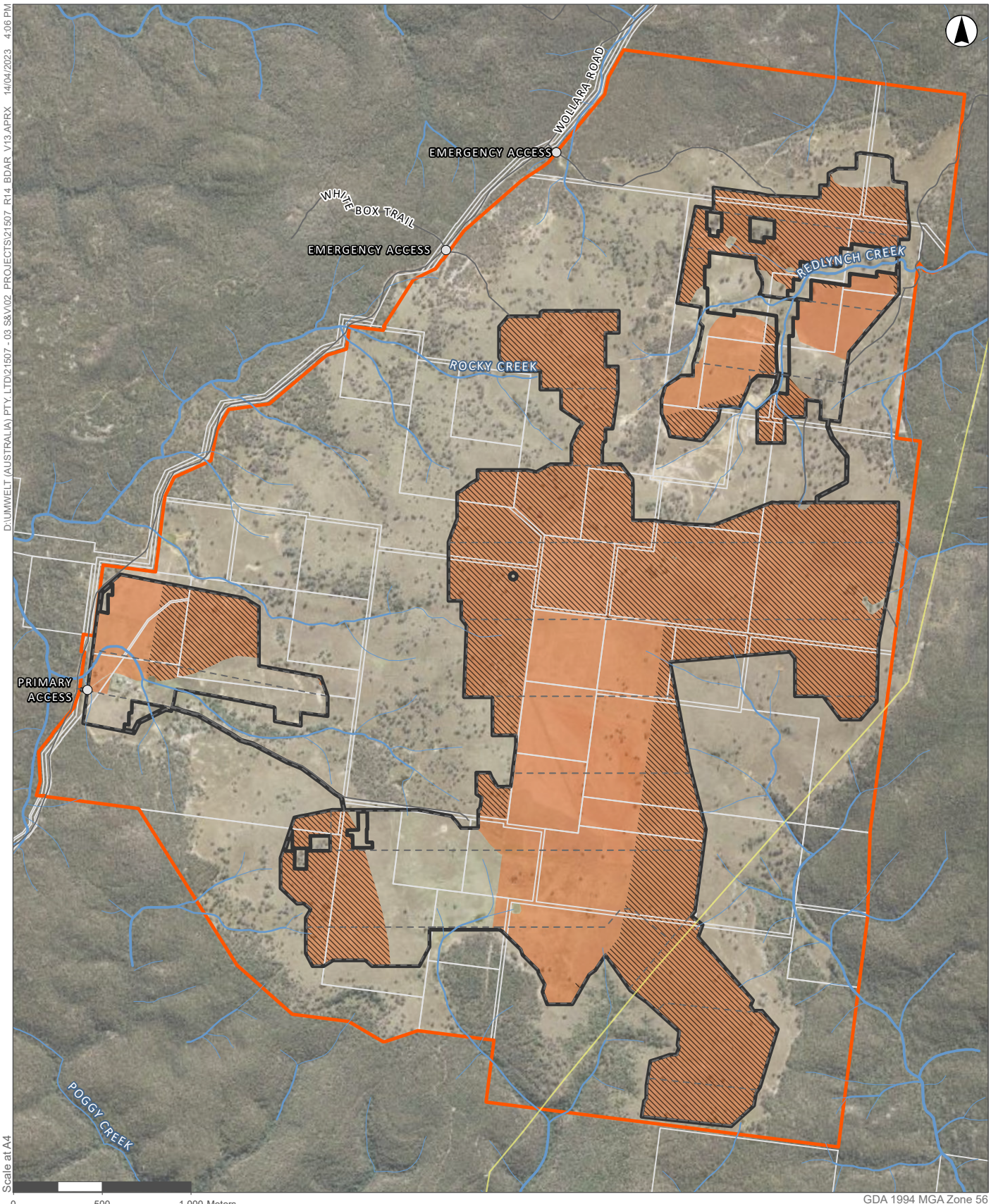


Legend

- Access Points
- Proposed Access Tracks
- Existing Roads and Tracks
- Watercourse
- Electricity Transmission Line
- Property Boundaries
- Development Footprint
- Project Area

Threatened Ecological Communities within the Development Footprint

- White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland VEC - EPBC Act
- White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC - BC Act

FIGURE 4.3

Threatened Ecological Communities

Image Source: ESRI Basemap (2021) **Data source:** NSW LPI (2021), NSW DSFI (2021); NPWS Estate (2019); Lightsource BP (2022)

4.4 Vegetation Zones

A description of each vegetation Condition Zone within the Development Footprint is provided in **Section 4.2** of this Report. A map of the vegetation condition zones is provided in **Figure 4.2** and the details of each Condition Zone including area, patch size class and the BAM survey plots required and completed are provided in **Table 4.5**.

Table 4.5 Vegetation Condition Zones and patch sizes

Vegetation Condition Zone ID	PCT ID number and name	Condition / other defining feature	Area (ha)	Patch size class (select multiple if areas of native vegetation are discontinuous)	No. vegetation integrity plots required	No. vegetation integrity plots completed	Plot IDs of vegetation integrity plots used in assessment
PCT 483 - 1	483 Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Scattered Trees	23.64	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	4	5	P18, P20, P21, P22, P45
PCT 483 - 2	483 Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Moderate condition derived native grassland	168.48	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	6	18	P6, P8, P44, P51, P52, P61, P62, P63, P64, P65, P66, P67, P68, P69, P79, P80, P81, P82
PCT 483 - 3	483 Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Moderate to low condition derived native grassland	308.37	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	7	19	P7, P9, P10, P11, P16, P17, P34, P36, P37, P41, P53, P55, P56, P57, P58, P70, P73, P74, P75
PCT 483 - 4	483 Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Low condition derived native grassland	199.14	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	6	10	P15, P38, P39, P40, P42, P46, P54, P83, P84, P85
PCT 1661 - 1	1661 Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	Scattered Trees	6.07	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	4	P2, P23, P26, P43

Vegetation Condition Zone ID	PCT ID number and name	Condition / other defining feature	Area (ha)	Patch size class (select multiple if areas of native vegetation are discontinuous)	No. vegetation integrity plots required	No. vegetation integrity plots completed	Plot IDs of vegetation integrity plots used in assessment
PCT 1661 - 2	1661 Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	Moderate to low condition derived native grassland	36.79	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	4	11	P1, P4, P5, P27, P30, P50, P59, P60, P76, P77, P78
PCT 1661 - 3	1661 Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	Low condition derived native grassland	53.24	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	5	5	P3, P28, P29, P71, P72

4.5 Vegetation Integrity (Vegetation Condition)

4.5.1 Vegetation Integrity Survey Plots

Details on the number of BAM plots (floristic and vegetation integrity survey plots) required and completed for each vegetation condition zone, in accordance with Table 3 of the BAM, are provided in **Table 4.6**. The vegetation integrity plot survey locations are shown in **Figure 2.1**. A summary of the BAM VI plot data is contained in **Appendix C** and a digital copy of the data has been forwarded to BCD.

4.5.2 Scores

The vegetation integrity condition scores for the BAM Plots completed are provided in **Table 4.6**. This table represents the combined scores from all plots completed for each vegetation condition zone, including the vegetation integrity score and the presence of hollow bearing trees.

Table 4.6 Vegetation Integrity Condition Scores

Vegetation Zone ID	Composition condition score	Structure condition score	Function condition score	Vegetation integrity score	Hollow bearing trees present?
PCT 483 Condition Zone 1 – Scattered Trees	80.2	85.1	69.6	78	Yes
PCT 483 Condition Zone 2 – Moderate Condition Derived Native Grassland	58.1	67.5	9.3	33.1	No
PCT 483 Condition Zone 3 – Moderate to Low Condition Derived Native Grassland	61.5	65.5	0.5	12.4	No
PCT 483 Condition Zone 4 – Low Condition Derived Native Grassland	37.5	36	0.7	9.9	No
PCT 1661 Condition Zone 1 – Scattered Trees	59.5	27.6	81	51.1	Yes
PCT 1661 Condition Zone 2 – Moderate to Low Condition Derived Native Grassland	40.6	17.1	3.3	13.2	No
PCT 1661 Condition Zone 3 – Low Condition Derived Native Grassland	32.3	16.1	0.1	3.3	No

4.5.3 Use of Benchmark Data

The V1.1 Benchmarks (https://www.lmbc.nsw.gov.au/bamcalc/app/assets/version1.1-benchmarks.csv) were utilised for this assessment in accordance with the current transitional arrangements for BAM C Cases in progress on 31 January 2023 (case opened 10/05/2022). Screenshots of the benchmark values used are provided in **Appendix D**.

5.0 Habitat Suitability for Threatened Species

5.1 Identification of Threatened Species for Assessment

5.1.1 Ecosystem Credit Species

The ecosystem credit species predicted to occur on or use the Development Footprint are identified in **Table 5.1**. Justification is provided for any species from the BAM-C automatically populated list excluded from assessment.

Table 5.1 Predicted Ecosystem Credit Species

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints / Geographic Limitations	Species retained for further assessment?	Justification for any Exclusions	Associated PCT and Condition Zone species retained within	Sensitivity to gain class
		BC Act	EPBC Act							
Regent Honeyeater (Non-important habitat)	*Anthochaera phrygia*	CE	CE	Yes	BAM-C	-	Yes	Yes	PCT 483 all condition zones PCT 1661 all condition zones	High
Glossy Black-Cockatoo (Foraging habitat)*	*Calyptorhynchus lathami*	V	-	Yes	Observed during surveys	Presence of Allocasuarina and Casuarina species	Yes / Partial	No *Casuarina* or *Allocasuarina* present within DNG Condition zones	PCT 483 Scattered PCT 1661 Scattered	High
Speckled Warbler	*Chthonicola sagittata*	V	-	No	BAM-C	-	Yes	-	PCT 1661 all condition zones	High
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus victoriae*	V	V	No	BAM-C	-	Yes	-	PCT 1661 all condition zones	High
Varied Sittella	*Daphoenositta chrysoptera*	V	-	No	BAM-C	-	Yes	-	PCT 1661 all condition zones	Moderate
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	No	BAM-C	-	Yes	-	PCT 1661 all condition zones	High
Black Falcon	*Falco subniger*	V	-	No	BAM-C	-	Yes	-	PCT 1661 all condition zones	Moderate
Little Lorikeet	*Glossopsitta pusilla*	V	-	No	BAM-C	-	Yes	-	PCT 483 all condition zones PCT 1661 all condition zones	High

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints / Geographic Limitations	Species retained for further assessment?	Justification for any Exclusions	Associated PCT and Condition Zone species retained within	Sensitivity to gain class
		BC Act	EPBC Act							
Painted Honeyeater	*Grantiella picta*	V	V	No	BAM-C	Mistletoes present at a density of greater than five mistletoes per hectare	Partial	Excluded from PCT 483 DNG condition zones as habitat constraints not met	PCT 483 scattered trees condition zone	Moderate
White-throated Needletail	*Hirundapus caudacutus*	-	V	No	BAM-C	-	Yes	-	PCT 483 all condition zones PCT 1661 all condition zones	High
Square-tailed Kite (Foraging habitat)	*Lophoictinia isura*	V	-	Yes	BAM-C	-	Yes	-	PCT 1661 all condition zones	Moderate
Hooded Robin (south-eastern form)	*Melanodryas cucullata cucullata*	V	V	No	BAM-C	-	Yes	-	PCT 1661 all condition zones	Moderate
Turquoise Parrot	*Neophema pulchella*	V	-	No	BAM-C	-	Yes	-	PCT 483 all condition zones PCT 1661 all condition zones	High
Barking Owl (Foraging habitat)	*Ninox connivens*	V	-	Yes	BAM-C	-	Yes	-	PCT 483 all condition zones PCT 1661 all condition zones	High

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints / Geographic Limitations	Species retained for further assessment?	Justification for any Exclusions	Associated PCT and Condition Zone species retained within	Sensitivity to gain class
		BC Act	EPBC Act							
Corben's Long-eared Bat	*Nyctophilus corbeni*	V	V	No	BAM-C	-	Yes	-	PCT 1661 all condition zones	High
Scarlet Robin	*Petroica boodang*	V	-	No	BAM-C	-	Yes	-	PCT 1661 all condition zones	Moderate
Flame Robin	*Petroica phoenicea*	V	-	No	BAM-C	-	Yes	-	PCT 1661 all condition zones	Moderate
New Holland Mouse	*Pseudomys novaehollandiae*	-	V	No	Supplementary SEARs	-	Yes	-	PCT 483 all condition zones PCT 1661 all condition zones	High
Grey-headed Flying-fox (Non-breeding habitat)	*Pteropus poliocephalus*	V	V	Yes	Supplementary SEARs	-	Yes	-	PCT 483 all condition zones PCT 1661 all condition zones	High

5.1.2 Species Credit Species

5.1.2.1 Predicted Flora Species Credit Entities

The flora species credit species predicted to occur on the Development Footprint are identified in **Table 5.2**.

Justification is provided for any species from the BAM-C automatically populated list excluded from assessment. Geographic limitations, habitat constraints, degradation or lack of suitable microhabitats are the permitted reasons for excluding species credit species.

For threatened flora species NSW, DPIE (2020b) identify that only the suitable habitat for the target species within the Development Footprint needs to be surveyed and includes areas in the Development Footprint supporting any listed habitat constraints and PCTs associated with that species in the TBDC. In this context NSW DPIE (2020b) also identify that suitable habitat for threatened flora may encompass entire PCTs or be restricted to niches determined with consideration of habitat constraints, land use history, disturbance events and climatic factors. The TBDC and the Threatened Species Profile website, along with appropriate published or peer-reviewed references and/or data must be used to determine suitable habitat (NSW DPIE 2020b).

The Draft Land Categorisation Mapping for the Development Footprint also identifies large areas of Category 1 - Exempt Land. Areas of PCT 483 correspond to a CEEC and are therefore excluded from consideration as Category 1 Exempt Land under the BAM, however areas of derived native grassland condition zones for PCT 1661 all correspond to Category 1 - Exempt Land. Surveys within PCT 1661 areas which correspond to Category 1 – Exempt Land have been undertaken as a precautionary measure where field habitat assessment confirmed the potential presence of suitable habitat for the target species.

Table 5.2 Predicted Flora Species Credit Species

Common Name	Scientific Name	Listing Status		Sources	Habitat Constraints / Geographic Limitations	Species retained for further assessment?	Justification if excluded from further assessment	PCT and Vegetation Condition Zone species retained within / associated with
		BC Act	EPBC Act					
Commersonia procumbens	*Commersonia procumbens*	V	V	☒ BAM-C ☐ TBDC / BioNet Atlas ☐ Previous survey ☐ Current survey	Piliga Sandstone	No	Habitat constraints not met as the Development Footprint is not on Piliga Sandstone.	None
Commersonia rosea	*Commersonia rosea*	E	E	☐ BAM-C ☒ TBDC / BioNet Atlas ☐ Previous survey ☐ Current survey	-	Yes	-	PCT 1661 Scattered Trees PCT 1661 Moderate to Low Condition Derived Native Grassland where shrubs potentially present
***Cymbidium canaliculatum* population in the Hunter Catchment**	*Cymbidium canaliculatum*	E Pop.	Not listed	☐ BAM-C ☒ TBDC / BioNet Atlas ☐ Previous survey ☐ Current survey	Epiphytic in a range of eucalypts, Acacia and Angophora, Fallen/standing dead timber including logs Hunter catchment as defined by Australia's River Basins (Geoscience Australia 1997)	Yes	-	PCT 483 Scattered Trees Condition Zone PCT 1661 Scattered Trees Condition Zone

Common Name	Scientific Name	Listing Status		Sources	Habitat Constraints / Geographic Limitations	Species retained for further assessment?	Justification if excluded from further assessment	PCT and Vegetation Condition Zone species retained within / associated with
		BC Act	EPBC Act					
Pine Donkey Orchid	*Diuris tricolor*	V	Not listed	☐ BAM-C ☒ TBDC / BioNet Atlas ☐ Previous survey ☐ Current survey	N/A	Yes	-	PCT 1661 Scattered Trees Parts of PCT 1661 Moderate to Low Derived Native Grassland
Fairy Bells	*Homoranthus darwinioides*	V	V	☐ BAM-C ☒ TBDC / BioNet Atlas ☐ Previous survey ☐ Current survey	N/A	Yes		PCT 1661 Scattered Trees PCT 1661 Moderate to Low Condition Derived Native Grassland where shrubs potentially present
Large-leafed Monotaxis	*Monotaxis macrophylla*	E	Not listed	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	N/A	No although limited precautionary surveys undertaken as part of habitat searches	The Development Footprint is assessed as too disturbed to support this species. This is due to a long history of agricultural land use including clearing, pasture improvement, grazing, exclusion of natural fire regimes through fuel reduction and lack of suitable microhabitats (rocky ridges).	PCT 483 & PCT 1661 Scattered Trees Condition Zones PCT 483 Moderate Derived Native Grassland and Moderate to Low Derived Native Grassland Condition Zones and PCT 483 Scattered Trees Condition Zone where surrounded by the above derived native grassland zones. PCT 1661 Scattered Trees and PCT 1661 Moderate to Low Condition Derived Native Grassland where shrubs potentially present

Common Name	Scientific Name	Listing Status		Sources	Habitat Constraints / Geographic Limitations	Species retained for further assessment?	Justification if excluded from further assessment	PCT and Vegetation Condition Zone species retained within / associated with
		BC Act	EPBC Act					
Ozothamnus tesselatus	*Ozothamnus tesselatus*	V	V	☐ BAM-C ☒ TBDC / BioNet Atlas ☐ Previous survey ☐ Current survey	N/A	Yes	-	PCT 1661 Scattered Trees PCT 1661 Moderate to Low Condition Derived Native Grassland where shrubs potentially present
Scant Pomaderris	*Pomaderris queenslandica*	E	Not listed	☒ BAM-C ☐ TBDC / BioNet Atlas ☐ Previous survey ☐ Current survey	N/A	Yes	-	PCT 1661 Scattered Trees PCT 1661 Moderate to Low Condition Derived Native Grassland where shrubs potentially present

5.1.2.2 Threatened Fauna Candidate Species

The fauna species credit species predicted to occur on the Development Footprint are identified in **Table 5.3**.

Justification is provided for any species from the BAM-C automatically populated list excluded from assessment. Geographic limitations, vagrant species, habitat constraints, degradation or lack of suitable microhabitats are the permitted reasons for excluding species credit species. Species credit fauna associated with PCT 1655 are included in the assessment in **Table 5.3** and were subject to surveys. It is noted that PCT 1655 has subsequently been removed from the Development Footprint and will not be impacted by the Project.

The 'Species credit' threatened bats and their habitats NSW survey guide for the Biodiversity Assessment Method (NSW OEH 2018) defines potential habitat as the area of the Development Footprint that support any listed habitat constraints and PCTs associated with the target species as per the TBDC. This approach to habitat assessment and surveying has been adopted for target threatened microbat species.

Table 5.3 Predicted Threatened Fauna Species Credit Species

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints / Geographic Limitations	Species retained for further assessment?	Justification if excluded from further assessment	PCT vegetation condition zones species retained within
		BC Act	EPBC Act						
Regent Honeyeater (Important Habitat)	*Anthochaera phrygia*	CE	CE	Yes	☒ BAM-C ☐ TBDC / BioNet Atlas ☐ Previous survey ☐ Current survey	-	Yes	N/A	Assessed by Important Habitat Mapping
Pink-tailed Legless Lizard	*Aprasia parapulchella*	V	V	No	☒ BAM-C ☐ TBDC / BioNet Atlas ☐ Previous survey ☐ Current survey	Rocky areas or within 50 m of rocky areas	Yes	N/A	All PCTs and Condition Zones with surveys stratified to areas with rocks
Gang-gang Cockatoo (Breeding Habitat)	*Callocephalon fimbriatum*	V	Not listed	Yes	☒ BAM-C ☒ TBDC / BioNet Atlas ☐ Previous survey ☐ Current survey	Hollow bearing trees with hollows >9 cm	Yes	Excluded from derived native grassland condition zones for PCT 483 and 1661 due to lack of trees for nesting.	PCT 483 Scattered trees PCT 1661 Scattered Trees
Glossy Black-Cockatoo (Breeding Habitat)	*Calyptorhynchus lathami*	V	Not listed	Yes	☐ BAM-C ☐ TBDC / BioNet Atlas ☐ Previous survey ☒ Current survey	Hollow bearing trees with hollows >15 cm >8 m AGL	Yes	Excluded from derived native grassland condition zones for PCT 483 and 1661 due to lack of trees for nesting.	PCT 483 Scattered trees PCT 1661 Scattered Trees

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints / Geographic Limitations	Species retained for further assessment?	Justification if excluded from further assessment	PCT vegetation condition zones species retained within
		BC Act	EPBC Act						
Large-eared Pied Bat	*Chalinolobus dwyeri*	V	V	No	☐ BAM-C ☒ TBDC / BioNet Atlas ☐ Previous survey ☐ Current survey	Within 2 km of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within 2 km of old mines or tunnels	No	There are records for this species on the BioNet Atlas in areas adjacent to the Development Footprint, however there are no associated PCTs present and no suitable breeding habitat within 100 m of the Development Footprint.	-
Striped Legless Lizard	*Delma impar*	V	V	No	☒ BAM-C ☐ TBDC / BioNet Atlas ☐ Previous survey ☐ Current survey	-	Yes, although it is noted that this species has been previously incorrectly regarded as synonymous with the recently described Hunter Valley Delma (*Delma vescolineata*)	-	All PCTs and Condition Zones with surveys stratified to areas with rocks
Little Eagle (Breeding Habitat)	*Hieraaetus morphnoides*	V	Not listed	Yes	☐ BAM-C ☒ TBDC / BioNet Atlas ☐ Previous survey ☐ Current survey	Potential nest trees - live (occasionally dead) large old trees within vegetation)	Yes	Excluded from derived native grassland condition zones for PCT 483 and 1661 due to lack of trees for nesting.	PCT 483 Scattered trees PCT 1661 Scattered Trees

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints / Geographic Limitations	Species retained for further assessment?	Justification if excluded from further assessment	PCT vegetation condition zones species retained within
		BC Act	EPBC Act						
Swift Parrot (Important Habitat)	*Lathamus discolor*	E	CE	Yes	☐ BAM-C ☒ TBDC / BioNet Atlas ☐ Previous survey ☐ Current survey	As per mapped areas	No	The Development Footprint is not within a mapped important habitat area.	-
Square-tailed Kite (Breeding Habitat)	*Lophoictinia isura*	V	Not listed	Yes	☒ BAM-C ☐ TBDC ☐ Previous survey ☐ Current survey	Potential nest trees	Yes	Excluded from derived native grassland condition zones for PCT 483 and 1661 due to lack of trees for nesting.	PCT 483 Scattered trees PCT 1661 Scattered Trees
Little Bent-winged Bat	*Miniopterus australis*	V	Not listed	Yes	☐ BAM-C ☒ TBDC / BioNet Atlas ☐ Previous survey ☐ Current survey	Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding	No	Habitat constraints are not present within Development Footprint	-
Large Bent-winged Bat (Breeding Habitat)	*Miniopterus orianae oceanensis*	V	Not listed	Yes	☐ BAM-C ☒ TBDC / BioNet Atlas ☐ Previous survey ☐ Current survey	Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding	No	No associated PCTs present and no suitable breeding habitat within 100 m of the Development Footprint.	-

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints / Geographic Limitations	Species retained for further assessment?	Justification if excluded from further assessment	PCT vegetation condition zones species retained within
		BC Act	EPBC Act						
Barking Owl (Breeding Habitat)	*Ninox connivens*	V	Not listed	Yes	☒ BAM-C ☐ TBDC / BioNet Atlas ☐ Previous survey ☐ Current survey	Hollow bearing trees with hollows >20 cm diameter and >4 m AGL	Yes	Excluded from derived native grassland condition zones for PCT 483 and 1661 due to lack of trees for nesting.	PCT 483 Scattered trees PCT 1661 Scattered Trees
Powerful Owl (Breeding Habitat)	*Ninox strenua*	V	Not listed	No	☐ BAM-C ☒ TBDC / BioNet Atlas ☐ Previous survey ☐ Current survey	Hollow bearing trees with hollows >20 m diameter	Yes	Excluded from derived native grassland condition zones for PCT 483 and 1661 due to lack of trees for nesting.	PCT 483 Scattered trees PCT 1661 Scattered Trees
Greater Glider	*Petauroides volans*	Not listed	V	No	☐ BAM-C ☒ TBDC / BioNet Atlas ☐ Previous survey ☐ Current survey	Hollow bearing trees	Yes	Excluded from derived native grassland condition zones for PCT 483 and 1661 due to lack of trees for nesting.	PCT 483 Scattered trees PCT 1661 Scattered Trees
Squirrel Glider	*Petaurus norfolcensis*	V	Not listed	No	☐ BAM-C ☒ TBDC / BioNet Atlas ☐ Previous survey ☐ Current survey		Yes	Excluded from derived native grassland condition zones for PCT 483 and 1661 due to lack of trees for nesting.	PCT 483 Scattered trees PCT 1661 Scattered Trees

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints / Geographic Limitations	Species retained for further assessment?	Justification if excluded from further assessment	PCT vegetation condition zones species retained within
		BC Act	EPBC Act						
Brush-tailed Rock-wallaby	*Petrogale penicillata*	E	V	No	☐ BAM-C ☒ TBDC / BioNet Atlas ☐ Previous survey ☐ Current survey	Land within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or clifflines	No	Habitat constraints not met and habitat degraded.	-
Koala	*Phascolarctos cinereus*	V	V	Yes	☒ BAM-C ☐ TBDC / BioNet Atlas ☐ Previous survey ☐ Current survey	Presence of koala use trees	Yes	Excluded from derived native grassland condition zones for PCT 483 and 1661 due to lack of trees for nesting.	PCT 483 Scattered trees PCT 1661 Scattered Trees
Grey-headed Flying-fox (Breeding Habitat)	*Pteropus poliocephalus*	V	V	Yes	☐ BAM-C ☒ TBDC / BioNet Atlas ☐ Previous survey ☐ Current survey	Breeding camps	No	Habitat constraints / breeding camps are not present.	-
Masked Owl (Breeding Habitat)	*Tyto novaehollandiae*	V	Not listed	Yes	☐ BAM-C ☒ TBDC / BioNet Atlas ☐ Previous survey ☐ Current survey	Hollow bearing trees with hollows >20 cm diameter	Yes	Excluded from derived native grassland condition zones for PCT 483 and 1661 due to lack of trees for nesting.	PCT 483 Scattered trees PCT 1661 Scattered Trees

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints / Geographic Limitations	Species retained for further assessment?	Justification if excluded from further assessment	PCT vegetation condition zones species retained within
		BC Act	EPBC Act						
Eastern Cave Bat	*Vespadelus troughtoni*	V	Not listed	No	☐ BAM-C ☒ TBDC / BioNet Atlas ☐ Previous survey ☐ Current survey	Within 2 km of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within 2 km of old mines, tunnels, old buildings or sheds	No	There are records for this species on the BioNet Atlas in areas adjacent to the Development Footprint, however there are no associated PCTs present and no suitable breeding habitat within 100 m of the Development Footprint.	No
Key to Listing Status V = Vulnerable, E = Endangered, CE = Critically Endangered.									

5.2 Presence of Candidate Species Credit Species

5.2.1 Threatened Flora Species

No threatened flora species were observed within the Development Footprint and targeted surveys were completed for all candidate threatened flora species. A summary of the methods used and determination of presence for candidate threatened flora species credit species is provided in **Table 5.4**.

Table 5.4 Determining the Presence of Candidate Flora Species Credit Species on the Development Footprint

Common Name	Scientific Name	Listing Status		Method used to determine presence	Present?	Further assessment required?
		BC Act	EPBC Act			
-	*Commersonia rosea*	E	E	Targeted threatened species survey	No	No
***Cymbidium canaliculatum* population in the Hunter Catchment**	*Cymbidium canaliculatum*	EP	-	Targeted threatened species survey	No	No
Pine Donkey Orchid	*Diuris tricolor*	V	-	Targeted threatened species survey	No	No
Fairy Bells	*Homoranthus darwinioides*	V	V	Targeted threatened species survey	No	No
Large-leafed Monotaxis	*Monotaxis macrophylla*	E	-	Targeted threatened species survey	No	No
-	*Ozothamnus tesselatus*	V	V	Targeted threatened species survey	No	No
Scant Pomaderris	*Pomaderris queenslandica*	E	-	Targeted threatened species survey	No	No

5.2.2 Threatened Fauna Species

The following threatened fauna species have been assessed for species credits within the Development Footprint:

- Regent Honeyeater (not observed / assessed by mapped important habitat).
- Barking Owl.

A summary of the methods used and determination of presence for candidate threatened fauna species credit species is provided in **Table 5.5**. Based on existing BioNet Atlas records (DPE 2023a) it is also considered that the Large-eared Pied Bat and Eastern Cave Bat may utilise the Development Footprint for foraging, however no breeding habitat or PCTs associated with these species will be impacted by the Project. These two species are not associated with any PCTs which will be impacted by the Project.

Table 5.5 Determining the Presence of Candidate Fauna Species Credit Species on the Development Footprint

Common Name	Scientific Name	Listing Status		Method used to determine presence	Present?	Further assessment required? (BAM Subsections 5.2.5 and 5.2.6)
		BC Act	EPBC Act			
Regent Honeyeater Mapped Important Habitat	***Anthochaera phrygia***	**CE**	**CE**	**Within important habitat mapped area**	**Not observed during surveys / assessed via important habitat mapping**	**Yes**
Pink-tailed Legless Lizard	*Aprasia parapulchella*	V	V	Targeted threatened species survey	No	No
Gang-gang Cockatoo Breeding Habitat	*Callocephalon fimbriatum*	V	Not listed	Targeted threatened species survey	No	No
Glossy Black-Cockatoo Breeding Habitat	*Calyptorhynchus lathami*	V	Not listed	Targeted threatened species survey	No	No
Striped Legless Lizard	*Delma impar*	V	V	Targeted threatened species survey	No	No, it is noted that this species has been previously incorrectly regarded as synonymous with the currently unlisted and recently described Hunter Valley Delma (*Delma vescolineata*). Both species were not observed during surveys.
Little Eagle Breeding Habitat	*Hieraaetus morphnoides*	V	Not listed	Targeted threatened species survey	No	No
Square-tailed Kite Breeding Habitat	*Lophoictinia isura*	V	Not listed	Targeted threatened species survey	No	No
Barking Owl Breeding Habitat	***Ninox connivens***	**V**	**Not listed**	**Targeted threatened species survey**	**Yes**	**Yes**
Powerful Owl Breeding Habitat	*Ninox strenua*	V	Not listed	Targeted threatened species survey	No	No

Common Name	Scientific Name	Listing Status		Method used to determine presence	Present?	Further assessment required? (BAM Subsections 5.2.5 and 5.2.6)
		BC Act	EPBC Act			
Greater Glider	*Petauroides volans*	Not listed	V	Targeted threatened species survey	No	No
Squirrel Glider	*Petaurus norfolcensis*	V	Not listed	Targeted threatened species survey	No	No
Koala	*Phascolarctos cinereus*	V	V	Targeted threatened species survey	No	No
Masked Owl Breeding Habitat	*Tyto novaehollandiae*	V	Not listed	Targeted threatened species survey	No	No

5.3 Threatened Species Surveys

A summary of the targeted surveys completed for candidate threatened flora species is provided in **Table 5.6**, further details of the threatened flora surveys completed, and guidelines applied are provided in **Section 2.3** of this Report.

Table 5.6 Summary of Species Credit Threatened Flora Surveys Completed

Common Name	Scientific Name	Threatened Flora Species Surveys			Present	Further assessment required
		Survey Method	Timing of survey within recommended period?	Survey Effort (hours & no people)		
-	*Commersonia rosea*	Parallel field traverses	☒ Yes January, February 2022	15.25 person hours completed by up to 2 people over multiple days	No	No
***Cymbidium canaliculatum* population in the Hunter Catchment**	*Cymbidium canaliculatum*	Parallel field traverses / phase 1 grid-based search	☒ Yes January, February 2022	Phase 1 grid search: 115 person hours completed by up to 3 people over multiple days Other parallel field traverses: 15.25 person hours completed by up to 2 people over multiple days	No	No

Common Name	Scientific Name	Threatened Flora Species Surveys			Present	Further assessment required
		Survey Method	Timing of survey within recommended period?	Survey Effort (hours & no people)		
Donkey Orchid	*Diuris tricolor*	Parallel field traverses	☒ Yes October 2022	12.5 hrs x 2 people	No	No
Fairy Bells	*Homoranthus darwinioides*	Parallel field traverses	☒ Yes November 2022	10.5 hrs x 2 people	No	No
Large-leafed Monotaxis	*Monotaxis macrophylla*	Parallel field traverses / phase 1 grid-based search	☒ Yes January, February 2022	Phase 1 grid search: 115 person hours completed by up to 3 people over multiple days Other parallel field traverses: 15.25 person hours completed by up to 2 people over multiple days	No	No
-	*Ozothamnus tesselatus*	Parallel field traverses	☒ Yes October 2022	12.5 hrs x 2 people	No	No
Scant Pomaderris	*Pomaderris queenslandica*	Parallel field traverses	☒ Yes November 2021	10.5 hrs x 2 people	No	No

A summary of the targeted surveys completed for candidate threatened fauna species is provided in **Table 5.7**, further details of the threatened fauna surveys completed, survey timing and guidelines followed are provided in **Section 2.4** of this Report.

Table 5.7 Summary of Species Credit Threatened Fauna Surveys Completed

Common Name	Scientific Name	Threatened Fauna Species Surveys			Present/Further assessment required
		Survey Method	Timing of survey within recommended period?	Survey effort (hours & no people)	
Pink-tailed Legless Lizard	*Aprasia parapulchella*	Rock rolling searches	☒ Yes	Rock rolling searches – 2 days x 2 people	No

Common Name	Scientific Name	Threatened Fauna Species Surveys			Present/Further assessment required
		Survey Method	Timing of survey within recommended period?	Survey effort (hours & no people)	
Gang-gang Cockatoo Breeding Habitat	*Callocephalon fimbriatum*	Diurnal census during breeding period	☒ Yes	44.25 hrs x 2 people	No
Glossy Black-Cockatoo Breeding Habitat	*Calyptorhynchus lathami*	Diurnal census during breeding period	☒ Yes	66.75 hrs x 2 people	No
Striped Legless Lizard	*Delma impar*	Rock rolling searches	☒ Yes	Rock rolling searches – 2 days x 2 people	No
Little Eagle Breeding Habitat	*Hieraaetus morphnoides*	Diurnal census during breeding period	☒ Yes	75.25 hrs x 2 people	No
Square-tailed Kite Breeding Habitat	*Lophoictinia isura*	Diurnal census during breeding period	☒ Yes	59.25 hrs x 2 people	No
Barking Owl Breeding Habitat	*Ninox connivens*	Diurnal surveys: habitat searches and hollow-bearing tree assessment Nocturnal surveys: Quiet listening, Stag watching, Call playback and spotlighting	☒ Yes	Diurnal surveys: 121 hrs x 2 people Nocturnal Surveys: 21.5 hrs x 2 people	Yes
Powerful Owl Breeding Habitat	*Ninox strenua*	Diurnal surveys: habitat searches and hollow-bearing tree assessment Nocturnal surveys: Quiet listening, Stag watching, Call playback and spotlighting	☒ Yes	Diurnal surveys: 61.75 hrs x 2 people Nocturnal Surveys: 14.5 hrs x 2 people	No

Common Name	Scientific Name	Threatened Fauna Species Surveys			Present/Further assessment required
		Survey Method	Timing of survey within recommended period?	Survey effort (hours & no people)	
Greater Glider	*Petauroides volans*	Spotlighting	☒ Yes	Spotlighting: 21.5 hrs x 2 people Camera trapping: 1080 trap nights	No
Squirrel Glider	*Petaurus norfolcensis*	Camera trapping and spotlighting	☒ Yes	Spotlighting: 21.5 hrs x 2 people Camera trapping: 1080 trap nights	No
Koala	*Phascolarctos cinereus*	Spotlighting and camera trapping	☒ Yes	Spotlighting: 21.5 hrs x 2 people Camera trapping: 1080 trap nights	No
Masked Owl	*Tyto novaehollandiae*	Diurnal surveys: habitat searches and hollow-bearing tree assessment Nocturnal surveys: Quiet listening, Stag watching, Call playback and spotlighting	☒ Yes	Diurnal surveys: 61.75 hrs x 2 people Nocturnal Surveys: 14.5 hrs x 2 people	No

5.4 Expert Reports and of More Appropriate Local Data

No expert reports were utilised in place of targeted surveys for the purposes of this assessment. This assessment has also not relied upon alternative data (more appropriate local data) to assess habitat suitability. Area or Count, and Location of Suitable Habitat for a Species Credit Species (a Species Polygon).

5.4.1 Results for BC Act Listed Species Credit Entities

5.4.1.1 Regent Honeyeater *(Anthochaera phrygia)* Species Polygon

Mapped important habitat for this species is present within the Development Footprint, the species polygon details are provided in **Table 5.8** and the species polygon is mapped in **Figure 5.1**.

Table 5.8 Regent Honeyeater Species Polygon Details

Information Required	Species Polygon Details
Biodiversity Risk Weighting	Very High (3)
SAII Entity	Yes, mapped important habitat areas
Habitat constraints / microhabitats present on the Development Footprint / vegetation zone	Mapped important habitat areas
Extent of suitable habitat present	PCT 483 Condition Zone 1 – Scattered Trees = 16.89 ha PCT 483 Condition Zone 2 – Moderate Condition Derived Native Grassland = 11.92 ha PCT 483 Condition Zone 3 – Moderate to Low Condition Derived Native Grassland = 5.87 ha PCT 483 Condition Zone 4 – Low Condition Derived Native Grassland = 2.38 ha PCT 1661 Condition Zone 1 – Scattered Trees = 4.04 ha PCT 1661 Condition Zone 2 – Moderate to Low Condition Derived Native Grassland = 3.42 ha PCT 1661 Condition Zone 3 – Low Condition Derived Native Grassland = 0.44 ha Total = 44.96 ha
TBDC species specific recommendations	If the Development Footprint is within a mapped area, no survey is required for that species and it is assumed present. The part of the Development Footprint within the important habitat map forms the species polygon used to generate species credits. Where only part of the Development Footprint is mapped as important habitat, the remaining areas are assessed for ecosystem credits. BCD has advised that PCT condition zones containing derived native grassland must be included within the species polygon where they overlap with mapped important habitat within the Development Footprint. This approach has been applied as shown in **Figure 5.1**. Species was not observed during any surveys.

