blade strike to species listed under the EPBC Act and/or the BC Act to the extent that the development would have a significant adverse impact on any of these species.

5.3.4 Connectivity of Native Vegetation and Habitat Corridors

As described in **Section 1.8**, the Development Corridor is located in a region of NSW that has been extensively modified and disturbed as a result of a long history of agricultural land uses. Specifically, the Development Corridor is occupied by agricultural landscapes on the valley floors and low slopes, with substantial areas of intact vegetation associated with the network of public reserves, upper slopes and ridgetops.

Broadly speaking, much of the Indicative Development Footprints occur where the connectivity of native vegetation and habitat corridors has been previously compromised by historical agricultural land uses. However, there are specific locations of the Indicative Development Footprints where it is considered likely that the Project will interrupt the connectivity of native vegetation and fauna habitat. These are summarised below in **Table 5.8** and presented in **Figure 1.6**.

Table 5.8 Interruption of Native Vegetation and Fauna Habitat Connectivity

Location within Indicative Development Footprints	Summary of Interruption
<ul style="list-style-type: none"> • Turbines 17 and 20 • Associated access tracks 	<ul style="list-style-type: none"> • Despite there being an existing farm track here, as it is very thin and used infrequently it does not currently interrupt the connectivity of native vegetation or fauna habitat. • A large patch of Vegetation Zone 5 will be intersected. • A patch of Vegetation Zone 9 will be intersected. We note that this is a previously disturbed vegetation community. • The Project will interrupt the connectivity of native vegetation and fauna habitat to a width of between 30 and 70 metres.
<ul style="list-style-type: none"> • Turbines 34, 37, 39, 41, 42, 48, 49, 50, 51, 56, 58, 61, 62, 63, 67, 139 and 141 • Associated access tracks • Transmission line 	<ul style="list-style-type: none"> • There are some existing farm tracks in this location of the Indicative Development Footprints, however as they are very thin and used infrequently, they do not currently interrupt the connectivity of native vegetation or fauna habitat. • Large patches of Vegetation Zone 5 will be intersected. • Large patches of Vegetation Zone 8 will be intersected. Note that this is a previously disturbed vegetation community. • A small patch of Vegetation Zone 9 will be intersected. • The Project will interrupt the connectivity of native vegetation and fauna habitat to a width of between 30 and 200 metres.

Location within Indicative Development Footprints	Summary of Interruption
<ul style="list-style-type: none"> • Turbines 65, 68, 146, 147 and 148 • Access tracks 	<ul style="list-style-type: none"> • Despite there being an existing farm track here, as it is very thin and used infrequently it does not currently interrupt the connectivity of native vegetation or fauna habitat. • Large patches of Vegetation Zone 5 will be intersected. • Large patches of Vegetation Zone 8 will be intersected. Note that this is a previously disturbed vegetation community. • The Project will interrupt the connectivity of native vegetation and fauna habitat to a width of between 30 and 130 metres.
<ul style="list-style-type: none"> • Turbines 150 • Access tracks • Transmission line 	<ul style="list-style-type: none"> • Despite there being an existing farm track here, as it is very thin and used infrequently it does not currently interrupt the connectivity of native vegetation or fauna habitat. • Large patches of Vegetation Zone 5 will be intersected. • Large patches of Vegetation Zone 7 will be intersected. Note that this is a previously disturbed vegetation community. • The Project will interrupt the connectivity of native vegetation and fauna habitat to a width of between 20 and 100 metres.
<ul style="list-style-type: none"> • Turbines 84, 85, 86, 87, 143 • Transmission line 	<ul style="list-style-type: none"> • There is a reasonably sized access track along the ridgeline that is being utilised. However there will be particular sections that will require redesign for construction works. This track upgrade is not considered to modify the existing interruption of connectivity of native vegetation or fauna habitat beyond the current level. • Large patches of Vegetation Zone 5 will be intersected. • Large patches of Vegetation Zone 3 will be intersected. • The Project will interrupt the connectivity of native vegetation and fauna habitat to a width of between 10 and 130 metres.
<ul style="list-style-type: none"> • Access tracks and transmission line north of Turbine 145 	<ul style="list-style-type: none"> • There are existing farm tracks in this location of the Indicative Development Footprints, however as they are very thin and used infrequently, they do not currently interrupt the connectivity of native vegetation or fauna habitat. • Large patches of Vegetation Zone 5 will be intersected. • Large patches of Vegetation Zone 8 will be intersected. Note that this is a previously disturbed vegetation community. • Large patches of Vegetation Zone 3 will be intersected. • The Project will interrupt the connectivity of native vegetation and fauna habitat to a width of between 10 and 30 metres.