Information Required	Species Polygon Details
Habitat condition (vegetation integrity score for each vegetation zone in the polygon)	PCT 483 Condition Zone 1 – Scattered Trees = 78 PCT 483 Condition Zone 2 – Moderate Condition Derived Native Grassland = 33.1 PCT 483 Condition Zone 3 – Moderate to Low Condition Derived Native Grassland = 12.4 PCT 483 Condition Zone 4 – Low Condition Derived Native Grassland = 9.9 PCT 1661 Condition Zone 1 – Scattered Trees = 51.1 PCT 1661 Condition Zone 2 – Moderate to Low Condition Derived Native Grassland = 13.2 PCT 1661 Condition Zone 3 – Low Condition Derived Native Grassland = 3.3

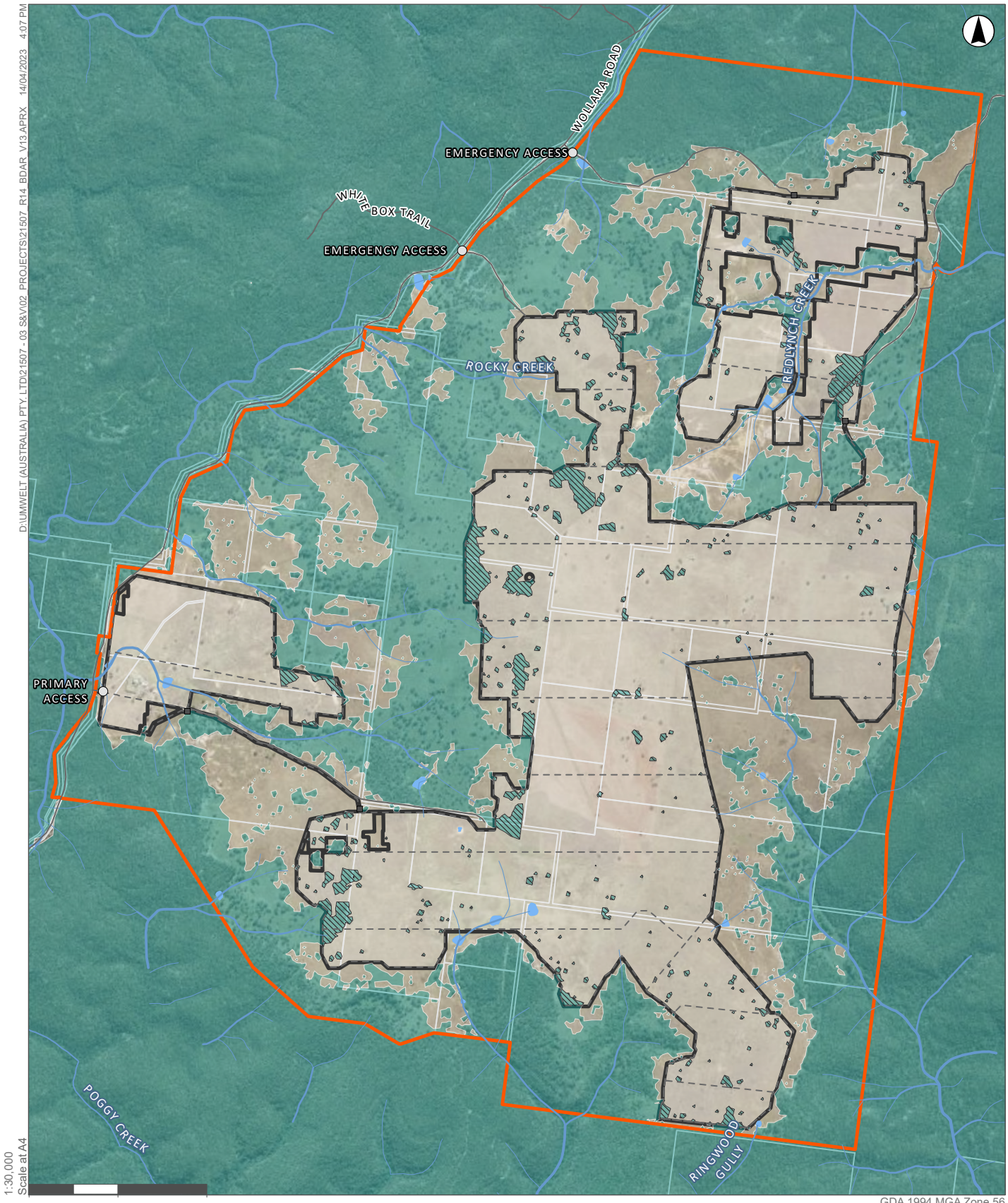


FIGURE 5.1

Candidate Species Credit Species Records and Species Polygons - Regent Honeyeater

Image Source: ESRI Basemap (2021) **Data source:** NSW LPI (2021), NSW DSFI (2021); NPWS Estate (2019); Lightsource BP (2022)

5.4.1.2 Barking Owl (Ninox connivens)

The Barking Owl was detected within the Development Footprint during surveys completed on the following dates:

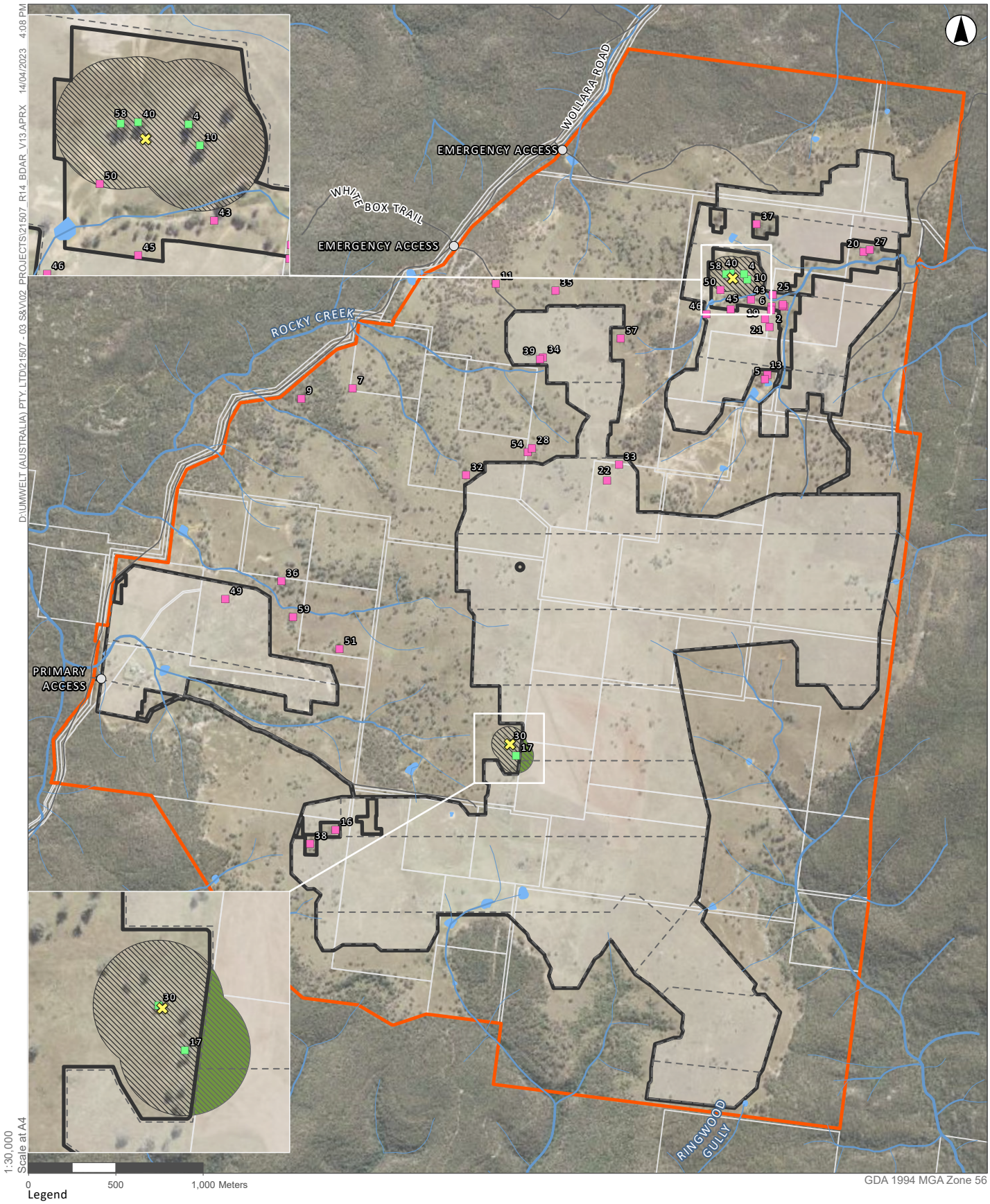
- 23 August 2021 – One Barking Owl calling in response to call playback within the vicinity of hollow-bearing trees 17 and 30. These trees were observed to contain potentially suitable characteristics for breeding and have been used for the purposes of mapping the species polygon.
- 30 August 2021 – one Barking Owl was observed on dusk near hollow-bearing tree numbers 4, 10, 40 and 58. It came in quickly to verbal calling. A second Barking Owl was heard calling to the north-west of the individual observed outside of the Development Footprint. No individuals were observed directly existing from a hollow, however hollow-bearing trees 4, 10, 40 and 58 were observed from the ground to contain characteristics suitable for breeding and the individual observed was displaying territorial behaviour during the breeding season. These trees have been used for the purposes of mapping the species polygon.
- 7 December 2021 – a pair of Barking Owls were again heard calling in response to call playback within the vicinity of hollow bearing trees 17 and 30.
- Comprehensive targeted nocturnal survey including quiet listening and call playback throughout the remainder of the site did not detect any barking owl activity in other areas.

All of the trees where the Barking Owl was observed will be retained, and the Project will only impact highly disturbed grazing land within the buffer to one tree in the central part of the Development Footprint. A compensatory buffer on the western side of this tree will be retained to ensure that the suitability of the tree as nesting habitat is retained. The species polygon details are provided in **Table 5.9** and the species polygon is mapped in **Figure 5.2**.

Table 5.9 Barking Owl Species Polygon Details

Information Required	Species Polygon Details
Biodiversity Risk Weighting	High (2)
SAII Entity	No
Habitat constraints / microhabitats present on the Development Footprint / vegetation zone	Suitable hollow trees where activity detected during the breading season.
Extent of suitable habitat present	PCT 483 Condition Zone 2 – Moderate Condition Derived Native Grassland = 1.2 ha PCT 483 Condition Zone 4 – Low Condition Derived Native Grassland = 0.01 ha

Information Required	Species Polygon Details
TBDC species specific recommendations	The TBDC identifies that for the assessment of Barking Owl breeding habitat: Where any known nest tree(s) occurs on site (e.g., known from existing data, studies or other documented evidence), a species polygon providing a circular buffer with a 100 m RADIUS should be drawn around the known nest tree(s). In addition, or where there are no known nest trees on site, assessors should apply the following process: 1. Look for SIGNS OF BREEDING on site as follows; suitable habitat AND (a) presence of male and female OR (b) calling to each other (duetting) OR (c) find nest. 2. Where signs of breeding on site are present, POTENTIAL NEST TREES should be identified. Potential nest trees are living or dead trees with hollows greater than 20 cm diameter and greater than 4 m above the ground. 3. Where potential nest trees are identified on site then, night monitoring at the identified potential nest locations for a minimum of 2 nights should be undertaken to detect the presence of any owl of this species using a potential nest tree or demonstrating behaviour focussed on a potential nest tree (e.g. investigating the hollow or roosting within 10 m). NSW DPE are currently developing survey guidance for threatened bird species. In the interim, assessors must undertake species surveys using best practice methods that can be replicated for repeat surveys (as per the BAM threatened species survey requirements). 4. If monitoring of potential nest trees detects this owl species using, or demonstrating behaviour focused on the trees (e.g., investigation of the hollow or roosting within 10 m) on site, the species polygons should be drawn around those trees (i.e. the identified potential nest trees where any owl of this species is observed using or focusing behaviour around the tree). The species polygons should be circular in shape and must include a buffer radius of 100 m around each tree. The purpose of the buffer is to minimise disturbance/avoid clearing, for a development application, or to conserve and improve habitat, for a biodiversity stewardship agreement, within the area essential for breeding. This includes habitat suitable for male roosts, feeding/grooming perches and fledgling requirements. It does not account for foraging habitat. The species uses paddock trees to extend foraging area from intact woodland. The shape of the buffer can be modified where evidence provided in the Biodiversity Assessment Report indicates an alternative shape would better meet the species needs in the context of the assessment site. For example, extant vegetation is linear, and the nest tree is already located near the edge of the wooded area.
Habitat condition (vegetation integrity score for each vegetation zone in the polygon)	PCT 483 Condition Zone 2 – Moderate Condition Derived Native Grassland = 33.1 PCT 483 Condition Zone 4 – Low Condition Derived Native Grassland = 9.9



Legend

- Access Points
- Proposed Access Tracks
- Existing Roads and Tracks
- Property Boundaries
- Development Footprint
- Project Area
- Barking Owl Observation Locations
- Hollow Bearing Trees >20cm Opening (no Barking Owl activity detected)
- Hollow Bearing Trees >20cm Opening (where Barking Owl activity detected)
- Barking Owl Potential Nest Tree Buffer (100m)
- Barking Owl Species Polygon

FIGURE 5.2

Barking Owl Observation Locations

Image Source: ESRI Basemap (2021) **Data source:** NSW LPI (2021), NSW DSFI (2021); NPWS Estate (2019); Lightsource BP (2022)

5.4.1.3 Large-eared Pied-bat (*Chalinolobus dwyeri*)

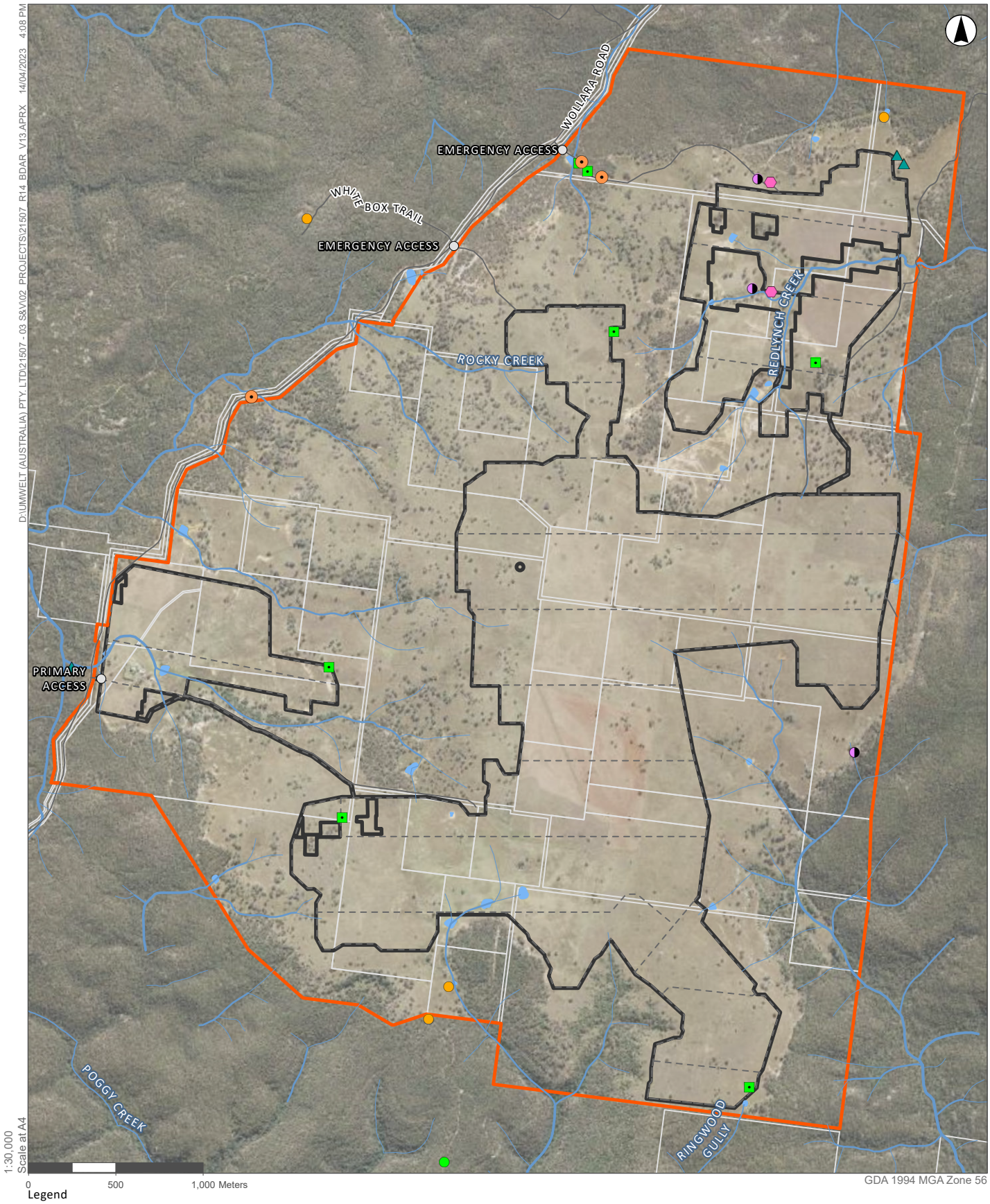
There are four (4) previous records for this species adjacent to the Development Footprint on the BioNet Atlas (NSW DPE 2023a), these records are mapped in **Figure 5.3**. No suitable breeding habitat for this species has been observed within the Development Footprint or within 100 m of the Development Footprint. Potential breeding habitat is PCTs associated with the species within 100 m of rocky areas containing caves, or overhangs or crevices, cliffs or escarpments, or old mines, tunnels, culverts, derelict concrete buildings. Breeding habitat is considered a potential serious and irreversible impact (SAII) under the BAM. Aerial photograph analysis identified that these habitat features are not present within 100 m of the Development Footprint and site surveys have confirmed that these features are not present within the Development Footprint.

There are no PCTs associated with this species that will be impacted by the Project and a species polygon is therefore not required.

5.4.1.4 Eastern Cave Bat (*Vespadelus troughtoni*) Species Polygon

There is one previous record for this species to the south of the Development Footprint on the BioNet Atlas (NSW DPE 2023a), this record in mapped in **Figure 5.3**. Potential calls from this species were recorded during ultrasonic call recording surveys using Anabat detectors. It is noted that this species cannot be differentiated from the Little Forest Bat (*Vespadelus vulturnus*) by call between 49–53 kHz where they overlap in frequency in locations where they are sympatric, such as the Project Area. This species may be present, however species polygons for foraging habitat should align with PCTs on the Development Footprint to which the species is associated that are within 2 km of identified potential roost habitat features. There are no PCTs associated with this species that will be impacted by the Project and a species polygon is therefore not required.

The TBDC identifies that potential breeding habitat is a potential SAII entity and is assessed as PCTs associated with the species within 100 m of rocky areas containing caves, or overhangs or crevices, cliffs or escarpments, or old mines, tunnels, culverts, derelict concrete buildings. Aerial photograph analysis identified that these habitat features are not present within 100 m of the Development Footprint and site surveys have confirmed that these features are not present within the Development Footprint.



Legend

- Access Points
- Proposed Access Tracks
- Existing Roads and Tracks
- Watercourse
- Waterbodies
- Development Footprint
- Project Area

Ecosystem Credit Species Records

- Diamond Firetail (7)
- Dusky Woodswallow (3)
- Glossy Black-Cockatoo (3)
- Little lorikeet (3)
- White-throated Needletail (2)

Bionet Search Records

- Eastern Cave Bat
- Large-eared Pied Bat

FIGURE 5.3

Other Threatened Species Observation Locations

Image Source: ESRI Basemap (2021) **Data source:** NSW LPI (2021), NSW DSFI (2021); NPWS Estate (2019); Lightsource BP (2022)

5.4.2 Results for BC Act Listed Ecosystem Credit Species

The ecosystem credit species were observed within the Development Footprint are described in **Table 5.10**.

Table 5.10 Ecosystem Credit Species Observation Details

Common Name	Scientific Name	Observation Details
Glossy-black Cockatoo	*Calyptorhynchus lathami*	This species was heard calling to the south-west of the Development Footprint on 14 October 2021 and was observed in the north-eastern part of the Development Footprint in two locations on 31 January 2022. The observation locations are shown in **Figure 5.3**. The behaviours observed were consistent with foraging and no use of the site for breeding habitat was observed despite targeted survey in the breeding season.
Diamond Firetail	*Stagonopleura guttata*	This species was observed within the Development Footprint at several locations as shown in **Figure 5.3**. The observation dates were 24 August 2021, 23 November 2021, 2 February 2022 and 22 March 2022.
Dusky Woodswallow	*Artamus cyanopterus*	This species was seen within the Development Footprint on 26 August 2021 and 23 November 2021. The observation locations are shown in **Figure 5.3**.
Little Lorikeet	*Glossopsitta pusilla*	The Little Lorikeet was observed foraging within the Development Footprint on 22 September 2021, 8 February 2022 and 22 March 2022. The observation locations are shown in **Figure 5.3**.

5.4.3 Results for EPBC Act Listed Species

Details of the threatened species listed within the EPBC Act observed during surveys or mapped by important habitat are described in **Table 5.11**.

Table 5.11 Results for EPBC Act Listed Species Present (recorded within the Development Footprint)

Common Name	Scientific Name	Extent (ha) of Suitable Habitat Present On Site
Regent Honeyeater	*Anthochaera phrygia*	This species was not observed during surveys. This species is assessed by mapped important habitat which overlaps with the Development Footprint. The extent of mapped important habitat within the Development Footprint is 44.96 ha.
Glossy Black-Cockatoo	*Calyptorhynchus lathami*	Areas of suitable foraging habitat for this species is limited to scattered occurrences of *Allocasuarina* trees which are present within PCT 1661.
White-throated Needletail	*Hirundapus caudacutus*	This species was recorded during surveys on 23 November 2022 (8 individuals observed) and on 1 February 2022 (3 individuals observed). The entire area of the Development Footprint is considered to provide suitable aerial foraging habitat for this species.
Diamond Firetail	*Stagonopleura guttata*	The entire area of the Development Footprint, excluding water and cleared land and exotic vegetation is considered to provide suitable foraging habitat for this species.

5.5 SEPP (Biodiversity and Conservation) 2021

Chapters 3 and 4 of State Environmental Planning Policy (SEPP) (Biodiversity and Conservation) 2021 (the SEPP) contain provisions for assessing impacts to Koalas for Local Council assessed development applications. This SEPP is not directly relevant to State Significant Development. Chapter 3 of the SEPP has been considered below in the identification of potential Koala habitat and breeding habitat to support further assessment under State and Commonwealth legislation.

For RU1 Primary Production zoned land, Chapter 3 Koala Habitat Protection 2020 of the SEPP describes:

- Potential habitat as areas of native vegetation where trees of the types listed in Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component.
- Core Koala habitat as area of land with a resident population of Koalas, evidenced by attributes such as breeding females, being females with young, and recent sightings of and historical records of a population.

This assessment of Koala habitat has used the Koala feed tree schedule itemised in both Schedule 1 and Schedule 3 of SEPP (Biodiversity and Conservation) 2021 as the latter provides a comprehensive list of preferred feed trees based on recent studies (OEH 2018a).

Three of the tree species listed in Schedule 3 of the SEPP have been recorded within the Project Area. These tree species represent 15% or greater of the total number of trees within any PCT in the Subject Land and, as such, all PCTs across the Subject Land represent potential Koala habitat. **Table 5.12** lists the Koala feed trees present within the Development Footprint.

Table 5.12 Koala Feed Tree Present within Project Area

Scientific Name	Common Name
Angophora floribunda	Rough-barked Apple
*Eucalyptus albens**	White Box
Eucalyptus crebra	Narrow-leaved Ironbark
Eucalyptus melliodora	Yellow Box

Despite the Development Footprint containing potential habitat for the Koala, the Koala was not recorded in the Project Area despite extensive ecological surveys. In addition, a review of the BioNet Atlas of NSW Wildlife reveals three records of this species within 5 km of the Project Area (including one from within the Project Area dated 1957), with six records within 20 km of the Subject Land. These records range from 1957 to 2016.

As a result, the Subject Land does not represent core Koala habitat as the Koala was not recorded in the Project Area and very few Koalas have been recorded within 5 km within the last 18 years. No further provisions of Koala habitat protection in SEPP (Biodiversity and Conservation) 2021 apply. Notwithstanding this, the Koala is a species credit species under the BAM and has been further considered as part of this BDAR.

6.0 Identifying Prescribed Impacts

Prescribed impacts which are predicted to occur as a result of the proposed development are documented in **Table 6.1**.

Table 6.1 Prescribed Impacts Identified

Feature	Present	Description of feature characteristics and location	Threatened entities that use, are likely to use, or are part of the habitat feature.
Karst, caves, crevices, cliffs, rocks or other geological features of significance	☐Yes / ☒ No	There are no karst, caves, crevices, cliffs, rocks or other geological features of significance within the Development Footprint. There are areas of rock piles, minor rock outcropping and shallow sandstone that will be impacted by the Project.	Based on the results of the surveys completed it is considered that there will be no known threatened entities using the features identified.
Human-made structures	☒ Yes / ☐No	There is an occupied residential dwelling and farm sheds within the Development Footprint proposed for removal. There is also a disused 1900s house in the north-eastern part of the Development Footprint.	No threatened entities were observed using or are likely to use any man-made structures that will be removed or modified by the Project.
Non-native vegetation	☒ Yes / ☐No	The non-native vegetation has been attributed to Category 1 land. This consists of land used primarily for agriculture and has poor value for threatened species.	No threatened entities were observed using or are likely to use any non-native vegetation that will be removed or modified by the Project.
Habitat connectivity	☒ Yes / ☐ No	There will be clearing of native vegetation including canopy trees, these are mainly isolated and scattered trees, areas of derived native grassland and highly disturbed agricultural land assessed as Category 1 Land. The Project includes corridors between the four distinct Project areas.	The threatened entities observed during surveys are highly mobile species, capable of flying over the areas proposed for development. It is likely that these species will also utilise the retained areas of connectivity between the four Project areas. Theses species include: • Barking Owl. • Diamond Firetail. • Dusky Woodswallow. • Glossy Black-Cockatoo. • Little Lorikeet. • White-throated Needletail.

Feature	Present	Description of feature characteristics and location	Threatened entities that use, are likely to use, or are part of the habitat feature.
Waterbodies, water quality and hydrological processes	☒ Yes / ☐ No	Ten farm dams are proposed for removal. First and second order watercourses will also be impacted. Aquatic impacts are addressed in the Aquatic Assessment prepared by Coast Ecology (2023).	No threatened entities were observed using aquatic areas.
Wind turbine strikes (wind farm development only)	☐ Yes / ☒ No	This assessment is not a wind farm development.	Not applicable
Vehicle strikes	☒ Yes / ☐ No	Vehicle movements would be on tracks throughout the Development Footprint and would utilise existing tracks where possible.	No threatened entities are likely to be affected by vehicle strikes as vehicle movements will be at low speed.

7.0 Avoid and Minimise Impacts

7.1 Avoid and Minimise Direct and Indirect Impacts

7.1.1 Project Location

7.1.1.1 Location of Surface Works in Areas with No or Low Biodiversity Values

The entire extent of the Project Area shown in **Figure 7.1** was initially investigated for the potential establishment of the Project and subject to initial surveys. The Project Area (2000 ha) has provided flexibility in design to prioritise avoidance of high value biodiversity areas and the subject land has been already impacted by widespread clearing and ongoing pasture improvement works for agricultural use.

Since the early planning stages, the Proponent has sought to balance the areas of biodiversity impacts proposed with achieving retention of areas for a future Biodiversity Stewardship Agreement (BSA) to provide offsets for the Project. The Project has been designed to take advantage of the most disturbed parts of the Development Footprint and is centred on the areas of Category 1 – Exempt Land, areas of degraded derived native grassland which have been subject to historical clearing and are currently managed for livestock grazing. The areas of intact forest and woodland present were avoided during the refinement of the Development Footprint in the planning process. Development Footprint alterations have resulted in biodiversity impact avoidance through an initial-avoidance of approximately 38% (reducing from 2,000 ha to 1,249 ha) of the project area, a secondary approximately 30% reduction in Development Footprint area (reducing from 1,249 ha to 882 ha) and a further approximately 10% reduction in Development Footprint (882 ha to 799.5 ha). This has included the following targeted measures:

- Redesign the Project to minimise impacts on areas of mapped Regent Honeyeater important habitat (the generic mapping includes both areas of scattered trees and grassland).
- Alteration of the Project to reduce impacts to suitable breeding habitat for the Barking Owl.
- Alteration of the Project to avoid impact to PCTs associated with habitat for the Large-eared Pied bat and the Eastern Cave Bat.
- Reduction in the impacts to White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC to avoid areas of woodland with intact crown condition, and resulting in impact minimisation to areas to areas of scattered trees and derived native grassland condition zones.
- Establishment of exclusion zones within the Development Footprint to avoid Redlynch Creek which crosses the Project Area, and the remains of a Slab Hut of historic heritage importance.

7.1.1.2 Location of Sub-Surface Works in Areas with No or Low Biodiversity Values

Underground cabling will be required to connect infrastructure to the substation which is located in the south-eastern section of the central Project area. The underground cabling has been located within the footprints of the access roads and areas with low biodiversity values.

7.1.1.3 Avoidance of Wildlife Corridors

The Development Footprint contains agricultural land, predominantly comprised of grazed grasslands with remnant trees. It is surrounded by the Goulburn River National Park. Patches of retained forest and woodland vegetation are present typically in areas surrounding watercourses and on steeper or less fertile rocky habitats.

The Development Footprint contains three polygons which are separated by proposed vehicle access tracks, as shown in **Figure 3.2**. The three polygons which form the Development Footprint will be protected with fauna exclusion fencing, however the vehicle tracks will not be fenced to avoid habitat fragmentation and ensure that connectivity for terrestrial fauna species is maintained through the Project Area.

7.1.1.4 Location of Works to Minimise Interactions with Threatened Entities

Reductions in the Development Footprint assessed by Umwelt are shown in **Figure 7.1** and have included design considerations to minimise impacts to breeding habitat for the Barking Owl, mapped Important Habitat for the Regent Honeyeater and the higher quality areas of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC associated with PCT 483 Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley.

7.1.1.5 Location of Works to Avoid Impacts on Waterbodies and Hydrological Processes

Watercourse impacts will be limited to ephemeral first and second order streams. The main drainage trunk and the third order section of Redlynch Creek will be retained via an exclusion zone with impacts limited to designated crossing points.

7.1.1.6 Alternative Routes Considered

The Project has been designed to make use of the existing access tracks present throughout the site. It is considered that the use of other routes will not result in further impact minimisation or avoidance.

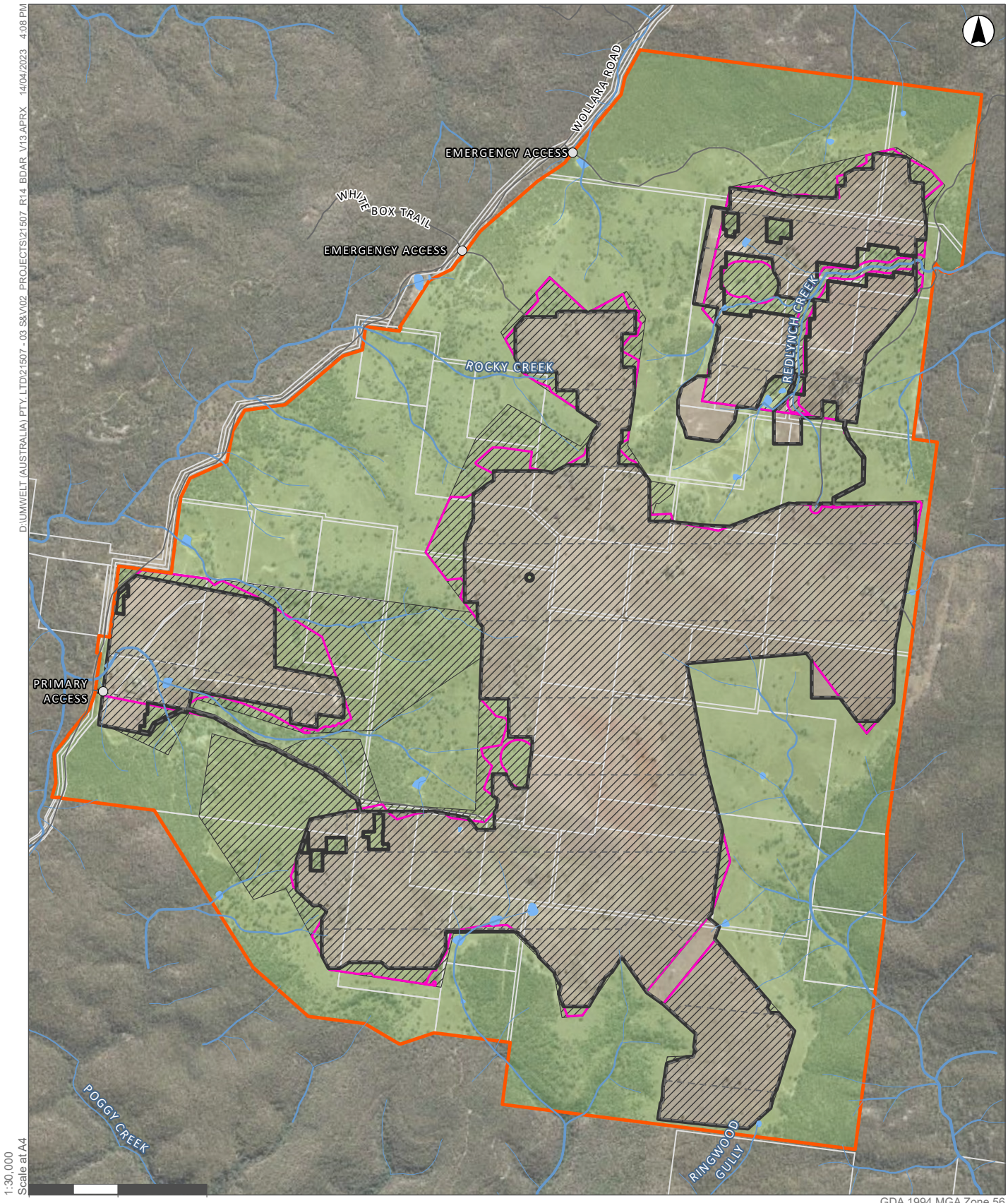


FIGURE 7.1

Impact Avoidance and Minimisation Locations

Image Source: ESRI Basemap (2021) **Data source:** NSW LPI (2021), NSW DSFI (2021); NPWS Estate (2019); Lightsource BP (2022)

7.1.1.7 Alternative Sites Within the Subject Land Considered

The entire extent of the Project Area shown in **Figure 7.1** was initially investigated for the potential establishment of the Project, and subject to initial surveys. Areas of intact vegetation were avoided early in the planning process to minimise impacts to the areas with the highest biodiversity values including large areas of mapped Important Habitat for the Regent Honeyeater and the highest quality areas of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland critically endangered ecological community.

Impact avoidance focused the Development Footprint on the previously cleared areas of historically disturbed vegetation, particularly areas with a long history of agricultural use mapped as Category 1 Exempt Land.

7.1.2 Project Design and Planning

7.1.2.1 Alterations to the Project Footprint

Several Project refinements have been incorporated into the design and layout of the Project since the preparation of the initial Scoping Report and the completion of biodiversity surveys, to avoid and/or minimise impacts to sensitive environmental features. These refinements have been implemented as an outcome of ongoing consultation with landholders, refining the engineering design and targeted ecological surveys conducted across the Project Area. This has resulted in several iterations to the Development Footprint to achieve the current design, shown in **Figure 7.1**.

Development Footprint alterations have resulted in biodiversity impact avoidance through an initial avoidance of approximately 38% (reducing from 2,000 ha to 1,249 ha) of the project area, a secondary approximately 30% reduction in Development Footprint area (reducing from 1,249 ha to 882 ha) and a further approximately 10% reduction in Development Footprint (882 ha to 799.5 ha). These alterations and refinements targeted the retention of:

- All areas of moderate to good condition White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC.
- All areas of the VEC Hunter Valley Footslopes Slaty Gum Woodland.
- Much of the mapped Regent Honeyeater Important Habitat within the Development Footprint.
- All suitable Barking Owl breeding trees where activity was detected during surveys.
- PCTs associated with the threatened microbat species Large-eared Pied Bat and Eastern Cave Bat.
- The third order sections of Redlynch Creek.

7.1.2.2 Design Measures

The Project has been designed to take advantage of an existing 500 kV transmission line crossing the south-east portion of the site, allowing easy connection to the national electricity grid and avoiding the requirement for additional clearing for transmission lines.

7.1.2.3 Location of Ancillary Structures and Sheds in Areas with No Biodiversity Values, or in Areas of Poorest Habitat

All ancillary structures and sheds will be located within the Development Footprint which will be utilised during the operational stage of the Project. Staged construction works will enable the use of the Development Footprint for ancillary structures and sheds such as site facilities, storage areas and materials stockpiles.

7.1.2.4 Location of Ancillary Structures and Sheds to Avoid Habitat of Threatened Entities

All ancillary structures and sheds will be located within the Development Footprint which will be utilised during the operational stage of the Project. Staged construction works will enable the use of the Development Footprint for ancillary structures such as site facilities, storage areas and materials stockpiles. Threatened species habitat will not be separately impacted by the location of ancillary structures.

7.1.2.5 Actions that Provide for Ecological Rehabilitation, Restoration and/or Maintenance or Retained Areas

The residual parts of the Project Area are currently being investigated for the establishment of a BSA to generate biodiversity credits to offset the impacts associated with the Project. The establishment of a BSA would provide offsets in the same locality as the Project and provide an opportunity for the rehabilitation, restoration and maintenance of the residual site areas. Specific objectives would include tree planting in areas of derived native grassland associated with the White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC and monitoring, rehabilitation and protection of areas of mapped important habitat for the Regent Honeyeater.

7.1.2.6 Alternative Modes or Technologies Considered

The proponent considered the possibility of establishing a wind farm on the Development Footprint in lieu of a solar farm. Discussions with the proponent identified that a wind farm may have a reduced direct impact footprint, however, would likely result in increased indirect impacts to birds and bats through turbine strikes and barotrauma events. This would potentially have a higher level of impact on the Regent Honeyeater and higher visual impacts within the surrounding Goulburn River National Park.

Alternative Project layouts based on different solar farm designs using mature technology with a proven track record of large-scale implementation, have also been investigated including:

- Fixed versus tracking options for PV module mounting: A single-axis tracking system was chosen for the Project as it allows for more efficient electricity generation than fixed tilt options, leading to more efficient land use. Tracking systems also have a lower visual impact as they minimise glare from the sun, which can occur when the sun is at low angles in the sky and the PV modules are not facing the sun.
- Mono-facial versus bifacial PV modules: Bifacial PV modules were selected for the Project as they allow for more efficient electricity generation than traditional single-sided PV modules, leading to more efficient land use. The distance between the rows of modules is also larger for bifacial modules, which helps to minimise environmental and visual impacts of the Project and facilitate grazing.

- Selection of higher rated capacity solar panels has also been adopted to ensure that the Development Footprint is minimised, the Project obtains a capacity of a 550 MWp of solar electricity and the cost of purchasing the solar panels maintains the projects economic viability.

7.1.2.7 Project Design Constraints

The Project Area was selected for the location of a solar farm due to the presence of an existing 500 kV transmission line, which means that there will be no requirement for a new electricity transmission line or associated impacts. To ensure that the project remains economically viable the total capacity of solar production needs to remain at or above a 550 MWp of solar electricity.

The Project Area is also characterised by suitable terrain and topography, high quality solar irradiance and ideal climatic conditions and access to major transport networks for delivery of construction materials. There is only one surrounding land holder (the NSW Government) and the visual impacts associated with the Project are minimised by the existing screening provided by the Goulburn River National Park.

7.2 Avoid and Minimise Prescribed Impacts

Prescribed Impacts are additional impacts which require assessment; however, they are not impacts which require consideration when calculating the number and classes of biodiversity credits required. Clause 6.1 of the Biodiversity Conservation Regulation defines *Prescribed Impacts* as:

- the impacts of development on the following habitat of threatened species or ecological communities:
    - karst, caves, crevices, cliffs and other geological features of significance,
    - rocks,
    - human made structures,
    - non-native vegetation,
    - the impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range,
    - the impacts of development on movement of threatened species that maintains their lifecycle,
    - the impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining or other development),
    - the impacts of wind turbine strikes on protected animals,
    - the impacts of vehicle strikes on threatened species of animals or on animals that are part of a threatened ecological community.

7.2.1 Project Location

Potential prescribed impacts of relevance to the Project are identified in **Section 6.0** of this Report and comprise disturbances to non-native vegetation, human made structures and waterbodies such as dams and watercourses. Areas of non-native vegetation, excluded areas and human made structures are not likely to provide habitat of importance to threatened entities which should be avoided through modification to the Project location.

7.2.2 Project Design

Potential prescribed impacts of relevance to the Project are identified in **Section 6.0** of this Report and comprise disturbances to non-native vegetation, human made structures and waterbodies such as dams and watercourses. Areas of non-native vegetation, excluded areas and human made structures are not likely to provide habitat of importance to threatened entities which should be avoided through modification to the Project design.

7.3 Other Measures Considered

7.3.1 Do Nothing Option

The 'Do nothing' option was considered as part of environmental impact assessment for this Project. The Project Area is currently used for livestock grazing. The 'do nothing option' would allow for the continued use of the Project Area solely for agricultural purposes. The 'do nothing option' would also imply that the Project is not developed and would therefore forego the Project's identified benefits, namely:

- the provision of additional renewable energy supply to assist in reaching state and Commonwealth renewable energy targets in areas of the network that can handle large scale solar without the need for new network upgrades or powerlines such as Renewable Energy Zones
- assistance in the transition towards cleaner electricity generation and a reduction in greenhouse gas emissions
- increased energy security and supply into the Australian grid
- significant social and economic benefits created through capital investment, provision of direct and indirect employment opportunities during the construction and operation of the Project and community benefit scheme.

The adverse impacts associated with the Project are considered to be manageable through the implementation of the impact avoidance, minimisation and offsetting measures proposed. Considering the benefits of the Project, the 'do nothing option' is considered to not be a preferred option for the Proponent.

7.4 Summary of Measures to Avoid and Minimise Impacts

A summary of the measures proposed to avoid and minimise direct, indirect and prescribed impacts associated with the Project is provided in **Table 7.1.**

Table 7.1 Avoidance and Minimisation Measures for Direct, Indirect and Prescribed Impacts

Action	Outcome	Timing	Responsibility
Preliminary biodiversity constraints analysis	Preliminary assessment of biodiversity constraints to inform Project design and minimise impacts to areas with high biodiversity values	Project design	Project Ecologist, Planning Team and Proponent
Location and design of works in existing disturbed areas where possible	Focus impacts on areas of low biodiversity value	Project design	Project Ecologist, Planning Team and Proponent
Reduction of Development Footprint boundary / impact footprint	Avoidance and minimisation of impacts to mapped important habitat for the Regent Honeyeater, areas associated with the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland critically endangered ecological community and Barking Owl Breeding Habitat.	Project design	Proponent
Workforce education and training	Environmental awareness for workforce	Pre-construction and during construction and operation	Engineering procurement and construction contractor (EPC)
Implement Construction Environmental Management Plan (CEMP)	Management and minimisation of potential environmental impacts	Project construction	EPC Contractor
Implementation of vegetation protection zones for areas to be retained	Protect retained habitats	During construction phase	Project Ecologist and EPC Contractor
Ecologist pre-clearance surveys and supervision of works	Minimisation of impacts to local fauna and their habitats through identification of fauna present and management to minimise harm	Construction / site clearing phase	Project Ecologist and EPC Contractor
Fencing and access control	Avoidance of unplanned human and livestock interference and disturbance to retained areas	Construction and operational phases	EPC Contractor
Erosion and sedimentation control	Minimise erosion and sedimentation within the site and downstream habitats through installation and maintenance of erosion and sediment controls	Construction and operational phases	EPC Contractor

Action	Outcome	Timing	Responsibility
Weed management	Prevent weed incursions and spread	During construction, site clearing and operational phases	EPC Contractor
Fauna exclusion	Prevent entrapment of fauna within site infrastructure	Operational phase	EPC Contractor and Project ecologist

8.0 Impact Assessment

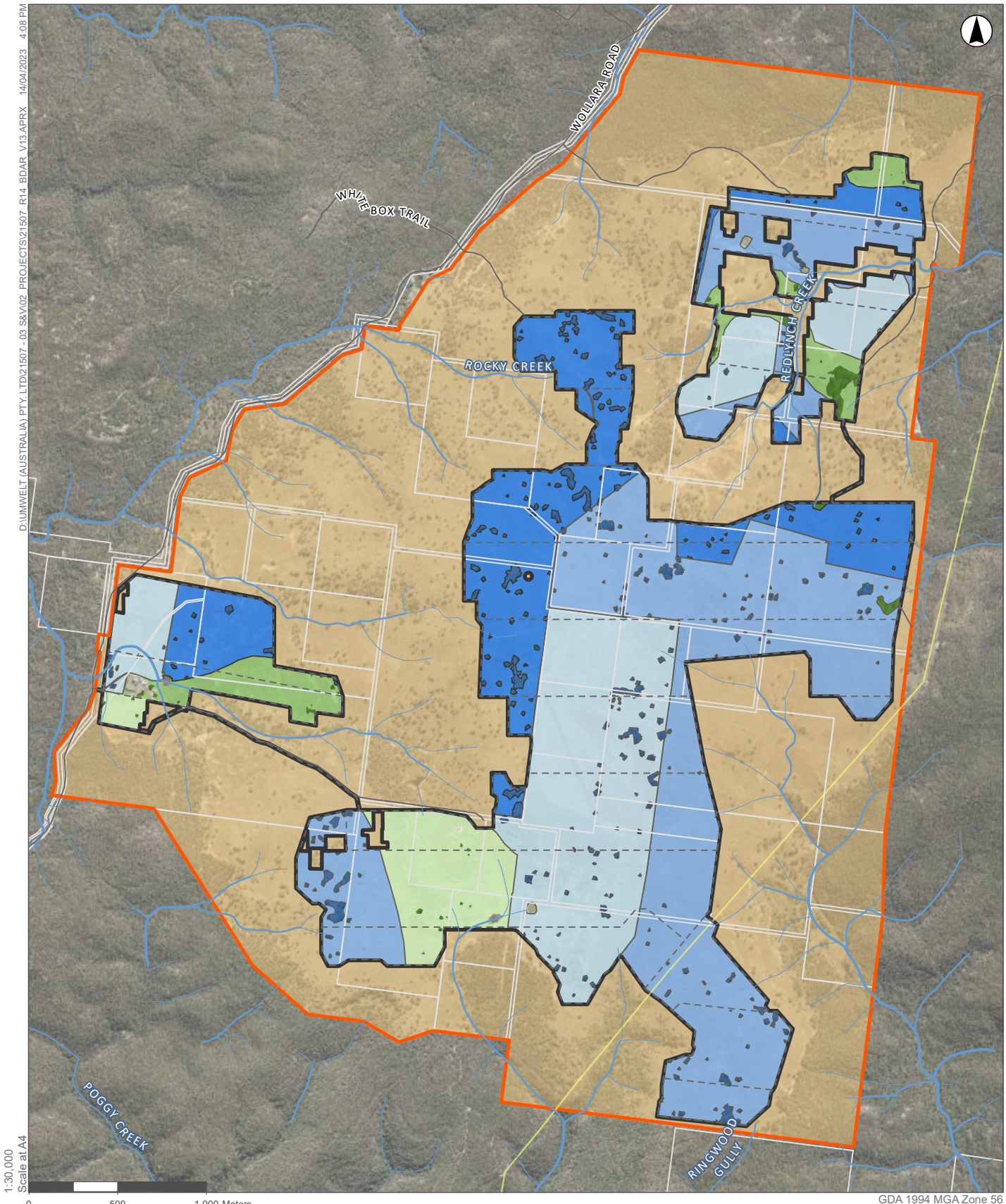
8.1 Direct Impacts

8.1.1 Residual Direct Impacts

The parts of the Development Footprint which are subject to impacts associated with the Project are mapped in **Figure 8.1**. **Table 8.1** summarises the extent of proposed residual direct impacts to plant community types and threatened entities observed or assumed to be present on the Development Footprint.

Table 8.1 Summary of Residual Direct Impacts

Direct impact (Describe the impact on PCT/TEC/EC or threatened species and their habitat)	BC Act Status	EPBC Act Status	Potential SAII Entity	Project Phase/ Timing of Impact	Extent
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands	Critically Endangered Ecological Community	Critically Endangered Ecological Community	Yes	Construction phase	Derived native grassland component = 675.99 ha Scattered Trees component = 23.64 ha Total extent = 699.63 ha
Regent Honeyeater **Mapped Important Habitat**	Critically Endangered	Critically Endangered	Yes	Construction phase	Scattered Trees = 20.93 ha Derived Native Grassland = 24.03 ha Total extent = 44.96 ha
Barking Owl **Breeding Habitat**	Vulnerable	Not listed	No	Not applicable	Total / Derived Native Grassland = 1.21 ha



Legend

- Proposed Access Tracks
- Existing Roads and Tracks
- Watercourse
- Electricity Transmission Line
- Property Boundaries
- Development Footprint
- Project Area
- Impact Avoidance Areas

Plant Community Types and Condition Zones

PCT 483 - Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley

- Low Condition Derived Native Grassland
- Moderate to Low Condition Derived Native Grassland
- Moderate Condition Derived Native Grassland
- Scattered Trees

PCT 1661 - Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin

- Low Condition Derived Native Grassland
- Moderate to Low Condition Derived Native Grassland
- Scattered Trees

FIGURE 8.1

Final Impacts likely to occur on the Subject Land

Image Source: ESRI Basemap (2021) **Data source:** NSW LPI (2021), NSW DSFI (2021); NPWS Estate (2019); Lightsource BP (2022)

8.1.2 Change in Vegetation Integrity Score

For each vegetation zone the change in vegetation integrity is based on the development impacting to zero during construction. No vegetation integrity scores have been assessed as above zero after development and there would be no management actions required to maintain any remaining vegetation as it has been assumed that impact will occur to all vegetation within the vegetation zones. While this assessment is based on impacting vegetation integrity scores to zero, it is expected that the actual vegetation integrity score will not decrease to zero due to the retention of grassland areas under the solar panels and within the edges of the Development Footprint.

Table 8.2 Impacts to Vegetation Integrity

PCT and Vegetation Condition Zone	Management zone	Area (ha)	Before development				After development				Change in VI score
			Composition	Structure	Function	VI score	Composition	Structure	Function	VI score	
PCT 483 Condition Zone 1 – Scattered Trees	Development Footprint	23.64	80.2	85.1	69.6	78	0	0	0	0	-78
PCT 483 Condition Zone 2 - Moderate Condition Derived Native Grassland	Development Footprint	168.48	58.1	67.5	9.3	33.1	0	0	0	0	-33.1
PCT 483 Condition Zone 3 – Moderate to Low Condition Derived Native Grassland	Development Footprint	308.37	61.5	65.5	0.5	12.4	0	0	0	0	-12.4
PCT 483 Condition Zone 4 - Low Condition Derived Native Grassland	Development Footprint	199.14	37.5	36	0.7	9.9	0	0	0	0	-9.9
PCT 1661 Condition Zone 1 – Scattered Trees	Development Footprint	6.07	59.5	27.6	81	51.1	0	0	0	0	-51.1
PCT 1661 Condition Zone 2 - Moderate to Low Condition Derived Native Grassland	Development Footprint	36.79	40.6	17.1	3.3	13.2	0	0	0	0	-13.2

PCT and Vegetation Condition Zone	Management zone	Area (ha)	Before development				After development				Change in VI score
			Composition	Structure	Function	VI score	Composition	Structure	Function	VI score	
PCT 1661 Condition Zone 3 - Low Condition Derived Native Grassland	Development Footprint	53.24	32.3	16.1	0.1	3.3	0	0	0	0	-3.3

8.2 Indirect Impacts

Table 8.3 summarises the extent of the proposed residual indirect impacts to plant community types and threatened entities observed or assumed to be present on the Development Footprint.

Table 8.3 Summary of Residual Indirect Impacts

Indirect impact	Threatened Entity Impacted	Project Impact Intensity	Frequency / Duration	Project phase/ timing of impact	Likelihood and consequences
Increased site occupation	Ecosystem credit species retained for assessment in **Table 5.1** and species credit threatened fauna species assessed as present in **Table 5.5.**	High	Frequent/ Ongoing	Construction and operation	Likely to occur, consequences are likely to include reduction in habitat suitability for threatened fauna
Connectivity and corridors	Ecosystem credit species retained for assessment in **Table 5.1** and species credit threatened fauna species assessed as present in **Table 5.5.**	Low	Frequent / Ongoing	Operation	A reduction in wildlife connectivity will occur, however some connectivity will be retained through planned corridor areas.
Light spill impacts	Ecosystem credit species retained for assessment in **Table 5.1** and species credit threatened fauna species assessed as present in **Table 5.5.**	Low	Frequent/ Ongoing	Operation	Limited impacts may occur, consequences likely to include minor alteration to fauna behaviours including avoidance of light and opportunistic utilisation of light spill areas.

Indirect impact	Threatened Entity Impacted	Project Impact Intensity	Frequency / Duration	Project phase/ timing of impact	Likelihood and consequences
Noise impacts	Ecosystem credit species retained for assessment in **Table 5.1**and species credit threatened fauna species assessed as present in **Table 5.5.**	Low	Frequent / short term	Construction	Construction noise will occur, consequences may include short term reduction in suitability of retained and adjoining habitats during construction works for sensitive fauna species.
Air quality impacts	Ecosystem credit species retained for assessment in **Table 5.1** and species credit threatened fauna species assessed as present in **Table 5.5.**	Low	Infrequent / short term	Construction	Low potential to occur if appropriate dust suppression is undertaken. Consequences include physical injury to airways of fauna species and short term reduced photosynthetic capacity for impacted flora.
Water impacts	Ecosystem credit species retained for assessment in **Table 5.1** and species credit threatened fauna species assessed as present in **Table 5.5.**	Low	Infrequent / long term	Construction and operation	Likely to occur. Consequences include loss of existing ephemeral watercourses within the Development Footprint.
Weed invasion	Ecosystem credit species retained for assessment in **Table 5.1** and species credit threatened fauna species assessed as present in **Table 5.5.**	Low	Frequent / long term	Construction and operation	High potential to occur, although existing site use has resulted in widespread weed invasion. Consequences include introductions of new weeds and reduced grazing and suppression of existing weeds.
Pest animal species	Ecosystem credit species retained for assessment in **Table 5.1** and species credit threatened fauna species assessed as present in **Table 5.5.**	Low	Frequent / long term	Construction and operation	Likely already occurring due to historical habitat modification. Low potential for increased impacts, potential consequences include reduced habitat suitability and predation of threatened fauna species.
Security fencing	Ecosystem credit species retained for assessment in **Table 5.1** and species credit threatened fauna species assessed as present in **Table 5.5.**	Moderate	Frequent / Long term	Construction and operation	Likely to occur. Consequences include reduction in habitat connectivity.

8.3 Prescribed Impacts

Prescribed impacts associated with the Project are identified in **Section 6.0** of this report and are further documented below.

8.3.1 Karst, Caves, Crevices, Cliffs, Rocks or Other Geological Features of Significance

8.3.1.1 Nature and Extent

The Project is not likely to impact caves, crevices, cliffs or geological features of significance.

Impacts are likely to occur to minor areas of rock outcropping which do not contain habitat structure for threatened bat species, shallow exposed rock and areas of piled rock which has been removed from paddocks. These impacts are likely to be long-term and permanent. Relocation of rock piles will occur to minimise potential impacts.

8.3.1.2 Duration

This is likely to be one-off, permanent impact for the life of the Project which will occur during construction.

8.3.1.3 Consequences

No threatened species have been recorded utilising these habitats and no significant consequences are predicted to occur.

8.3.2 Human Made Structures

8.3.2.1 Nature and Extent

The post-war sheds house and ancillary structures and sheds will be repurposed for the construction compound and the disused 1900s house will be removed.

8.3.2.2 Duration

This will be a one-off, permanent impact for the life of the Project that will occur during construction.

8.3.2.3 Consequences

No threatened species have been observed utilising these structures and no significant consequences are predicted to occur.

8.3.3 Non-Native Vegetation

8.3.3.1 Nature and Extent

Minor areas of non-native vegetation occur around the existing dwelling and will be removed by the Project. Extensive areas of non-native vegetation are present within the areas assessed as Category 1 Exempt Land.

8.3.3.2 Duration

This will be a one-off, permanent impact for the life of the Project that will occur during construction and site clearing.

8.3.3.3 Consequences

No threatened species have been observed utilising these habitats and no significant consequences are predicted to occur.

8.3.4 Excluded Areas – Category 1 Exempt Land

8.3.4.1 Nature and Extent

The areas of Category 1 Exempt Land mapped within the Development Footprint are identified in **Figure 1.5**. PCT Mapping and BAM Plot surveys have been undertaken to assess areas of Category 1 Exempt Land. The Project will result in long-term permanent removal of these areas, although it is possible that grass-dominated areas in a similar condition state will persist in these areas under the proposed solar panels.

8.3.4.2 Duration

This will be a one-off, permanent impact for the life of the Project that will occur during construction and site clearing.

8.3.4.3 Consequences

This impact will reduce the extent of suitable habitat available to threatened species which are capable of utilising highly disturbed terrestrial agricultural environments. This impact may also modify or reduce the suitability of aerial habitats for threatened species which forage during flight such as birds and bats. These areas contain highly disturbed non-woody vegetation utilised for agricultural purposes including cattle grazing.

8.3.5 Habitat Connectivity

8.3.5.1 Nature and Extent

The Project has potential to affect habitat connectivity for flora and fauna species. The areas of clearing primarily consist of native vegetation composed of scattered canopy trees and areas of derived native grassland composed of highly disturbed agricultural land. The Project includes corridors between the Development Footprint areas which will not be fenced, to enable the persistence of habitat connectivity through the site.

8.3.5.2 Duration

This will be a one-off, permanent impact for the life of the Project that will occur during construction and site operation.

8.3.5.3 Consequences

The consequences include reduced wildlife connectivity, however all areas likely to be important for habitat connectivity for woodland species have been maintained. The Project is unlikely to have any substantive impacts to connectivity as the Development Footprint is already substantially degraded by clearing, tree thinning and agricultural management, such that species utilising these areas for connectivity are already highly mobile and disturbance tolerant. Due to the nature and layout of the site, which is surrounded by undeveloped land, there will be no overall changes to landscape connectivity for wildlife movement.

8.3.6 Waterbodies, Water Quality and Hydrological Processes

8.3.6.1 Nature and Extent

The ephemeral first and second order watercourses present within the Development Footprint will be impacted by the Project. Several small farm dams will also be filled to facilitate the Project. The third order section of Redlynch Creek will be retained.

8.3.6.2 Duration

This will be a one-off, permanent impact for the life of the Project that will occur during construction and site operation.

8.3.6.3 Consequences

The impacts associated with waterbodies and watercourses include reduced availability of habitat for aquatic species, altered hydrology and increased erosion and sedimentation within the Development Footprint. Suitable environmental controls will be implemented to prevent impacts to downstream environments within the Goulburn River National Park.

8.3.7 Vehicle Strikes

8.3.7.1 Nature and Extent

The Project includes the construction of several access roads through the site which will be utilised in the day-to-day operation of the Solar Farm. Vehicles driven through the site will adhere to appropriate speed limits to minimise impacts associated with vehicle strikes.

8.3.7.2 Duration

There will be an ongoing potential, however low probability of this impact occurring for the life of the Project.

8.3.7.3 Consequences

There is no reasonable probability that threatened entities will be impacted by vehicle strikes as vehicle movements will be at low speed.

8.4 Mitigating Residual Impacts – Management Measures and Implementation

The following management measures are proposed to mitigate the residual impacts (direct, indirect and prescribed) associated with the Project. The impact mitigation measures proposed for residual impacts are also further summarised in **Table 8.4**, with implementation details provided in **Table 8.5**.

8.4.1 Workforce Education and Training

The development of education packages and training can help to mitigate anthropogenic impacts on biodiversity resulting from the construction and operation of the Project. The ability of non-ecological personnel to identify key threatened species or key ecological threats can help to mitigate impacts on threatened species. The following mitigation actions will be implemented for the Project to develop a greater understanding and awareness of biodiversity issues in non-ecological trained personnel:

- Inductions for the workforce will be undertaken to make them aware of the key ecological issues present in the Development Footprint to aid in their understanding of their role and responsibilities in the protection and/or minimisation of impacts to all native biodiversity.
- Inductions will identify the location of sensitive flora and fauna, including any defined exclusion / no-go areas, and the policies being implemented to protect the biodiversity values of such areas.
- Responsibilities with respect to weed management and biosecurity.

8.4.2 Implementation of Vegetation Protection Zones for Areas to be Retained

During construction, temporary exclusion fencing or other form of suitable marking measure, will be used to demarcate vegetation in locations where necessary to avoid accidental damage to areas of vegetation outside of the Development Footprint. Access control is an important feature in protecting and demarcating areas outside the Development Footprint from vehicle access, human access, and accidental disturbance. Proposed measures include:

- appropriate temporary fencing (or other form of suitable marking measures) and signposting of areas to prevent the uncontrolled entry of people, accidental disturbance and to minimise vehicular and human traffic
- clear and visible signage is to be appropriately located to inform the workforce and others of the restricted access or otherwise of areas outside the Development Footprint
- worker education and awareness of exclusion areas, including as delivered through site induction information
- the use of GPS enabled machinery (where available) to help prevent accidental disturbance of exclusion areas.

8.4.3 Ecologist Pre-Clearance Surveys and Supervision of Works

Pre-clearance surveys and tree felling supervision will be undertaken by an appropriately qualified and experienced ecologist to minimise potential impacts to fauna species, particularly hollow-dependent fauna. A detailed tree-felling supervision protocol is to be developed and documented as part of the CEMP for the Project. Rock piles within the site should also be retained and relocated to development exclusion zones during pre-clearance surveys to avoid burial.

8.4.4 Erosion and Sedimentation Control

A Stormwater Management Plan including an Erosion Sediment Control Plan (ESCP) will be prepared to appropriately limit post development flows and manage downstream water quality as part of the site establishment and clearing works. Measures to be implemented include:

- Minimising the area of disturbance (as far as practicable).
- Diverting run-off water around disturbed areas.
- Installation and ongoing maintenance of temporary erosion and sediment controls (e.g., sediment fencing) throughout the duration of the construction of the Project.
- Design, implementation, and ongoing maintenance of permanent operational phase controls (e.g. catch drains) during the operational phase of the Project.
- Stabilisation (i.e., landscaping and revegetation) of all disturbed areas not required for the operation of the Project, to reduce the potential for future erosion.
- The ESCP will be drafted with regard to the Managing Urban Stormwater: Soils and Construction (Volume 1) standard or to the standard of any equivalent replacement to this standard available at the commencement of construction.

8.4.5 Weed Management

Weed species could be inadvertently brought into the Development Footprint or surrounding habitats with imported materials, on vehicles and mobile plant, or could invade naturally through removal of native vegetation and the creation of a suitable growth medium. The presence of weed species has the potential to decrease the value of vegetation for native species, particularly threatened species.

Weed management controls will include:

- The survey and treatment of invasive weed species prior to the disturbance of topsoil within the Development Footprint to prevent an outbreak and / or the spread of species to previously unaffected areas within the Development Footprint.
- Ongoing environmental inspections and treatment of outbreaks of invasive weed species as required within the Development Footprint during the construction and operation of the Project.
- All machinery and equipment will be cleaned thoroughly prior to entering the Development Footprint. Cleaning must include the removal of all mud and plant matter (inside and out), followed by washing with high pressure water.

8.4.6 Fencing, Access Control and Fauna Exclusion

To avoid native fauna (non-avian) becoming trapped within the solar farm, a security fence will be constructed to deter fauna from occupying and becoming entrapped within the site infrastructure. This fencing will occur across the three separate Development Footprint polygons.

8.4.7 Preparation and Implement of Construction Environmental Management Plan

A CEMP will be prepared to document the environmental impact mitigation, performance targets and monitoring requirements for the construction and operational phases of the Project.

Table 8.4 Summary of Proposed Mitigation and Management Measures for Residual Impacts (Direct, Indirect, and Prescribed)

Mitigation Measure	Method/Technique	Timing	Frequency	Responsibility	Likely Efficacy
Workforce education and training	Environmental awareness for construction and operational site workers	Construction and operation	For all new contractors and employees as part of the general site induction	EPC Contractor	Measure is likely to achieve intended outcome
Implementation of vegetation protection zones for areas to be retained	Temporary delineation of the Development Footprint impact footprint until permanent fencing is installed.	Construction / site clearing	Prior to and during site clearing and construction Permanent fencing to remain for the life of the development	EPC Contractor and Project Ecologist	Measure is likely to achieve intended outcome
Ecologist pre-clearance surveys and supervision of works	• Minimisation of impacts to local fauna and their habitats through identification of fauna present and management to minimise harm. • Relocation of rock piles. • Dam de-watering.	Construction / site clearing	Prior to and during site clearing	EPC Contractor and Project Ecologist	Measure is likely to achieve intended outcome
Erosion and sedimentation control	Installation and maintenance of appropriate erosion and sediment controls and work practices.	Prior to and during civil works until permanent controls such as sediment basins are installed and established.	Temporary erosion and sediment controls would be installed prior to commencement of construction and permanent measures such as stormwater detention basins would be maintained for the life of the development.	EPC Contractor	Measure is likely to achieve intended outcome
Weed management	Targeted spraying and/or grazing to suppress weed invasion	All stages of the development	As needed	EPC Contractor / Project Ecologist	Measure is likely to achieve intended outcome

Mitigation Measure	Method/Technique	Timing	Frequency	Responsibility	Likely Efficacy
Fencing, Access Control and Fauna exclusion	Installation of a permanent security fence of the three individual Development Footprint polygons	During operation	For the life of the development	EPC Contractor	Measure is likely to achieve intended outcome
Preparation and Implementation of CEMP	Develop plan to adequately manage: • environmental impacts during • construction including dam • dewatering controls, fencing and • access control, weed management • and erosion and sediment control.	To prepared prior to the commencement of works and implemented for all construction works and for the life of the development as necessary	For the life of the development	Proponent / EPC Contractor	Measure is likely to achieve intended outcome

Implementation details for the proposed impact mitigation and management measures are provided in **Table 8.5**.

Table 8.5 Implementation Details for Proposed Impact Mitigation and Management Measures

Measure/Action	Monitoring and Evaluation Strategy	Performance Criteria	Adaptive Management Threshold	Adaptive Management Response
Workforce education and training	Completion and maintenance of a site induction register	Induction of all construction workers	Failure of EPC Contractor to induct workers	Breaches to be reported in accordance with notification procedures (7 days). Suspension of the relevant works until construction workers are inducted
Implementation of vegetation protection zones for areas to be retained	Monitoring to be undertaken by the Project Ecologist prior to commencement and monthly during construction works.	Protection of retained vegetation and habitats	Breach of vegetation protection zones / damaged to retained habitats	Breaches to be reported in accordance with notification procedures (7 days). Suspension of the relevant works until appropriate protection measures are implemented and appropriate remedial actions to remedy any adverse impacts are completed.
Ecologist pre-clearance surveys and supervision of works	Reporting on preclearance surveys and works supervision to be undertaken by Project Ecologist	Completion of proposed works	Completion of clearing works without Project ecologist supervision	Breaches to be reported in accordance with notification procedures (7 days). Ecologist must be present on site during pre-clearance surveys and works requiring ecological supervision.
Erosion and sedimentation control	Monitoring to be undertaken in accordance with requirements of CEMP.	Temporary erosion and sediment controls to be installed prior to works. Permanent controls to be maintained for the life of the development	Monitoring detects lack or failure of required temporary or permanent erosion and sediment controls.	Breaches to be reported in accordance with notification procedures (7 days). Erosion and sediment controls to be installed and/or improved.
Weed management	Monitoring to be undertaken in accordance with requirements of CEMP.	Weed growth to be continually suppressed within the Development Footprint area	Monitoring detects increasing weed infestations which are not being suppressed.	Alternative methods or herbicides to be used to achieve success.

Measure/Action	Monitoring and Evaluation Strategy	Performance Criteria	Adaptive Management Threshold	Adaptive Management Response
Fencing, Access Control and Fauna exclusion	Monitoring to be undertaken in accordance with requirements of CEMP.	Exclusion of all target fauna species.	Repair or upgrade to fencing.	Fencing design to be improved to achieve effectiveness.
Preparation and Implementation of CEMP	Implementation to be supervised by Project Ecologist or suitable environmental consultant with regular reporting to DPE during construction.	Completion of all proposed environmental protection works and monitoring inspections	Monitoring detects breach or failure to implement CEMP.	Breaches to be reported in accordance with notification procedures (7 days).

8.5 Adaptive Management Strategy for Uncertain Impacts (Where Relevant)

It is considered that the potential impacts associated with the Project are predictable and known. Adaptive strategies for impact mitigation measures are provided in **Table 8.5**. Further adaptive management strategies will be provided in the CEMP for the Project.

9.0 Serious and Irreversible Impacts

9.1 Assessment for Serious and Irreversible Impacts on Biodiversity Values

The determination of a SAII on biodiversity values is to be made by the decision maker in accordance with the principles set out in the BC Regulation 2017. Under Clause 6.7 (2) of the BC Regulation 2017, an impact is to be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species or ecological community becoming extinct because of one of the following four principles:

- Principle 1: The impact 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
- Principle 2: the impact it 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
- Principle 3: it is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution, or
- Principle 4: the impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable.

SAII on biodiversity values of proposed development or activity means SAII on biodiversity values as determined under section 6.5 of the BC Act, that would remain after the measures proposed to be taken to avoid or minimise the impact on biodiversity values of the proposed development.

If the Minister for Planning is of the opinion that proposed SSD is likely to have SAII on biodiversity values, the Minister is required to:

- take those impacts into consideration, and
- determine whether there are any additional and appropriate measures that will minimise those impacts if consent or approval is to be granted.

A summary of the entities of relevance to this assessment which are listed as at risk of a SAII is provided in **Table 9.1**.

Table 9.1 Entities at Risk of an SAII

Common Name	Scientific Name	Principle	Reason for Inclusion in Assessment
Regent Honeyeater	*Anthochaera phrygia*	1 & 2	Included in current list of entities at risk of an SAII and is likely to be impacted by the proposal
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions.	-	1 & 2	Included in current list of entities at risk of an SAII and is likely to be impacted by the proposal

The locations of mapped important habitat for the Regent Honeyeater and the extent of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC within the Development Footprint are mapped in **Figure 9.1**.

The SAII additional impact assessment provisions (AIAPs) from the 2020 version of the BAM are addressed in **Section 9.1.1** of this report. These AIAPs were updated in the 2020 version of the BAM from the AIAPs provided in the 2017 version of the BAM which are also currently reproduced in Appendix B of the DPIE (2019) Guidance to assist a decision maker to determine serious and irreversible impacts.

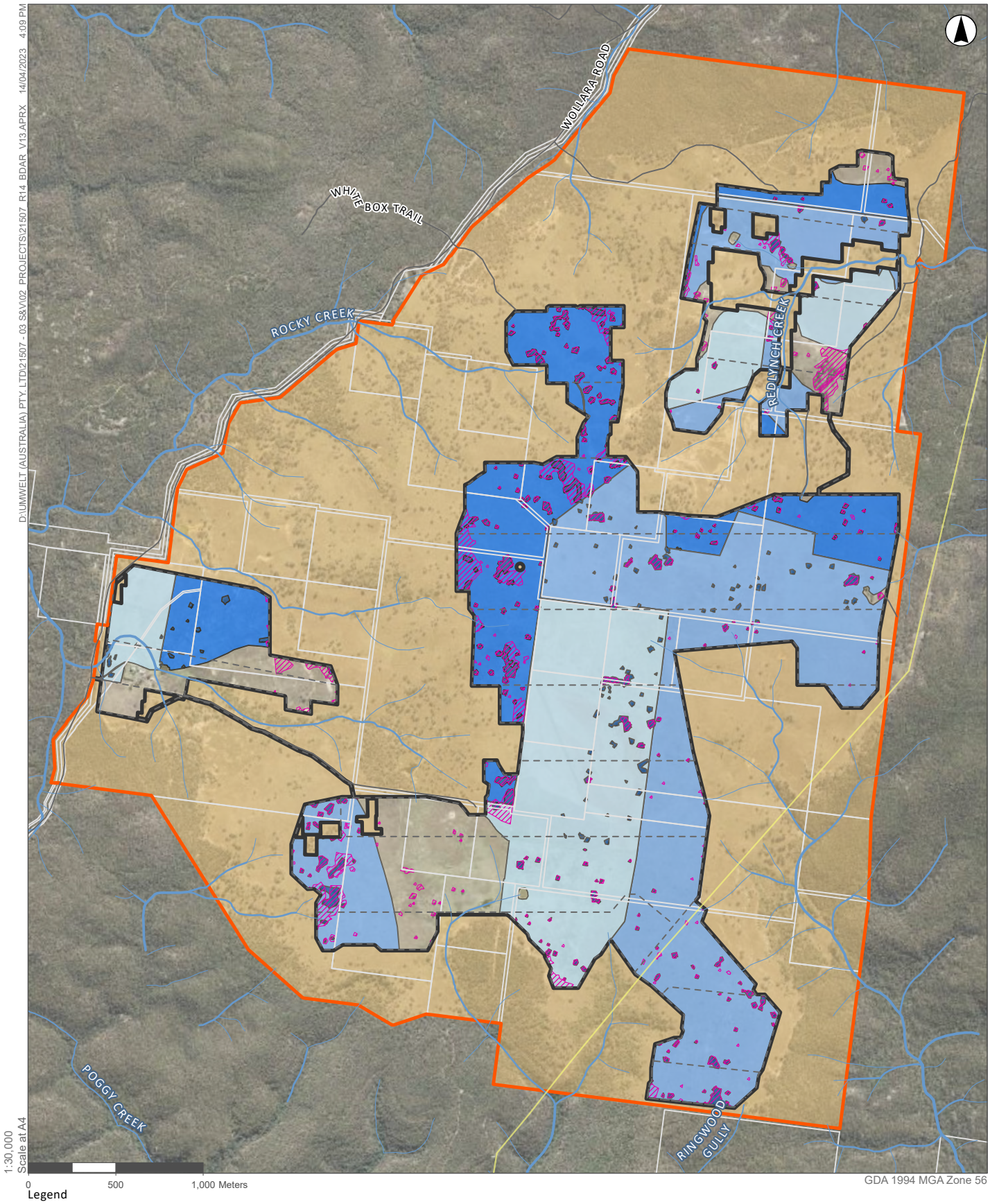


FIGURE 9.1

Serious and Irreversible Impact Entities within the Development Footprint

Image Source: ESRI Basemap (2021) **Data source:** NSW LPI (2021), NSW DSFI (2021); NPWS Estate (2019); Lightsource BP (2022)

9.1.1 Additional Impact Assessment Provisions for TECs at Risk of an SAII

9.1.1.1 White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions

The additional impact assessment provisions for TEC at risk of an SAII have been addressed for the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC in **Table 9.2**. The location of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC within the Development Footprint is shown in **Figure 9.1** and **Figure 9.2**. This ecological community is listed as critically endangered under the BC Act and the EPBC Act. The NSW Extent of this CEEC based on the NSW State Vegetation Type Mapping is shown in **Figure 9.3**.

Table 9.2 SAII Impact Assessment – Box White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CECC

Response to BAM Section 9.1.1 Criteria
1. The action and measures taken to avoid the direct and indirect impact on the TEC at risk of an SAII (or reference to where these have been addressed in the relevant section of the BDAR).
The actions and measures proposed to avoid direct and indirect impacts are documented in **Section 7.0** of this report.
2. The assessor must consult the TBDC and/or other sources to report on the current status of the TEC including: **a. Evidence of reduction in geographic distribution (Principle 1, clause 6.7(2)(a) BC Regulation) as the current total geographic extent of the TEC in NSW AND the estimated reduction in geographic extent of the TEC since 1970 (not including impacts of the proposal)** **b. The extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes (Principle 2, clause 6.7(2)(b) BC Regulation) indicated by:** **vi. Change in community structure** **vii. Change in species composition** **viii. Disruption of ecological processes** **ix. Invasion and establishment of exotic species** **x. Degradation of habitat**

Response to BAM Section 9.1.1 Criteria
xi. Fragmentation of habitat **c. Evidence of restricted geographic distribution (Principle 3, clause 6.7(2)(c) BC Regulation), based on the TEC's geographic range in NSW according to the:** **i. extent of occurrence** **ii. area of occupancy** **iii. number of threat defined locations.** **d. Evidence that the TEC is unlikely to respond to management (Principle 4, clause 6.7(2)(d) BC Regulation).**
The TBDC has been reviewed in relation to the information available for the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC. Additional sources relied upon are referenced within the text below. **a.** The current extent of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC and the estimated reduction in the geographic extent since 1970 is not available in the TBDC. Threatened Species Scientific Committee An assessment completed by Threatened Species Scientific Committee (TSSC) (2006) and reproduced by Tozer and Simpson (2020) estimate that the pre-1750 area of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC was 3,717,366 ha, which has been reduced to a current extent in 2020 of just 250,729 ha. This represents a 93% reduction since 1750. State Vegetation Type Map Umwelt has utilised the current available State Vegetation Type Mapping (SVTM) which identifies an estimate of the per 1750 and current extent of White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland using the best currently available mapping. The SVTM pre-1750 area of White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC is between 1,895,058 ha and 2,403,693 ha and the current SVTM extent of White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland is between 1,267,603 ha and 1,639,571 ha. The variance in the SVTM upper estimate is due to some mapped PCTs being identified as only partly being associated with the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC. Based on the STVM there has been a 33.1–31.75% reduction in White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland since 1750. Annual Loss and Reduction in Extent Since 1970 Tozer and Simpson (2020) have identified that the loss of the woodland component of White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC between 2009 and 2019 was 6653 ha or 665.3 ha per annum distributed disproportionately between years.

Response to BAM Section 9.1.1 Criteria
Using an annual loss rate of 665.3 ha, an estimate of the loss over the 1970 to 2020 period of 33,265 ha of the woodland component of the CEEC has been obtained. However, it is considered the rate of loss prior to 2009 is likely to have been much greater than 665.3 ha per annum due to a non-linear rate of clearing attributed to less legislative restrictions protecting White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland prior to its listing. **b.** The following information has been obtained from the Conservation Assessment of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC prepared by Tozer and Simpson (2020). <u>Changes in community structure</u> In relation to community structure there are essentially no remaining areas that are fully intact and most of the remaining extent has lost its understory, been invaded by exotic species, lost entire suites of species or lost its structure in terms of the loss of tree, shrub and/or ground layers. <u>Changes in species composition</u> Species composition has been adversely affected by degradation and fragmentation which has caused the loss of suites of species such as understorey components or faunal components such as reptiles, mammals and/or woodland birds. The species lost are sometimes replaced by more common species such as aggressive noisy miners, exotic flora or monocultures of native grasses. <u>Disruption of ecological processes</u> The ecological community has undergone or is likely to undergo within a time frame appropriate to the life cycle of the habitat characteristics of its component species a very large disruption of biotic processes or interactions. The changes have been such that reestablishment of the ecological processes, species composition and community structure of the original ecological community is not likely to be possible, even with immediate positive human intervention. <u>Invasion and establishment of exotic species</u> Weeds have invaded most of the remaining areas of the original pre-1750 extent of this ecological community and result in continuing detrimental change. Extensive areas have experienced elevated soil nitrogen as a result of the application of chemical fertilisers, which is associated with the invasion of weeds and eventual conversion of native to exotic pasture. <u>Degradation of habitat</u> The ecological community continues to be degraded at both the patch and landscape scale. This ongoing modification, while not necessarily leading to the destruction of all elements of the ecological community, threatens it with extinction. Cumulatively, the disruption of biotic processes and interactions caused by the implementation of management for agricultural production is very severe and less than 10% of the original distribution of White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland is likely to have avoided the long-term impacts of pastoralism.

Response to BAM Section 9.1.1 Criteria
Fragmentation of habitat The community has been extensively cleared throughout its range and remnants are typically small, isolated, highly fragmented and occur in predominantly cleared landscapes and exhibit highly modified understoreys. **c.** The extent of occurrence of White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland throughout its entire range in Australia is identified by Tozer and Simpson (2020) as 702,800 km^2. The extent of occurrence within NSW is not identified in the TBDC or separately assessed by Tozer and Simpson (2020). The current geographic extent of this CEEC across its range is estimated by Tozer and Simpson (2020) (reproduced from TSSC 2006) as 576,654 ha, which includes an area of occupancy of 250,729 ha within NSW. This estimate does not include the derived native grassland component of the ecological community. It is also considered that the current extent of White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland provided by Tozer and Simpson (2020) is an underestimate based on the current SVTM mapping which maps between 1,267,603 ha and 1,639,571 ha within NSW. The variance in the SVTM estimate is due to the upper limit including some PCTs which are described as only partly being associated with the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC. No threat defined locations are specifically identified in the TBDC profile. It is not likely that a single threatening event in a geographically or ecologically distinct area would rapidly affect all occurrences of this CEEC. **d.** This principle (principle 4) is not applicable to the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC. The ecological community does respond to management, some successful management measures are outlined in the document titled 'A Guide to Managing Box Gum Grassy Woodlands' (Rawlings, Freudenberger and Carr 2010). While not directly relevant to the Project the following management actions are also listed within the TBDC: • Undertake control of rabbits, hares, foxes, pigs and goats (using methods that do not disturb the native plants and animals of the remnant). • Manage stock to reduce grazing pressure in high quality remnants (i.e. those with high flora diversity or fauna habitat). • Do not harvest firewood from remnants (this includes living or standing dead trees and fallen material). • Leave fallen timber on the ground. • Erect on-site markers to alert maintenance staff to the presence of a high quality remnant or population of a threatened species. • Encourage regeneration by fencing remnants, controlling stock grazing and undertaking supplementary planting, if necessary. • Undertake weed control (taking care to spray or dig out only target species).

Response to BAM Section 9.1.1 Criteria
• Protect all sites from further clearing and disturbance. • Ensure remnants remain connected or linked to each other; in cases where remnants have lost connective links, re-establish them by revegetating sites to act as steppingstones for fauna, and flora (pollen and seed dispersal). • Mark remnants onto maps (of the farm, shire, region, etc) and use to plan activities (e.g. remnant protection, rehabilitation or road, rail and infrastructure maintenance work). On-site markers can alert maintenance staff to the presence of a threatened species.
3. Where the TBDC indicates that data is 'unknown' or 'data deficient' for a TEC for a criterion listed in Section 9.1.1(2), the assessor must record this in the BDAR.
The NSW White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC is not identified as 'unknown' or 'data deficient' in the TBDC.
4. The following questions are addressed in relation to the impacts from the proposal of the TEC. **a. The impact on the geographic extent of the TEC (Principles 1 and 3) by estimating the total area of the TEC to be impacted by the proposal:** **i. in hectares** **ii. as a percentage of the current geographical extent of the TEC in NSW** **b. the extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes (Principle 2) of the TEC by:** **i. estimating the size of any remaining, but now isolated, areas of the TEC; including areas of the TEC within 500 m of the development footprint or equivalent area for other types of proposals** **ii. describing the impacts on connectivity and fragmentation of the remaining areas of TEC measured by:** - **distance between isolated areas of the TEC, presented as the average** - **distance if the remnant is retained AND the average distance if the remnant is removed as proposed, and** - **estimated maximum dispersal distance for native flora species characteristic of the TEC, and** - **other information relevant to describing the impact on connectivity and fragmentation, such as the area to perimeter ratio for remaining areas of the TEC as a result of the development** **iii. Describing the condition of the TEC according to the vegetation integrity score for the relevant vegetation zone (s) (Section 4.3). The assessor must also include the relevant composition, structure and function condition scores for each vegetation zone.**

Response to BAM Section 9.1.1 Criteria
a. The Project will impact approximately 699.63 ha of this CEEC including approximately 23.64 ha of vegetation which is described as scattered trees and 675.99 ha which is described as a derived native grassland, including 507.5 ha which is too disturbed to require biodiversity offsetting. Tozer and Simpson (2020) have identified that not all the areas occupied by White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland are covered by maps of appropriate scale and accuracy. Therefore, the values for extent of occurrence and area of occupancy quoted may underestimate the true values. The best available information on the current geographic extent of this CEEC across its range is estimated from the SVTM as between 1,267,603 ha and 1,639,571 ha within NSW, as mapped in **Figure 9.3**. It is considered that this is likely to be an underestimate given there are many areas of derived native grasslands corresponding to this CEEC which are not mapped as part of the SVTM. The Project will impact between 0.05% and 0.04% of the geographic extent of this CEEC mapped in the SVTM. It is considered that the actual proportional impact is likely to be much lower due to the presence of large areas of highly degraded derived native vegetation which are not captured in the STVM. **b.** The Project will not isolate any areas of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC, as four discreet Project areas are proposed with connecting areas to be retained both between these areas and around the outside of the Development Footprint. The Project will fragment areas of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC in derived native grassland form within the south-eastern section of the site from other retained areas of the CEEC within the northern and western sections of the site but, as stated, not isolate these from surrounding native vegetation. However, these areas were already separated by highly disturbed agricultural use areas. The fragmentation will occur through the removal of areas of highly degraded derived native grassland vegetation and scattered trees. The retained areas will remain connected through other vegetation communities both within the Project Area and the adjoining Goulburn River National Park. The separation distance that will result between the retained areas of White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC in the western and south-eastern parts of the Project Area is approximately 560 m to >1300 m. These areas would remain connected through a highly disturbed agricultural landscape if the Project was to not proceed. The main dispersal mechanisms for flora species associated with the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC are inferred to be by one or a combination of dispersal mechanisms, including animals, wind, water runoff, and gravity. Eucalypts within the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC are likely to rely on animal assisted dispersal by highly mobile vertebrate pollinators (birds and bats) which disperse pollen over large areas when foraging (Southerton *et al*. 2004). The maximum dispersal distance for native flora species characteristic of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological community is estimated to be at least 1,000 m and potentially much further. The Project will increase the area to perimeter ratio of the remaining areas of derived native grassland associated with the Box Gum TEC, as the Project area is situated centrally within an occurrence of mostly derived native grassland associated the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC.

Response to BAM Section 9.1.1 Criteria
Within the Development Footprint, areas of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC correspond to PCT 483 Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley. All of these areas have been degraded over a relatively long time period by agricultural management, which has included clearing of trees and understorey vegetation, grazing and pasture improvement. Impacts to areas of intact White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC within the Project Area have been avoided. The Vegetation Condition Zones and corresponding areas for this PCT are: • PCT 483 Condition Zone 1 – Scattered Trees = 23.64 ha. • PCT 483 Condition Zone 2 – Moderate Condition Derived Native Grassland = 168.48 ha. • PCT 483 Condition Zone 3 – Moderate to Low Condition Derived Native Grassland = 308.37 ha. • PCT 483 Condition Zone 4 – Low Condition Derived Native Grassland = 199.14 ha. The Vegetation integrity scores for the above vegetation condition zones are: • PCT 483 Condition Zone 1 – Scattered Trees = 78. • PCT 483 Condition Zone 2 – Moderate Condition Derived Native Grassland = 33.1. • PCT 483 Condition Zone 3 – Moderate to Low Condition Derived Native Grassland = 12.4. • PCT 483 Condition Zone 4 – Low Condition Derived Native Grassland = 9.9.
5. The assessor may also provide new information that demonstrates that the principle identifying that the TEC is at risk of an SAII is not accurate.
The White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC is identified as at risk of an SAII under Principles 1 – Species or ecological community currently in rapid rate of decline and under Principle 2 – Species or ecological communities with very small population size. **According to DPIE (2019), very small population size for ecological communities includes communities that have very high levels of either environmental degradation or disruption of biotic processes, and interactions have an increased risk of failure to sustain their characteristic native species assemblages.** It is considered that the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC does not have a very small population size (SAII Principle 2), based on the current information available from the SVTM, but has experienced high levels of environmental degradation and a very large disruption of biotic processes.