Location within Indicative Development Footprints	Summary of Interruption
<ul style="list-style-type: none"> • Turbines 125, 127 and 142 • Access tracks 	<ul style="list-style-type: none"> • There is an existing farm track in this location of the Indicative Development Footprints, however as it is very thin and used infrequently it does not currently interrupt the connectivity of native vegetation or fauna habitat. • Large patches of Vegetation Zone 5 will be intersected. • Large patches of Vegetation Zone 7 will be intersected. Note that this is a previously disturbed vegetation community. • The Project will interrupt the connectivity of native vegetation and fauna habitat to a width of between 20 and 150 metres.

The overall indirect impacts on connectivity of native vegetation and habitat corridors described above are not considered to be significant. While the Project will enhance levels of fragmentation within the region, it will occur to the extent where species or communities are significantly impacted.

The most substantial impacts to connectivity of native vegetation and habitat corridors will occur during the construction phase of the Project. During this time the movement of species will be discouraged from travelling across the Indicative Development Footprints as a result of the substantial works being undertaken. However following completion of the construction, it is expected that native vegetation will recover to the edge of the permanent above ground infrastructure naturally as well as through rehabilitation efforts committed to by RPRE. Full extent of this will be detailed in the future BMP required for the Project and implemented by RPRE.

The turbine hardstands contain the necessary clearing between adjacent native vegetation and the turbine as a mechanism to deter fauna species (i.e. birds and bats) from being impacted by blade strike, they will persist as permanent disruptions to the connectivity. Over time, native vegetation and fauna habitat will return to the access tracks, underground cabling and transmission line disturbance areas and adjoining land. In such circumstances the indirect impacts on connectivity and habitat corridors is considered to be reduced.

Umwelt have experience on multiple major projects that have involved access tracks, underground cabling and transmission lines where over time native flora and fauna species return to the previously disturbed landscapes. We acknowledge that the vegetation will never return to its original state, however we believe it is important to acknowledge that some form of habitat does persist.

The following threatened species, threatened ecological communities and habitats are those considered likely to be affected by the aforementioned indirect impacts.

- White Box Yellow Box Blakely's Red Gum Woodland, EEC (BC Act)
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland, CEEC (EPBC Act)
- Squirrel glider (*Petaurus norfolcensis*), Vulnerable (BC Act).

In conclusion, the indirect impacts to connectivity and fragmentation that will result from the Project are not considered to be different to those that were presented, discussed and assessed as part of the original approval, including Biodiversity Assessment (NGH Environmental 2014) and Biodiversity Assessment Addendum (NGH Environmental 2016).

5.4 Serious and Irreversible Impacts

Under the BC Act, a determination of whether an impact is serious and irreversible must be made in accordance with the principles prescribed in the BC Regulation. The principles have been designed to capture those impacts which are likely to contribute significantly to the risk of extinction of a threatened species or ecological community in New South Wales. These are impacts that:

- will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline, or
- will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size, or
- impact on the habitat of a species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution, or
- impact on a species or ecological community that is unlikely to respond to measures to improve habitat and vegetation integrity and is therefore irreplaceable.

A number of species-credit species, predicted species and threatened ecological communities generating biodiversity credits for the Project are nominated as candidate SAIL entities in the *Guidance to Assist a Decision-Maker to Determine a Serious and Irreversible Impact* (OEH 2017b). These are presented below in **Table 5.9**, as well as an indication as to whether or not they were recorded within Development Corridor.