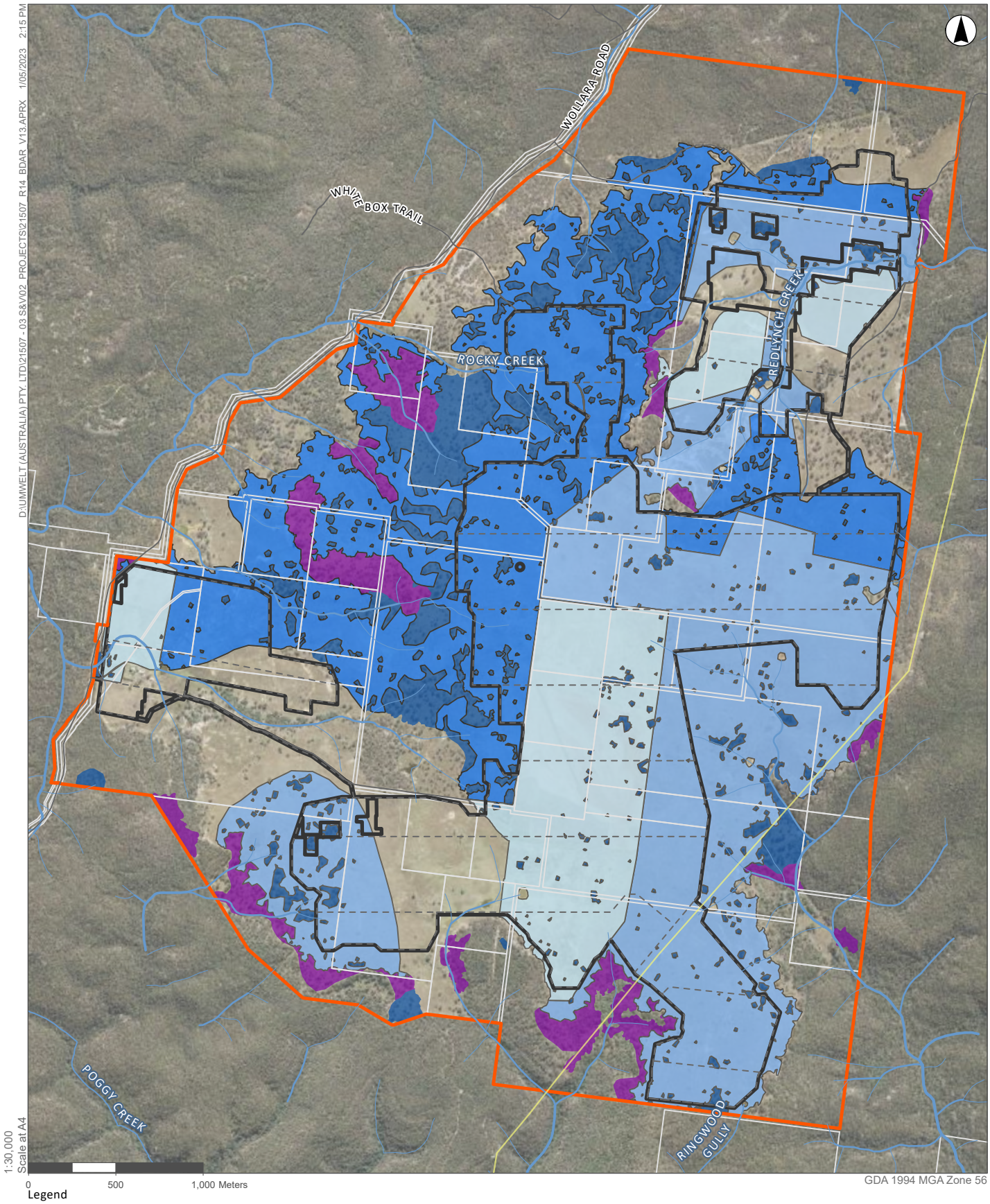


FIGURE 9.2

Box Gum Woodland CEEC Impact Avoidance

Image Source: ESRI Basemap (2021) **Data source:** NSW LPI (2021), NSW DSFI (2021); NPWS Estate (2019); Lightsource BP (2022)

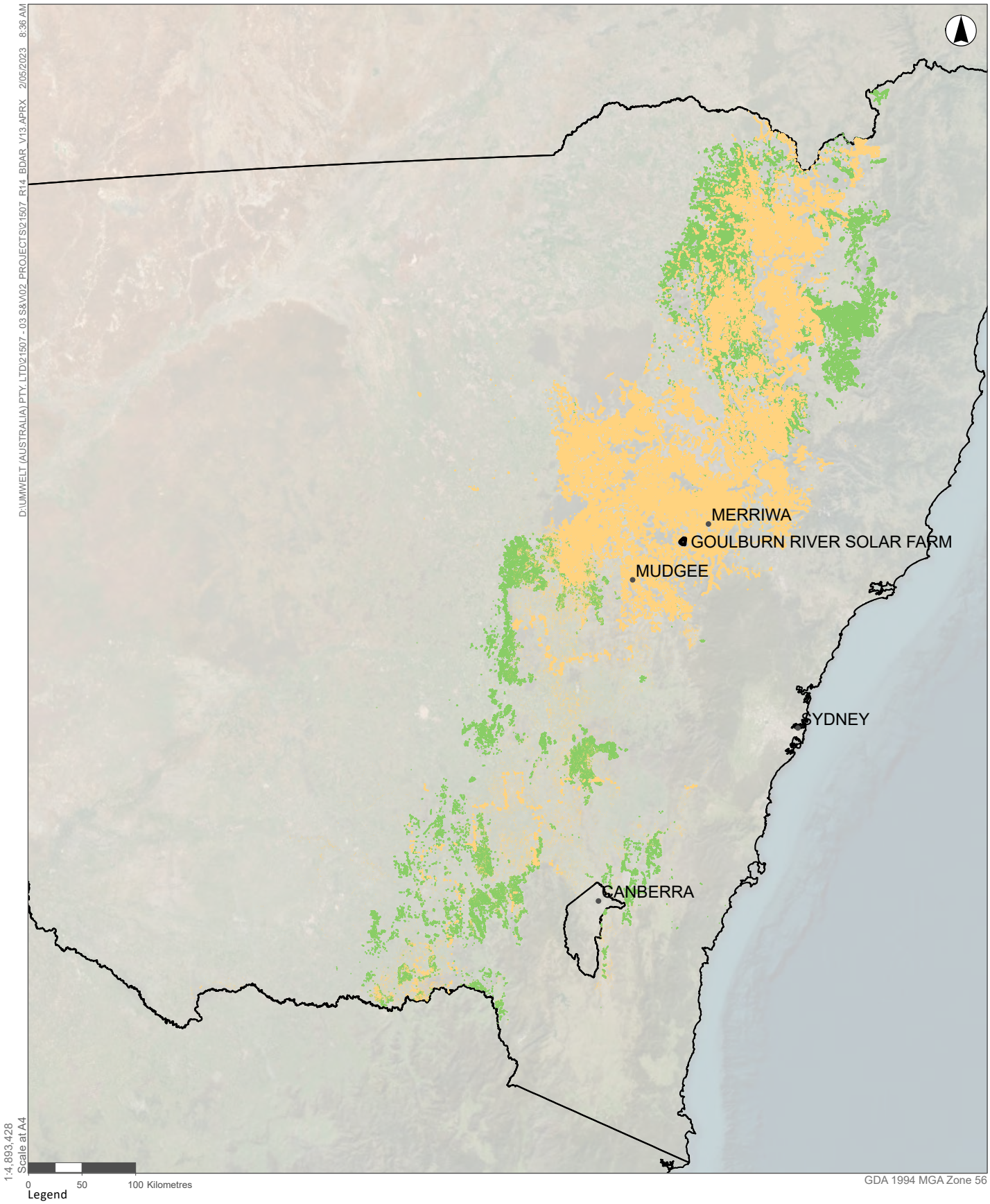


FIGURE 9.3

Box Gum Woodland CEEC NSW Distribution (based on NSW State Vegetation Type Map)

Image Source: ESRI Basemap (2021) **Data source:** NSW LPI (2021), NSW DSFI (2021); NPWS Estate (2019); Lightsource BP (2022)

9.1.2 Additional Impact Assessment Provisions for Threatened Species at Risk of an SAII

9.1.2.1 Regent Honeyeater (*Anthochaera phrygia*)

The additional impact assessment provisions for threatened species at risk of an SAII have been addressed for the Regent Honeyeater in **Table 9.3**. This species is listed as critically endangered under the BC Act and the EPBC Act.

Table 9.3 AII Impact Assessment – Regent Honeyeater

Response to BAM Section 9.1.2 Criteria
1. The assessor is required to provide further information in the BDAR or BCAR for any species at risk of an SAII, including the action and measures taken to avoid the direct and indirect impact on the species at risk of an SAII. Where these have been addressed elsewhere the assessor can refer to the relevant sections of the BDAR or BCAR.
Measures proposed to avoid direct and indirect impacts on this species are documented in **Section 7.0** of this report. Impact and impact avoidance areas for areas of mapped Important Regent Honeyeater Habitat are shown in **Figure 9.4**.
2. The assessor must consult the TBDC and/or other sources to report on the current population of the species including: **a. Evidence of rapid decline (Principle 1, clause 6.7(2)(a) BC Regulation) presented by an estimate of the:** **i. Decline in population of the species in NSW in the past 10 years or three generations (whichever is longer), or** **ii. Decline in population of the species in NSW in the past 10 years or three generations (whichever is longer) as indicated by: an index of abundance appropriate to the species; decline in geographic distribution and/or habitat quality; exploitation; effect of introduced species, hybridisation, pathogens, pollutants, competitors or parasites** **b. Evidence of small population size (Principle 2, clause 6.7(2)(b) BC Regulation) presented by:** **i. An estimate of the species' current population size in NSW, and** **ii. An estimate of the decline in the species' population size in NSW in three years or one generation (whichever is longer), and** **iii. Where such data is available, an estimate of the number of mature individuals in each subpopulation, or the percentage of mature individuals in each subpopulation, or whether the species is likely to undergo extreme fluctuations** **c. Evidence of limited geographic range for the threatened species (Principle 3, clause 6.7(2)(c) BC Regulation) presented by:** **i. Extent of occurrence** **ii. Area of occupancy**

Response to BAM Section 9.1.2 Criteria
iii. Number of threat-defined locations (geographically or ecologically distinct areas in which a single threatening event may rapidly affect all species occurrences), and **iv. Whether the species' population is likely to undergo extreme fluctuations** **d. Evidence that the species is unlikely to respond to management (Principle 4, clause 6.7(2)(d) BC Regulation) because:** **i. Known reproductive characteristics severely limit the ability to increase the existing population on, or occupy new habitat (e.g., Species is clonal) on, a biodiversity stewardship site** **ii. The species is reliant on abiotic habitats which cannot be restored or replaced (e.g., Karst systems) on a biodiversity stewardship site, or** **iii. Life history traits and/or ecology is known but the ability to control key threatening processes at a biodiversity stewardship site is currently negligible (e.g., Frogs severely impacted by chytrid fungus).**
The TBDC has been reviewed in relation to the information available Regent Honeyeater. Additional sources relied upon are referenced within the text below. **a.** The TBDC identifies that this species meets the criteria of a population reduction of >80% in 10 years or three generations. The Regent Honeyeater Recovery Plan also confirms that the Regent Honeyeater had prior to 2011 undergone a population decline of >80% within three generations (Commonwealth of Australia 2016). The NSW Scientific Committee (2010) have identified that generation length is estimated at 5 years or 15 years for three generations. Crates et al., 2020 estimated that there are fewer than 350 individuals which persist in the wild. The NSW Scientific Committee's (2010) final determination to list the Regent Honeyeater as critically endangered estimated that there may have been fewer than 250 mature individuals left in the wild. The National Recovery Plan for this species estimates the population in 2010 at 350–400 mature individuals (Commonwealth of Australia 2016). The population of the regent honeyeater has declined significantly prior to the last 15 years and population monitoring is impeded by small population size coupled with a very large area of occupancy and this species nomadic behaviour. The 2019/20 mega fires that impacted the east coast of Australia represent a significant pulse impact event on the habitat quality of this species. Crates *et al*., 2020 have estimated that the 2019/20 mega fires burnt an estimated 71,011 square kilometres representing 13% of the species area of occupancy with high to very high burn severity identified for 54% of the burned area. Crates *et al*., 2020 also identified that assessment based on regent honeyeater nest locations since 2015 returned the most severe fire impact estimate, with 44% of 1 km grid cells where nesting has been recorded, having been affected by fire. The impact of the 2019/20 mega fire event is also likely to have exacerbated reduction in suitable foraging and breeding habitat from extensive land clearing and competition from larger honeyeater species such as the Noisy Miner.

Response to BAM Section 9.1.2 Criteria
b. The TBDC identifies that this species meets the criteria for a population size of <50 individuals or <250 individuals where threats are known. Crates *et al*., 2020 estimated that there are fewer than 350 individuals which persist in the wild. Population monitoring is impeded by small population size coupled with a very large area of occupancy, population fluctuations in particular areas and nomadic behaviour. Provision of an accurate estimation of the decline in the species' population size in NSW in one generation (5 years) is not possible based on current available data. This species is not likely to undergo extreme fluctuations. **c.** The Regent Honeyeater has a relatively large geographic range compared to its current population size. Crates *et al*., 2020 estimates that the extent of occurrence for this species based on records from 1996 onwards is 605,690 km^2. BCD have estimated the extent of occurrence as 367,167 km^2. Crates *et al*., 2020 estimates that the area of occupancy for this species based on records from 1996 onwards is 1226 km^2. BCD have estimated the area of occupancy as 3,204 km^2. BCD have identified that the Important Mapped Habitat Areas include nine (9) locations and of these four (4), are considered critical to the survival of the species: Bundarra-Barraba, Mudgee-Wollar, Capertee Valley and Hunter Valley. It is considered that the breeding sites are likely to be critical to the species survival and the Development Footprint which contains habitat in the form of scattered trees within degraded agricultural land mapped within the buffer to a breeding location is not critical to the species survival. Based on available data it is considered that this species' population is not likely to undergo extreme fluctuations and the population trend reported in the scientific literature is of a continuing decline. **d.** There is no data in the TBDC or the scientific literature supporting that the species known reproductive characteristics severely limit its ability to increase existing population on, or occupy new habitat, however this species is difficult to manage on a site-by-site basis due to its nomadic nature and the ability to increase the population on biodiversity stewardships sites is limited. The species is not likely to be reliant on abiotic habitats which cannot be restored or replaced on a biodiversity stewardship site. It is accepted that historical declines in the population of this species are attributable to extensive land clearing. Lack of breeding success is now considered to be one of the main reasons for the continuing population decline of the Regent Honeyeater due to threats such as competition from aggressive and larger honeyeaters and predation by natural predators. There is potential that these threats could be managed at a biodiversity stewardship site in limited circumstances, such as where nest sites are present and can be protected (Crates *et al*., 2018).
3. Where the TBDC indicates data is 'unknown' or 'data deficient' for a species for a criterion listed in Subsection 9.1.2(2.), the assessor must record this in the BDAR or BCAR.
The TBDC does not specifically indicate that data is unknown or deficient for this species.

Response to BAM Section 9.1.2 Criteria
4. In relation to the impacts from the proposal on the species at risk of an SAII, the assessor must include data and information on: **a. The impact on the species' population (Principles 1 and 2) presented by:** **i. An estimate of the number of individuals (mature and immature) present in the subpopulation on the Development Footprint (the site may intersect or encompass the subpopulation) and as a percentage of the total NSW population, and** **ii. An estimate of the number of individuals (mature and immature) to be impacted by the proposal and as a percentage of the total NSW population, or** **iii. If the species' unit of measure is area, provide data on the number of individuals on the site, and the estimated number that will be impacted, along with the area of habitat to be impacted by the proposal** **b. Impact on geographic range (Principles 1 and 3) presented by:** **i. The area of the species' geographic range to be impacted by the proposal in hectares, and a percentage of the total AOO, or EOO within NSW** **ii. The impact on the subpopulation as either: all individuals will be impacted (subpopulation eliminated); OR impact will affect some individuals and habitat; OR impact will affect some habitat, but no individuals of the species will be directly impacted** **iii. To determine if the persisting subpopulation that is fragmented will remain viable, estimate (based on published and unpublished sources such as scientific publications, technical reports, databases or documented field observations) the habitat area required to support the remaining population, and habitat available within dispersal distance, and distance over which genetic exchange can occur (e.g., Seed dispersal) and pollination distance for the species** **iv. To determine changes in threats affecting remaining subpopulations and habitat if the proposed impact proceeds, estimate changes in environmental factors including changes to fire regimes (frequency, severity); hydrology, pollutants; species interactions (increased competition and effects on pollinators or dispersal); fragmentation, increased edge effects, likelihood of disturbance; and disease, pathogens and parasites. Where these factors have been considered elsewhere in relation to the target species, the assessor may refer to the relevant sections.**
In relation to the impacts from the proposal on the species at risk of an SAII, the assessor must include data and information on: a. The potential serious and irreversible impact trigger for this species is identified as removal of mapped important habitat, although other impacts may also result in a SAII on this species.

Response to BAM Section 9.1.2 Criteria
Areas identified in The National Recovery Plan (2016) as critical to the survival of the species formed the basis of the important habitat mapping in the BAM. These were refined to only include areas of suitable habitat based on expert opinion and PCTs associated with the species. A dataset of occurrence records was generated from BioNet, BirdLife Australia, Australian National University Difficult Bird Research Group and expert opinion of historic, unrecorded breeding. Records were overlayed on the refined areas. All woodland vegetation within 200 m of a record was added. Records of known breeding events that occurred outside of the polygons created above were identified. Radial buffers of 1 km were applied to single breeding events (once off breeding at a location) and 5 km buffers applied to multiple breeding events (multiple events in the same year or over multiple years at one location). All woodland vegetation was selected within 1 km buffers. Within 5 km buffers, PCTs associated with the species were selected, along with all woodland vegetation within 200 m of a record. The Development Footprint is surrounded by the Goulburn River National Park, where multiple breeding events have been recorded both within the National Park and on adjoining lands (not within the Project Area). It is likely that the Development Footprint is within a 5 km buffer area of a breeding location. No Regent Honeyeaters have been observed on the Development Footprint during surveys. This species is mobile and highly nomadic and may travel through or forage within the Development Footprint from time to time. Six Regent Honeyeater pairs (12 mature individuals) nested within an area where Noisy Miners were culled within the Goulburn River National Park in 2017 (Crates et al., 2020). It is estimated that approximately 12 individuals or less than 5% of the remaining population of Regent Honeyeaters may forage within or travelling through the Development Footprint at any one time. It is considered unlikely that this species would breed within the Development Footprint. It is considered that the Project would not have a measurable impact on the Regent Honeyeater and that an overall improvement of the best habitats present would result if a BSA was established over the residual parts of the site outside of the Development Footprint. As identified above six Regent Honeyeater pairs (12 mature individuals) nested within an area where Noisy Miners were culled within the Goulburn River National Park in 2017 (Crates et al., 2020). It is estimated that approximately 12 individuals or less than 5% of the remaining population of Regent Honeyeaters may forage within or travel through the Project Area at any one time. The species polygon for this species is mapped as 44.96 ha. **b.** The Project will impact a total of 44.96 ha of mapped important habitat of which approximately 20.93 ha contains woody vegetation suitable for foraging. The remaining 24.03 ha of the species polygon / mapped important habitat corresponds to derived native grassland habitat which is not likely to support this species as foraging or breeding habitat. The Project will impact approximately 0.037% of this species area of occupancy based on the area of occupancy estimated by Crates *et al*., 2020 as 1226 km^2 or 0.014% of this species area of occupancy based on the BCD area of occupancy estimate of 3204 km^2. It is considered that the Project will affect some habitat for this species, but no individuals or known nesting locations of the species will be directly impacted and the Project will not fragment any subpopulation of the Regent Honeyeater as this species is highly mobile and nomadic.

Response to BAM Section 9.1.2 Criteria
The Project may exacerbate impacts associated with habitat loss and competition from larger or more aggressive bird species such as the Noisy Miner which favours disturbed landscapes and forest edge habitats. However, these impacts have potential to be mitigated through the establishment of a BSA across the residual parts of the site and the restoration and ongoing management of these areas for conservation. Management measures may include replanting, monitoring for Regent Honeyeaters and control of predators and/or over abundant competitors such as the Noisy Miner.
5. The assessor may also provide new information that can be used to demonstrate that the principle identifying the species as at risk of an SAII, is inaccurate.
Not applicable.

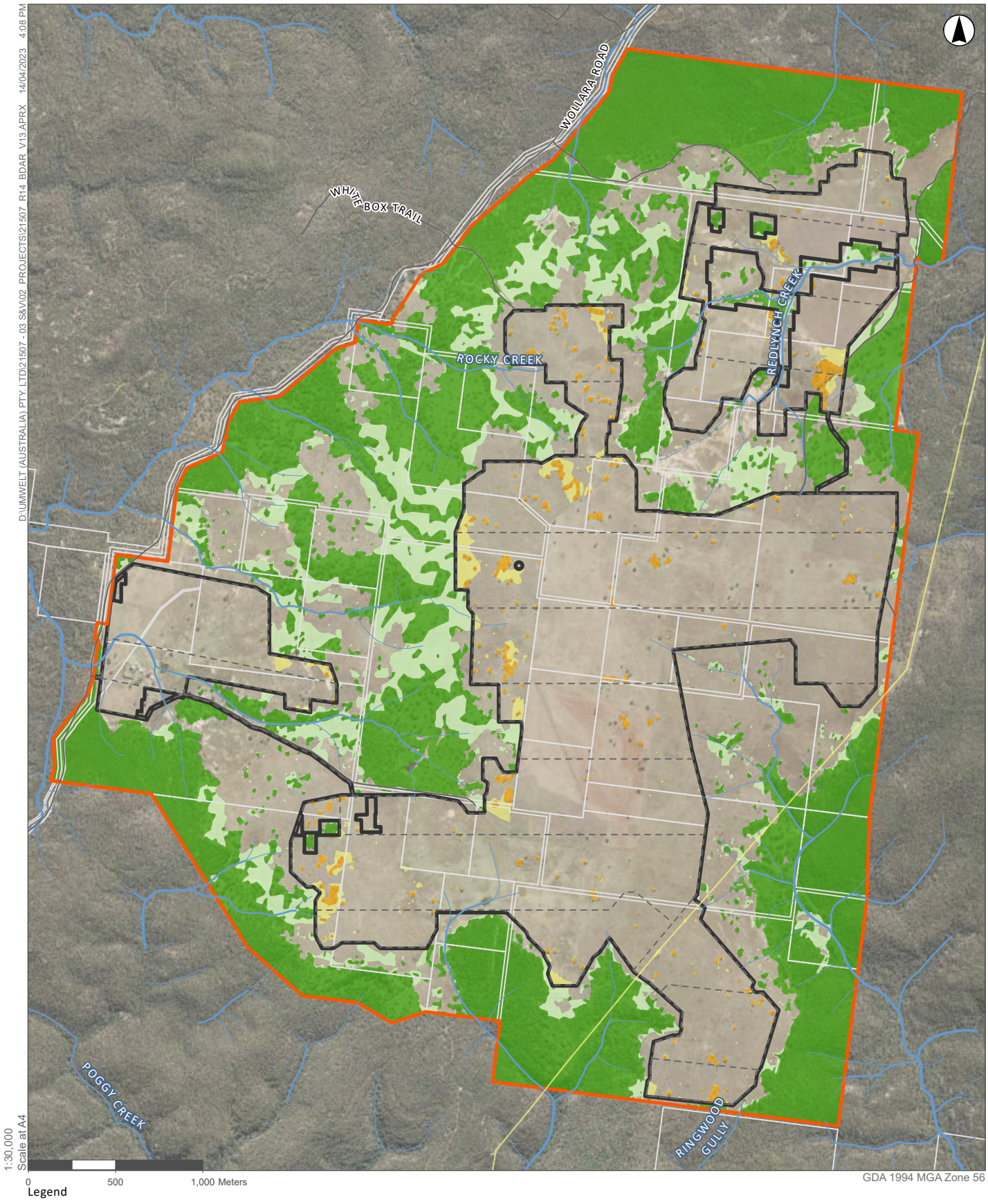


FIGURE 9.4

Regent Honeyeater Impact Avoidance

Image Source: ESRI Basemap (2021) **Data source:** NSW LPI (2021), NSW DSFI (2021); NPWS Estate (2019); Lightsource BP (2022)

10.0 Impact Summary

10.1 Determining an Offset Requirement for Impacts

10.1.1 Impacts on Native Vegetation and TECs (Ecosystem Credits)

The PCTs and associated condition zones which do not require an offset (as per BAM Subsection 9.2.1(3.)), are listed in **Table 10.1** and the PCTs which require ecosystem credits are listed in **Table 10.2**.

Table 10.1 Impacts that Do Not Require Offset – Ecosystem Credits

Vegetation zone	PCT name	TEC	Impact area (ha)	TEC Association	Entity at risk of an SAII?	Current VI score
PCT 483 Condition Zone 3 – Moderate to Low Condition Derived Native Grassland	Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Yes / CEEC	308.37	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Yes	12.4
PCT 483 Condition Zone 4 - Low Condition Derived Native Grassland	Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Yes / CEEC	199.14	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Yes	9.9
PCT 1661 Condition Zone 2 - Moderate to Low Condition Derived Native Grassland	Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	No	36.79	None	No	13.2
PCT 1661 Condition Zone 3 - Low Condition Derived Native Grassland	Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	No	53.24	None	No	3.3

Table 10.2 Impacts that Require an offset – Ecosystem Credits

Vegetation zone	PCT name	TEC	Impact area (ha)	Current VI score	Future VI score	Change in VI score	Biodiversity risk weighting	Number of ecosystem credits required
PCT 483 Condition Zone 1 – Scattered Trees	Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Yes	23.64	78	0	-78	2.5	1152
PCT 483 Condition Zone 2 - Moderate Condition Derived Native Grassland	Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Yes	168.48	33.1	0	-33.1	2.5	3490
PCT 1661 Condition Zone 1 – Scattered Trees	Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	No	6.07	51.1	0	-51.1	1.75	136
							Total Ecosystem Credits	**4778**

10.1.2 Impacts on Threatened Species and their Habitat (Species Credits)

Table 10.3 provides a summary of the species credit threatened that require an offset (as per BAM Subsection 9.2.2(2.)) and identifies the amount of credits required. The area within the Development Footprint which was included within the total of all species polygons is shown in **Figure 10.1**.

Table 10.3 Impacts that Require an Offset – Species Credits

Common Name	Scientific Name	BC Act Status	EPBC Act Status	Loss of habitat (ha) or individuals	Biodiversity risk weighting	Number of species credits required
Regent Honeyeater	*Anthochaera phrygia*	CE	CE	44.96	3	1546
Barking Owl	*Ninox connivens*	V	-	1.21		7
					Total Species Credits	**1553**

10.1.3 Indirect and Prescribed Impacts

No offsets are required or proposed for indirect and prescribed impacts.

10.2 Impacts That Do Not Need Further Assessment

Areas within the Development Footprint that do not contain native vegetation do not need to be assessed for ecosystem credits (as per BAM Section 9.3(1–2.)). Areas assessed as not containing native vegetation are limited to waterbodies, particularly farm dams, land which is totally cleared of all vegetation such as frequently used existing vehicle tracks and a small area of exotic vegetation around the existing dwelling.

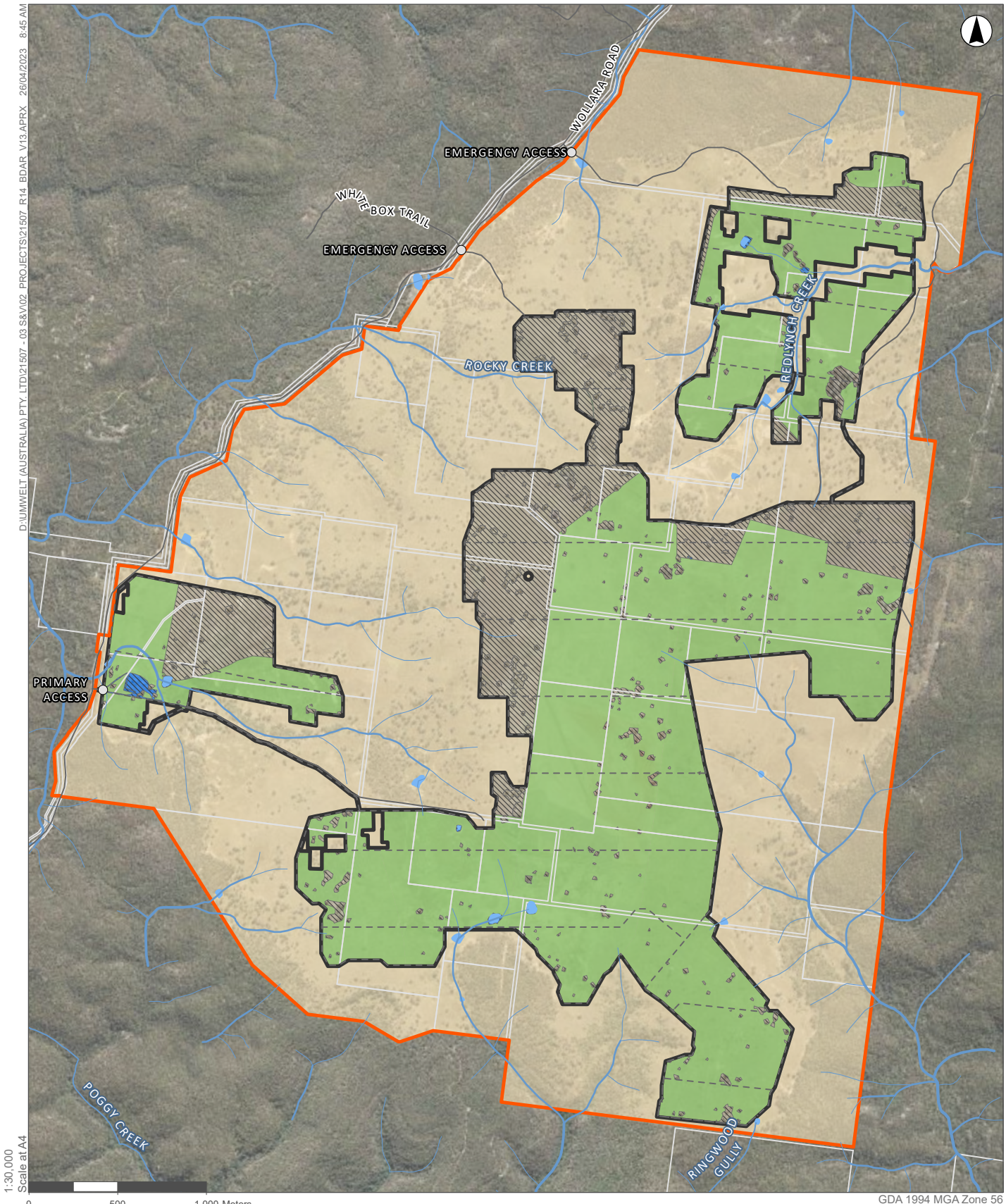


FIGURE 10.1

Thresholds for Assessing and Offsetting Impacts

Image Source: ESRI Basemap (2021) **Data source:** NSW LPI (2021), NSW DSFI (2021); NPWS Estate (2019); Lightsource BP (2022)

11.0 Biodiversity Credit Report

Biodiversity Credit Reports which identify the like-for-like and variation credit requirements are provided in **Appendix D.**

11.1 Ecosystem Credits

The ecosystem credit requirements and those that could be retired in accordance with the offset rules are listed in **Table 11.1.**

Table 11.1 Ecosystem Credit Class and Matching Credit Profiles

Ecosystem Credit		Attributes shared with matching credits						
	Rule Type	PCT name	PCT vegetation class	PCT vegetation formation	Associated TEC	Offset trading group	Hollow bearing trees present?	IBRA subregion (in which proposal is located)
PCT 483 Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley 4642 credits (includes credits for part of PCT which does not correspond to EPBC Act Listed CEEC)	Like for Like	74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698	Grassy Woodlands	Western Slopes Grassy Woodlands	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC	1152 credits = yes 3490 credits = no	Kerrabee, Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometres of the outer edge of the impacted site.

Ecosystem Credit		Attributes shared with matching credits						
	Rule Type	PCT name	PCT vegetation class	PCT vegetation formation	Associated TEC	Offset trading group	Hollow bearing trees present?	IBRA subregion (in which proposal is located)
PCT 1661 Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin 136 credits	Like for Like	54, 110, 217, 255, 273, 287, 330, 333, 341, 343, 346, 348, 358, 403, 455, 456, 472, 577, 581, 592, 617, 673, 676, 713, 940, 956, 1277, 1279, 1313, 1316, 1381, 1610, 1661, 1668, 1709	Western Slopes Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrubby sub-formation)	No	Western Slopes Dry Sclerophyll Forests - ≥ 50% - < 70% cleared group (including Tier 3 or higher threat status).	Yes	Kerrabee, Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and Yengo. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site.

11.2 Species Credits

The species credit requirements and those that could be retired in accordance with the offset rules are listed in Table 11.2.

Table 11.2 Species Credit Class and Matching Credit Profiles

Species credit	Attributes shared with matching credits				
	Name of threatened species	Kingdom	BC Act status	EPBC Act status	IBRA region
Regent Honeyeater 1546 Credits	Like for Like Rules: Regent Honeyeater	Fauna	Critically endangered	Critically endangered	Like for Like Rules: Any in NSW
Barking Owl 7 Credits	Like for Like Rules: Barking Owl	Fauna	Vulnerable	-	Like for Like Rules: Any in NSW

11.3 Biodiversity Offset Strategy

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

Lightsource bp has, where practicable, altered the Project to avoid and minimise ecological impacts in the planning stage, and a range of impact mitigation strategies have been included to mitigate the impact on ecological values prior to the consideration of offsetting requirements.

The retirement of biodiversity credits is proposed to be undertaken following a staged approach, to match the areas of staged clearing. Lightsource bp is currently considering the merits of all options available under the BOS to satisfy the offsetting requirements for the Project. The offset options available under the BC Act and BC Regulation include:

- land based offsets through the establishment of new Stewardship Sites or by retiring credits from existing Stewardship Sites
- purchasing credits from the market, and/or
- paying into the Biodiversity Conservation Fund.

The Proponent has committed to further investigate the retirement of biodiversity credits through the establishment of a Biodiversity Stewardship Site within the residual parts of the proposed Goulburn River Solar Farm property and this may include ecological rehabilitation of land to generate biodiversity credits. Where credits are not directly generated and retired through a Biodiversity Stewardship Agreement within the Goulburn River Solar Farm property, they would be purchased from the market or a payment would be made to the Biodiversity Conservation Fund. The like-for-like credit rules would be followed for nationally listed entities which require credits. The like-for-like or variation rules would be followed for all other entities which require credits.

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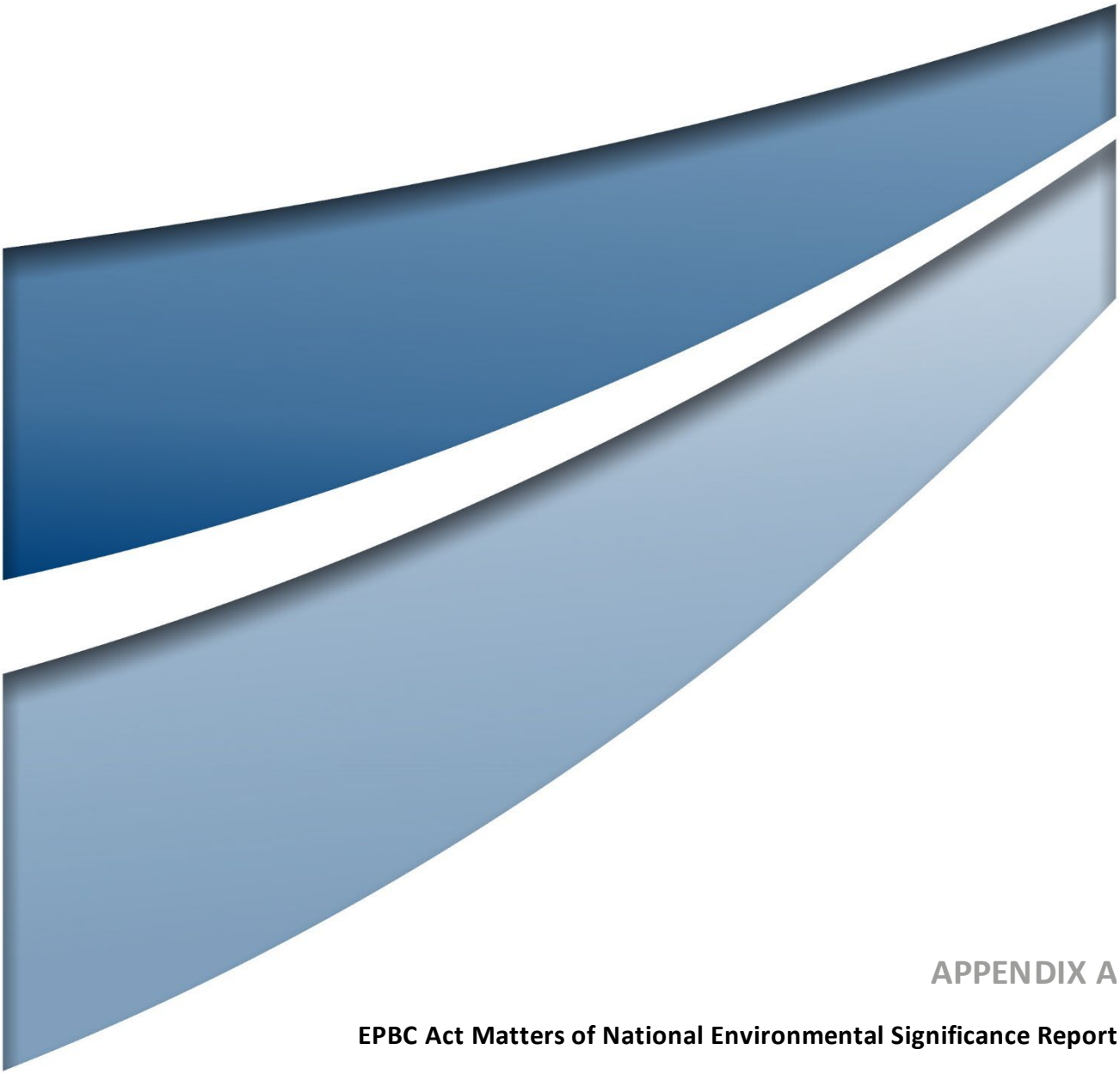

APPENDIX A

EPBC Act Matters of National Environmental Significance Report

umwelt
Environmental & Social Consultants

lightsource bp

GOULBURN RIVER SOLAR FARM

Matters of National Environmental Significance
Assessment Report

FINAL

May 2022

GOULBURN RIVER SOLAR FARM

Matters of National Environmental Significance Assessment Report

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Lightsource Development Services

Project Director: Malinda Facey
Project Manager: Jessica Henderson
Technical Director: Rachel Musgrave
Technical Manager: Jacob Manners
Report No. 21507/R14/Appendix A
Date: May 2022

Acknowledgement of Country

Umwelt would like to acknowledge the traditional custodians of the country on which we work and pay respect to their cultural heritage, beliefs, and continuing relationship with the land. We pay our respect to the Elders – past, present, and future.

Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
V1	Rachel Musgrave	2 May 2023	Rachel Musgrave	2 May 2023

Abbreviations

Abbreviation	Definition
BAM	Biodiversity Assessment Method
BAM-C	Biodiversity Assessment Method Calculator
BESS	Battery Energy Storage System
BDAR	Biodiversity Development Assessment Report
BOAMS	Biodiversity Offsets and Agreement Management System
BOS	Biodiversity Offset Scheme
BSA	Biodiversity Stewardship Agreement
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environmental Management Plan
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
DAWE	Commonwealth Department of Agriculture, Water and the Environment
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DPE	NSW Department of Planning and Environment
Development Footprint	The area of land that is directly impacted by a proposed development.
Development Site	An area of land that is subject to a proposed development under the EP&A Act, including areas which will be retained and impacted by the proposal (synonymous with Development Footprint).
EIS	Environmental Impact Statement
GIS	Geographic Information Systems
Ha	hectares
km	kilometres
LGA	Local Government Area
m	metres
mm	millimetres
MNES	Matters of National Environmental Significance
MWh	Megawatt hour
MWp	Megawatt peak
NSW	New South Wales
PCT	Plant Community Type
PMST	Protected Matters Search Tool
Project Area	The broader property area that the subject land is located within.
the Project	Goulburn River Solar Farm
SEARs	Secretary's Environmental Assessment Requirements
TEC	Threatened Ecological Community
TSSC	Commonwealth Threatened Species Scientific Committee

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1.0 Introduction

1.1 Background

Lightsource Development Services Australia Pty Ltd (Lightsource bp) have engaged Umwelt (Australia) Pty Ltd (Umwelt) to prepare this Matters of National Environmental Significance (MNES) Report for the proposed Goulburn River Solar Farm (the Project) within the locality of Merriwa, NSW.

The Solar Farm component of the Project has been determined to be a controlled action and requires approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The Decision on Referral Letter from the Australian Government Department of Climate Change, Energy, the Environment and Water (DCCEEW) (formerly Department of Agriculture, Water and the Environment (DAWE), now superseded) (Reference 2021/9102), identifies that the Project has the potential to impact on several nationally listed threatened species and ecological communities which are further assessed within this Report. It should be noted that the Public Road and Culvert Upgrade component of the Project does not form part of the controlled action determination as the impacts associated with that component of the Project are not considered to be significant.

This Appendix consolidates the DCCEEW assessment requirements, as provided in the supplementary Secretary's Environmental Assessment Requirements (SEARs) for the project, issued on 2 February 2022 as part of the controlled action determination (EPBC 2021/9102).

The Biodiversity Assessment Method (BAM) has been endorsed as the assessment method for MNES under a Bilateral Agreement made under the EPBC Act. The Australian Government is the decision-maker for whether the Project will be approved under the EPBC Act.

1.2 NSW and Commonwealth Bilateral Agreement

The Bilateral Agreement made under Section 45 of the EPBC Act relating to environmental assessment between the Commonwealth of Australia and NSW was signed by both parties in 2015. This Agreement enables NSW to conduct a single environmental assessment process. When the assessment process is complete, NSW provides a report to the Australian Government assessing the likely impacts on MNES listed under the EPBC Act.

An Amending Agreement between the Commonwealth and NSW was entered into on 24 March 2020, which endorses the NSW BAM (DPIE 2020a). Offsets are required under the EPBC Act for any residual significant adverse impacts on MNES. The Assessment Bilateral Agreement applies to all NSW projects that require EPBC Act approval to achieve streamlining benefits for projects that use the Biodiversity Offset Scheme (BOS).

A Biodiversity Development Assessment Report (BDAR) has been prepared in accordance with the BAM, to assess the biodiversity related impacts associated with the Project. Relevant information and results obtained from site surveys associated with the BDAR preparation have been reviewed and incorporated into this report.