As the Project has been deemed a State Significant Development, assessments against these nominated SAILs are not required and therefore have not been prepared. However, this report provides a high level consideration of the degree to which the Project has avoided and mitigated impacts to all biodiversity matters, including the nominated SAILs. Furthermore, impacts to the three nominated SAILs recorded within the Indicative Development Footprints have credits generated for them and will be offset accordingly.

Table 5.9 Species and Threatened Ecological Communities at risk of SAILs

Nominated SAILs	Recorded within Development Corridor
Threatened Ecological Communities	
White Box Yellow Box Blakely's Red Gum Woodland	✓
Threatened Species	
<i>Acacia meiantha</i>	x
regent honeyeater <i>Anthochaera phrygia</i>	x
crimson spider orchid <i>Caladenia concolor</i>	x
large-eared pied bat <i>Chalinolobus dwyeri</i>	x
<i>Eucalyptus alligatrix</i> subsp. <i>alligatrix</i>	x
<i>Euphrasia arguta</i>	x
swift parrot <i>Lathamus discolor</i>	x

Nominated SALLs	Recorded within Development Corridor
yellow-spotted tree frog <i>Litoria castanea</i>	x
large bent-winged bat <i>Miniopterus orianae oceanensis</i>	✓
brush-tailed rock-wallaby <i>Petrogale penicillata</i>	x
golden sun moth <i>Synemon plana</i>	✓
<i>Zieria obcordata</i>	x

5.5 Matters of National Environmental Significance

While not a requirement of the BDAR, this section summarises impacts identified for the project on MNES. Relevant to the project these include:

- White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC
- Striped legless lizard
- Superb parrot
- Golden sun moth

5.5.1 White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC

Through the Biodiversity Assessment (NGH Environmental 2014) and the Biodiversity Assessment Addendum (NGH Environmental 2016) the Federal approval for the project allows up to 9.5 hectares of White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC.

As per **Section 5.2** above, the project will result in impacts to 37.27 hectares of White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC (see **Figure 3.2**). This presents an impact increase of 27.77 hectares for the CEEC. It is noted that 65.61 hectares of *White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC* under the EPBC Act was identified within the Development Corridor. Therefore, 28.34 hectares of the CEEC has been avoided by the Project and will persist within the wider Development Corridor, and considerable amounts of the CEEC occur beyond the Development Corridor in the local region.

5.5.2 Striped legless lizard

Through the Biodiversity Assessment (NGH Environmental 2014) and the Biodiversity Assessment Addendum (NGH Environmental 2016) the Federal approval for the project allows up to 49.5 hectares of habitat for the striped legless lizard.

As per **Section 5.1.1** above, the project will result in impacts to 3.58 hectares of striped legless lizard habitat (see **Figure 3.3**). This presents an impact reduction of 45.92 hectares for the striped legless lizard. Additional habitat will persist for this species beyond the extent of the Indicative Development Footprints.

With 13.97 hectares of striped legless lizard habitat identified within the Development Corridor, 10.38 hectares will persist beyond the extent of the Indicative Development Footprints.

5.5.3 Golden sun moth

Through the Biodiversity Assessment (NGH Environmental 2014) and the Biodiversity Assessment Addendum (NGH Environmental 2016) the Federal approval for the project allows up to 66.94 hectares of habitat for the golden sun moth.

As per **Section 5.1.1** above, the project will result in impacts to 27.55 hectares of golden sun moth (see **Figure 3.3**). This presents an impact reduction of 39.39 hectares for the golden sun moth. With 62.42 hectares of golden sun moth habitat identified within the Development Corridor, 34.87 hectares will persist beyond the extent of the Indicative Development Footprints.

5.5.4 Superb parrot

Through the Biodiversity Assessment (NGH Environmental 2014) and the Biodiversity Assessment Addendum (NGH Environmental 2016) the Federal approval for the project allows up to 24.9 hectares of foraging habitat for the superb parrot. Importantly, this 24.9 hectares aligns with the Box Gum Woodland, not including the Derived Native Grasslands.

As per **Section 5.1.1** above, the project will result in impacts to 19.82 hectares of superb parrot habitat (see **Figure 3.3**). This presents an impact reduction of 5.08 hectares for the superb parrot. With 36.1 hectares of superb parrot habitat identified within the Development Corridor, 16.28 hectares will persist beyond the extent of the Indicative Development Footprints.

5.5.4.1 Hollow Bearing Tree Impacts

In addition to those Direct Impacts presented above that generate credits under BAM, documented here is a revised assessment of direct impacts to hollow bearing trees (HBTs) by the Project. The original Biodiversity Assessment (NGH Environmental 2014) estimated that 1,029 hollow bearing trees would be cleared. Through the response to submission phase of the existing approval, a more accurate quantitative assessment of hollow bearing trees was completed in the Biodiversity Assessment Addendum (NGH Environmental 2016). This estimated that 893 hollow bearing trees would be impacted by the project.

The Biodiversity Assessment Addendum (NGH Environmental 2016) concluded that impacts to 893 hollow bearing trees would be unlikely to result in an unacceptably high loss of habitat, loss of habitat function for native fauna or loss of stand structural complexity. Furthermore, the impacts were considered unlikely to have a population scale impact on common birds that are widely distributed and abundant (NGH Environmental 2016).

There are no impact thresholds applicable to the removal of hollow bearing trees within the State Development Consent (DPE 2017). However, the EPBC Approval conditions limit the clearing of up to 170 hollow bearing trees within Box Gum Woodland. This assessment of hollow bearing trees being impacted has been limited entirely to those impacts on Vegetation Zones 3 and 4 as these are the only two vegetation zones applicable for the superb parrot.

The Biodiversity Assessment (NGH Environmental 2014) and Biodiversity Assessment Addendum (NGH Environmental 2016) did not discuss the average number of hollow bearing trees per hectare of each vegetation zone. As such, Umwelt has interpreted what information was provided to determine this.

The Biodiversity Assessment Addendum (NGH Environmental 2016), presents a combined total of 50.2 hectares of Box Gum Woodland and associated derived grasslands were to be impacted by the Project.

This includes 24.9 hectares of Box Gum Woodland and 25.3 hectares of Box Gum Woodland Derived Native Grasslands. A total of 170 hollow bearing trees for the superb parrot were to be impacted by the project within these vegetation communities. NGH Environmental (2016) noted that 1 hollow bearing tree had been calculated for each hectare of impact on Box Gum Woodland Derived Native Grasslands, equating to 25 hollow bearing trees (rounded) per hectare of this vegetation community. This therefore leaves 145 hollow bearing trees being impacted within the Box Gum Woodland, equating to 5.8 hollow bearing trees per hectare.

In addition to the hollow bearing tree impacts presented above in **Section 5.1.1.1**, following Umwelt's additional ecological surveys, an updated hollow bearing tree assessment has been prepared for the Project to provide added rigour around the extrapolation of hollow bearing tree impacts within Box Gum Woodland and associated Derived Native Grasslands being calculated for the project.

Umwelt completed a number of hollow bearing tree assessments within Vegetation Zones 3 and 4. These are detailed in **Table 5.10** below. It is important to note that although no hollow bearing trees were recorded in our sampling of Vegetation Zone 3, we acknowledge that this community does comprise scattered trees and some of these will be hollow bearing trees. Consistent with the Biodiversity Assessment Addendum (NGH Environmental 2016) we have assumed 1 hollow bearing tree per hectare of Vegetation Zone 4.

Table 5.10 Umwelt hollow bearing tree assessments

Vegetation Zone	Area of Assessment	Number of HBT	Number of HBT/ha	Average Number of HBT/ha
3	0.1	4	40.0	15.7
3	0.25	2	8.0	
3	0.1	2	20.0	
3	0.1	3	30.0	
3	6.5	9	1.4	
3	0.1	1	10.0	
3	0.1	1	10.0	
3	0.1	4	40.0	
3	0.1	0	0.0	
3	1.6	26	16.3	
3	1.5	12	8.0	
3	1.8	28	15.6	
3	1.5	33	22.0	
3	1.13	14	12.4	
3	1.78	28	15.7	
3	1.12	1	0.9	
3	0.06	1	16.7	
4	0.1	0	0	1
4	0.1	0	0	
4	0.1	0	0	
4	0.1	0	0	
4	0.1	0	0	