1.3 EPBC Act Referral Outcome and Advice

The Project has been determined to be a Controlled Action and requires approval under the EPBC Act. The DCCEEW have identified that based on the information in the referral documentation, the location of the action, species records and likely habitat in the area there are likely to be significant impacts to:

- White Box-Yellow Box-Blakley's Red Gum Grassy Woodland and Derived Native Grassland – Critically Endangered.
- Regent Honeyeater (*Anthochaera phrygia*) – Critically Endangered.

DCCEEW have also identified that additionally there is some risk that there may be significant impacts on the following further matters and further assessment is required to determine if the following communities and species are present in the proposed action area and if so, the extent to which they may be impacted by the proposed action:

- Central Hunter Valley Eucalypt Forest and Woodland – Critically Endangered.
- Swift Parrot (*Lathamus discolor*) – Critically Endangered.
- Painted Honeyeater (*Grantiella picta*) – Vulnerable.
- Large-eared Pied Bat (*Chalinolobus dwyeri*) – Vulnerable.
- Corben's Long-eared Bat (*Nyctophilus corbeni*) – Vulnerable.
- Pink tailed Worm-lizard (*Aprasia parapulchella*) – Vulnerable.
- Bluegrass (*Dichanthium setosum*) – Vulnerable.
- Homoranthus darwinioides – Vulnerable.

DCCEEW have also requested further analysis of the impacts of the 2019–2020 bushfires on the following species as part of this assessment:

- White Box-Yellow Box-Blakley's Red Gum Grassy Woodland and Derived Native Grassland.
- Regent Honeyeater (*Anthochaera phrygia*) – Critically Endangered.
- Koala (*Phascolarctos cinereus*) (Combined Population of QLD, NSW and the ACT) – Vulnerable.
- Greater Glider (*Petauroides Volans*) – Vulnerable.
- Brush tailed Rock wallaby (*Petrogale penicillata*) – Vulnerable.
- Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (*Dasyurus maculatus maculatus* (South-east mainland population)) – Endangered.
- New Holland Mouse, Pookila (*Pseudomys novaehollandiae*) – Vulnerable.
- Grey-headed Flying-fox (*Pteropus poliocephalus*) – Vulnerable.

Biodiversity requirements included in the supplementary SEARs are reproduced in **Table 1.1**, which lists the relevant section of this report and the Solar Farm BDAR (Umwelt 2023) that specifically addresses that requirement.

Table 1.1 Commonwealth supplementary SEARs for Solar Farm component of the Project

Key Issue	SEARs Requirement	Relevant Section in this document	BDAR Reference
General requirements – Relevant regulations	5. The Environmental Impact Statement (EIS) must address all matters outlined in Schedule 4 of the Environment Protection and Biodiversity Conservation Regulations 2000 (Cth) and all matters outlined below in relation to the controlling provisions.		
General requirements – Project description	6. The title of the action, background to the action and current status.	**Section 1.4.1**	
	7. The precise location and description of all works to be undertaken (including associated offsite works and infrastructure), structures to be built or elements of the action that may have impacts on MNES.	**Section 1.4.2**	
	8. How the action relates to any other actions that have been, or are being taken in the region affected by the action.	**Section 1.4.3**	**Section 1.4.3**
	9. How the works are to be undertaken and design parameters for those aspects of the structures or elements of the action that may have relevant impacts on MNES.	**Section 1.4.4**	
General requirements – Impacts	10. The EIS must include an assessment of the relevant impacts of the action on the matters protected by the controlling provisions, including: i. a description and detailed assessment of the nature and extent of the likely direct, indirect and consequential impacts, including short term and long term relevant impacts; ii. a statement whether any relevant impacts are likely to be unknown, unpredictable or irreversible; iii. analysis of the significance of the relevant impacts; and iv. any technical data and other information used or needed to make a detailed assessment of the relevant impacts.	**Section 4.0**	**Section 8.0**

Key Issue	SEARs Requirement	Relevant Section in this document	BDAR Reference
General requirements – Avoidance, mitigation, and offsetting	11. For each of the relevant matters protected that are likely to be significantly impacted by the action, the EIS must provide information on proposed avoidance and mitigation measures to manage the relevant impacts of the action including: i. a description, and an assessment of the expected or predicted effectiveness of the mitigation measures, v. any statutory policy basis for the mitigation measures; vi. the cost of the mitigation measures; vii. an outline of an environmental management plan that sets out the framework for continuing management, mitigation and monitoring programs for the relevant impacts of the action, including any provisions for independent environmental auditing; viii. the name of the agency responsible for endorsing or approving each mitigation measure or monitoring program.	**Section 4.0**	**Section 7.0** and **Section 8.4**
	14. In addition to the general requirements described above, specific information is required with respect to each of the determined controlling provisions. These requirements are outlined in paragraphs 15–17.		
Biodiversity (threatened species and communities and migratory species)	15. The EIS must identify each EPBC Act listed threatened species and community and migratory species likely to be impacted by the action. For any species and communities that are likely to be impacted, the proponent must provide a description of the nature, quantum and consequences of the impacts. For species and communities potentially located in the project area or in the vicinity that are not likely to be impacted, provide evidence why they are not likely to be impacted.	**Section 2.2**	**Section 2.3** **Section 2.4** **Section 5.1** **Section 5.2**
	16. For each of the EPBC Act listed threatened species and communities and migratory species likely to be impacted by the action the EIS must provide a separate: • description of the habitat (including identification and mapping of suitable breeding habitat, suitable foraging habitat, important populations and habitat critical for survival), with consideration of, and reference to, any relevant Commonwealth guidelines and policy statements including listing advice, conservation advice and recovery plans; • details of the scope, timing and methodology for studies or surveys used and how they are consistent with (or justification for divergence from) published Australian Government guidelines and policy statements;	**Section 2.0** **Section 3.0** **Section 4.0**	**Section 2.0** **Section 4.0** **Section 5.0** **Section 7.0** **Section 8.0** **Section 10.0** **Section 11.0**

Key Issue	SEARs Requirement	Relevant Section in this document	BDAR Reference
	• description of the relevant impacts of the action having regard to the full national extent of the species or community's range; • description of the specific proposed avoidance and mitigation measures to deal with relevant impacts of the action; • identification of significant residual adverse impacts likely to occur after the proposed activities to avoid and mitigate all impacts are taken into account; • a description of any offsets proposed to address residual adverse significant impacts and how these offsets will be established; • details of how the current published NSW Biodiversity Assessment Method (BAM) has been applied in accordance with the objects of the EPBC Act to offset significant residual adverse impacts; and • details of the offset package to compensate for significant residual impacts including details of the credit profiles required to offset the action in accordance with the BAM and/or mapping and descriptions of the extent and condition of the relevant habitat and/or threatened communities occurring on proposed offset sites. Note: For the purposes of approval under the EPBC Act, it is a requirement that offsets directly contribute to the ongoing viability of the specific protected matter impacted by a proposed action and deliver an overall conservation outcome that improves or maintains the viability of the MNES i.e. 'like for like'. In applying the BAM, residual impacts on EPBC Act listed TECs must be offset with Plant Community Type(s) (PCT) that are ascribed to the specific EPBC listed ecological community. PCTs from a different vegetation class will not generally be acceptable as offsets for EPBC listed communities.		
	17. Any significant residual impacts not addressed by the BAM may need to be addressed in accordance with the EPBC Act 1999 Environmental Offset Policy. (http://www.environment.gov.au/epbc/publications/epbc-act-environmental-offsets-policy.)	**Section 4.0**	**Section 11.0**

1.4 Project Description

1.4.1 The title of the action, background to the action and current status

The solar farm component of the Project is a proposed solar farm which includes construction, operation, maintenance and eventually decommissioning works. The solar farm is proposed to generate approximately 550 MWp (Megawatt peak) of solar electricity, with a Battery Energy Storage System (BESS) of approximately 570 MWh (Megawatt hour) and an electrical substation to connect the solar farm to the existing 500 kV transmission line that runs through the Project Area.

1.4.2 The precise location and description of all works to be undertaken (including associated offsite works and infrastructure), structures to be built or elements of the action that may have impacts on MNES

1.4.2.1 Project Location

The Project is located approximately 28 kilometres (km) southwest of the township of Merriwa and is surrounded by the Goulburn River National Park. It is within the Upper Hunter Local Government Area (LGA) of New South Wales (NSW). The boundary of the Project Area and Development Footprint is shown on the Site Map provided as **Figure 1.1** of the BDAR.

The elevated central parts of the Project Area are located on the Liverpool West Basalt rock unit, with surrounding areas on the Banks Wall Sandstone rock unit, which is part of the Narrabeen Group sandstones (Colquhoun *et al.*, 2021). The areas influenced by the Liverpool West Basalt rock unit are highly productive and have been historically cleared and continue to be utilised for livestock grazing on improved pastures.

The current site vegetation consists of a mosaic of exotic dominated pasture vegetation where pasture improvement has taken place, derived native grasslands subject to various degrees of disturbance in various timeframes, isolated paddock trees, areas of thinned trees and intact woodland and forest around the periphery of the Project Area.

The Project will also require road upgrade works including public road and culvert upgrades on Ringwood Road between Bow River and Killoe Creek. The potential impacts on MNES for this component of the Project is discussed within the Public Road and Culvert Upgrade BDAR in Appendix 7 of the Environmental Impact Statement (EIS).

1.4.2.2 Description of Works

The Development Footprint and Project Area are mapped in **Figure 1.2** of the BDAR. The key components of the Project include:

- Approximately one million bifacial solar PV modules in an east-west single-axis tracking arrangement with an approximate height of 5 metres (m) above ground level.
- A BESS with an approximate 280 MWp and 570 MWh capacity. The BESS will be housed in a series of outdoor containers, either distributed across the site or aggregated in one central location.

- Onsite 500 kV switchyard and substation, with underground electrical conduits and cabling leading into the yard and overhead lines reaching above to the existing transmission line. An additional tower may be erected on the current line to accommodate the grid connection.
- Onsite power line connection via underground electrical conduits and cabling.
- Communications tower, up to 30 m high, providing communications, radio and cellular services to the site and wider region.
- Internal access roads allowing for site maintenance.
- Site office and operations and maintenance building with parking for the operations team.
- Primary solar farm site access point from the existing driveway from Wollara Road, with additional existing access points to be maintained along the north-western boundary of the Project Area.
- Drainage line crossings if and where required to manage existing surface water flows (to be determined during further design development) and access points for construction purposes.
- Security fencing around the main development footprint areas (excluding linking roads /not the entire property), installation of crossing gates, water tanks or dams, and fencing and potential alternate secondary access points to facilitate ongoing livestock grazing.

The Project will also require road and culvert upgrade works on Ringwood Road, between Bow River and Killoe Creek. These repairs will include 8 m bitumen-sealed formation with a minimum of 500 mm unsealed shoulders. The horizontal and vertical alignment of the proposed road will ensure safe sight distance, safe movement of longer vehicles, and an improved road network for the users.

The culvert upgrades are at the locations where Ringwood Road intersects the Bow River and Killoe Creek. The culvert upgrades will include:

- Installing culverts designed to accommodate two-way heavy vehicles, including B doubles and various farm machinery.
- Culvert width 7 m (3.5 m lane width) sealed carriageway with suitable guardrail and signage and associated drainage works.
- Stockpile site to be located on disturbed land within the road reserve in consultation with Upper Hunter Council.
- Temporary side track at both locations to facilitate access during construction.

1.4.3 How the action relates to any other actions that have been, or are being taken in the region affected by the action

Other projects that are or are proposed to be taken within close proximity to the Project site include the Merriwa Solar Farm and he Wollar Solar Farm.

The proposed Merriwa Solar Farm is located within the Merriwa area to the north of the Goulburn River National Park. Detailed impact assessment documentation and biodiversity reporting is currently being prepared and is not available for the Merriwa Solar Farm Project, however preliminary information available indicates that the site contains suitable habitat for the Regent Honeyeater and the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland critically endangered ecological community listed under the EPBC Act.

The Wollar Solar Farm is located to the south-west of the Project Area at Tichular and is an approved project. Impact assessment documentation for the Wollar Solar Farm identifies impacts and offsetting to the following MNES also proposed to be impacted and offset by the Goulburn River Solar Farm:

- Regent Honeyeater (25.66 ha of suitable foraging habitat).
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland (232 ha including 29 ha of woodland and 203 hectares of derived native grassland).

1.4.4 How the works are to be undertaken and design parameters for those aspects of the structures or elements of the action that may have relevant impacts on MNES

The following design considerations have factored into the selection of the Development Footprint and biodiversity impact avoidance:

- The Project Area was selected for the location of a solar farm due to the presence of an existing 500 kv transmission line, which means that there will be no requirement for a new electricity transmission line or associated impacts. To ensure that the project remains economically viable the total capacity of solar production needs to remain at or above a 550 MWp of solar electricity.
- The Project Area is also characterised by suitable terrain and topography, high quality solar irradiance and ideal climatic conditions, access to major transport networks for delivery of construction materials. There is only one surrounding land holder (the NSW Government) and the visual impacts associated with the Project can be managed through the screening provided by the Goulburn River National Park.
- The Project Area (2000 hectares (ha)) has provided flexibility in design to prioritise avoidance of high value biodiversity areas and the subject land has been already impacted by widespread clearing and ongoing pasture improvement works for agricultural use.

Throughout the EIS preparation and scoping phases of the Project several design refinements have occurred including:

- Biodiversity impact avoidance through an initial approximately 30% reduction in development footprint area (reducing from 1,249 ha to 882 ha) and a further secondary approximately 10% reduction in development footprint (882 ha to 799.5 ha).
- Selection of higher rated capacity solar panels to ensure that the development footprint is minimised, the project obtains a capacity of a 550 MWp of solar electricity and the cost of purchasing the solar panels maintains the projects economic viability.

- Optimising opportunities to maintain connectivity between the Project Area and surrounding Goulburn River National Park and within the Project Area through limiting fencing to strategic areas.
- Redesign the Project to minimise impacts on areas of mapped Regent Honeyeater (*Anthochaera phrygia*) important habitat (the generic mapping includes both areas of scattered trees and grassland).
- Alteration of the Project to avoid impact to Plant Community Types (PCTs) associated with habitat for the Large-eared Pied bat (*Chalinolobus dwyeri*).
- Reduction in the area occupied by the Project for the White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland critically endangered ecological community (CEEC)to avoid areas of woodland with intact crown condition, and impact minimisation to areas to areas of scattered trees and derived native grassland condition zones.
- Establishment of exclusion zones within the Development Footprint to avoid Redlynch Creek which crosses the Project Area.

2.0 Methods

The information outlined in this report is based on the results of both a desktop-based literature and database review and comprehensive biodiversity surveys undertaken over multiple years and seasons. The surveys were undertaken in accordance with the BAM and are documented in the BDAR prepared for the solar farm component of the Project. While it is acknowledged that this methodology is endorsed by the Commonwealth under the Assessment Bilateral Agreement, Umwelt has also sought to refer to the Commonwealth survey guidelines where relevant.

2.1 Desktop Literature and Database Review

The following key information sources containing existing ecological information related to the site have been reviewed as part of the preparation of this report:

- Biodiversity Assessment Methodology 2020 (DPIE 2020a).
- NSW BioNet (incorporating the BioNet Atlas and Threatened Species Data Collection(TBDC)) (DPE 2022a), accessed March 2023.
- NSW Department of Planning and Environment (DPE) BAM Important Areas viewer (DPE 2022b), accessible through the Biodiversity Offsets and Agreement Management System (BOAMS) portal, accessed March 2023.
- BioNet Vegetation Classification Database (DPE 2022c), accessed March 2023.
- Protected Matters Search Tool (PMST) (DCCEEW 2023b) for known/predicted EPBC Act-listed threatened and migratory species, as well as threatened ecological communities (TECs), accessed March 2023.
- National Flying Fox Monitoring Viewer (DCCEEW 2023c) - https://www.environment.gov.au/webgis-framework/apps/ffc-wide/ffc-wide.jsf, accessed March 2023.

These reports and databases were reviewed to obtain information in relation to the PCTs, habitat constraints, microhabitats and previous site records for threatened species. A likelihood of occurrence assessment was completed for the nationally listed threatened species, migratory species and threatened ecological communities identified from the PMST (DAWE 2022c) using the definitions provided in **Table 2.1**. The results of this assessment are provided in **Section 3.0**.

2.2 MNES Likelihood of Occurrence Assessment

A likelihood of occurrence assessment has been undertaken in **Table 2.1** for MNES identified from the Biodiversity Assessment Method Calculator (BAM-C), from a 10 km radius search of the BioNet Atlas and from a 10 km PMST search. The assessment has been undertaken utilising the following likelihood of occurrence ratings and definitions:

- **Know Occurrence –** Recent and reliable records of this matter exist within the Project Area.
- **High Likelihood of Occurrence –** Probable that the matter occurs in the Project Area, despite lack of records.
- **Moderate Likelihood of Occurrence –** Suitable habitat is present for this matter however records of the matter are not known to occur in the immediate locality of the Project Area.
- **Low Likelihood of Occurrence –** There are no records for this matter, habitat requirements are not met, or the normal distribution range of the matter does not coincide with the Project Area locality. Despite this, the matter may be present in rare circumstances.
- **Not Likely to Occur –** The matter is not likely to occur within the locality of the Project Area.

Those matters identified in **Table 2.1** has having a known occurrence or a high or medium likelihood of occurrence in the Project Area are assessed further in **Section 4.2** of this Report.

Table 2.1 MNES Likelihood of Occurrence Assessment

MNES Name	Status		Desktop Assessment Source & PMST Notes for 10 km Search Area	Likelihood to Occur within the Project Areas (Solar Farm and Road Upgrade Areas)	Further Assessment and/or Survey Required?
	BC Act	EPBC Act			
Wetlands of International Importance (RAMSAR Wetlands)					
Hunter Estuary Wetlands	-	Ramsar	Ramsar Wetlands - within 100–150 km of Ramsar site	**Not present** – Hunter Estuary Wetland Areas occur approximately 100–150 km upstream of the Project Area. Disturbances in the Project Area are not expected to have any direct or indirect impact on the Hunter Estuary Wetlands Ramsar Site.	No
Threatened Ecological Communities					
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	-	E	MNES Search (may occur)	Not present – ecological community not observed during surveys.	No
Central Hunter Valley eucalypt forest and woodland	-	CE	MNES Search (may occur)	Not present – ecological community not observed during surveys.	No
Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland	-	CE	MNES Search (may occur)	Not present – ecological community not observed during surveys.	No
Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South--eastern Australia	-	E	MNES Search (likely presence)	Not present – ecological community not observed during surveys.	No
Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland	-	E	MNES Search (may occur)	Not present – ecological community not observed during surveys.	No

MNES Name	Status		Desktop Assessment Source & PMST Notes for 10 km Search Area	Likelihood to Occur within the Project Areas (Solar Farm and Road Upgrade Areas)	Further Assessment and/or Survey Required?
	BC Act	EPBC Act			
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	-	CE	MNES Search (may occur)	Not present – ecological community not observed during surveys.	No
Hunter Valley Weeping Myall (Acacia pendula) Woodland	-	CE	MNES Search (may occur)	Not present – ecological community not observed during surveys.	No
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	-	CE	MNES Search (likely presence)	Observed during surveys. Associated with areas of PCT 483 which meet condition threshold requirements.	Yes
Weeping Myall Woodlands	-	E	MNES Search (may occur)	Not present – ecological community not observed during surveys.	No
Threatened Flora Species					
Androcalva procumbens	V	V	MNES Search (likely presence)	**Unlikely.** No known records within 10 km of the Project Area. No habitat within the Project Area.	No
Androcalva rosea (syn. *Commersonia rosea*) Sandy Hollow Commersonia	E	E	BioNet Atlas, MNES Search (known presence)	**Moderate to Low.** Recorded adjacent to Project Area on western side of Wollara Road, however habitats within the Project Area are significantly more disturbed.	Yes
Dichanthium setosum Bluegrass	V	V	BioNet Atlas, MNES Search (likely presence)	**Moderate to Low.** Denatured records mapped mostly south of the Goulburn River. Associated with PCT 483. Not predicted to occur according to the BAM-C for the solar farm project area. It is predicted in BAM-C for the road upgrade area. The Solar Farm Project Area is located within the Sydney Basin Bioregion, this species is not known or predicted to occur within the Sydney Basin Bioregion.	Yes

MNES Name	Status		Desktop Assessment Source & PMST Notes for 10 km Search Area	Likelihood to Occur within the Project Areas (Solar Farm and Road Upgrade Areas)	Further Assessment and/or Survey Required?
	BC Act	EPBC Act			
Euphrasia arguta	CE	CE	MNES Search (may occur)	**Unlikely.** No known records within 10 km of the Project Area. No habitat within the Project Area.	No
Homoranthus darwinioides Fairy Bells	V	V	BioNet Atlas, MNES Search (known)	**Moderate.** Recorded at several locations in adjoining sandstone areas of the Goulburn River National Park, however habitats within the Project Area are significantly more disturbed.	Yes
Lepidium aschersonii Spiny peppercress	V	V	MNES Search (may occur)	**Unlikely.** No known records within 10 km of the Project Area. No habitat within the Project Area.	No
Ozothamnus tesselatus	V	V	BioNet Atlas, MNES Search (likely presence)	**Moderate.** Known to occur within the locality mostly south of the Goulburn River.	Yes
Persoonia hirsuta	E	E	MNES Search (may occur)	**Unlikely.** No known records within 10 km of the Project Area. No habitat within the Project Area. Not predicted to occur within BAM-C.	No
Prasophyllum sp. Wybong (C.Phelps ORG 5269)	-	CE	MNES Search (may occur)	**Unlikely.** No known records within 10 km of the Project Area. No habitat within the Project Area. Not predicted to occur within BAM-C.	No
Prostanthera discolor	V	V	MNES Search (likely presence)	**Unlikely.** No known records within 10 km of the Project Area. No habitat within the Project Area. Not predicted to occur within BAM-C.	No
Thesium australe	V	V	MNES Search (likely presence)	**Unlikely.** No known records within 10 km of the Project Area. No habitat within the Project Area. Not predicted to occur within BAM-C.	No
Tylophora linearis	V	E	BioNet Atlas, MNES Search (may occur)	**Unlikely.** Local records are south of the Goulburn River and not predicted to occur within BAM-C.	No

MNES Name	Status		Desktop Assessment Source & PMST Notes for 10 km Search Area	Likelihood to Occur within the Project Areas (Solar Farm and Road Upgrade Areas)	Further Assessment and/or Survey Required?
	BC Act	EPBC Act			
Threatened Fauna Species					
Anthochaera phrygia Regent Honeyeater	CE	CE	BioNet Atlas, MNES Search (known presence)	Foraging habitat use: **high**, Breeding habitat use: **low** Site mapped as important habitat.	Yes
Aphelocephala leucopsis Southern Whiteface*	V	V	MNES Search (known presence)	**Unlikely.** No known records within 10 km of the Project Area. No habitat within the Project Area.	No
Aprasia parapulchella Pink-tailed Legless Lizard	V	V	BioNet Atlas, MNES Search (known presence)	**Moderate.** Recorded in 2000approximately 7 km to the west of the Solar Farm Project Area. Associated in BAM-C with PCT 483.	Yes
Botaurus poiciloptilus Australasian Bittern	E	E	MNES Search (may occur)	**Unlikely.** No known records within 10 km of the Project Area. No habitat within the Project Area.	No
Calidris ferruginea Curlew Sandpiper	E	CE, M	MNES Search (may occur)	**Unlikely.** No known records within 10 km of the Project Area. No habitat within the Project Area.	No
Callocephalon fimbriatum Gang-gang Cockatoo*	V	E	BioNet Atlas, MNES Search (known presence)	**Moderate.** Recorded within the locality of the Solar Farm Project Area.	Yes
Calyptorhynchus lathami South Eastern Glossy Black-Cockatoo*	V	V	BioNet Atlas, MNES Search (known presence)	**Known.** Observed during surveys for the Solar Farm Project Area.	Yes
Chalinolobus dwyeri Large-eared Pied Bat	V	V	BioNet Atlas, MNES Search (known presence)	**High.** Recorded within the locality of the Solar Farm Project Area.	Yes
Climacteris picumnus victoriae Brown Treecreeper (south-eastern)*	V	V	MNES Search (known presence)	**High.** Recorded within the locality of the Solar Farm Project Area. Associated in BAM-C with PCT 1661.	Yes

MNES Name	Status		Desktop Assessment Source & PMST Notes for 10 km Search Area	Likelihood to Occur within the Project Areas (Solar Farm and Road Upgrade Areas)	Further Assessment and/or Survey Required?
	BC Act	EPBC Act			
Dasyurus maculatus Spotted-tailed Quoll	V	E	BioNet Atlas, MNES Search (known presence)	**Low.** Single record south of Goulburn River. Associated in BAM-C with PCT 1661.	Identified in the EPBC Act Assessment Guidance as priority management species for further assessment and considered further in **Section 4.0**.
Delma impar Striped Legless Lizard	V	V	MNES Search (likely presence)	**Low.** No records within the locality of the Project Area. Associated with in BAM-C with PCT 483. Previously confused with the recently described Hunter Valley Delma (*Delma vescolineata*).	No
Falco hypoleucos Grey Falcon	V	V	MNES Search (likely presence)	**Low.** No records within the locality of the Project Area. Considered unlikely to occur within the Project Area.	No
Grantiella picta Painted Honeyeater	V	V	BioNet Atlas, MNES Search (known presence)	**High.** Recorded within the locality of the Solar Farm Project Area. Associated in BAM-C with PCT 483.	Yes
Heleioporus australiacus Giant Burrowing Frog	V	V	MNES Search (may occur)	**Unlikely.** No records within the locality of the Project Area. No habitat within the Project Area.	No
Hirundapus caudacutus White-throated Needletail	-	V,M	BioNet Atlas, MNES Search (known presence)	**Known**. Observed during surveys. Associated in BAM-C with PCT 483 and PCT 1661.	Yes
Lathamus discolor Swift Parrot	E	CE	BioNet Atlas, MNES Search (likely presence)	**Moderate to Low.** Suitable foraging habitat present, low number of local records. Potential for sporadic annual occurrence.	Yes
Leipoa ocellata Malleefowl	E	V	BioNet Atlas, MNES Search (likely presence)	**Unlikely.** Recorded within the locality of the solar farm. No habitat within the Project Area.	No

MNES Name	Status		Desktop Assessment Source & PMST Notes for 10 km Search Area	Likelihood to Occur within the Project Areas (Solar Farm and Road Upgrade Areas)	Further Assessment and/or Survey Required?
	BC Act	EPBC Act			
Litoria booroolongensis Booroolong Frog	E	E	MNES Search (may occur)	**Unlikely.** No known records within the locality of the Project Area. No habitat within the Project Area.	No
Melanodryas cucullata cucullata South-eastern Hooded Robin*	V	E	BioNet Atlas, MNES Search (known presence)	**Moderate.** Recorded adjacent to the Project Area/solar farm. Associated with PCT 1661.	Yes
Neophema chrysostoma Blue-winged Parrot*	-	V	MNES Search (may occur)	**Unlikely.** No known records within the locality of the Project Area. No habitat within the Project Area.	No
Numenius madagascariensis Eastern Curlew	-	CE	MNES Search (may occur)	**Unlikely.** No known records within the locality of the Project Area. No habitat within the Project Area.	No
Nyctophilus corbeni Corben's Long-eared Bat	V	V	BioNet Atlas, MNES Search (known presence)	**Moderate.** Recorded within the locality of the solar farm.	No
Petauroides volans Greater Glider (southern and central)*	E	E	MNES Search (known presence)	**Unlikely.** No known records within the locality of the Project Area. No habitat within the Project Area.	Identified in the EPBC Act Assessment Guidance as priority management species for further assessment and considered further in **Section 4.0**.
Petaurus australis australis Yellow-bellied Glider (south-eastern)	V	V	MNES Search (may occur)	**Unlikely.** No known records within the locality of the Project Area. No habitat within the Project Area.	No

MNES Name	Status		Desktop Assessment Source & PMST Notes for 10 km Search Area	Likelihood to Occur within the Project Areas (Solar Farm and Road Upgrade Areas)	Further Assessment and/or Survey Required?
	BC Act	EPBC Act			
Petrogale penicillata Brush-tailed Rock-wallaby	E	V	BioNet Atlas, MNES Search (known presence)	**Low.** Recorded within the locality of the solar farm. No habitat within the Project Area.	Identified in the EPBC Act Assessment Guidance as priority management species for further assessment and considered further in **Section 4.0**.
Phascolarctos cinereus Koala	E	E	BioNet Atlas, MNES Search (known presence)	**Low.** Record marked on site from 1957 with questionable locational accuracy. Recent call, scat and scratching records made 5 km SW on alluvial flats associated with the Goulburn River. Associated with PCT 483 and PCT 1661.	Identified in the EPBC Act Assessment Guidance as priority management species for further assessment and considered further in **Section 4.0**.
Polytelis swainsonii Superb Parrot	V	V	MNES Search (may occur)	**Low.** No known records within the locality of the Project Area.	No
Pseudomys novaehollandiae New Holland Mouse	-	V	MNES Search (known presence)	**Unlikely.** No known records within the locality of the Project Area. No habitat within the Project Area.	Identified in the EPBC Act Assessment Guidance as priority management species for further assessment and considered further in **Section 4.0**.
Pteropus poliocephalus Grey-headed Flying-fox	V	V	MNES Search (may occur)	**Low.** No known records within the locality of the Project Area. The closest known flying-fox camp is located at Muswellbrook.	Identified in the EPBC Act Assessment Guidance as priority management species for further assessment and considered further in **Section 4.0**.

MNES Name	Status		Desktop Assessment Source & PMST Notes for 10 km Search Area	Likelihood to Occur within the Project Areas (Solar Farm and Road Upgrade Areas)	Further Assessment and/or Survey Required?
	BC Act	EPBC Act			
Pycnoptilus floccosus Pilotbird	-	V	MNES Search (may occur)	**Unlikely.** No known records within the locality of the Project Area. No habitat within the Project Area.	No
Rostratula australis Australian Painted Snipe	E	E	MNES Search (likely presence)	**Unlikely.** No known records within the locality of the Project Area. No habitat within the Project Area.	No
Stagonopleura guttata Diamond Firetail	V	V	MNES Search (known presence)	**Known.** Observed during surveys.	Yes
Migratory Species					
Actitis hypoleucos Common Sandpiper		M	MNES Search (may occur)	**Unlikely.** No known records within the locality of the Project Area. No habitat within the Project Area.	No
Apus pacificus Fork-tailed Swift		M	MNES Search (likely presence)	**Moderate.** No known records within the locality of the Project Area. Project Suitable habitat is present.	No
Calidris acuminata Sharp-tailed Sandpiper		M	MNES Search (may occur)	**Unlikely.** No known records within the locality of the Project Area. No habitat within the Project Area.	No
Calidris ferruginea Curlew Sandpiper		CE	MNES Search (may occur)	**Unlikely.** No known records within the locality of the Project Area. No habitat within the Project Area.	No
Calidris melanotos Pectoral Sandpiper		M	MNES Search (may occur)	**Unlikely.** No known records within the locality of the Project Area. No habitat within the Project Area.	No
Gallinago hardwickii Latham's Snipe		M	MNES Search (may occur)	**Unlikely.** No known records within the locality of the Project Area. No habitat within the Project Area.	No
Hirundapus caudacutus White-throated Needletail		V	MNES Search (known presence)	**Known.** Observed during surveys. Associated in BAM-C with PCT 483 and PCT 1661.	Yes

MNES Name	Status		Desktop Assessment Source & PMST Notes for 10 km Search Area	Likelihood to Occur within the Project Areas (Solar Farm and Road Upgrade Areas)	Further Assessment and/or Survey Required?
	BC Act	EPBC Act			
Monarcha melanopsis Black-faced Monarch		M	MNES Search (may occur)	**Unlikely.** No known records within the locality of the Project Area. No habitat within the Project Area.	No
Motacilla flava Yellow Wagtail		M	MNES Search (may occur)	**Unlikely.** No known records within the locality of the Project Area. No habitat within the Project Area.	No
Myiagra cyanoleuca Satin Flycatcher		M	MNES Search (likely presence)	**Unlikely.** No known records within the locality of the Project Area. No habitat within the Project Area.	No
Numenius madagascariensis Eastern Curlew	-	CE	MNES Search (may occur)	**Unlikely.** No known records within the locality of the Project Area. No habitat within the Project Area.	No
Rhipidura rufifrons Rufous Fantail		M	MNES Search (known presence)	**Unlikely.** No known records within the locality of the Project Area. No habitat within the Project Area.	No
KEY * = species listed under EPBC Act after determination that the Project was a Controlled Action under Section 75 of the EPBC Act. V = Vulnerable, E = Endangered, CE = Critically Endangered, M = Migratory					

2.3 Field Surveys

2.3.1 Plant Community Type Mapping

The native vegetation extent within the Development Footprint was determined during site surveys, through Geographic Information Systems (GIS) mapping and aerial photograph interpretation using recent aerial imagery. Native vegetation and PCT mapping was undertaken using best-practice techniques to delineate vegetation communities across the Development Footprint. Vegetation mapping involved the following key steps:

- review of aerial imagery to assess vegetation distribution patterns as dictated by change in canopy texture, tone, and colour, as well as topography
- review of the modelled distribution of vegetation communities within broader scale regional based vegetation mapping
- preparation of a draft plant community type map based on interpretation of digital aerial imagery
- field-based ground-truthing of the draft plant community type mapping
- confirmation of vegetation community floristic delineations based on plot data.

PCT were delineated through the identification of patterns of plant species assemblages in each of the identified strata. Slight variations in species composition are typical across the extent of a community and are often associated with microhabitats or ecotones with other communities.

2.3.2 Plant Community and Threatened Ecological Community Surveys

Comprehensive plant community surveys have been undertaken, as documented in the BDAR. A stratified plot-based floristic and vegetation integrity of the Development Footprint was undertaken in accordance with Table 3 and Section 4.2.1 of the BAM, to assess the expected environmental variation and address any gaps and verify the results of previous mapping and site information.

The BAM plots were sampled by Umwelt ecologists on the following dates:

- 3 February 2022
- 21–25 March 2022
- 5–7 April 2022
- 15–16 June 2022
- 30 January–2 February 2023
- BAM plot survey stratification for each plant community type is listed in **Table 2.1**.

Table 2.2 Plant Community Type Survey Plot Stratification Details

PCT ID	PCT Name	Vegetation Condition Zone	Area (ha)	Quantity of Plots Required (BAM 2020 Table 3)	Plots Completed
483	Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Scattered Trees	23.69	4	4
		Moderate Condition Derived Native Grassland	166.69	6	18
		Moderate to Low Condition Derived Native Grassland	310.28	7	19
		Low Condition Derived Native Grassland	199.09	6	10
1661	Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	Scattered Trees	6.07	3	4
		Moderate to Low Condition Derived Native Grassland	36.79	4	10
		Low Condition Derived Native Grassland	53.24	5	5

The PCTs mapped within the Project Area were compared to TECs listed under the EPBC Act using the Commonwealth Threatened Species Scientific Committee (TSSC) listing and conservation advice and/or policy statements. The following approach was used:

- A list of nationally listed TECs potentially occurring within the Project Area was obtained through the completion of a PMST search using a 10 km buffer and review of the EPBC Act List of TECs.
- Full-floristic plot assessment, rapid assessments and meandering surveys were completed to determine floristic composition and structure of each PCT.
- For TECs with a potential occurrence within the Project Area, the TEC diagnostic characteristics and condition thresholds were analysed, as identified in the listing advice provided by the TSSC for the relevant candidate TECs assessed.
- Comparison was undertaken with published species lists, including lists of 'important species' as identified on the listing advice provided by the TSSC for potentially occurring nationally listed TECs.
- Comparison with habitat descriptions and distributions for potentially occurring nationally listed TECs was made.

Assessments were completed for the nationally listed TECs potentially occurring using any relevant guidelines and recovery plans published by the Commonwealth.

2.3.3 EPBC Act Listed Threatened Species Surveys

Biodiversity surveys have been undertaken by Umwelt in the Project Area between 2017 and 2022.

The following guidelines relevant to the BAM were utilised for the completion of habitat assessments and targeted surveys for candidate threatened and migratory listed species:

- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (DEC 2004).
- Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment method (DPIE 2020b).
- Flora Species with Specific Survey Requirements List Version 1.
- 'Species Credit' Threatened Bats and their Habitats – NSW Survey Guide for the Biodiversity Assessment Method (OEH 2018).
- Bat Calls of NSW – Region Based Guide to the echolocation calls of microchiropteran bats (Pennay *et al.*, 2004).
- NSW Survey Guide for Threatened Frogs – A guide for the survey and assessment of threatened frogs and their habitats for the Biodiversity Assessment Method (DPIE 2020c).
- Survey Guidelines for Australia's Threatened Mammals: Guidelines for Detecting Mammals Listed as Threatened under the Environment Protection and Biodiversity Conservation Act 1999. Commonwealth of Australia (DSEWPC 2011).
- Survey guidelines for Australia's threatened frogs: Guidelines for detecting frogs listed as threatened under the EPBC Act. Canberra: Department of Environment, Water, Heritage and the Arts (DEWHA 2010a).
- Survey Guidelines for Australia's Threatened Birds: Guidelines for Detecting Birds Listed as Threatened under the Environment Protection and Biodiversity Conservation Act 1999. Commonwealth of Australia (DEWHA 2010b).

The locations of surveys completed for all EPBC Act listed species are documented in the BDAR prepared for the Project.

Surveys were undertaken for the threatened species considered to have potential to occur in the Project Area based on database reviews, including the EPBC Act PMST (DCCEEW 2023b) and NSW BioNet Atlas (DPE 2022a). Surveys included species-specific surveys and on-ground searches in suitable habitat throughout the Project Area. Additionally, opportunistic surveys were undertaken for these species in conjunction with the plant community surveys undertaken.

Targeted surveys for EPBC Act listed species-credit, ecosystem-credit and dual-credit species were undertaken over the dates provided in **Table 2.2** and **Table 2.3**.

Table 2.3 Surveys Targeting Threatened EPBC Act Listed Flora Species

Scientific Name	Common Name	Listing Status		Survey Method	Relevant Guidelines and Resources
		BC Act	EPBC Act		
***Androcalva rosea* (syn. *Commersonia rosea*)**	Sandy Hollow Commersonia	E	E	• 10 m parallel traverse. • Sampling and opportunistic observations were undertaken during all floristic and vegetation plot surveys.	• Surveying threatened plants and their habitats NSW survey guide for the Biodiversity Assessment Method (DPIE 2020b). • NSW TBDC (DPE 2022d).
Dichanthium setosum	Bluegrass	V	V	• 10 m parallel traverse. • Sampling and opportunistic observations were undertaken during all floristic and vegetation plot surveys.	• Surveying threatened plants and their habitats NSW survey guide for the Biodiversity Assessment Method (DPIE 2020b). • NSW TBDC (DPE 2022d).
Homoranthus darwinioides	Fairy Bells	V	V	• 10 m parallel traverse. • Sampling and opportunistic observations were undertaken during all floristic and vegetation plot surveys.	• Surveying threatened plants and their habitats NSW survey guide for the Biodiversity Assessment Method (DPIE 2020b). • NSW TBDC (DPE 2022d).
Ozothamnus tesselatus		V	V	• 20 m parallel traverse. • Sampling and opportunistic observations were undertaken during all floristic and vegetation plot surveys.	• Surveying threatened plants and their habitats NSW survey guide for the Biodiversity Assessment Method (DPIE 2020b). • NSW TBDC (DPE 2022d).
Key V = Vulnerable, E = Endangered, CE = Critically Endangered.					

Table 2.4 Surveys Targeting Threatened and Migratory EPBC Act Listed Fauna Species

Scientific Name	Common Name	Listing Status		Credit Type	Survey Method	Relevant Guidelines and Resources
		BC Act	EPBC Act			

Anthochaera phrygia	Regent Honeyeater	CE	CE	Dual	This species is assumed to be present based on the presence of mapped important habitat within the Development Footprint.	• Survey guidelines for Australia's threatened birds (DEWHA 2010b).
						  ○ Area searches for 20 hours for 10 days (in areas < 50 ha).
						  ○ Targeted searches for 20 hours for 5 days (targeting areas of heavily flowering trees and flocks of other blossom feeders).
						• NSW TBDC (DPE 2022a).
						• Important habitat mapping for regent honeyeater (DPE).

Aprasia parapulchella	Pink-tailed Legless Lizard	V	V	Species	Reptile rock-rolling searches	• Survey guidelines for Australia's threatened reptiles (DSEWPC 2011b).
						  ○ Searches restricted to an area of relatively homogeneous habitat within each site and a search beneath all rocks that can be turned is made.
						  ○ Rock cover density rather than fixed area size determines a plot, and 150–200 rocks need to be turned to be reasonably confident of determining the species' presence.
						  ○ Search success appears to be highest in spring and early summer on warm but not hot days, after a period of rainfall extending over several days.
						  ○ During summer months surveys are carried out in the mornings or on cloudy days when soil temperatures beneath the rocks are not too high.
						  ○ During late autumn and winter surveys are carried out on clear sunny days as warming of the rocks appears to attract individuals to the soil surface beneath the rocks.
						• NSW TBDC (DPE 2022a).

Scientific Name	Common Name	Listing Status		Credit Type	Survey Method	Relevant Guidelines and Resources
		BC Act	EPBC Act			
Callocephalon fimbriatum*	Gang-gang Cockatoo	V	E	Dual	Diurnal census Avifauna breeding activity, stick nest and tree hollow search Opportunistic observation of avifauna breeding activity	• Survey guidelines for Australia's threatened birds (DEWHA 2010b). ○ No specific EPBC guidelines available so survey effort was as per the requirements for the Glossy Black-Cockatoo. • NSW TBDC (DPE 2022a).
Calyptorhynchus lathami*	Glossy Black-Cockatoo	V	V	Dual	Diurnal census Avifauna breeding activity, stick nest and tree hollow search Opportunistic observation	• Survey guidelines for Australia's threatened birds (DEWHA 2010b). ○ Land-based area searches for 5 hours for 1 day. ○ Targeted searches for 20 hours for 4 days (search for signs of feeding or nests). • NSW TBDC (DPE 2022a).
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Species	Ultrasonic microbat call detection (Anabat)	• Survey guidelines for Australia's threatened mammals (DSEWPC 2011a). ○ A combination of techniques is recommended: ▪ Unattended bat detectors for total of 16 detector nights at a minimum of 4 nights (area < 50 ha). ▪ Attended bat detectors for total of 6 detector nights for minimum of 3 nights (area <50 ha). ▪ Harp traps and/or mistnests total efforts of 16 trap or net nights with minimum of 4 nights (area <50 ha). • NSW TBDC (DPE 2022a).
Climacteris picumnus victoriae*	Brown Treecreeper (south-eastern)	V	V	Ecosystem	Opportunistic diurnal census undertaken although no surveys required for ecosystem credit species	• Survey guidelines for Australia's threatened birds (DEWHA 2010b). ○ No relevant EPBC Act Survey guidelines have been prepared. • NSW TBDC (DPE 2022a).