Table 5.11 Box gum woodland hollow bearing tree updated assessment

PCT and Condition	Vegetation Community ¹	Previous Impact Ratio (HBT/hectare)	Current Impact Ratio (HBT/hectare)	Average Impact Ratio (HBT/hectare)	Area of Impact			Extrapolated Hollow Bearing Tree Impacts ²		
					DC	IDF - WF	IDF - ER	DC	IDF - WF	IDF - ER
350 <i>Moderate to Good Condition</i>	Box Gum Woodland	5.8	15.7	10.7	36.10	18.68	1.14	386	200	12
350 <i>Derived Native Grassland</i>	Box Gum Woodland Derived Native Grassland	1	1	1	30.90	19.42	0.25	31	19	0
Total								417	219	12

¹Biodiversity Assessment Addendum (NGH Environmental 2016)

² Averages are rounded up or down to the nearest whole number.

DC: Development Corridor; **IDF – WF:** Indicative Development Footprint – Wind Farm; **IDF – ER:** Indicative Development Footprint – External Roads

As per **Table 5.11**, the Project will impact directly on a total of 231 hollow bearing trees, comprising 212 from Vegetation Zone 3 and comprising 19 from Vegetation Zone 4. Compared with the approved 170 hollow bearing trees within consistent vegetation communities, this increase of 61 HBTs suitable for superb parrot equates to a 35.8 per cent increase.

With 417 HBTs suitable for superb parrot calculated within the Development Corridor, 186 of these will be avoided by the Project. Of the 231 hollow bearing trees suitable for superb parrot being impacted by the Project, 12 have been calculated to occur within the Indicative Development Footprint – External Roads. Furthermore, as discussed in **Section 4**, approximately 232 HBTs suitable for the superb parrot identified along High Rock Road, Dalton Road, Rye Park Road and Blakney Creek South Road have been avoided by the modified project.

Offsets associated with these impacts are included within the credit requirement for these vegetation zones as described below in **Section 6.3**. As per Consent Condition 14 of the Federal approval (DoEE 2017), these impacts will need to be offset at a ratio of 10:1. This would total 2,310 hollow bearing trees.

6 Biodiversity Credit Impact Summary

6.1 Impacts Not Requiring Assessment

Under the BAM, impacts to areas of land without native vegetation do not require further assessment. The Indicative Development Footprints contains approximately 164.52 hectares of non-native vegetation, access track/roads, planted vegetation and waterbodies that will be removed as a result of the Project and does not require further assessment as they do not contain native vegetation. All Non-native Vegetation presented in **Figure 3.1** does not require further assessment in accordance with Section 10.4 of the BAM.

6.2 Impacts Not Requiring Offset

Impacts on native vegetation not requiring offsets under the BAM include native vegetation that has a vegetation integrity score of less than 20 (where it is not associated with ecosystem-credit species habitat or a TEC), less than 17 (where it is associated with ecosystem-credit habitat or a VEC) or less than 15 (where it is representative of a EEC or CEEC).

As all native vegetation recorded within the Indicative Development Footprints has a higher vegetation integrity score than the required threshold, there are no areas of native vegetation impact not requiring offset.

6.3 Impacts Requiring Offset

Four PCTs and five species-credit species are considered to require offsetting in accordance with the BAM (OEH 2017a). **Table 6.1** summarises this outcome.

In relation to impacts of the Indicative Development Footprints, associated with Vegetation Zone 3 and 4, it is important to note that a majority of these impacts include TECs (refer to **Table 5.7**). Therefore particular offset rules will apply. This alignment with TECs does not result in additional credits to those presented below.

For Vegetation Zone 3, 19.4 hectares aligns with *White Box Yellow Box Blakely's Red Gum Woodland EEC* under the BC Act (9.34 hectares within SWS IBRA and 10.06 hectares within SEH IBRA) and 18.76 hectares aligns with *White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC* under the EPBC Act (8.72 hectares within SWS IBRA and 10.04 hectares within SEH IBRA).

For Vegetation Zone 4, 19.56 hectares aligns with *White Box Yellow Box Blakely's Red Gum Woodland EEC* under the BC Act (14.96 hectares within SWS IBRA and 4.6 hectares within SEH IBRA) and 18.5 hectares aligns with *White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC* under the EPBC Act (14.55 hectares within SWS IBRA and 3.95 hectares within SEH IBRA).

Table 6.1 Impacts Requiring Offset

Veg Zone	PCT/Species-credit	Vegetation Integrity Score			Area (ha) ¹	Credits Required
		Current	Future ¹	Change ¹		
Ecosystem Credits						
NSW – South Western Slopes IBRA Bioregion						
1	289 Mugga Ironbark - Inland Scribbly Gum - Red Box shrub/grass open forest on hills in the upper slopes sub-region of the NSW South Western Slopes Bioregion <i>Moderate to Good</i>	73.3	0	-73.3	1.07	34
2	335 Tussock grass - sedgeland fen - rushland - reedland wetland in impeded creeks in valleys in the upper slopes sub-region of the NSW South Western Slopes Bioregion <i>Moderate to Good</i>	53.4	0	-53.4	7.55	202
3	350 Candlebark - Blakely's Red Gum - Long-leaved Box grassy woodland in the Rye Park to Yass region of the NSW South Western Slopes Bioregion and South Eastern Highland Bioregion <i>Moderate to Good</i>	75.2	0 (35.3)	-75.2 (-39.9)	5.49 (4.27)	292
4	350 Candlebark - Blakely's Red Gum - Long-leaved Box grassy woodland in the Rye Park to Yass region of the NSW South Western Slopes Bioregion and South Eastern Highland Bioregion <i>Derived Native Grassland</i>	35.3	0	-35.3	15.06	266
5	351 Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion <i>Moderate to Good</i>	74.9	0 (34.9)	-74.9 (-40)	44.43 (9.61)	1,625
6	351 Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion <i>Derived Native Grassland</i>	25	0	-25	131.86	1,443

Veg Zone	PCT/Species-credit	Vegetation Integrity Score			Area (ha) ¹	Credits Required
		Current	Future ¹	Change ¹		
7	351 Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion <i>Acacia Shrubland</i>	51.3	0	-51.3	2.0	45
8	351 Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion <i>Sifton Bush Shrubland</i>	23.5	0	-23.5	66.93	687
9	351 Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion <i>Argyle Apple Forest</i>	68.6	0	-68.6	0.61	18
South Eastern Highlands IBRA Bioregion						
1	289 Mugga Ironbark - Inland Scribbly Gum - Red Box shrub/grass open forest on hills in the upper slopes sub-region of the NSW South Western Slopes Bioregion <i>Moderate to Good</i>	-	-	-	-	-
2	335 Tussock grass - sedgeland fen - rushland - reedland wetland in impeded creeks in valleys in the upper slopes sub-region of the NSW South Western Slopes Bioregion <i>Moderate to Good</i>	38.5	0	-38.5	1.60	31
3	350 Candlebark - Blakely's Red Gum - Long-leaved Box grassy woodland in the Rye Park to Yass region of the NSW South Western Slopes Bioregion and South Eastern Highland Bioregion <i>Moderate to Good</i>	65.6	0 (27.4)	-65.6 (-38.2)	5.34 (4.72)	265

Veg Zone	PCT/Species-credit	Vegetation Integrity Score			Area (ha) ¹	Credits Required
		Current	Future ¹	Change ¹		
4	350 Candlebark - Blakely's Red Gum - Long-leaved Box grassy woodland in the Rye Park to Yass region of the NSW South Western Slopes Bioregion and South Eastern Highland Bioregion <i>Derived Native Grassland</i>	36.6	0	-36.6	4.61	84
5	351 Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion <i>Moderate to Good</i>	71.4	0 (33)	-71.4 (-38.4)	23.15 (8.11)	860
6	351 Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion <i>Derived Native Grassland</i>	26.8	0	-26.8	48.32	566
7	351 Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion <i>Acacia Shrubland</i>	53.8	0 (29.4)	-53.8 (-24.4)	1.95 (2.81)	76
8	351 Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion <i>Sifton Bush Shrubland</i>	25.6	0	-25.6	20.66	231
9	351 Brittle Gum - Broad-leaved Peppermint - Red Stringybark open forest in the north-western part (Yass to Orange) of the South Eastern Highlands Bioregion <i>Argyle Apple Forest</i>	-	-	-	-	-