Scientific Name	Common Name	Listing Status		Credit Type	Survey Method	Relevant Guidelines and Resources
		BC Act	EPBC Act			
Delma impar	Striped Legless Lizard	V	V	Species	Reptile rock-rolling searches	• Survey guidelines for Australia's threatened reptiles (DSEWPC 2011b). ○ Surveys primarily undertaken during the active period of the species (between September and May). Some survey techniques (such as active searching) may be undertaken during the cooler months of the year, but often with less success. ○ In areas with surface rock, artificial shelter site surveys or rock turning should be the primary technique (with supplementary techniques employed as appropriate. ○ In areas with little to no rocky habitat (such as the ACT), artificial shelter site surveys or pitfall trapping should be used in conjunction with hand searches around tussocks.
Grantiella picta	Painted Honeyeater	V	V	Ecosystem	Opportunistic diurnal census undertaken although no surveys required for ecosystem credit species	• Survey guidelines for Australia's threatened birds (DEWHA 2010b). ○ No relevant EPBC Act Survey guidelines have been prepared. • NSW TBDC (DPE 2022a).
Hirundapus caudacutus	White-throated Needletail	-	V	Ecosystem	Opportunistic diurnal census undertaken although no surveys required for ecosystem credit species	• Survey guidelines for Australia's threatened birds (DEWHA 2010b). ○ No relevant EPBC Act Survey guidelines have been prepared. ○ The species is a trans-equatorial migrant, breeding in the Northern Hemisphere and flying south for the boreal winter. Identify presence in Australia between late October to April as noted in the Conservation Advice (TSSC 2019). • NSW TBDC (DPE 2022a).

Scientific Name	Common Name	Listing Status		Credit Type	Survey Method	Relevant Guidelines and Resources
		BC Act	EPBC Act			
Lathamus discolor	Swift Parrot	E	CE	Dual	Opportunistic diurnal census undertaken although no surveys required for ecosystem credit species and species credit component assessed by important habitat mapping which does not occur within the Project Area.	• Survey guidelines for Australia's threatened birds (DEWHA 2010b). ○ Area searches or transect surveys for 20 hours for 8 days (in reas < 50 ha). ○ Targeted surveys for 20 hours for 8 days (targeting areas of heavily flowering eucalypts). • NSW TBDC (DPE 2022a). • Important habitat mapping for swift parrot (DPE).
Melanodryas cucullata cucullata*	South-eastern Hooded Robin	V	E	Ecosystem	Opportunistic diurnal census undertaken although no surveys required for ecosystem credit species	• Survey guidelines for Australia's threatened birds (DEWHA 2010b). ○ No relevant EPBC Act Survey guidelines have been prepared. • NSW TBDC (DPE 2022a).
Nyctophilus corbeni	Corben's Long-eared Bat	V	V	Ecosystem	No surveys required (ecosystem credit species)	• Survey guidelines for Australia's threatened bats (DEWHA 2010). ○ harp traps ○ mistnets ○ ecolocation call detectors ○ combined efforts. • NSW Threatened Biodiversity Data Collection (TBDC) (DPE 2022a).
Stagonopleura guttata*	Diamond Firetail	V	V	Ecosystem	Opportunistic diurnal census undertaken although no surveys required for ecosystem credit species	• Survey guidelines for Australia's threatened birds (DEWHA 2010b). ○ No relevant EPBC Act Survey guidelines have been prepared. • NSW TBDC (DPE 2022a).

KEY

* = species listed under EPBC Act after determination that the Project was a Controlled Action under Section 75 of the EPBC Act.

V = Vulnerable, E = Endangered, CE = Critically Endangered, M = Migratory.

3.0 Survey Results

3.1 Plant Community Types and Threatened Ecological Communities

The PCTs identified in this assessment are based on the PCTs available prior to the release of the revised PCTs for eastern NSW and associated update to the BAM Calculator which occurred in February 2023. In-progress BAM-C assessments and projects with substantially progressed surveys are able to undertake this approach, in accordance with the transitional arrangements.

Vegetation within the Development Footprint has been assessed as aligning with the PCTs identified within **Table 3.1**. The extent of these PCTs is mapped in **Figure 4.2** of the Solar Farm BDAR**.** Detailed descriptions for each PCT are provided within the BDAR.

Table 3.1 Plant Community Types and TEC Associations

Current BAM-C PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Condition Zone and Area within Solar Farm Footprint (ha)	Condition Zone and Area within Roadworks Footprint (ha)	EPBC TEC Associations
483	Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	Western Slopes Grassy Woodlands	Grassy Woodlands	Scattered Trees: Total Area = 23.64 EPBC Act CEEC Component = 19.26 ha	N/A	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC (In part = 19.26 ha)
				Moderate Condition Derived Native Grassland: 168.48	N/A	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC
				Moderate to Low Condition Derived Native Grassland: 308.37	N/A	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC
				Low Condition Derived Native Grassland: 199.14	N/A	Does not meet condition thresholds for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC
1661	Narrow-leaved Ironbark – Black Pine – Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	Western Slopes Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrubby sub-formation)	Scattered Trees: 6.07	N/A	Does not correspond to any listed EPBC Act TEC
				Moderate to Low Condition Derived Native Grassland: 36.79	N/A	Does not correspond to any listed EPBC Act TEC
				Low Condition Derived Native Grassland: 53.24	N/A	Does not correspond to any listed EPBC Act TEC

3.2 Threatened Ecological Community Considerations

One nationally listed TEC, the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC, occurs within the Project Area. This CEEC corresponds to the Areas of PCT 483, excluding derived native grassland areas mapped as Low Condition and the areas of Scattered Trees surrounded by areas mapped as Low Condition derived native grassland.

3.3 Threatened Flora Species

No threatened flora species listed under the EPBC Act have been observed within the Project Area.

3.4 Threatened Fauna Species

3.4.1 Species Credit Fauna Species Observed

The following EPBC Act-listed threatened species have been recorded in the Project Area and surrounds. The locations of the species credit species recorded within the Project Area is shown in Figure 5.3 of the BDAR:

- Diamond Firetail (*Stagonopleura guttata*): This species was observed within the Development Footprint at several locations as shown in the BDAR. The observation dates were 24 August 2021, 23 November 2021, 2 February 2022 and 22 March 2022.
- White-throated Needletail (*Hirundapus caudacutus*): This species was recorded during surveys on 23 November 2022 (8 individuals observed) and on 1 February 2022 (3 individuals observed). The entire area of the Development Footprint is considered to provide suitable aerial foraging habitat for this species.
- Glossy Black-Cockatoo (*Calyptorhynchus lathami*): This species was heard calling to the south-west of the Development Footprint on 14 October 2021 and was observed in the north-eastern part of the Development Footprint in two locations on 31 January 2022. The behaviours observed were consistent with foraging and no use of the site for breeding habitat was observed despite targeted survey in the breeding season.

3.4.2 Mapped Important Habitat Species

3.4.2.1 Regent Honeyeater (*Anthochaera phrygia*)

This species is assumed to be present based on the presence of mapped important habitat within the Development Footprint. The extent of mapped important habitat within the Development Footprint is 45.09 ha.

4.0 MNES Impact Assessment

4.1 Determination of MNES Likely to be Impacted by the Project

The EPBC Act Listed Matters which are known to occur or have a medium to high potential to occur within the Project Area are listed in **Table 4.1**. This Table provides an assessment to determine which of these MNES are likely to be impacted by the Project. For species and communities potentially located in the Project Area or in the vicinity that are not likely to be impacted, additional evidence of why they are not likely to be impacted is provided. Additional MNES entities identified as priority management species following the 2019–2020 bushfires in the supplementary SEARs have also been identified for further assessment.

Table 4.1 Determination of MNES Likely to be Impacted by the Project

Entity	EPBC Act Status	Presence / Likelihood of Occurrence	Impact Potential	Nature of Impact	Quantum of Impact	Consequences of Impact	Further Impact Assessment Required
White Box – Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered Ecological Community	Yes / Observed	Present.	Associated PCT removal.	Scattered trees condition zone = 19.26 ha. Derived native grassland moderate condition zone = 168.48 ha. Derived native grassland moderate to low condition zone = 308.37 ha.	Loss of habitat.	Yes.
Sandy Hollow Commersonia (*Androcalva rosea* (syn. *Commersonia rosea*))	Endangered	Not observed during surveys, not likely to occur	Not likely to occur.	No impact likely to occur.	No impact likely to occur.	No impact likely to occur.	No.
Bluegrass (*Dichanthium setosum*)	Vulnerable	–Not observed during surveys, not likely to occur	Not likely to occur / Not known from the Sydney Basin Bioregion or predicted to occur in BAM-C for solar farm Project Area. Not observed during targeted surveys for Road Works Project Area.	No impact likely to occur.	No impact likely to occur.	No impact likely to occur.	No.

Entity	EPBC Act Status	Presence / Likelihood of Occurrence	Impact Potential	Nature of Impact	Quantum of Impact	Consequences of Impact	Further Impact Assessment Required
Fairy Bells (*Homoranthus darwinioides*)	Vulnerable	Not observed during surveys, not likely to occur.	Not likely to occur.	No impact likely to occur.	No impact likely to occur.	No impact likely to occur.	No.
Ozothamnus tesselatus	Vulnerable	Not observed during surveys, not likely to occur.	Low.	No impact likely to occur.	No impact likely to occur.	No impact likely to occur.	No.
Regent Honeyeater (*Anthochaera phrygia*)	Critically Endangered	Site mapped as important habitat, moderate likelihood of occurrence.	High.	Mapped Important Habitat Removal.	45.09 ha of mapped important habitat.	Loss of potential degraded suitable foraging habitat. Species has not been recorded within the Project Area during surveys.	Yes.
Southern Whiteface (*Aphelocephala leucopsis*)*	Vulnerable	Not observed during surveys. High potential for occurrence.	High.	Removal of suitable habitat.	Species not associated with any PCTs in BAM C. Impacts across the Development Footprint will include removal of 699.6 ha of PCT 483 including 23.64 ha of scattered trees and 675.96 ha of derived native grassland condition zones and 96.1 ha of PCT 1661, including 6.07 ha of scattered trees and 90.03 ha of derived native grassland condition zones.	Loss and modification of suitable habitat.	Yes.

Entity	EPBC Act Status	Presence / Likelihood of Occurrence	Impact Potential	Nature of Impact	Quantum of Impact	Consequences of Impact	Further Impact Assessment Required
Pink-tailed Legless Lizard (*Aprasia parapulchella*)	Vulnerable	Not observed during surveys, not likely to occur.	Low.	No impact likely to occur.	No impact likely to occur.	No impact likely to occur.	No.
Gang-gang Cockatoo (*Callocephalon fimbriatum*)*	Endangered	Not observed during surveys, not likely to occur.	Species not observed during surveys, no impacts likely to occur.	No impact likely to occur.	No impact likely to occur.	No impact likely to occur.	No.
Glossy Black-Cockatoo (*Calyptorhynchus lathami*)*	Vulnerable	Observed during surveys. Potential to utilise scattered occurrences of *Allocasuarina luehmannii* trees as foraging habitat. There are present in low densities in PCT 1661.	Moderate.	Removal of suitable foraging habitat.	Removal of scattered *Allocasuarina luehmannii* trees within the Project Area. Species is associated with PCT 483 and PCT 1661. Impacts across the Development Footprint will include removal of 23.64 ha of PCT 483 scattered trees condition zone and 6.07 ha of PCT 1661, scattered trees condition zone.	Loss of potential foraging habitat.	Yes.

Entity	EPBC Act Status	Presence / Likelihood of Occurrence	Impact Potential	Nature of Impact	Quantum of Impact	Consequences of Impact	Further Impact Assessment Required
Large-eared Pied Bat (*Chalinolobus dwyeri*)	Vulnerable	Assumed presence, high likelihood of occurrence limited to use of Project Area as foraging habitat	Moderate.	No PCTs associated with this species will be impacted.	No PCTs associated with this species will be impacted.	Modification of areas of suitable aerial foraging habitat.	Yes.
Brown Treecreeper (south-eastern) (*Climacteris picumnus victoriae*)*	Vulnerable	Assumed presence. High likelihood of occurrence.	High.	Modification of foraging habitat.	Species associated with PCT 1661 of which 96.1 ha will be impacted, including 6.07 ha of scattered trees and 90.03 ha of derived native grassland condition zones.	Modification of areas of suitable aerial foraging habitat.	Yes.
Spotted-tailed Quoll (*Dasyurus maculatus* maculatus) (South-east mainland Population)	Endangered	Not observed / Assessed as ecosystem credit entity with assumed presence	Low.	Modification of movement habitat used for landscape connectivity.	Reduction in areas available for movement through the Project Area and loss in area of highly disturbed foraging habitat. Species associated with PCT 1661 of which 96.1 ha will be impacted, including 6.07 ha of scattered trees and 90.03 ha of derived native grassland condition zones.	Reduced opportunities for movement through the Project Area, species likely to persist if present within the Project Area and locality due to retention of linkage corridors and areas of highest quality suitable habitat.	Significant Impact Assessment not required, however supplementary SEARs identifies that this species is a priority management species and requires analysis of the impacts of the 2019–2020 bushfires.

Entity	EPBC Act Status	Presence / Likelihood of Occurrence	Impact Potential	Nature of Impact	Quantum of Impact	Consequences of Impact	Further Impact Assessment Required
Painted Honeyeater (*Grantiella picta*)	Vulnerable	Assumed presence. High likelihood of occurrence.	Moderate.	Removal of habitat.	Species associated with PCT 483 of which 699.6 ha will be impacted, including 23.64 ha of scattered trees and 675.96 ha of derived native grassland condition zones.	Loss of potential degraded suitable foraging habitat. Species has not been recorded within the Project Area during surveys.	Yes
White-throated Needletail (*Hirundapus caudacutus*)	Vulnerable	Observed during surveys. Known to occur.	Moderate.	Modification of aerial foraging habitat and removal of potential low quality roost habitat.	Species is associated with PCT 483 and PCT 1661 in BAM C. Impacts across the Development Footprint will include removal of 699.6 ha of PCT 483 including 23.64 ha of scattered trees and 675.96 ha of derived native grassland condition zones and 96.1 ha of PCT 1661, including 6.07 ha of scattered trees and 90.03 ha of derived native grassland condition zones.	Loss of potential degraded suitable foraging habitat. Species has been recorded within the Project Area during surveys.	Yes.
Swift Parrot (*Lathamus discolor*)	Critically Endangered	Moderate. Not observed. Assessed as ecosystem credit species with assumed presence.	Low to moderate.	Direct removal of suitable foraging habitat.	No mapped important habitat will be impacted.	Loss of suitable foraging habitat.	Yes.

Entity	EPBC Act Status	Presence / Likelihood of Occurrence	Impact Potential	Nature of Impact	Quantum of Impact	Consequences of Impact	Further Impact Assessment Required
					Species is associated with PCT 483 and PCT 1661 in BAM C. Impacts across the Development Footprint will include removal of 699.6 ha of PCT 483 including 23.64 ha of scattered trees and 675.96 ha of derived native grassland condition zones and 96.1 ha of PCT 1661, including 6.07 ha of scattered trees and 90.03 ha of derived native grassland condition zones.		
South-eastern Hooded Robin (*Melanodryas cucullata cucullata*)*	Endangered	Assessed as ecosystem credit species with assumed presence. Likely to occur.	High.	Direct removal of suitable foraging habitat.	Species associated with PCT 1661 of which 96.1 ha will be impacted, including 6.07 ha of scattered trees and 90.03 ha of derived native grassland condition zones.	Loss of suitable foraging habitat.	Yes.

Entity	EPBC Act Status	Presence / Likelihood of Occurrence	Impact Potential	Nature of Impact	Quantum of Impact	Consequences of Impact	Further Impact Assessment Required
Diamond Firetail (*Stagonopleura guttata*)*	Vulnerable	Observed. Know to occur.	Medium.	Removal of habitat.	Impacts across the Development Footprint will include removal of 699.6 ha of PCT 483 including 23.64 ha of scattered trees and 675.96 ha of derived native grassland condition zones and 96.1 ha of PCT 1661, including 6.07 ha of scattered trees and 90.03 ha of derived native grassland condition zones.	Loss of known habitat.	Yes.
Koala (combined populations of QLD, NSW, ACT) (*Phascolarctos cinereus*)	Endangered	Not observed	Low / Not likely to occur.	No impact likely to occur.	No impact likely to occur.	No impact likely to occur.	Significant Impact Assessment completed.
Greater Glider (*Petauroides volans*)*	Vulnerable	Not observed	Not likely to occur.	No impact likely to occur.	No impact likely to occur.	No impact likely to occur.	Significant Impact Assessment not required, however supplementary SEARs identifies that this species is a priority management species and requires analysis of the impacts of the 2019–2020 bushfires.

Entity	EPBC Act Status	Presence / Likelihood of Occurrence	Impact Potential	Nature of Impact	Quantum of Impact	Consequences of Impact	Further Impact Assessment Required
Brush-tailed Rock Wallaby (*Petrogale penicillata*)	Vulnerable	Not observed	Not likely to occur, no suitable habitat present.	No impact likely to occur.	No impact likely to occur.	No impact likely to occur.	Significant Impact Assessment not required, however supplementary SEARs identifies that this species is a priority management species and requires analysis of the impacts of the 2019–2020 bushfires.
New Holland Mouse (*Pseudomys novaehollandiae*)	Vulnerable	No suitable habitat present, not likely to occur	Not impact likely to occur.	No impact likely to occur.	No impact likely to occur.	No impact likely to occur.	Significant Impact Assessment not required, however supplementary SEARs identifies that this species is a priority management species and requires analysis of the impacts of the 2019–2020 bushfires.

Entity	EPBC Act Status	Presence / Likelihood of Occurrence	Impact Potential	Nature of Impact	Quantum of Impact	Consequences of Impact	Further Impact Assessment Required
Corben's Long-eared Bat (*Nyctophilus corbeni*)	Vulnerable	Not observed / foraging habitat assessed as ecosystem credit entity	Medium.	Removal of habitat.	Impacts across the Development Footprint will include removal of 699.6 ha of PCT 483 including 23.64 ha of scattered trees and 675.96 ha of derived native grassland condition zones and 96.1 ha of PCT 1661, including 6.07 ha of scattered trees and 90.03 ha of derived native grassland condition zones.	Loss of known habitat.	Yes.
Grey-headed Flying-fox (*Pteropus poliocephalus*)	Vulnerable	Not observed / foraging habitat assessed as ecosystem credit entity	Low, nearest camp site is in Mudgee.	Direct removal of suitable foraging habitat.	Species is associated with PCT 483 and PCT 1661. Impacts across the Development Footprint will include removal of 23.64 ha of PCT 483 scattered trees condition zone and 6.07 ha of PCT 1661, scattered trees condition zone.	Loss of suitable foraging habitat in an area which is not in proximity to any known camps.	Significant Impact Assessment completed.
KEY * = species listed under EPBC Act after determination that the Project was a Controlled Action under Section 75 of the EPBC Act.							

4.2 EPBC Act Significant Impact Assessments

Significant impact assessments have been provided for the following nationally listed threatened species and ecological communities that are likely to be impacted by the Project, in accordance with the Matters of National Environmental Significance Significant Impact Guidelines 1.1 (DOE 2013) for the EPBC Act:

- White Box – Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland
- Regent Honeyeater (*Anthochaera phrygia*)
- South-eastern Hooded Robin (*Melanodryas cucullata cucullata*)
- Swift Parrot (*Lathamus discolor*)
- Koala (*Phascolarctos cinereus*) (combined populations of QLD, NSW, ACT)
- Spotted-tailed Quoll (*Dasyurus maculatus maculatus*) (South-east mainland Population)
- Painted Honeyeater (*Grantiella picta*)
- Large-eared Pied Bat (*Chalinolobus dwyeri*)
- Glossy Black-Cockatoo (*Calyptorhynchus lathami*)
- White-throated Needletail (*Hirundapus caudacutus*)
- Diamond Firetail (*Stagonopleura guttata*)
- Brown Treecreeper (south-eastern) (*Climacteris picumnus victoriae*)
- Southern Whiteface (*Aphelocephala leucopsis*)
- Corben's Long-eared Bat (*Nyctophilus corbeni*)
- Grey-headed Flying-fox (*Pteropus poliocephalus*).

These species were identified in **Table 4.1** as having potential to be impacted by the Project.

4.2.1 White Box - Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland

4.2.1.1 Significant Impact Assessment

White Box – Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland is listed as a CEEC under the EPBC Act. The Significant impact assessment criteria for CEEC are listed below in bold font and specifically addressed for this ecological community.

- **reduce the extent of an ecological community**

The Project will reduce the extent of the ecological community through the removal of areas of PCT 483 Grey Box X White Box grassy open woodland on basalt hills in the Merriwa Region Upper Hunter Valley, including areas of the derived native grassland and scatted trees condition zones within the Development Footprint.

- **fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines**

The Project will increase the fragmentation of the ecological community which occurs within the Project Area. Project design measures have been implemented to minimise the extent to which fragmentation which will occur.

- **adversely affect habitat critical to the survival of an ecological community**

The primary land use undertaken on the Development Footprint is agriculture. Due to the high levels of degradation from the ongoing agricultural use of the Development Footprint, and the avoidance of areas of moderate to good quality habitat for this CEEC, it is considered that habitat to be impacted is not critical to the survival of the ecological community.

- **modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns**

Impacts within the Solar Farm project area will result in the alteration of surface water drainage patterns, however the impacts will be limited to first and second order streams. There is only one third order stream within the Development Footprint, Redlynch Creek. While Redlynch Creek is within the Development Footprint, much of this creek occurs within the proposed exclusion zone.

- **cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting**

The construction of the proposed solar farm will require the removal of scattered trees and result in impacts to areas of derived native grasslands. The grassland areas to be impacted have been assessed as likely to be completely removed, however there is potential that these areas may regenerate as native grasslands and persist under the panels which are proposed to be installed. Changes in species composition and loss of functionally important species has potential to occur within the Development Footprint.

- **cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:**
    - **assisting invasive species, that are harmful to the listed ecological community, to become established, or**
    - **causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or**

Management of invasive species would occur as part of the Project and fertilizer, herbicide and chemical use would be carefully controlled to ensure no impacts to areas of retained vegetation.

- **interfere with the recovery of an ecological community.**

The primary land use undertaken on the Development Footprint is agriculture. This land use has resulted in the ongoing degradation of the habitats present. It is considered that the Development Footprint is not an area likely to be prioritized for the recovery of this ecological community due to its importance as agricultural land. The Project will further reduce the potential for the recovery of the ecological community within the Development Footprint, however it is considered that if the status quo is maintained the Development Footprint is not likely to be an area for the recovery of the ecological community.

4.2.1.2 Impact Avoidance Measures

The Project has been designed to avoid impacts to areas of this CEEC which are in moderate to good condition. The Project has been designed to encompass the most disturbed areas of the site where the condition thresholds for this CEEC are not met and where lower condition states such as derived native grassland or scattered trees are present.

4.2.1.3 Impact Mitigation Measures

Impact mitigation measures for the Project are documented in detail in **Section 8.4** of the BDAR.
The measures proposed include:

- Education and training for construction and operation phase workers.
- Implementation of vegetation protection zones for retained areas.
- Completion of pre-clearance and works supervision by an ecologist.
- Installation and maintenance of erosion and sediment controls.
- Installation of security fencing for the area containing panels.
- Preparation and implementation of a Construction Environmental Management Plan (CEMP) incorporating appropriate monitoring and adaptive management strategies.

4.2.1.4 Impacts of the 2019–2020 bushfires

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event. Large areas of other connected National Parks and private properties along the Great Dividing Range were also impacted by this fire event.

This threatened ecological community predominantly occurs in areas on the western slopes and tablelands from Southern Queensland, through NSW and central Victoria in areas which were not impacted by the 2019–2020 bushfires.

4.2.1.5 Significant Impact Assessment Conclusion and Proposed Offsets

It is considered that the Project will have a significant impact on the White Box – Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC.

The proponent has committed to undertaking investigations into the use of the residual areas of the Development Footprint as a Biodiversity Stewardship Site to generate biodiversity credits which would directly offset impacts to this listed CEEC. Residual credit requirements would be sourced in accordance with the like-for-like requirements and would include measures such as purchase of credits from the Biodiversity Conservation Trust or from the market.

4.2.2 Regent Honeyeater (*Anthochaera phrygia*)

4.2.2.1 Significant Impact Assessment

The Regent Honeyeater is listed as critically endangered under the EPBC Act. The significant impact assessment criteria for critically endangered species are listed below in bold font and specifically addressed for this species.

- **lead to a long-term decrease in the size of a population**

This species has not been observed within the Development Footprint and is not likely to be directly impacted by the Project. The areas of mapped important habitat for this species have been mapped based on buffers to known breeding sites located in adjoining areas, including the Goulburn River National Park.

The areas proposed to be impacted are heavily degraded and are their removal is not likely to lead to a long-term decrease in the size of a population of the Regent Honeyeater.

This species has been recorded at three localities within the south eastern area of the solar farm development footprint.

- **reduce the area of occupancy of the species**

The Project will reduce the extent of mapped important habitat for this species. The Regent Honeyeater has a large geographic range compared to its population size and no areas of confirmed breeding habitat are present on the Development Footprint, although they do occur nearby. The areas proposed to be impacted do not contain confirmed occupied habitat and are heavily degraded. It is therefore considered that the Project is not likely to reduce the area of occupancy of this species.

- **fragment an existing population into two or more populations**

The Project will not fragment any populations of the Regent Honeyeater, as this species is highly mobile and nomadic.

- **adversely affect habitat critical to the survival of a species**

The National Recovery Plan identifies that habitat critical to the survival of the Regent Honeyeater includes:

  - Any breeding or foraging areas where the species is likely to occur (as mapped).
  - Any newly discovered breeding or foraging locations.

The Development Footprint is mapped in or near the Mudgee Wollar breeding area shown in the National Recovery Plan and within an area where the species is likely to occur (DOE 2016).

- **disrupt the breeding cycle of a population**

The Project will reduce the extent of mapped important habitat for this species. The Regent Honeyeater has a large geographic range compared to its population size and no areas of confirmed breeding habitat are present on the Development Footprint, although they do occur nearby. It is considered that the Project would not disrupt the breeding of this species within the Goulburn River National Park or other known breeding locations nearby.

- **modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline**

The Regent Honeyeater has a large geographic range compared to its population size and no areas of confirmed breeding habitat are present on the Development Footprint. The Project will reduce the extent of suitable foraging habitat available to this species, however suitable impact avoidance measures have been applied and the establishment of a Biodiversity Stewardship Agreement (BSA) of the residual parts of the Development Footprint would provide an opportunity to improve the areas of retained habitats.

- **result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat**

The Project is not a type of development which is likely to introduce invasive species that are harmful to the Regent Honeyeater.

- **introduce disease that may cause the species to decline, or**

The Project is not a type of development which is likely to introduce disease that may cause the Regent Honeyeater to decline.

- **interfere with the recovery of the species.**

The Project is unlikely to interfere directly with the recovery of this species, however the Project may indirectly affect this species recovery through the removal of suitable foraging habitat for this species in an area of mapped Important Habitat.

4.2.2.2 Impact Avoidance Measures

The Project has been designed to minimise impacts to areas of Important Habitat mapped for the Biodiversity Assessment Method, for this species. The Important Habitat mapping was created using the following methods:

- Generation of a dataset of occurrence records.
- Mapping important bird areas identified in the National Recovery Plan for the Regent Honeyeater and refinement through expert opinion, vegetation association identification and mapping of woodland vegetation within 200 m of records.
- Application of one-kilometre radial buffers to woodland vegetation associated with the species for records of single breeding events located outside of mapped important bird areas.

- Application of five-kilometre radial buffers to woodland vegetation associated with the species for records of multiple breeding events outside of the mapped important bird areas.
- The Development Footprint has been reduced by the proponent to minimise impacts to areas mapped as important habitat.

4.2.2.3 Impact Mitigation Measures

Impact mitigation measures for the Project are documented in detail in **Section 8.4** of the BDAR. The measures proposed include:

- Education and training for construction and operation phase workers.
- Implementation of vegetation protection zones for retained areas.
- Completion of pre-clearance and works supervision by an ecologist.
- Installation and maintenance of erosion and sediment controls.
- Installation of security fencing for the area containing panels.
- Preparation and implementation of a CEMP incorporating appropriate monitoring and adaptive management strategies.

The offsetting strategy proposed will also provide opportunities to rehabilitate areas of mapped important habitat within the Project Area.

4.2.2.4 Impacts of the 2019–2020 bushfires

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event, including areas of mapped Regent Honeyeater Important Habitat.

The 2019–2020 mega fire event that impacted the east coast of Australia represent a significant pulse impact on the quality of the habitat for this species. Crates *et al.*, 2020 have estimated that the 2019–2020 fires burnt an estimated 71,011 square kilometres representing 13% of the species area of occupancy with hit to very high burn severity identified for 54% of the burnt area. This study also identified that nest locations known since 2015 returned the most severe fire impact estimate, with 44% of 1 km grid cells where nesting has been recorded having been impacted by fire.

4.2.2.5 Significant Impact Assessment Conclusion and Proposed Offsets

It is considered that the Project is likely to result in a significant impact to the Regent Honeyeater.

The proponent has committed to undertaking investigations into the use of the residual areas of the Project Area as a Biodiversity Stewardship Site, to generate species credits which would directly offset impacts on mapped Important Habitat for the Regent Honeyeater. Residual credit requirements would be sourced in accordance with the like-for-like requirements and would include measures such as purchase of credits from the Biodiversity Conservation Trust or from the market.

4.2.3 Southern Whiteface (*Aphelocephala leucopsis*)

4.2.3.1 Important Population Criteria

The Southern Whiteface is listed as vulnerable under the EPBC Act. For vulnerable species the EPBC Act a consideration of whether the species constitutes an important population is required. An important population is defined as a:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity, and/or
- populations that are near the limit of the species range.

Southern Whiteface were not observed during surveys, and it is considered that the Development Footprint does not contain a population which meets the above criteria, considering this species breeding and dispersal behaviours, likely genetics, and range.

4.2.3.2 Significant Impact Assessment

The significant impact assessment criteria for vulnerable species are listed below in bold font and specifically addressed for this species.

- lead to a long-term decrease in the size of an important population of a species

The Development Footprint does not contain an important population of the Southern Whiteface and the Project will not result in a long-term decrease in the size of an important population of this species.

- reduce the area of occupancy of an important population

The Development Footprint does not contain an important population of the Southern Whiteface and the Project is unlikely to reduce the area of occupancy of an important population of the Southern Whiteface.

- fragment an existing important population into two or more populations

The Development Footprint does not contain an important population of the Southern Whiteface and the Project is not a type of development which is likely to fragment the habitat of species.

- adversely affect habitat critical to the survival of a species

According to DCCEEW (2023f), Habitat critical to the survival of the Southern Whiteface includes areas that have:

  - relatively undisturbed open woodlands and shrublands with an understorey of grasses or shrubs, or both;
  - habitat with low tree densities and an herbaceous understory litter cover which provides essential foraging habitat;
  - living and dead trees with hollows and crevices which are essential for roosting and nesting.

- The Development Footprint has been disturbed by a history of agricultural use and does not contain habitat critical to the survival of this species.
- disrupt the breeding cycle of an important population.

The Development Footprint does not contain an important population of the Southern Whiteface and therefore the Project would not disrupt the breeding cycle of an important population.

- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The Project will result in the removal of areas of suitable habitat for this species, however there are larger areas of suitable habitat present within the adjoining Goulburn River National Park. It is considered that the Project would not affect the availability or quality of habitat that this species would decline.

- result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

The Project is not a type of development which is likely to introduce invasive species that are harmful to this species.

- introduce disease that may cause the species to decline, or

The Project is not a type of development which is likely to introduce disease that may cause this species to decline.

- interfere substantially with the recovery of the species.

The Project is unlikely to interfere directly with the recovery of this species.

4.2.3.3 Impact Avoidance Measures

The Southern Whiteface was not observed during surveys, however, there are records of this species nearby the Project Area.

The Project has been designed and reduced by the proponent to minimise impacts to areas of intact woodland and forest habitats, including areas of suitable habitat for this species. Details of impact avoidance measures applied for the Project are documented in **Section 7.0** of the BDAR.

4.2.3.4 Impact Mitigation Measures

Impact mitigation measures for the Project are documented in detail in **Section 8.4** of the BDAR.
The measures proposed include:

- Education and training for construction and operation phase workers.
- Implementation of vegetation protection zones for retained areas.
- Completion of pre-clearance and works supervision by an ecologist.
- Installation and maintenance of erosion and sediment controls.

- Installation of security fencing for the area containing panels.
- Preparation and implementation of a CEMP incorporating appropriate monitoring and adaptive management strategies.

4.2.3.5 Impacts of the 2019–2020 Bushfires

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event.

There is currently no data surrounding the impacts of the 2019–2020 bushfires on this species.

4.2.3.6 Significant Impact Assessment Conclusion and Proposed Offsets

It is considered that the Project is unlikely to result in a significant impact to the Southern Whiteface.

4.2.4 Glossy Black-Cockatoo (*Calyptorhynchus lathami*)

4.2.4.1 Important Population Criteria

The Glossy Black-Cockatoo is listed as vulnerable under the EPBC Act. For vulnerable species the EPBC Act a consideration of whether the species constitutes an important population is required. An important population is defined as a:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity, and/or
- populations that are near the limit of the species range.

Glossy Black-Cockatoo were observed during surveys, and it is considered that the Development Footprint does not contain a population which meets the above criteria, considering this species breeding and dispersal behaviours, likely genetics, and range.

4.2.4.2 Significant Impact Assessment

The significant impact assessment criteria for vulnerable species is listed below in bold font and specifically addressed for this species.

- lead to a long-term decrease in the size of an important population of a species

The Development Footprint does not contain an important population of the Glossy Black-Cockatoo and the Project will not result in a long-term decrease in the size of an important population of this species.

- reduce the area of occupancy of an important population

The Development Footprint does not contain an important population of the Glossy Black-Cockatoo and the Project is not likely to reduce the area of occupancy of an important population of the Glossy Black-Cockatoo.

- fragment an existing important population into two or more populations

The Development Footprint does not contain an important population of the Glossy Black-Cockatoo and the Project is not a type of development which is likely to fragment the habitat of this mobile and migratory species.

- adversely affect habitat critical to the survival of a species

According to DCCEEW (2022b), habitat critical to the survival or important habitats of a species or ecological community refers to areas that are necessary:

  - for activities such as foraging, breeding, roosting, or dispersal
  - for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)
  - to maintain genetic diversity and long-term evolutionary development
  - for the reintroduction of populations or recovery of the species or ecological community.

No areas necessary for the above factors are considered to be present within the Development Footprint. The Project is thus considered unlikely to adversely affect habitat critical to the survival of the species.

- disrupt the breeding cycle of an important population

No breeding habitat use was observed onsite during targeted habitat surveys. Thus, the Project is considered unlikely to affect habitat critical to the survival of the species.

- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The Project will result in the removal of areas of suitable habitat for this species, however there are larger areas of suitable habitat present within the adjoining Goulburn River National Park. It is considered that the Project would not affect the availability or quality of habitat that this species would decline.

- result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

The Project is not a type of development which is likely to introduce invasive species that are harmful to this species.

- introduce disease that may cause the species to decline, or

The Project is not a type of development which is likely to introduce disease that may cause this species to decline.

- interfere substantially with the recovery of the species.

The Project is not likely to interfere directly with the recovery of this species.

4.2.4.3 Impact Avoidance Measures

Glossy Black-Cockatoo was observed within the Project Area during surveys for the Project.

The Project has been designed and reduced by the proponent to minimise impacts to areas of intact woodland and forest habitats, including areas of suitable habitat for this species. Details of impact avoidance measures applied for the Project are documented in **Section 7.0** of the BDAR.

4.2.4.4 Impact Mitigation Measures

Impact mitigation measures for the Project are documented in detail in **Section 8.4** of the BDAR. The measures proposed include:

- Education and training for construction and operation phase workers.
- Implementation of vegetation protection zones for retained areas.
- Completion of pre-clearance and works supervision by an ecologist.
- Installation and maintenance of erosion and sediment controls.
- Installation of security fencing for the area containing panels.
- Preparation and implementation of a CEMP incorporating appropriate monitoring and adaptive management strategies.

4.2.4.5 Impacts of the 2019–2020 Bushfires

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event.

The subspecies was severely affected by the 2019–2020 bushfires, with a significant portion of their known range burnt (Cameron et al. 2021). They were identified as a priority species post 2019–2020 bushfires, requiring urgent management interventions (Legge *et al* 2020).

4.2.4.6 Significant Impact Assessment Conclusion and Proposed Offsets

It is considered that the Project is unlikely to result in a significant impact to the Glossy Black Cockatoo.

4.2.5 Large-Eared Pied Bat (*Chalinolobus dwyeri*)

4.2.5.1 Important Population Criteria

The Large-eared Pied Bat is listed as vulnerable under the EPBC Act. For vulnerable species the EPBC Act a consideration of whether the species constitutes an important population is required. An important population is defined as a:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity, and/or
- populations that are near the limit of the species range.

Large-eared Pied Bat were not observed during surveys, and it is considered that the Development Footprint does not contain a population which meets the above criteria, considering this species breeding and dispersal behaviours, likely genetics, and range.

4.2.5.2 Significant Impact Assessment

The significant impact assessment criteria for vulnerable species are listed below in bold font and specifically addressed for this species.

- lead to a long-term decrease in the size of an important population of a species

The Development Footprint does not contain an important population of the Large-eared Pied Bat and the Project will not result in a long-term decrease in the size of an important population of this species.

- reduce the area of occupancy of an important population

The Development Footprint does not contain an important population of the Large-eared Pied Bat and the Project is not likely to reduce the area of occupancy of an important population of the White-throated Needletail.

- fragment an existing important population into two or more populations

The Development Footprint does not contain an important population of the Large-eared Pied Bat. This species is highly mobile and capable of traversing large areas of discontinuous and unsuitable habitat. The proposed action is not likely to fragment a population of this species.

- adversely affect habitat critical to the survival of a species

There is no current definition of habitat critical to the survival of this species (DAWE 2021b).

The Development Footprint contains some areas of suitable foraging habitat for this species, and this species has been recorded historically nearby to the Development Footprint. Further refinements to the Project footprint have resulted in the retention of PCTs associated with the threatened microbat species Large-eared Pied Bat. The Development Footprint is surrounded by the Goulburn River National Park which provides larger areas of higher quality habitats for this species and contains areas where this species has been recorded.

- disrupt the breeding cycle of an important population

The Development Footprint does not contain an important population of the Large-eared Pied Bat. Thus, the project will not disrupt the breeding cycle of an important population of this species.

- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The Project will result in the removal of areas of suitable habitat for this species, however there are larger areas of suitable habitat present within the adjoining Goulburn River National Park. Further refinements to the Project footprint have resulted in the retention of PCTs associated with the threatened microbat species Large-eared Pied Bat and Eastern Cave Bat. It is considered that the Project would not affect the availability or quality of habitat that this species would decline.

- result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

The Project is not a type of development which is likely to introduce invasive species that are harmful to this species.

- introduce disease that may cause the species to decline, or

The Project is not a type of development which is likely to introduce disease that may cause this species to decline.

- interfere substantially with the recovery of the species.

The Project is not likely to interfere directly with the recovery of this species.

4.2.5.3 Impact Avoidance Measures

The large-eared Pied Bat was not observed during surveys, however there are records for this species in proximity of the Project Area.

The Project has been designed and reduced by the proponent to minimise impacts to areas of intact woodland and forest habitats, including areas of suitable habitat for this species. Details of impact avoidance measures applied for the Project are documented in **Section 7.0** of the BDAR.

4.2.5.4 Impact Mitigation Measures

Impact mitigation measures for the Project are documented in detail in **Section 7.4** of the BDAR.
The measures proposed include:

- Education and training for construction and operation phase workers.
- Implementation of vegetation protection zones for retained areas.
- Completion of pre-clearance and works supervision by an ecologist.
- Installation and maintenance of erosion and sediment controls.
- Installation of security fencing for the area containing panels.
- Preparation and implementation of a CEMP incorporating appropriate monitoring and adaptive management strategies.

4.2.5.5 Impacts of the 2019–2020 Bushfires

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event.

The Conservation Advice for this species estimates that 26.6% of the species habitat occurs within areas affected by the 2019–2020 wildfires (DAWE 2021). The impact of these fires is yet to be thoroughly assessed. Individuals congregate to roost and raise young which places a reasonable proportion of a local population at a single locality. Most known cave roosts are in shallow caves or in the outer reaches of deeper mines or caves. As such, individuals are potentially susceptible to direct mortality from heat and smoke from fires. Mortality can be expected to be higher during high intensity fires or where fires occur on a regular basis. Mortality is potentially higher for creched young unable to escape smoke as adults may be able to. The longer-term impacts of fire frequency and intensity on the Large-eared Pied Bat are unknown.

4.2.5.6 Significant Impact Assessment Conclusion and Proposed Offsets

It is considered that the Project is unlikely to result in a significant impact to the Large-eared Pied Bat.

4.2.6 Brown Treecreeper (South-Eastern) (*Climacteris picumnus victoriae*)

4.2.6.1 Important Population Criteria

The Brown Treecreeper (south-eastern) is listed as vulnerable under the EPBC Act. For vulnerable species the EPBC Act a consideration of whether the species constitutes an important population is required. An important population is defined as a:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity, and/or
- populations that are near the limit of the species range.

Brown Treecreeper (south-eastern) were not observed during surveys, and it is considered that the Development Footprint does not contain a population which meets the above criteria, considering this species breeding and dispersal behaviours, likely genetics, and range.

4.2.6.2 Significant Impact Assessment

The significant impact assessment criteria for vulnerable species are listed below in bold font and specifically addressed for this species.

- lead to a long-term decrease in the size of an important population of a species

The Development Footprint does not contain an important population of the Brown Treecreeper (south-eastern) and the Project will not result in a long-term decrease in the size of an important population of this species.

- reduce the area of occupancy of an important population

The Development Footprint does not contain an important population of the Brown Treecreeper (south-eastern) and the Project is not likely to reduce the area of occupancy of an important population of the Brown Treecreeper (south-eastern).

- fragment an existing important population into two or more populations

The Development Footprint does not contain an important population of the Brown Treecreeper (south-eastern) and the Project is not a type of development which is likely to fragment the habitat of species.