Veg Zone	PCT/Species-credit	Vegetation Integrity Score			Area (ha) ¹	Credits Required
		Current	Future ¹	Change ¹		
Species Credits						
NSW – South Western Slopes IBRA Bioregion						
-	striped legless lizard (<i>Delma impar</i>)	-	-	-	3.58	34
-	southern myotis (<i>Myotis macropus</i>)	-	-	-	0.10	3
-	squirrel glider (<i>Petaurus norfolcensis</i>)	-	-	-	64.86	2,188
-	superb parrot (breeding habitat) (<i>Polytelis swainsonii</i>)	-	-	-	9.76	292
-	golden sun moth (<i>Synemon plana</i>)	-	-	-	12.31	238
South Eastern Highlands IBRA Bioregion						
-	squirrel glider (<i>Petaurus norfolcensis</i>)	-	-	-	41.32	1,248
-	superb parrot (breeding habitat) (<i>Polytelis swainsonii</i>)	-	-	-	10.06	265
-	golden sun moth (<i>Synemon plana</i>)	-	-	-	15.24	314

¹ Values in parentheses indicate those assessed as partial impacts within the Transmission Line Corridors refer to **Section 5.1.1.**

7 Biodiversity Credit Report

A full Biodiversity Credit Report is included in **Appendix F**.

8 Biodiversity Offset Strategy

RPRE is committed to delivering a biodiversity offset strategy that appropriately compensates for the unavoidable loss of ecological values as a result of the Project.

As discussed in **Section 4.0**, RPRE has, where possible, optimised the Project (including the Development Corridor and Indicative Development Footprints) to avoid and minimise ecological impacts in the Project planning stage.

Additionally, the Indicative Development Footprints will be finalised once turbine and contractor(s) are selected by RPRE. In doing so, RPRE will seek to further minimise impacts to biodiversity values. Additionally, a range of impact mitigation strategies are proposed through the future BMP to mitigate the impact on ecological values prior to the consideration of offsetting requirements. The offset requirements for the Project, as calculated in accordance with the BAM are identified in **Section 6.0**.

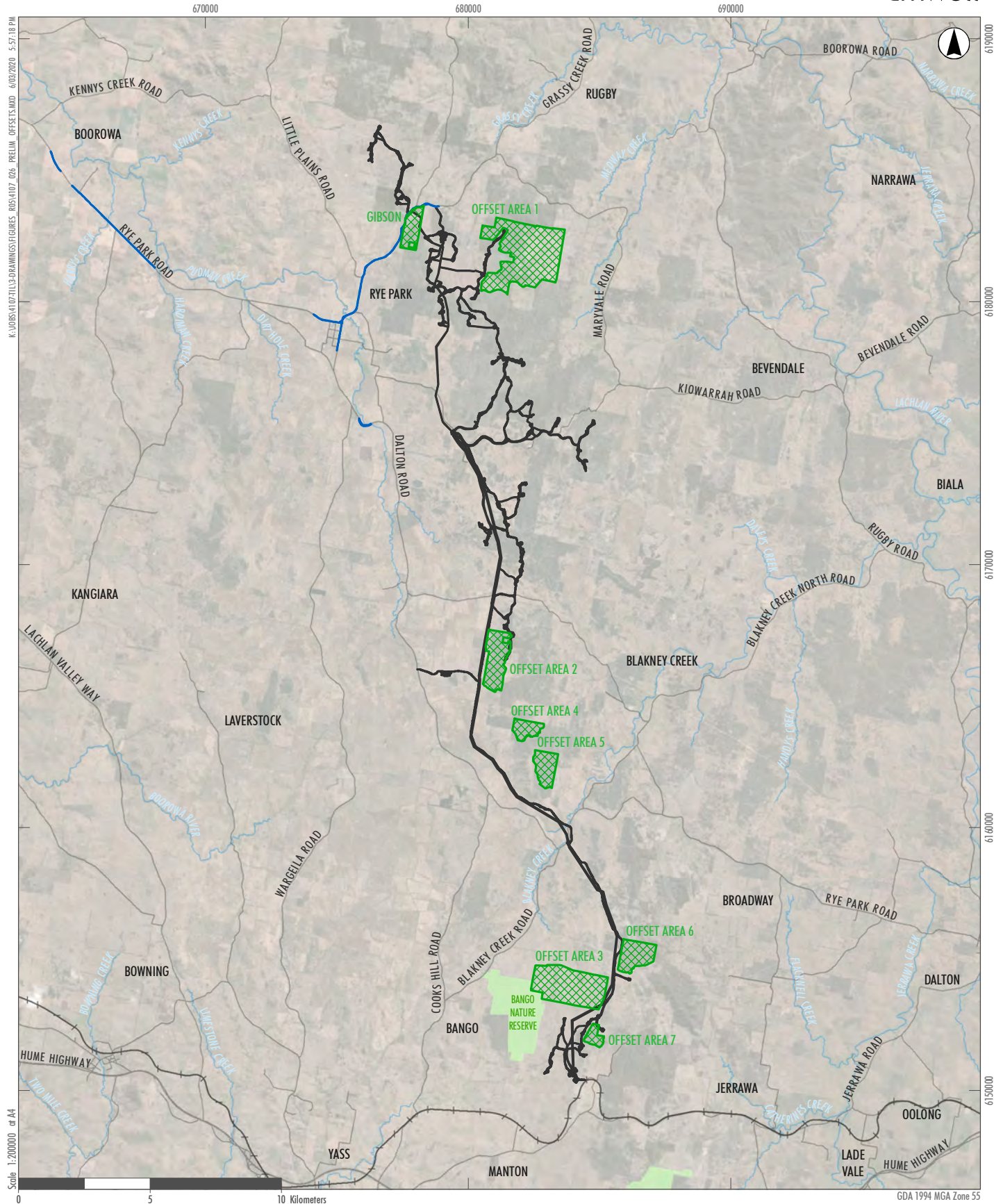
The offset strategy will be implemented in consideration of the process outlined in the BC Act and the final composition of the offset strategy may evolve as the Project progresses.

The biodiversity offset strategy will be developed during the assessment process in consultation with the BCD and DPIE and based on the credits required to be retired to offset the impacts of the Project as specified in **Section 6.3** and the offset options available under the BC Act and BC Regulation including:

- Land based offsets through the establishment of new Stewardship Sites (and subsequent retirement of credits) or by retiring credits from existing Stewardship Sites. RPRE would retire the required number and class of credits determined in accordance with the BDAR and the offset rules in the BC Regulation.
- Securing (purchasing) credits through the open credit market, and/or
- Paying into to the Biodiversity Conservation Fund (BCF).

Seven potential offset sites have been identified within parcels of land adjacent to the Project. These sites have had varying degrees of ecological surveys completed on them to consider their offset suitability for the Project. Through consideration of their size and potential credit generation, there are five potential offset sites likely to be further investigated for offset purposes. These are currently the priority sites of consideration for land-based offsets for the Project. In addition to these, RPRE have engaged Umwelt to complete a strategic investigation of potentially suitable land-based offset sites at a regional scale that may be suitable for this Project as well as another one of their proposed wind farm projects.

The five potential offset sites (**Figure 8.1**) have, based on a range of preliminary surveys, the potential to generate ecosystem and species credits consistent with those impacted by the Project. This includes PCTs 298, 335, 350 and 351 ecosystem credits. Species credits species likely to generate credits on the five potential offset sites are golden sun moth (*Synemon plana*), superb parrot (*Polytelis swainsonii*) and squirrel glider (*Petaurus norfolcensis*).



Legend

- Rye Park Wind Farm Modified Indicative Development Footprint — External Roads
- Rye Park Wind Farm Modified Indicative Development Footprint — Wind Farm
- Preliminary Offset Investigation Sites
- Watercourses
- NPWS Estate

FIGURE 8.1

Preliminary Offset Investigation Sites

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