- adversely affect habitat critical to the survival of a species

According to DCCEEW (2023e), habitat critical to the survival of the brown treecreeper (south-eastern) includes areas that have:

  - Relatively undisturbed grassy woodland with native understorey.
  - Habitat structure should be quite open at ground level so that birds are able to feed on or near the ground and maintain vigilance against predators.
  - The required degree of openness is mostly likely to be created by moderate levels of disturbance by fire and/or grazing.
  - large living and dead trees which are essential for roosting and nesting sites and for foraging.
  - fallen timber which provides essential foraging habitat.
  - hollows in standing dead or live trees and tree stumps are also essential for nesting.

As the vegetation within the Development Footprint is highly disturbed, the vegetation largely does not meet the standard of habitat critical to the survival of this species. However, impact avoidance has been achieved for the relatively undisturbed parts of the Project Area where suitable habitat is present. Thus, the Project is unlikely to adversely affect habitat critical to the survival of this species.

- disrupt the breeding cycle of an important population.

The Development Footprint does not contain an important population of the Brown Treecreeper (south-eastern) and therefore the Project would not disrupt the breeding cycle of an important population.

- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The Project will result in the removal of areas of suitable habitat for this species, however there are larger areas of suitable habitat present within the adjoining Goulburn River National Park. It is considered that the Project would not affect the availability or quality of habitat that this species would decline.

- result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

The Project is not a type of development which is likely to introduce invasive species that are harmful to this species.

- introduce disease that may cause the species to decline, or

The Project is not a type of development which is likely to introduce disease that may cause this species to decline.

- interfere substantially with the recovery of the species.

The Project is not likely to interfere directly with the recovery of this species.

4.2.6.3 Impact Avoidance Measures

The Brown Treecreeper (south-eastern) was not observed during surveys, however, there are records of this species nearby the Project Area.

The Project has been designed and reduced by the proponent to minimise impacts to areas of intact woodland and forest habitats, including areas of suitable habitat for this species. Details of impact avoidance measures applied for the Project are documented in **Section 7.0** of the BDAR.

4.2.6.4 Impact Mitigation Measures

Impact mitigation measures for the Project are documented in detail in **Section 8.4** of the BDAR. The measures proposed include:

- Education and training for construction and operation phase workers.
- Implementation of vegetation protection zones for retained areas.
- Completion of pre-clearance and works supervision by an ecologist.
- Installation and maintenance of erosion and sediment controls.
- Installation of security fencing for the area containing panels.
- Preparation and implementation of a CEMP incorporating appropriate monitoring and adaptive management strategies.

4.2.6.5 Impacts of the 2019–2020 Bushfires

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event.

There is currently no data surrounding the impacts of the 2019–2020 bushfires on this species.

4.2.6.6 Significant Impact Assessment Conclusion and Proposed Offsets

It is considered that the Project is unlikely to result in a significant impact to the Brown Treecreeper (south-eastern).

4.2.7 Spotted-Tailed Quoll *(Dasyurus maculatus maculatus)* (South-East Mainland Population)

4.2.7.1 Significant Impact Assessment

The Spotted-tailed Quoll (South-east Mainland Population) is listed as endangered under the EPBC Act. The significant impact assessment criteria for endangered species are listed below in bold font and specifically addressed for this species.

- lead to a long-term decrease in the size of a population

The Spotted-tailed Quoll has not been observed during surveys and there are no records for this species within approximately 10 km of the Development Footprint on the BioNet Atlas (NSW DPE 2022a). The Development Footprint provides areas of highly disturbed habitat for this species. This species occupies a relatively large home range and there are larger areas of higher quality habitats present within the Goulburn River National Park. It is therefore considered that the Project is not likely to lead to a long-term decrease in the size of a population of this species.

- reduce the area of occupancy of the species

The Spotted-tailed Quoll has not been observed during surveys and there are no records for this species within approximately 10 km of the Development Footprint on the BioNet Atlas (NSW DPE 2022a). It is therefore considered that the Project is not likely to reduce the area of occupancy of this species.

- fragment an existing population into two or more populations

The Development Footprint is already highly disturbed, and this species has not been observed during surveys. The Goulburn River National Park contains higher quality areas of suitable habitat for this species which will maintain connectivity through the locality. It is considered that the Project is not likely to fragment an existing population of this species.

- adversely affect habitat critical to the survival of a species

The National Recovery Plan for the Spotted-tailed Quoll (VDELWP 2016) identifies that, habitat that is critical to the survival of the Spotted-tailed Quoll includes large patches of forest with adequate denning resources and relatively high densities of medium-sized mammalian prey. The Development Footprint consists of highly disturbed and fragmented agricultural land which does not contain any identified denning resources. It is considered that the Development Footprint is not an area of habitat critical to the survival of the Spotted-tailed Quoll.

- disrupt the breeding cycle of a population

This species has not been observed breeding within the Development Footprint. It is considered that the Project is not likely to disrupt the breeding cycle of a population of the Spotted-tailed Quoll.

- modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The nearest record for the Spotted-tailed Quoll on the BioNet Atlas (NSW DPE 2022a) is approximately 10 km south of the Development Footprint. This species was not observed during surveys, and it is considered that the Project will not modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

- result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat

The Project is not a type of development which is likely to introduce invasive species that are harmful to the Spotted-tailed Quoll.

- introduce disease that may cause the species to decline, or

The Project is not a type of development which is likely to introduce disease that may cause the Spotted-tailed Quoll to decline.

- interfere with the recovery of the species.

The Project is not likely to interfere directly with the recovery of this species.

4.2.7.2 Impact Avoidance Measures

The Project has been designed and reduced by the proponent to minimise impacts to areas of intact woodland and forest habitats, including areas of suitable habitat for this species. Details of impact avoidance measures applied for the Project are documented in **Section 7.4** of the BDAR.

4.2.7.3 Impact Mitigation Measures

Impact mitigation measures for the Project are documented in detail in **Section 8.4** of the BDAR. The measures proposed include:

- Education and training for construction and operation phase workers.
- Implementation of vegetation protection zones for retained areas.
- Completion of pre-clearance and works supervision by an ecologist.
- Installation and maintenance of erosion and sediment controls.
- Installation of security fencing for the area containing panels.
- Preparation and implementation of a CEMP incorporating appropriate monitoring and adaptive management strategies.

The offsetting strategy proposed will also provide opportunities to improve areas of suitable habitat within the Project Area.

4.2.7.4 Impacts of the 2019–2020 Bushfires

The Development Footprint was not burnt in the 2019–2020 bushfires, although parts of the Goulburn River National Park adjoining the eastern and southern parts of the Project Area were burnt. It is considered that a large proportion of the suitable habitat for this species within NSW was burnt during the 2019–2020 bushfires, with Conservation Advice (Threatened Species Scientific Committee 2020) identifying that 29 percent of the Spotted-tailed Quoll's distribution range overlaps with the fire-affected extent. The listing status of this species under the EPBC Act was subsequently upgraded to endangered following this fire event. Despite fire-associated impacts to the Spotted-tailed Quoll across its range, it is considered that the Development Footprint is not likely to provide regularly occupied foraging or shelter habitat.

4.2.7.5 Significant Impact Assessment Conclusion and Proposed Offsets

It is considered that the Project is unlikely to have a significant impact on the Spotted-tailed Quoll.

This species is an ecosystem credit entity under the BAM. The proponent has committed to undertaking investigations into the use of the residual areas of the Project Area as a BSA, to generate ecosystem credits which would indirectly offset impacts on this species. Any residual ecosystem credit requirements would be achieved through other appropriate measures, such as purchase of credits from the Biodiversity Conservation Trust or from the market.

4.2.8 Painted Honeyeater (*Grantiella picta*)

4.2.8.1 Important Population Criteria

The Painted Honeyeater is listed as vulnerable under the EPBC Act. For vulnerable species the EPBC Act a consideration of whether the species constitutes an important population is required. An important population is defined as a:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity, and/or
- populations that are near the limit of the species range.

No Painted Honeyeaters were observed during surveys, and it is considered that the Development Footprint does not contain a population which meets the above criteria, considering this species breeding and dispersal behaviours, likely genetics, and range.

4.2.8.2 Significant Impact Assessment

The significant impact assessment criteria for vulnerable species are listed below in bold font and specifically addressed for this species.

- lead to a long-term decrease in the size of an important population of a species

The Development Footprint does not contain an important population of the Painted Honeyeater and the Project will not result in a long-term decrease in the size of an important population of this species.

- reduce the area of occupancy of an important population

The Development Footprint does not contain an important population of the Painted Honeyeater and the Project is not likely to reduce the area of occupancy of an important population of the Painted Honeyeater.

- fragment an existing important population into two or more populations

The Development Footprint does not contain an important population of the Painted Honeyeater and the Project is not a type of development which is likely to fragment the habitat of this mobile and migratory species.

- adversely affect habitat critical to the survival of a species

The National Recovery Plan for this species (DAWE 2021a) identifies that habitat critical to the survival of this species can include breeding habitat, foraging habitat (both known and likely) and habitat for the long-term maintenance of the species. The Development Footprint contains some areas of suitable foraging habitat for this species, and this species has been recorded historically nearby to the Development Footprint. It is therefore considered that the Development Footprint contains habitat critical to the survival of this species. It should be noted however the suitable foraging habitat present are limited to *Amyema* mistletoes present in low densities in scattered trees in areas which have been highly disturbed by a long history of agricultural land use. Furthermore, the Development Footprint is surrounded by the Goulburn River National Park which provides larger areas of higher quality habitats for this species and contains areas where this species has been recorded.

- disrupt the breeding cycle of an important population

The Development Footprint does not contain an important population of the Painted Honeyeater and therefore the Project would not disrupt the breeding cycle of an important population.

- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The Project will result in the removal of areas of suitable habitat for this species, however there are larger areas of suitable habitat present within the adjoining Goulburn River National Park. It is considered that the Project would not affect the availability or quality of habitat that this species would decline.

- result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

The Project is not a type of development which is likely to introduce invasive species that are harmful to this species.

- introduce disease that may cause the species to decline, or

The Project is not a type of development which is likely to introduce disease that may cause this species to decline.

- interfere substantially with the recovery of the species.

The Project is not likely to interfere directly with the recovery of this species.

4.2.8.3 Impact Avoidance Measures

The Painted Honeyeater was not observed during surveys, however there are records for this species in proximity of the Project Area.

The Project has been designed and reduced by the proponent to minimise impacts to areas of intact woodland and forest habitats, including areas of suitable habitat for this species. Details of impact avoidance measures applied for the Project are documented in **Section 7.0** of the BDARs.

4.2.8.4 Impact Mitigation Measures

Impact mitigation measures for the Project are documented in detail in **Section 8.4** of the BDAR. The measures proposed include:

- Education and training for construction and operation phase workers.
- Implementation of vegetation protection zones for retained areas.
- Completion of pre-clearance and works supervision by an ecologist.
- Installation and maintenance of erosion and sediment controls.
- Installation of security fencing for the area containing panels.
- Preparation and implementation of a CEMP incorporating appropriate monitoring and adaptive management strategies.

The offsetting strategy proposed will also provide opportunities to rehabilitate areas of suitable habitat within the Project Area.

4.2.8.5 Impacts of the 2019–2020 Bushfires

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event, however areas where this species has previously been recorded on the BioNet Atlas (NSW DPE 2022a) within approximately 10 km have largely not been affected.

4.2.8.6 Significant Impact Assessment Conclusion and Proposed Offsets

It is considered that the Project will remove habitat critical to the survival of this species, as defined in the National Recovery Plan (DAWE 2021a). The Project therefore has the potential to have a significant impact on the Painted Honeyeater.

This species is an ecosystem credit species under the BAM. The proponent has committed to undertaking investigations into the use of the residual areas of the Project Area as a BSA, to generate ecosystem credits which would indirectly offset impacts on this species. Any residual ecosystem credit requirements would be achieved through other appropriate measures, such as purchase of credits from the Biodiversity Conservation Trust or from the market.

4.2.9 White-Throated Needletail (*Hirundapus caudacutus*)

4.2.9.1 Significant Impact Assessment

The White-throated Needletail is listed as vulnerable under the EPBC Act. For vulnerable species the EPBC Act a consideration of whether the species constitutes an important population is required. An important population is defined as a:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity, and/or
- populations that are near the limit of the species range.

White-throated Needletail were observed during surveys, and it is considered that the Development Footprint does not contain a population which meets the above criteria, considering this species breeding and dispersal behaviours, likely genetics, and range.

The significant impact assessment criteria for vulnerable species are listed below in bold font and specifically addressed for this species.

- lead to a long-term decrease in the size of an important population of a species

The Development Footprint does not contain an important population of the White-throated Needletail and the Project will not result in a long-term decrease in the size of an important population of this species.

- reduce the area of occupancy of an important population

The Development Footprint does not contain an important population of the White-throated Needletail and the Project is not likely to reduce the area of occupancy of an important population of the White-throated Needletail.

- fragment an existing important population into two or more populations

The Development Footprint does not contain an important population of the White-throated Needletail and the Project is not a type of development which is likely to fragment the habitat of this mobile and migratory species.

- adversely affect habitat critical to the survival of a species

There is no current definition of habitat critical to the survival of this species (TSSC 2019).

The Development Footprint contains some areas of suitable foraging habitat for this species, and this species has been recorded historically nearby to the Development Footprint. The Development Footprint is surrounded by the Goulburn River National Park which provides larger areas of higher quality habitats for this species and contains areas where this species has been recorded.

- disrupt the breeding cycle of an important population

This species doesn't breed in Australia, and thus, the Development Footprint is not considered to contain any breeding habitat for this species.

The Development Footprint does not contain an important population of the White-throated Needletail and therefore the Project would not disrupt the breeding cycle of an important population.

- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The Project will result in the removal of areas of suitable habitat for this species, however there are larger areas of suitable habitat present within the adjoining Goulburn River National Park. It is considered that the Project would not affect the availability or quality of habitat that this species would decline.

- result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

The Project is not a type of development which is likely to introduce invasive species that are harmful to this species.

- introduce disease that may cause the species to decline, or

The Project is not a type of development which is likely to introduce disease that may cause this species to decline.

- interfere substantially with the recovery of the species.

The Project is not likely to interfere directly with the recovery of this species.

4.2.9.2 Impact Avoidance Measures

The White-throated Needletail was observed during surveys.

The Project has been designed and reduced by the proponent to minimise impacts to areas of intact woodland and forest habitats, including areas of suitable habitat for this species. Details of impact avoidance measures applied for the Project are documented in **Section 7.0** of the BDAR.

4.2.9.3 Impact Mitigation Measures

Impact mitigation measures for the Project are documented in detail in **Section 8.4** of the BDAR.
The measures proposed include:

- Education and training for construction and operation phase workers.
- Implementation of vegetation protection zones for retained areas.
- Completion of pre-clearance and works supervision by an ecologist.
- Installation and maintenance of erosion and sediment controls.
- Installation of security fencing for the area containing panels.
- Preparation and implementation of a CEMP incorporating appropriate monitoring and adaptive management strategies.

4.2.9.4 Impacts of the 2019–2020 Bushfires

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event.

There is currently no data surrounding the impacts of the 2019–2020 bushfires on this species.

4.2.9.5 Significant Impact Assessment Conclusion and Proposed Offsets

It is considered that the Project is unlikely to result in a significant impact to the White-throated Needletail.

4.2.10 Swift Parrot (*Lathamus discolor*)

4.2.10.1 Significant Impact Assessment

The Swift Parrot is listed as critically endangered under the EPBC Act. The significant impact assessment criteria for critically endangered species are listed below in bold font and specifically addressed for this species.

- lead to a long-term decrease in the size of a population

This species has not been observed within the Development Footprint and is not likely to be directly impacted by the Project. There are no areas of mapped Important Habitat for this species within the Development Footprint. The nearest record for this species on the BioNet Atlas (NSW DPE 2022a) is from 2005 and located approximately 12 km to the south-west near the Wollar Railway Tunnel.

The areas proposed to be impacted are heavily degraded and are their removal is not likely to lead to a long-term decrease in the size of the population of the Swift Parrot.

- reduce the area of occupancy of the species

The Swift Parrot has a large geographic range compared to its population size and no areas of mapped Important Habitat are present on the Development Footprint or nearby. The areas proposed to be impacted do not contain confirmed occupied habitat and are heavily degraded. It is therefore considered that the Project is not likely to reduce the area of occupancy of this species.

- fragment an existing population into two or more populations

The Project will not fragment any habitat for the Swift Parrot, as this species is highly mobile and nomadic.

- adversely affect habitat critical to the survival of a species

The National Recovery Plan identifies that habitat critical to the survival of the Swift Parrot includes:

  - Breeding and foraging habitat in Tasmania.
  - Foraging habitat on the Australian mainland which contains preferred foraging species within known and likely foraging habitat.

The Development Footprint contains potential foraging habitat and the preferred foraging species White Box (Eucalyptus *albens*) (AGDOE 2016) and therefore meets the definition for habitat which is potentially critical to the survival of the Swift Parrot.

- disrupt the breeding cycle of a population

The Swift Parrot only breeds in Tasmania, therefore the Project has no potential to disrupt the breeding cycle of this species.

- modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The Swift Parrot has a large geographic range compared to its population size and no areas of confirmed breeding habitat are present on the Development Footprint. The Project will reduce the extent of suitable foraging habitat available to this species, however suitable impact avoidance measures have been applied and the establishment of a BSA of the residual parts of the Development Footprint would provide an opportunity to improve the areas of retained habitats.

- result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat

The Project is not a type of development which is likely to introduce invasive species that are harmful to the Swift Parrot.

- introduce disease that may cause the species to decline, or

The Project is not a type of development which is likely to introduce disease that may cause the Swift Parrot to decline.

- interfere with the recovery of the species.

The Project is not likely to interfere directly with the recovery of this species.

4.2.10.2 Impact Avoidance Measures

The Swift Parrot has not been observed during surveys and the Development Footprint is not mapped as Important Habitat for the Swift Parrot under the BAM. The nearest record for this species on the BioNet Atlas (NSW DPE 2022a) is from 2005 and located approximately 12 km to the south-west near the Wollar Railway Tunnel.

The Project has been designed and reduced by the proponent to minimise impacts to areas of intact woodland and forest habitats, including areas of suitable habitat for this species. Details of impact avoidance measures applied for the Project are documented in **Section 7.0** of the BDAR.

4.2.10.3 Impact Mitigation Measures

Impact mitigation measures for the Project are documented in detail in **Section 8.4** of the BDAR.
The measures proposed include:

- Education and training for construction and operation phase workers.
- Implementation of vegetation protection zones for retained areas.
- Completion of pre-clearance and works supervision by an ecologist.
- Installation and maintenance of erosion and sediment controls.
- Installation of security fencing for the area containing panels.

- Preparation and implementation of a CEMP incorporating appropriate monitoring and adaptive management strategies.
- The offsetting strategy proposed will also provide opportunities to rehabilitate areas of suitable habitat within the Project Area.

4.2.10.4 Impacts of the 2019–2020 Bushfires

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event, including areas of suitable habitat for the Swift Parrot.

The 2019–2020 mega fire event that impacted the east coast of Australia represent a significant pulse impact on the quality of the habitat for the Swift Parrot. The Draft National Recovery Plan estimates that between 10–30 percent of the distribution range of the Swift Parrot was impacted to some extent, with increasing likelihood of future similar fire events as a result of climate change (AGDAWE 2021a).

4.2.10.5 Significant Impact Assessment Conclusion and Proposed Offsets

It is considered that the Project is unlikely to have a significant impact on the Swift Parrot.

The proponent has committed to undertaking investigations into the use of the residual areas of the Project Area as a BSA, to generate ecosystem credits which would indirectly offset impacts on this species. Any residual ecosystem credit requirements would be achieved through other appropriate measures, such as purchase of credits from the Biodiversity Conservation Trust or from the market.

4.2.11 South-Eastern Hooded Robin (*Melanodryas cucullata cucullata*)

4.2.11.1 Significant Impact Assessment

The South-eastern Hooded Robin is listed as endangered under the EPBC Act. The significant impact assessment criteria for endangered species are listed below in bold font and specifically addressed for this species.

- **lead to a long-term decrease in the size of a population**

This species has been recorded near the Project Area but has not been observed within the Development Footprint and is not likely to be directly impacted by the Project.

The areas proposed to be impacted are heavily degraded and are their removal is not likely to lead to a long-term decrease in the size of a population of the South-eastern Hooded Robin.

- **reduce the area of occupancy of the species**

The Project will reduce the extent of potential habitat for this species. The South-eastern Hooded Robin has a relatively large geographic distribution occurring in south-east Australia spanning from far south-east Queensland to York Peninsula in South Australia. The population is not severely fragmented, and the number of locations is greater than 10 (DCCEEW 2023d). The areas proposed to be impacted do not contain confirmed occupied habitat and are heavily degraded. It is therefore considered that the Project is not likely to reduce the area of occupancy of this species.

- **fragment an existing population into two or more populations**

The Project will not fragment any populations of the South-eastern Hooded Robin, as the Project Area does not contain confirmed occupied habitat and are heavily degraded.

- **adversely affect habitat critical to the survival of a species**

According to the Conservation Advice (DCCEEW 2023d), habitat critical to the survival of the hooded robin (south-eastern) include areas of:

  - dry eucalypt and acacia woodlands and shrublands remnants with an open understorey, some grassy areas and a complex ground layer, often in or near clearings or open areas
  - structurally diverse habitats featuring: mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses
  - standing dead or live trees and tree stumps are also essential for nesting, roosting and foraging
  - moderately deep to deep soils, rocks and fallen timber which provides essential foraging habitat.

The Development footprint is substantially degraded following a history of agricultural use and this species was not observed during surveys. It is considered that it does not contain habitat critical to the survival of this species.

- **disrupt the breeding cycle of a population**

The Project will not disrupt the breeding cycle of any populations of the South-eastern Hooded Robin, as the Project Area does not contain confirmed occupied habitat and are heavily degraded.

- **modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline**

The Project will not modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that this species is likely to decline as the Project Area does not contain confirmed occupied habitat and are heavily degraded. The Development Footprint is surrounded by the Goulburn River National Park which provides larger areas of higher quality habitats for this species and contains areas where this species has been recorded.

- **result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat**

The Project is not a type of development which is likely to introduce invasive species that are harmful to the South-eastern Hooded Robin.

- **introduce disease that may cause the species to decline, or**

The Project is not a type of development which is likely to introduce disease that may cause the South-eastern Hooded Robin to decline.

- **interfere with the recovery of the species.**

The Project is not likely to interfere directly with the recovery of this species.

4.2.11.2 Impact Avoidance Measures

The South-eastern Hooded Robin was not observed during surveys, however there are records for this species in proximity of the Project Area.

The Project has been designed and reduced by the proponent to minimise impacts to areas of intact woodland and forest habitats, including areas of suitable habitat for this species. Details of impact avoidance measures applied for the Project are documented in **Section 8.4** of the BDAR.

4.2.11.3 Impact Mitigation Measures

Impact mitigation measures for the Project are documented in detail in **Section 8.0** of the solar farm and road upgrade BDAR Reports. The measures proposed include:

- Education and training for construction and operation phase workers.
- Implementation of vegetation protection zones for retained areas.
- Completion of pre-clearance and works supervision by an ecologist.
- Installation and maintenance of erosion and sediment controls.
- Installation of security fencing for the area containing panels.
- Preparation and implementation of a CEMP incorporating appropriate monitoring and adaptive management strategies.

4.2.11.4 Impacts of the 2019–2020 Bushfires

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event.

There is currently no data surrounding the impacts of the 2019–2020 bushfires on this species.

4.2.11.5 Significant Impact Assessment Conclusion and Proposed Offsets

It is considered that the Project is not likely to result in a significant impact to the South-eastern Hooded Robin.

4.2.12 Diamond Firetail (*Stagonopleura guttata*)

4.2.12.1 Important Population Criteria

The Diamond Firetail is listed as vulnerable under the EPBC Act. For vulnerable species the EPBC Act a consideration of whether the species constitutes an important population is required. An important population is defined as a:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity, and/or
- populations that are near the limit of the species range.

Diamond Firetail were observed during surveys, however, it is considered that the Development Footprint does not contain a population which meets the above criteria, considering this species breeding and dispersal behaviours, likely genetics, and range.

4.2.12.2 Significant Impact Assessment

The significant impact assessment criteria for vulnerable species are listed below in bold font and specifically addressed for this species.

- lead to a long-term decrease in the size of an important population of a species

The Development Footprint does not contain an important population of the Diamond Firetail and the Project will not result in a long-term decrease in the size of an important population of this species.

- reduce the area of occupancy of an important population

The Development Footprint does not contain an important population of the Diamond Firetail and the Project is not likely to reduce the area of occupancy of an important population of the Diamond Firetail.

- fragment an existing important population into two or more populations

The Development Footprint does not contain an important population of the Diamond Firetail and the Project is not a type of development which is likely to fragment the habitat of this species.

- adversely affect habitat critical to the survival of a species

According to DCCEEW (2023a), Habitat critical to the survival of the Diamond Firetail includes areas of:

  - Eucalypt, acacia or casuarina woodlands, open forests and other lightly timbered habitats.
  - Low tree density, few large logs, and little litter cover but high grass cover for foraging, roosting and breeding.
  - Drooping She-oak (*Allocasuarina verticillata*) within the Mt Lofty Ranges.
  - Additionally, areas that are not currently occupied by the species due to recent disturbance (e.g. fire, grazing or human activity), but which could become suitable again in the future, should also be considered habitat critical to the survival of the species.
  - Scattered trees with areas of high grass cover are present within the Development Footprint. Thus, the Project will affect habitat critical to the survival of the species.

- disrupt the breeding cycle of an important population

The Development Footprint does not contain an important population of the Diamond Firetail and therefore the Project would not disrupt the breeding cycle of an important population.

- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The Project will result in the removal of areas of suitable habitat for this species, however there are larger areas of suitable habitat present within the adjoining Goulburn River National Park. It is considered that the Project would not affect the availability or quality of habitat that this species would decline.

- result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

The Project is not a type of development which is likely to introduce invasive species that are harmful to this species.

- introduce disease that may cause the species to decline, or

The Project is not a type of development which is likely to introduce disease that may cause this species to decline.

- interfere substantially with the recovery of the species.

The Project is not likely to interfere directly with the recovery of this species.

4.2.12.3 Impact Avoidance Measures

The Diamond Firetail was observed during surveys. The Project has been designed and reduced by the proponent to minimise impacts to areas of intact woodland and forest habitats, including areas of suitable habitat for this species. Details of impact avoidance measures applied for the Project are documented in **Section 7.0** of the BDAR.

4.2.12.4 Impact Mitigation Measures

Impact mitigation measures for the Project are documented in detail in **Section 8.4** of the BDAR.
The measures proposed include:

- Education and training for construction and operation phase workers.
- Implementation of vegetation protection zones for retained areas.
- Completion of pre-clearance and works supervision by an ecologist.
- Installation and maintenance of erosion and sediment controls.
- Installation of security fencing for the area containing panels.
- Preparation and implementation of a CEMP incorporating appropriate monitoring and adaptive management strategies.

4.2.12.5 Impacts of the 2019–2020 Bushfires

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event.

There is currently no data surrounding the impacts of the 2019–2020 bushfires on this species.

4.2.12.6 Significant Impact Assessment Conclusion and Proposed Offsets

The proposal will impact an area of suitable habitat for the Diamond Firetail, however the better-quality habitats present within the Project Area will be retained and the Project Area is surrounded by large areas of suitable habitat within the Goulburn River National Park. It is therefore considered that the proposal is unlikely to have a significant impact on this species.

4.2.13 Koala (Combined Populations of QLD, NSW, ACT) (*Phascolarctos cinereus*)

4.2.13.1 Significant Impact Assessment

The Koala is listed as endangered under the EPBC Act. The significant impact assessment criteria for endangered species are listed below in bold font and specifically addressed for this species.

- **lead to a long-term decrease in the size of a population**

The Koala has not been observed during surveys and the Development Footprint is identified in the Koala Habitat Information Base – Koala Likelihood Map as mostly having No Koala Records, with the exception of a 10x10 km grid cell overlapping the south-western corner which has a 0.00–0.25 likelihood of occurrence (NSW DPIE 2019). There is one record for the Koala on the Development Footprint from the 1957, and the only recent records for this species from within the last 20 years are from approximately 4.5 km to the south-west along the floodplain of the Goulburn River (NSW DPE 2022a).

It is therefore considered that the Project is not likely to lead to a long-term decrease in the size of a population of the Koala.

- **reduce the area of occupancy of the species**

Based on the lack of recent observations for the Koala within the Development Footprint it is considered that the Project is not likely to reduce the area of occupancy of this species.

- **fragment an existing population into two or more populations**

The Project will not fragment any habitat for the Koala, as this species is considered unlikely to occur within the Development Footprint or directly adjoining areas.

- **adversely affect habitat critical to the survival of a species**

Considerations for determining critical habitat for the Koala are provided in the National Recovery Plan (AGDAWE 2022). It is considered that the Development Footprint is not an area of habitat critical to the survival of the Koala.

- **disrupt the breeding cycle of a population**

No Koalas have been observed breeding within the Development Footprint. It is considered that the Project is not likely to disrupt the breeding cycle of a population of Koalas.

- **modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline**

There are no records for the Koala on the BioNet Atlas (NSW DPE 2022a) within the Development Footprint since 1957. This species was not observed during surveys and it is considered that the Project will not modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

- **result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat**

The Project is not a type of development which is likely to introduce invasive species that are harmful to the Koala.

- **introduce disease that may cause the species to decline, or**

The Project is not a type of development which is likely to introduce disease that may cause the Koala to decline.

- **interfere with the recovery of the species.**

The Project is not likely to interfere directly with the recovery of this species.

4.2.13.2 Impact Avoidance Measures

The Project has been designed and reduced by the proponent to minimise impacts to areas of intact woodland and forest habitats, including areas of suitable habitat for this species. Details of impact avoidance measures applied for the Project are documented in **Section 7.4** of the BDAR.

4.2.13.3 Impact Mitigation Measures

Impact mitigation measures for the Project are documented in detail in **Section 8.4** of the BDAR.
The measures proposed include:

- Education and training for construction and operation phase workers.
- Implementation of vegetation protection zones for retained areas.
- Completion of pre-clearance and works supervision by an ecologist.
- Installation and maintenance of erosion and sediment controls.
- Installation of security fencing for the area containing panels.
- Preparation and implementation of a CEMP incorporating appropriate monitoring and adaptive management strategies.

The offsetting strategy proposed will also provide opportunities to improve areas of suitable habitat within the Project Area.

4.2.13.4 Impacts of the 2019–2020 Bushfires

The Development Footprint was not burnt in the 2019–2020 bushfires, although parts of the Goulburn River National Park adjoining the eastern and southern parts of the Project Area were burnt.

The National Recovery Plan for the Koala (AGDAWE 2022b) identifies that the 2019–2020 bushfires killed, injured or affected an estimated 61,000 Koalas and burnt 3,659,625 ha (9%) of the area within which the listed Koala and its habitat are known or likely to occur. The listing status of this species under the EPBC Act was subsequently upgraded to endangered following this fire event. Despite these impacts to the Koala across its range it is considered that the Development Footprint is not likely to provide occupied foraging, shelter or fire refuge habitat for the Koala.

4.2.13.5 Significant Impact Assessment Conclusion and Proposed Offsets

The proponent has committed to undertaking investigations into the use of the residual areas of the Project Area as a BSA. This species is assessed under the BAM with species credits where it is known or assumed to occur. This species was not observed during surveys and no offsets are required for this species.

4.2.14 Corben's Long-Eared Bat (*Nyctophilus corbeni*)

4.2.14.1 Significant Impact Assessment

The Corben's Long-eared Bat is listed as vulnerable under the EPBC Act. For vulnerable species the EPBC Act a consideration of whether the species constitutes an important population is required. An important population is defined as a:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity, and/or
- populations that are near the limit of the species range.

The Development Footprint is near the eastern limit of this species range, and it is therefore that occurrences of this species may constitute an important population.

The significant impact assessment criteria for vulnerable species are listed below in bold font and specifically addressed for this species.

- **lead to a long-term decrease in the size of an important population of a species**

The Project will require the removal of suitable foraging and shelter habitats for this species. There are larger areas of suitable habitat for this species surrounding the Project Area within the Goulburn River National Park. It is therefore considered that the Project is unlikely to lead to a long-term decrease in the size of an important population of this species.

- **reduce the area of occupancy of an important population**

The habitats which will be impacted by the Project are highly disturbed and are surrounded by higher quality habitats within the Goulburn River National Park. Large parts of the Project Area will also be retained and may be utilised as a biodiversity offset for the Project. It is therefore considered that the Project is not likely to reduce the area of occupancy of an important population of this species.

- **fragment an existing important population into two or more populations**

The Project is not a type of development which is likely to fragment the habitat of this highly mobile species.

- **adversely affect habitat critical to the survival of a species**

There are larger areas of suitable habitat for this species within the adjoining Goulburn River National Park. The areas which will be impacted by the Project have been disturbed by a long history of agricultural land use and it is considered that the Project is not likely to affect habitat critical to the survival of this species.

- **disrupt the breeding cycle of an important population**

The Development Footprint does contain suitable breeding habitat for this species, however there are larger areas of suitable breeding habitat present within the surrounding Goulburn River National Park. It is therefore considered that the Project is unlikely to disrupt the breeding cycle of an important population of Corben's Long-eared Bat.

- **modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline**

The Project will result in the removal of areas of suitable habitat for this species, however there are larger areas of suitable habitat present within the adjoining Goulburn River National Park. It is considered that the Project would not affect the availability or quality of habitat that this species would decline.

- **result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat**

The Project is not a type of development which is likely to introduce invasive species that are harmful to this species.

- **introduce disease that may cause the species to decline, or**

The Project is not a type of development which is likely to introduce disease that may cause this species to decline.

- **interfere substantially with the recovery of the species.**

The Project is not likely to interfere directly with the recovery of this species.

4.2.14.2 Impact Avoidance Measures

The Project has been designed and reduced by the proponent to minimise impacts to areas of intact woodland and forest habitats, including areas of suitable habitat for this species. Details of impact avoidance measures applied for the Project are documented in **Section 7.0** of the BDAR.

4.2.14.3 Impact Mitigation Measures

Impact mitigation measures for the Project are documented in detail in **Section 8.4** of the BDAR. The measures proposed include:

- Education and training for construction and operation phase workers.
- Implementation of vegetation protection zones for retained areas.
- Completion of pre-clearance and works supervision by an ecologist.
- Installation and maintenance of erosion and sediment controls.
- Installation of security fencing for the area containing panels.
- Preparation and implementation of a CEMP incorporating appropriate monitoring and adaptive management strategies.

The offsetting strategy proposed will also provide opportunities to rehabilitate areas of suitable habitat for this species within the Project Area.

4.2.14.4 Impacts of the 2019–2020 Bushfires

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event. This species is at the eastern edge of its distribution within the Development Footprint and most of the areas affected by the 2019–2020 bushfires are likely to be outside of this species range.

4.2.14.5 Significant Impact Assessment Conclusion and Proposed Offsets

It is considered that the Project is unlikely to have a significant impact on Corben's Long-eared bat.

This species is an ecosystem credit species under the BAM. The proponent has committed to undertaking investigations into the use of the residual areas of the Project Area as a BSA, to generate ecosystem credits which would indirectly offset impacts on this species. Any residual ecosystem credit requirements would be achieved through other appropriate measures, such as purchase of credits from the Biodiversity Conservation Trust or from the market.

4.2.15 Grey-Headed Flying-Fox (*Pteropus poliocephalus*)

4.2.15.1 Significant Impact Assessment

The Grey-headed Flying-fox is listed as vulnerable under the EPBC Act. For vulnerable species the EPBC Act a consideration of whether the species constitutes an important population is required. An important population is defined as a:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity, and/or
- populations that are near the limit of the species range.

No Grey-headed Flying-foxes were observed during surveys, and it is considered that the Development Footprint does not contain a population which meets the above criteria, considering this species breeding and dispersal behaviours, likely genetics, and range.

The significant impact assessment criteria for vulnerable species are listed below in bold font and specifically addressed for this species.

- **lead to a long-term decrease in the size of an important population of a species**

The Project will require the removal of suitable foraging habitats for this species. The Project will not impact any known roost or camp sites for this species. There are larger areas of suitable habitat for this species surrounding the Project Area within the Goulburn River National Park. It is therefore considered that the Project is not likely to lead to a long-term decrease in the size of an important population of this species.

- **reduce the area of occupancy of an important population**

The habitats which will be impacted by the Project are highly disturbed and are surrounded by higher quality habitats within the Goulburn River National Park. Large parts of the Project Area will also be retained and may be utilised as a biodiversity offset for the Project. It is therefore considered that the Project is unlikely to reduce the area of occupancy of an important population of this species.

- **fragment an existing important population into two or more populations**

The Project is not a type of development which is likely to fragment the habitat of this highly mobile species.

- **adversely affect habitat critical to the survival of a species**

There are larger areas of suitable habitat for this species within the adjoining Goulburn River National Park. The areas which will be impacted by the Project have been disturbed by a long history of agricultural land use and it is considered that the Project is not likely to affect habitat critical to the survival of this species.

- **disrupt the breeding cycle of an important population**

The Development Footprint does not contain known breeding habitat for this species and the nearest camp site is located in Mudgee. It is therefore considered that the Project is unlikely to disrupt the breeding cycle of an important population of the Grey-headed Flying-fox.

- **modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline**

The Project will result in the removal of areas of suitable habitat for this species, however there are larger areas of suitable habitat present within the adjoining Goulburn River National Park. It is considered that the Project would not affect the availability or quality of habitat that this species would decline.

- **result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat**

The Project is not a type of development which is likely to introduce invasive species that are harmful to this species.

- **introduce disease that may cause the species to decline, or**

The Project is not a type of development which is likely to introduce disease that may cause this species to decline.

- **interfere substantially with the recovery of the species.**

The Project is not likely to interfere directly with the recovery of this species.

4.2.15.2 Impact Avoidance Measures

The Project has been designed and reduced by the proponent to minimise impacts to areas of intact woodland and forest habitats, including areas of suitable habitat for this species. Details of impact avoidance measures applied for the Project are documented in **Section 7.0** of the BDAR.

4.2.15.3 Impact Mitigation Measures

Impact mitigation measures for the Project are documented in detail in **Section 8.4** of the BDAR.
The measures proposed include:

- Education and training for construction and operation phase workers.
- Implementation of vegetation protection zones for retained areas.
- Completion of pre-clearance and works supervision by an ecologist.
- Installation and maintenance of erosion and sediment controls.
- Installation of security fencing for the area containing panels.
- Preparation and implementation of a CEMP incorporating appropriate monitoring and adaptive management strategies.

The offsetting strategy proposed will also provide opportunities to rehabilitate areas of suitable habitat for this species within the Project Area.

4.2.15.4 Impacts of the 2019–2020 Bushfires

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event.
The National Recovery Plan for this species (AGDAWE 2021c) identifies that although several of the impacts have not been quantified, preliminary analysis indicates that the associated impact of the fires on this species are likely to be significant in relation to foraging habitat, but only minor in relation to impacts at camp sites. The National Flying Fox Monitoring Viewer identifies that the nearest camp sites for this species are located at Mudgee, 57 km to the south-west and Muswellbrook, 71 km to the east. The National Recovery Plan (AGDAWE 2021c) identifies that this species travels as far as 40 km to feed before returning to their roost the same night. It is considered that the known camp sites nearest to the Project are at or over the limit of this species nightly flying range and it is expected that the site would only be used infrequently or during passage between camp sites.

4.2.15.5 Significant Impact Assessment Conclusion and Proposed Offsets

It is considered that the Project is not likely to have a significant impact on the Grey-headed Flying-fox.

This species is an ecosystem credit species under the BAM. The proponent has committed to undertaking investigations into the use of the residual areas of the Project Area as a BSA, to generate ecosystem credits which would indirectly offset impacts on this species. Any residual ecosystem credit requirements would be achieved through other appropriate measures, such as purchase of credits from the Biodiversity Conservation Trust or from the market.

4.3 Additional Analysis of Impacts of 2019–2020 Bushfires for Priority Management Species

The following additional Priority Management Species require analysis of the impacts of the 2019–2020 bushfires as part of this Report:

- Koala (*Phascolarctos cinereus*).
- Greater Glider (*Petauroides volans*).
- Brush-tailed Rock Wallaby (*Petrogale penicillata*).
- Spotted-tailed Quoll (*Dasyurus maculatus maculatus* – south-east mainland population).
- New Holland Mouse (*Pseudomys novaehollandiae*).
- Grey-headed Flying-fox (*Pteropus poliocephalus*).

4.3.1 Koala (*Phascolarctos cinereus*)

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event.

The National Recovery Plan for the Koala (DAWE 2022c) identifies that the 2019–2020 bushfires killed, injured or affected an estimated 61,000 Koalas and burnt 3,659,625 ha (9%) of the area within which the listed Koala and its habitat are known or likely to occur. The listing status of this species under the EPBC Act was subsequently upgraded to endangered following this fire event. Despite these impacts to the Koala across its range it is considered that the subject land is unlikely to provide occupied foraging, shelter or fire refuge habitat for the Koala.

4.3.2 Greater Glider (*Petauroides volans*)

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event.

An estimated 40% of the distribution of the greater glider (southern and central) overlapped with the areas affected by the bushfires 2019–2020. A population decline analysis for the greater glider (southern and central) that incorporates spatial variation in fire severity plus estimated declines for differing fire severity classes, provided an estimate of overall decline for the taxon of 24% (range 17–31%) one year after the fire, assuming current management conditions (DCCEEW 2022a).

4.3.3 Brush-Tailed Rock Wallaby (*Petrogale penicillata*)

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event.

The 2019–2020 bushfires overlapped with approximately 50 percent of the Brush-tailed Rock-wallaby's distribution. The Brush-tailed Rock-wallaby is considered less susceptible to direct mortality from fire than some other mammal species, because it has access to rocky shelters that can protect animals from radiant heat, however increased predation and lack of food after fires may cause additional mortality (DAWE 2021c).

4.3.4 Spotted-Tailed Quoll (*Dasyurus maculatus maculatus* – South-East Mainland Population)

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event.

It is considered that a large proportion of the suitable habitat for this species within NSW was burnt during the 2019–2020 bushfires, with Conservation Advice (TSSC 2020) identifying that 29 percent of the Spotted-tailed Quoll's distribution range overlaps with the fire-affected extent. The listing status of this species under the EPBC Act was subsequently upgraded to endangered following this fire event.

4.3.5 New Holland Mouse (*Pseudomys novaehollandiae*)

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event.

There is currently no data surrounding the impacts of the 2019–2020 bushfires on this species.

4.3.6 Grey-Headed Flying-Fox (*Pteropus poliocephalus*)

The Development Footprint was not burnt in the 2019–2020 bushfires. Parts of the Goulburn River National Park to the south and south-east of the Development Footprint were impacted by this fire event.

The National Recovery Plan for this species (DAWE 2021d) identifies that although several of the impacts have not been quantified, preliminary analysis indicates that the associated impact of the fires on this species are likely to be significant in relation to foraging habitat, but only minor in relation to impacts at camp sites. The National Flying Fox Monitoring Viewer (DCCEEW 2023) identifies that the nearest camping site for this species is located at Aberdeen, and the closest nationally important flying-fox camp is located at Muswellbrook.

4.4 EPBC Act Significant Impact Assessment Conclusions

The assessments of significance undertaken have identified that the Project has potential to significantly impact the following listed threatened species and ecological communities:

- White Box – Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland.
- Regent Honeyeater (*Anthochaera phrygia*).
- Painted Honeyeater (*Grantiella picta*).

The impacts of the Project will be offset in accordance with the requirements of the BAM and the Bilateral Assessment Agreement and the like-for-like biodiversity offsetting rules under the EPBC Act for all entities which are likely to be significantly impacted.

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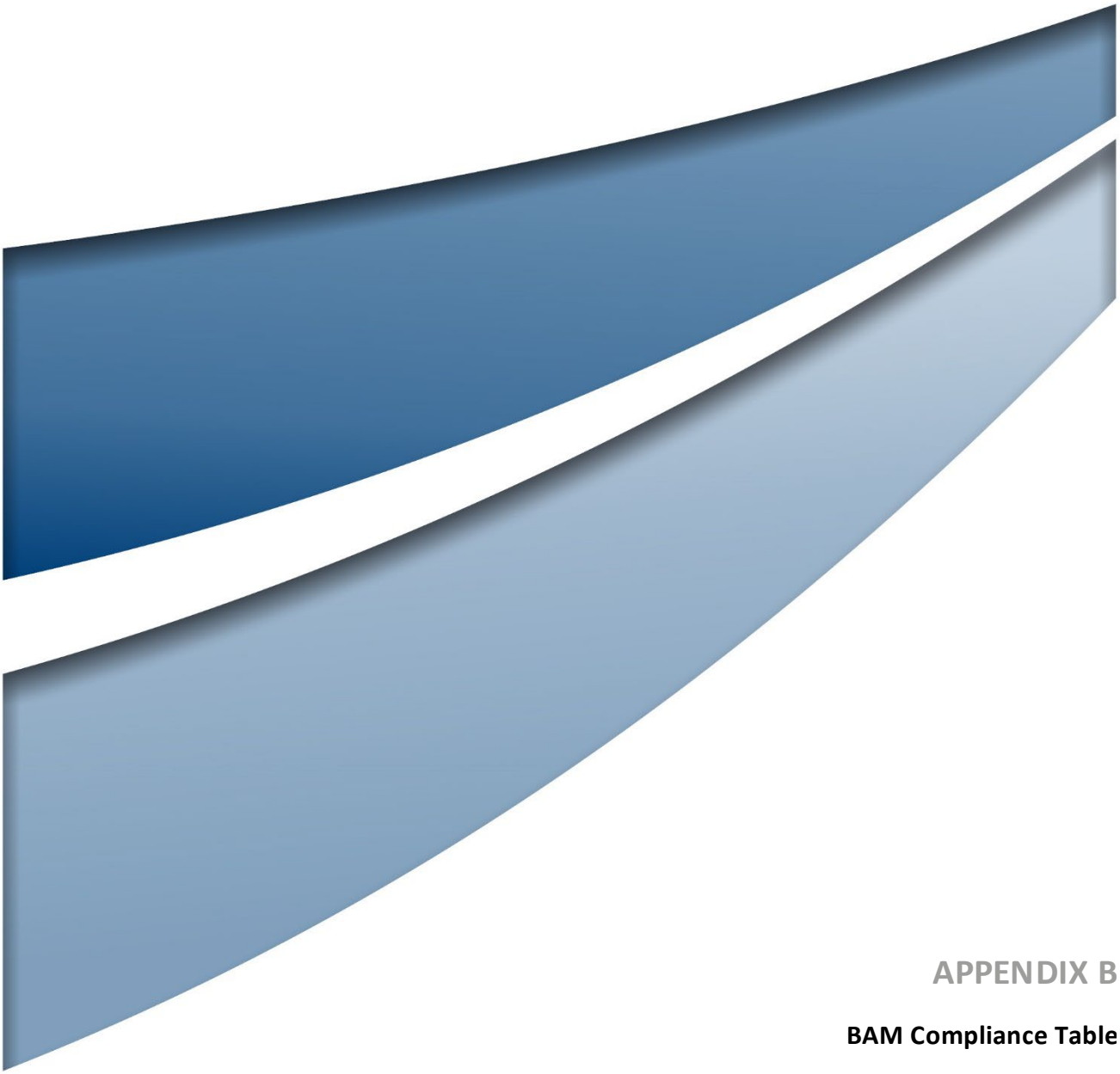


APPENDIX B

BAM Compliance Table

1.0 SEARS & BDAR Requirement Compliance

1.1 SEARS Requirements Compliance Details

Compliance with the SEARs Biodiversity Assessment Requirements for the project is documented in **Table A.1**.

Table A.1 Biodiversity Assessment Requirements for the project

Relevant Agency	Requirements	Comments
NSW DPIE SEARs	An assessment of the biodiversity values and the likely biodiversity impacts of the project in accordance with Section 7.9 of the *Biodiversity Conservation Act 2016* (NSW), the Biodiversity Assessment Method (BAM) 2020 and documented in a Biodiversity Development Assessment Report (BDAR), unless BCS and DPIE determine the proposed development is not likely to have any significant impacts on biodiversity values	This BDAR has been prepared in accordance with the BC Act, the BC Regulation and the Biodiversity Assessment Method. The NSW DPIE BDAR template and associated Guidance for the Biodiversity Development Assessment Report Template documentation (DPIE 2022) has also been utilsied to guide the format and content of the BDAR. The BDAR minimum information compliance requirements are addressed in **Section 1.2** of this Appendix.
	The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM;	Impact avoidance and minimisation measures are addressed in **Section 7.0** of the BDAR. Direct impacts are documented in **Section 8.1** of the BDAR. Indirect Impacts are documented in **Section 8.2** of the BDAR. Prescribed Impact are documented in **Section 8.3** of the BDAR.
	An assessment of the likely impacts on listed aquatic threatened species, populations or ecological communities, scheduled under the Fisheries Management Act 1994, and a description of the measures to minimise and rehabilitate impacts.	A separate Aquatic Assessment is provided as an Appendix to the EIS covering this requirement for the Solar Farm Project Area.
	If an offset is required, details of the measures proposed to address the offset obligations.	The Biodiversity Offset Strategy for the project is documented in **Section 11.3** of the BDAR.
	The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the Biodiversity Assessment Method Order 2017 under s6.10 of the Biodiversity Conservation Act 2016.	Details of the project team and accredited assessor are included in the Declarations page at the front of the BDAR.

Relevant Agency	Requirements	Comments
SEARs - BCD Standard Environmental Assessment Requirements	Biodiversity impacts related to the proposed development (SSD-33951458) are to be assessed in accordance with the Biodiversity Assessment Method 2020 and documented in a Biodiversity Development Assessment Report (BDAR). The BDAR must include information in the form detailed in the Biodiversity Conservation Act 2016 (s6.12), Biodiversity Conservation Regulation 2017 (s6.8) and Biodiversity Assessment Method 2020.	This BDAR has been prepared in accordance with the BC Act, the BC Regulation and the Biodiversity Assessment Method. The NSW DPIE BDAR template and associated Guidance for the Biodiversity Development Assessment Report Template documentation (DPIE 2022) has also been utilsied to guide the format and content of the BDAR. The BDAR minimum information compliance requirements are addressed in **Section 1.2** of this Appendix.
	The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the Biodiversity Assessment Method 2020.	Impact avoidance and minimisation measures are addressed in **Section 7.0** of the BDAR. Direct impacts are documented in **Section 8.1**. of the BDAR. Indirect Impacts are documented in **Section 8.2** of the BDAR. Prescribed Impact are documented in **Section 8.3** of the BDAR.
	The BDAR must include details of the measures proposed to address the offset obligation as follows; • The total number and classes of biodiversity credits required to be retired for the development/project; • The number and classes of like-for-like biodiversity credits proposed to be retired; • The number and classes of biodiversity credits proposed to be retired in accordance with the variation rules; • Any proposal to fund a biodiversity conservation action; • Any proposal to conduct ecological rehabilitation (if a mining project); • Any proposal to make a payment to the Biodiversity Conservation Fund. If seeking approval to use the variation rules, the BDAR must contain details of the reasonable steps that have been taken to obtain requisite like-for-like biodiversity credits.	Details of the offset obligations of the project are provided in Section 11 of the BDAR.

Relevant Agency	Requirements	Comments
	The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the Biodiversity Assessment Method Order 2017 under s6.10 of the Biodiversity Conservation Act 2016.	Details of the project team and accredited assessor are included in the Declarations page at the front of the BDAR.
Australian Government – Department of Climate Change, Energy, the Environment and Water	Guidelines for preparing assessment documentation relevant to the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) for proposals being assessed under the NSW Assessment Bilateral Goulburn River Solar Farm (EPBC 2021/9102), issued as part of the SEARS.	This requirement is addressed in **Appendix A** as part of the Matters of National Environmental Significance Assessment Report.

1.2 BDAR Requirements Compliance Details

Compliance with the BDAR minimum information requirements of the BAM is documented in **Table A.2**.

Table A.2 Assessment of Compliance with BDAR Minimum Information Requirements

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
Introduction	Chapters 2 and 3	**Information**	
		Introduction to the biodiversity assessment including:	–
		☒ brief description of the proposal	Section 1.2.1
		☒ identification of subject land boundary, including: ☒ operational footprint ☒ construction footprint indicating clearing associated with temporary/ancillary construction facilities and infrastructure	Section 1.2.2 and Figure 1.1 and Figure 1.2
		☒ general description of the subject land	Section 1.1.2
		☒ sources of information used in the assessment, including reports and spatial data	Section 1.6. Also referenced in text and listed in the References Section.
		☒ identification and justification for entering the BOS	Section 1.1
		Maps and tables	
		☒ Map of the subject land boundary showing the final proposal footprint, including the construction footprint for any clearing associated with temporary/ancillary construction facilities and infrastructure	Figure 1.1
Landscape	Section 3.1 and Section 3.2, Appendix E	**Information**	
		Identification of site context components and landscape features, including:	–
		☒ general description of subject land topographic and hydrological setting, geology and soils	Section 1.2.2
		☒ per cent native vegetation cover in the assessment area (as described in BAM Section 3.2)	Section 3.3 and Figure 1.2
		☒ IBRA bioregions and subregions (as described in BAM Subsection 3.1.3(2.))	Section 3.2.1 and Figure 1.1 and Figure 1.2

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		☒ rivers and streams classified according to stream order (as described in BAM Subsection 3.1.3(3.) and Appendix E)	Section 3.2.2 and Figure 1.1 and Figure 1.2
		☒ wetlands within, adjacent to and downstream of the site (as described in BAM Subsection 3.1.3(3.))	Section 3.2.2 and Figure 3.1
		☒ connectivity of different areas of habitat (as described in BAM Subsection 3.1.3(5–6.))	Section 3.2.3
		☒ karst, caves, crevices, cliffs, rocks and other geological features of significance and for vegetation clearing proposals, soil hazard features (as described in BAM Subsections 3.1.3(7.) and 3.1.3(12.))	Section 3.2.4
		☒ areas of outstanding biodiversity value occurring on the subject land and assessment area (as described in BAM Subsection 3.1.3(8–9.))	Section 3.2.5
		☒ any additional landscape features identified in any SEARs for the proposal	Section 3.2.7
		☒ NSW (Mitchell) landscape on which the subject land occurs	Section 3.2.6
		☒ details of field reconnaissance undertaken to confirm the extent and condition of landscape features and native vegetation cover (as described in Operational Manual Stage 1 Section 2.4)	Section 3.3
		Maps and tables	
		☒ Site Map ☒ Property boundary ☒ Boundary of subject land ☒ Cadastre of subject land (including labelling of Lot and DP or section plan if relevant) ☒ Landscape features identified in BAM Subsection 3.1.3.	Figure 1.1

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		☒ Location Map ☒ Digital aerial photography at 1:1,000 scale or finer ☒ Boundary of subject land ☒ Assessment area (i.e. the subject land and either 1500 m buffer area or 500 m buffer for linear development) ☒ Landscape features identified in BAM Subsection 3.1.3 ☒ Additional detail (e.g. local government area boundaries) relevant at this scale	Figure 1.2
		Landscape features identified in BAM Subsection 3.1.3 and to be shown on the Site Map and/or Location Map include:	–
		☒ IBRA bioregions and subregions ☒ rivers, streams and estuaries ☒ wetlands and important wetlands ☒ connectivity of different areas of habitat ☒ karst, caves, crevices, cliffs, rocks and other geological features of significance and if required, soil hazard features ☒ areas of outstanding biodiversity value occurring on the subject land and assessment area ☒ any additional landscape features identified in any SEARs for the proposal ☒ NSW (Mitchell) landscape on which the subject land occurs	Figure 1.1 and Figure 1.2
		Data	
		☒ All report maps as separate jpeg files	–
		Individual digital shape files of:	–
		☒ subject land boundary	–
		☒ assessment area (i.e. subject land and 1500 m buffer area) boundary	–

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		☒ cadastral boundary of subject land	–
		☒ areas of native vegetation cover	–
		☒ landscape features	–
Native vegetation	Chapter 4, Appendix A and Appendix H	**Information**	
		☒ Identify native vegetation extent within the subject land, including cleared areas and evidence to support differences between mapped vegetation extent and aerial imagery (as described in BAM Section 4.1(1–3.) and Subsection 4.1.1)	Section 4.1 and Figure 4.1
		☒ Provide justification for all parts of the subject land that do not contain native vegetation (as described in BAM Subsection 4.1.2)	Section 4.1.2
		☒ Review of existing information on native vegetation including references to previous vegetation maps of the subject land and assessment area (described in BAM Section 4.1(3.) and Subsection 4.1.1)	Section 2.2.1
		☒ Describe the systematic field-based floristic vegetation survey undertaken in accordance with BAM Section 4.2	Section 2.2.3
		☒ Where relevant, describe the use of more appropriate local data, provide reasons that support the use of more appropriate local data and include the written confirmation from the decision-maker that they support the use of more appropriate local data (as described in BAM Subsection 1.4.2 and Appendix A)	Not applicable
		For each PCT within the subject land, describe:	–
		☒ PCT name and ID	Section 4.2.1, Table 4.1
		☒ vegetation class	Section 4.2.1, Table 4.1
		☒ extent (ha) within subject land	Section 4.2.1, Table 4.1
		☒ evidence used to identify a PCT including any analyses undertaken, references/sources, existing vegetation maps (BAM Section 4.2(1–3.))	Section 4.2.2
		☒ plant species relied upon for identification of the PCT and relative abundance of each species	Section 4.2.2

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		☒ if relevant, TEC status including evidence used to determine vegetation is the TEC (BAM Subsection 4.2.2(1–2.))	Section 4.2.2, Section 4.3 and Appendix C
		☒ estimate of per cent cleared value of PCT (BAM Subsection 4.2.1(5.))	Table 4.1
		Describe the vegetation integrity assessment of the subject land, including:	–
		☒ identification and mapping of vegetation zones (as described in BAM Subsection 4.3.1)	Method provided in Section 2.2, Results provided in Table 4.1, Figure 4.2 and Section 4.2.2
		☒ description of vegetation zones within the subject land (as described in Operational Manual Stage 1 Table 2 and Subsection 3.3.2)	Section 4.2.2
		☒ area (ha) of each vegetation zone	Table 4.1
		☒ assessment of patch size (as described in BAM Subsection 4.3.2)	Table 4.1
		☒ survey effort (i.e. number of vegetation integrity survey plots) as described in BAM Subsection 4.3.4(1–2.)	Table 2.1 and Table 4.9
		☒ use of relevant benchmark data from BioNet Vegetation Classification (as described in BAM Subsection 4.3.3(5.))	Section 4.5.3
		Where use of more appropriate local benchmark data is proposed (as described in BAM Subsection 1.4.2, BAM Subsection 4.3.3(5.) and BAM Appendix A):	–
		☐ identify the PCT or vegetation class for which local benchmark data will be applied ☐ identify published sources of local benchmark data (if benchmarks obtained from published sources) ☐ describe methods of local benchmark data collection (if reference plots used to determine local benchmark data)	Not applicable
		☐ provide justification for use of local data rather than BioNet Vegetation Classification benchmark values	Not applicable

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		☐ provide written confirmation from the decision-maker that they support the use of local benchmark data	Not applicable
		Maps and tables	
		☒ Map of native vegetation extent within the subject land at scale not greater than 1:10,000 including identification of all areas of native vegetation including areas that are ground cover only, cleared areas (as described in BAM Section 4.1(1–3.)) and all parts of the subject land that do not contain native vegetation (BAM Subsection 4.1.2)	Figure 4.1
		☒ Map of PCTs within the subject land (as described in BAM Section 4.2(1.))	Figure 4.2
		☒ Map of vegetation zones within the subject land (as described in BAM Subsection 4.3.1)	Figure 4.2
		☒ Map the location of floristic vegetation survey plots and vegetation integrity survey plots relative to PCT boundaries	Figure 2.1
		☒ Map of TEC distribution on the subject land and table of TEC listing, status and area (ha)	Figure 4.3 and Table 4.8
		☒ Map of patch size locations for each native vegetation zone and table of patch size areas (as described in BAM Subsection 4.3.2)	Patch size not mapped and exceeds 100ha for all vegetation condition zones, as listed in Table 4.9
		Table of current vegetation integrity scores for each vegetation zone within the site and including:	–
		☒ composition condition score ☒ structure condition score ☒ function condition score ☒ presence of hollow bearing trees	Table 4.10
		Data	
		☒ All report maps as separate jpeg files	–

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		☒ Plot field data (MS Excel format)	
		☒ Plot field datasheets	<Appendix D>
		Digital shape files of:	–
		☒ PCT boundaries within subject land	–
		☒ TEC boundaries within subject land	–
		☒ vegetation zone boundaries within subject land	–
		☒ floristic vegetation survey and vegetation integrity plot locations	–
Threatened species	Chapter 5	**Information**	
		Identify ecosystem credit species likely to occur on the subject land, including:	–
		☒ list of ecosystem credit species derived from the BAM-C (as described in BAM Subsection 5.1.1 and Section 5.2(1.))	Table 5.1
		☒ justification and supporting evidence for exclusion of any ecosystem credit species based on geographic limitations, habitat constraints or vagrancy (as described in BAM Subsections 5.2.1 and 5.2.2)	Table 5.1
		☒ justification for addition of any ecosystem credit species to the list	Table 5.1 / Justification for inclusion of additional Bionet Atlas species documented in Section 2.4.2
		Identify species credit species likely to occur on the subject land, including:	–
		☒ list of species credit species derived from the BAM-C (as described in BAM Subsection 5.1.1)	Table 5.2 and Table 5.3
		☒ justification and supporting evidence for exclusions based on geographic limitations, habitat constraints or vagrancy (as described in BAM Subsections 5.2.1 and 5.2.2)	Table 5.2 and Table 5.3

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		☒ justification and supporting evidence for exclusions based on degraded habitat constraints and/or microhabitats on which the species depends (as described in BAM Subsection 5.2.2)	Table 5.2 and Table 5.3
		☒ justification for addition of any species credit species to the list	Table 5.2 and Table 5.3 / Justification for inclusion of additional Bionet Atlas species documented in Section 2.4.2
		From the list of candidate species credit species, identify:	–
		☒ species assumed present within the subject land (if relevant) (as described in BAM Subsection 5.2.4(2.a.)) ☒ species present within the subject land on the basis of being identified on an important habitat map for a species (as described in BAM Subsection 5.2.4(2.d.)) ☒ species for which targeted surveys are to be completed to determine species presence (BAM Subsection 5.2.4(2.b.)) ☒ species for which an expert report is to be used to determine species presence (BAM Subsection 5.2.4(2.c.))	Table 5.4 and Table 5.5
		Present the outcomes of species credit species assessments from:	–
		☒ threatened species survey (as described in BAM Section 5.2.4)	Section 5.2.1 (flora) and Section 5.2.2 (fauna)
		☐ expert reports (if relevant) including justification for presence of the species and information used to make this determination (as described in BAM Subsection 5.2.4, Section 5.3, Box 3)	Not applicable
		Where survey has been undertaken include detailed information on:	–
		☒ survey method and effort (as described in BAM Section 5.3)	Section 5.3
		☒ justification of survey method and effort (e.g. citation of peer-reviewed literature) if approach differs from the department's taxa-specific survey guides or where no relevant guideline has been published	Section 2.7, Section 2.3.4 and Section 2.4.4.1

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		☒ timing of survey in relation to requirements in the TBDC or the department's taxa-specific survey guides. Where survey was undertaken outside these guides include justification for the timing of surveys	Table 5.6 and Table 5.7
		☒ survey personnel and relevant experience	Project Team including survey personnel are listed in the preface of the report. CVs can be provided on request.
		☒ describe any limitations to surveys and how these were addressed/overcome	Section 2.7
		Where an expert report has been used in place of survey (as described in BAM Section 5.3, Box 3), include:	–
		☐ justification of the use of an expert report ☐ identify the expert, provide evidence of their expert credentials and departmental approval of expert status ☐ all requirements of Box 3 have been addressed in the expert report	Not applicable
		Where use of local data is proposed (BAM Subsection 1.4.2):	–
		☐ identify relevant species ☐ identify data to be amended ☐ identify source of information for local data, e.g. published literature, additional survey data, etc. ☐ justify use of local data in preference to VIS Classification or TBDC data	Not applicable
		☐ provide written confirmation from the decision-maker that they support the use of local data	Not applicable
		Species polygon completed for species credit species present within the subject land (assumed present or determined on the basis of survey, expert report or important habitat map) ensuring that:	–
		☒ the unit of measure for each species is documented	Section 5.3.2
		for species assessed by area:	–

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		☒ the polygon includes the extent of suitable habitat for the target species within the subject land (as described in BAM Subsection 5.2.5)	Section 5.3.2, Table 5.8 to Table 5.11 and Figure 5.1 to Figure 5.4
		☒ a description of, and evidence-based justification for, the habitat constraints, features or microhabitats used to map the species polygon including reference to information in the TBDC for that species and any buffers applied	Section 5.3.2
		for species assessed by counts of individuals:	–
		☒ the number of individual plants present on the subject land (as described in BAM Subsection 5.2.5(3.))	Section 5.3.2
		☒ the method used to derive this number (i.e. threatened species survey or expert report) and evidence-based justification for the approach taken	Section 5.3.2
		☒ the polygon includes all individuals located on the subject land with a buffer of 30 m around the individuals or groups of individuals on the subject land	Section 5.3.2
		☒ Identify the biodiversity risk weighting for each species credit species identified as present within the subject land (as described in BAM Section 5.4)	Section 5.3.2, Table 5.8 to Table 5.11
		Maps and tables	
		☒ Table showing ecosystem credit species in accordance with BAM Subsection 5.1.1, and identifying:	Table 5.1
		☒ the ecosystem credit species removed from the list	Table 5.1
		☒ the sensitivity to gain class of each species	Table 5.1
		☒ Table detailing species credit species in accordance with BAM Section 5.2 and identifying:	Table 5.2 and Table 5.3
		☒ the species credit species removed from the list of species because the species is considered vagrant, out of geographic range or the habitat or microhabitat features are not present	Table 5.2 and Table 5.3
		☒ the candidate species credit species not recorded on the subject land as determined by targeted survey, expert report or important habitat map	Table 5.4 and Table 5.5

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		☒ Table detailing species credit species recorded or assumed as present within the subject land, habitat constraints or microhabitats associated with the species, counts of individuals (flora)/extent of suitable habitat (flora and fauna) (as described in BAM Subsection 5.2.6) and biodiversity risk weighting (BAM Section 5.4)	Section 5.3.2, Table 5.8 to Table 5.11
		☒ Map indicating the GPS coordinates of all individuals of each species recorded within the subject land and the species polygon for each species (as described in BAM Subsection 5.2.5)	Figure 5.1 to Figure 5.4
		Data	
		☒ Digital shape files of suitable habitat identified for survey for each candidate species credit species	–
		☒ Survey locations including GPS coordinates of any plots, transects, grids	
		☒ Digital shape files of each species polygon including GPS coordinates of located individuals	–
		☒ Species polygon map in jpeg format	–
		☐ Expert reports and any supporting data used to support conclusions of the expert report	Not applicable
		☒ Field datasheets detailing survey information including prevailing conditions, date, time, equipment used, etc.	Field data captured digitally
Prescribed impacts	Chapter 6	**Information**	
		Identify potential prescribed biodiversity impacts on threatened entities, including:	–
		☒ karst, caves, crevices, cliffs, rocks and other geological features of significance (as described in BAM Subsection 6.1.1) ☒ occurrences of human-made structures and non-native vegetation (as described in BAM Subsection 6.1.2) ☒ corridors or other areas of connectivity linking habitat for threatened entities (as described in BAM Subsection 6.1.3) ☒ waterbodies or any hydrological processes that sustain threatened entities (as described in BAM Subsection 6.1.4)	Table 6.1

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		☐ protected animals that may use the proposed wind farm development site as a flyway or migration route (as described in BAM Subsection 6.1.5)	Not applicable
		☒ where the proposed development may result in vehicle strike on threatened fauna or on animals that are part of a threatened ecological community (as described in BAM Subsection 6.1.6)	Table 6.1
		☒ Identify a list of threatened entities that may be dependent upon or may use habitat features associated with any of the prescribed impacts	Table 6.1
		☒ Describe the importance of habitat features to the species including, where relevant, impacts on life cycle or movement patterns (e.g. Subsection 6.1.3)	Table 6.1
		Where the proposed development is for a wind farm:	–
		☐ identify a candidate list of protected animals that may use the development site as a flyway or migration route, including: resident threatened aerial species, resident raptor species and nomadic and migratory species that are likely to fly over the proposal area (as described in BAM Subsection 6.1.5)	Not applicable
		☐ provide details of targeted survey for candidate species of wind farm developments undertaken in accordance with BAM Subsection 6.1.5(2–3.)	Not applicable
		☐ predict the habitual flight paths for nomadic and migratory species likely to fly over the subject land and map the likely habitat for resident threatened aerial and raptor species (BAM Subsection 6.1.5(4.))	Not applicable
		Where the proposal may result in vehicle strike:	–
		☒ identify a list of threatened fauna or protected fauna species that are part of a TEC and at risk of vehicle strike due to the proposal	Table 6.1
		Maps and tables	
		☒ Map showing location of any prescribed impact features (i.e. karst, caves, crevices, cliffs, rocks, human-made structures, etc.)	Figure 6.1
		☒ Map showing location of potential vehicle strike locations	Figure 6.1

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		☐ Maps of habitual flight paths for nomadic and migratory species likely to fly over the site and maps of likely habitat for threatened aerial species resident on the site (for wind farm developments only)	Not applicable
		Data	
		☒ Digital shape files of prescribed impact feature locations	–
		☒ Prescribed impact features map in jpeg format	–
Avoid and minimise impacts	Chapter 7	**Information**	
		Demonstration of efforts to avoid and minimise impacts on biodiversity values (including prescribed impacts) associated with the proposal location in accordance with Chapter 7, including an analysis of alternative:	–
		☒ modes or technologies that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed mode or technology	Section 7.1.2.6
		☒ routes that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed route	Section 7.1.1.6
		☒ alternative locations that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed location	Section 7.1.1.1 to Section 7.1.1.5, Section 7.1.1.8
		☒ alternative sites within a property on which the proposal is located that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed site	Section 7.1.1.7
		☒ Describe efforts to avoid and minimise impacts (including prescribed impacts) to biodiversity values through proposal design (as described in BAM Sections 7.1 and 7.2)	Section 7.1.2.1 and Section 7.1.2.2
		☒ Identification of any other site constraints that the proponent has considered in determining the location and design of the proposal (as described in BAM Subsection 7.2.1(3.))	Section 7.1.2.7
		☒ Detail measures or options considered but not implemented because they are not feasible and/or practical (e.g. due to site constraints)	Section 7.3
		Maps and tables	

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		☒ Table of measures to be implemented to avoid and minimise the impacts of the proposal, including action, outcome, timing and responsibility	Table 7.1
		☒ Map of alternative footprints considered to avoid or minimise impacts on biodiversity values; and of the final proposal footprint, including construction and operation	Figure 7.1
		☒ Maps demonstrating indirect impact zones where applicable	Section 8.2
		Data	
		Digital shape files of:	–
		☒ alternative and final proposal footprint	–
		☒ direct and indirect impact zones	–
		☒ Maps in jpeg format	–
Assessment of impacts	Chapter 8, Sections 8.1 and 8.2	**Information**	
		☒ Determine the impacts on native vegetation and threatened species habitat, including a description of direct impacts of clearing of native vegetation, threatened ecological communities and threatened species habitat (as described in BAM Section 8.1)	Section 8.1
		Assessment of indirect impacts on vegetation and threatened species and their habitat including (as described in BAM Section 8.2):	–
		☒ description of the nature, extent, frequency, duration and timing of indirect impacts of the proposal	Section 8.2, Table 8.3
		☒ documenting the consequences to vegetation and threatened species and their habitat including evidence-based justifications	Section 8.2, Table 8.3
		☒ reporting any limitations or assumptions, etc. made during the assessment	Section 8.2, Table 8.3
		☒ identification of the threatened entities and their habitat likely to be affected	Section 8.2, Table 8.3
		Assessment of prescribed biodiversity impacts (as described in BAM Section 8.3) including:	–

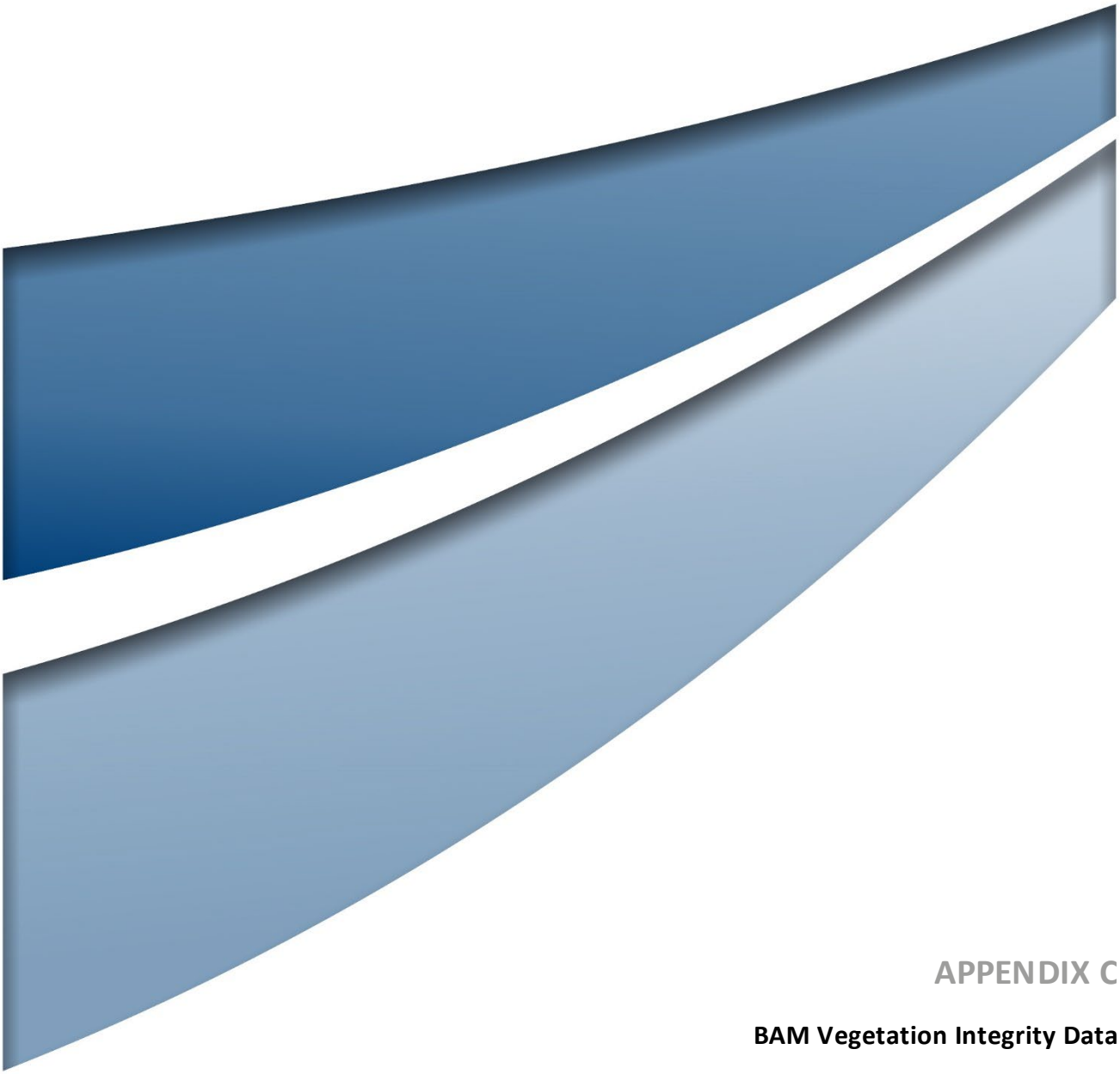
BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		assessment of the nature, extent frequency, duration and timing of impacts on the habitat of threatened species or ecological communities associated with:	–
		☒ karst, caves, crevices, cliffs, rocks and other features of geological significance	Section 8.3.1
		☒ human-made structures	Section 8.3.2
		☒ non-native vegetation	Section 8.3.3
		☒ connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	Section 8.3.5
		☒ movement of threatened species that maintains their life cycle	Section 8.3.5
		☒ water quality, waterbodies and hydrological processes that sustain threatened species and threatened ecological communities	Section 8.3.6
		☐ assessment of the impacts of wind turbine strikes on protected animals	Not applicable
		☒ assessment of the impacts of vehicle strikes on threatened species of animals or on animals that are part of a TEC	Section 8.3.7
		☒ evaluate the consequences of prescribed impacts	Section 8.3
		☒ describe impacts that are uncertain	Section 8.5
		☒ document limitations to data, assumptions and predictions	Section 8.3.8
		Maps and tables	
		☒ Table showing change in vegetation integrity score for each vegetation zone as a result of identified impacts	Table 10.1
		Data	
		N/A	–

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
Mitigation and management of impacts	Chapter 8, Sections 8.4 and 8.5	**Information**	
		Identification of measures to mitigate or manage impacts in accordance with the recommendations in BAM Sections 8.4 and 8.5 including:	–
		☒ techniques, timing, frequency and responsibility ☒ identify measures for which there is risk of failure ☒ evaluate the risk and consequence of any residual impacts	Table 8.3, Table 8.4
		☒ document any adaptive management strategy proposed	Table 8.5
		Identification of measures for mitigating impacts related to:	–
		☒ displacement of resident fauna (as described in BAM Subsection 8.4.1(2.)) ☒ indirect impacts on native vegetation and habitat (as described in BAM Subsection 8.4.1(3.)) ☒ mitigating prescribed biodiversity impacts (as described in BAM Subsection 8.4.2)	Section 8.4
		☒ Details of the adaptive management strategy proposed to monitor and respond to impacts on biodiversity values that are uncertain (BAM Section 8.5)	Table 8.5
		Maps and tables	
		☒ Table of measures to be implemented before, during and after construction to mitigate and manage impacts of the proposal, including action, outcome, timing and responsibility	Table 8.4
		Data	
		N/A	–
Impact summary	Chapter 9	**Information**	
		Identification and assessment of impacts on TECs and threatened species that are at risk of a serious and irreversible impacts (SAII, in accordance with BAM Section 9.1) including:	–
		☒ addressing all criteria in Subsection 9.1.1 for each TEC listed as at risk of an SAII present on the subject land	Section 9.1.1

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		☒ for each TEC, report the extent of the TEC in NSW	Section 9.1.1
		☒ addressing all criteria in Subsection 9.1.2 for each threatened species at risk of an SAII present on the subject land	Section 9.1.2
		☒ for each threatened species, report the population size in NSW	Section 9.1.2
		☒ documenting assumptions made and/or limitations to information ☒ documenting all sources of data, information, references used or consulted ☒ clearly justifying why any criteria could not be addressed	Section 9
		☒ Identification of impacts requiring offset in accordance with BAM Section 9.2	Section 10.1 and Table 10.1, Section 10.2 and Table 10.2
		☒ Identification of impacts not requiring offset in accordance with BAM Subsection 9.2.1(3.)	Section 10.1.1 – Not applicable
		☒ Identification of areas not requiring assessment in accordance with BAM Section 9.3	Section 10.2
		Maps and tables	
		☒ Map showing the extent of TECs at risk of an SAII within the subject land	Figure 9.1
		☒ Map showing location of threatened species at risk of an SAII within the subject land	Figure 9.1
		Map showing location of:	–
		☒ impacts requiring offset	Figure 8.1
		☒ impacts not requiring offset	Table 10.1
		☒ areas not requiring assessment	Section 10.2
		Data	
		Digital shape files of:	–
		☒ extent of TECs at risk of an SAII within the subject land	-

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
		☒ location of threatened species at risk of an SAII within the subject land	-
		☒ boundary of impacts requiring offset	–
		☒ boundary of impacts not requiring offset	-
		☒ boundary of areas not requiring assessment	-
		☒ Maps in jpeg format	–
Impact summary	Chapter 10	**Information**	
		Ecosystem credits and species credits that measure the impact of the development on biodiversity values, including:	–
		☒ future vegetation integrity score for each vegetation zone within the subject land (Equation 25 and Equation 26 in BAM Appendix H) ☒ change in vegetation integrity score (BAM Subsection 8.1.1) ☒ number of required ecosystem credits for the direct impacts of the proposal on each vegetation zone within the subject land (BAM Subsection 10.1.2)	Table 10.1
		☒ biodiversity risk weighting for each	Table 10.1 and Table 10.2
		☒ number of required species credits for each candidate threatened species that is directly impacted on by the proposal (BAM Subsection 10.1.3)	Table 10.2
		Maps and tables	
		☒ Table of PCTs requiring offset and the number of ecosystem credits required	Table 10.1
		☒ Table of threatened species requiring offset and the number of species credits required	Table 10.2
		Data	
		☒ Submitted proposal in the BAM Calculator	–

BDAR Section	BAM Ref.	BAM Requirement	Reference(s) in the BDAR
Biodiversity credit report	Chapter 10	**Information**	
		☒ Description of credit classes for ecosystem credits and species credits at the development or clearing site or land to be biodiversity certified (BAM Section 10.2)	Table 11.1, Table 11.2
		☒ BAM credit report in pdf format	Appendix D
		Maps and tables	
		☒ Table of credit class and matching credit profile	Table 11.1
		Data	
		☒ BAM credit report in pdf format	Appendix D



APPENDIX C

BAM Vegetation Integrity Data

1. Appendix C – BAM Plot Data

1.1 FLORA SPECIES LIST

BAM Growth Form Group	Family	Scientific Name	Common Name
Tree (TG)	Casuarinaceae	*Allocasuarina luehmannii*	Bulloak
Tree (TG)	Fabaceae (Mimosoideae)	*Acacia salicina*	Cooba
Tree (TG)	Malvaceae	*Brachychiton populneus*	Kurrajong
Tree (TG)	Myrtaceae	*Eucalyptus albens*	White Box
Tree (TG)	Myrtaceae	*Eucalyptus albens <--> moluccana*	
Tree (TG)	Myrtaceae	*Eucalyptus crebra*	Narrow-leaved Ironbark
Tree (TG)	Oleaceae	*Notelaea microcarpa*	Native Olive
Shrub (SG)	Asteraceae	*Cassinia sifton*	
Shrub (SG)	Chenopodiaceae	*Atriplex semibaccata*	Creeping Saltbush
Shrub (SG)	Chenopodiaceae	*Atriplex sp.*	
Shrub (SG)	Chenopodiaceae	*Maireana microphylla*	Small-leaf Bluebush
Shrub (SG)	Chenopodiaceae	*Salsola tragus*	Buckbush,Soft Rolpoly, Saltwort
Shrub (SG)	Ericaceae	*Lissanthe strigosa*	Peach Heath
Shrub (SG)	Fabaceae (Caesalpinioideae)	*Senna artemisioides subsp. zygophylla*	
Shrub (SG)	Fabaceae (Faboideae)	*Bossiaea buxifolia*	
Shrub (SG)	Fabaceae (Faboideae)	*Daviesia genistifolia*	Broom Bitter Pea
Shrub (SG)	Fabaceae (Faboideae)	*Indigofera adesmiifolia*	Tick Indigo
Shrub (SG)	Fabaceae (Faboideae)	*Indigofera australis*	Australian Indigo
Shrub (SG)	Fabaceae (Mimosoideae)	*Acacia paradoxa*	Kangaroo Thorn
Shrub (SG)	Fabaceae (Mimosoideae)	*Acacia parvipinnula*	Silver-stemmed Wattle
Shrub (SG)	Malvaceae	*Abutilon oxycarpum*	Straggly Lantern-bush
Shrub (SG)	Malvaceae	*Commersonia fraseri*	Brush Kurrajong
Shrub (SG)	Sapindaceae	*Dodonaea viscosa subsp. cuneata*	Wedge-leaf Hop-bush
Shrub (SG)	Scrophulariaceae	*Eremophila debilis*	Amulla
Shrub (SG)	Solanaceae	*Solanum brownii*	Violet Nightshade
Shrub (SG)	Solanaceae	*Solanum cinereum*	Narrawa Burr

BAM Growth Form Group	Family	Scientific Name	Common Name
Shrub (SG)	Thymelaeaceae	*Pimelea curviflora*	Rice Flower
Shrub (SG)	Thymelaeaceae	*Pimelea linifolia*	Slender Rice Flower
Grass & grasslike (GG)	Cyperaceae	*Carex appressa*	Tall Sedge
Grass & grasslike (GG)	Cyperaceae	*Carex inversa*	Knob Sedge
Grass & grasslike (GG)	Cyperaceae	*Cyperus gracilis*	Slender Flat-sedge
Grass & grasslike (GG)	Cyperaceae	*Cyperus laevis*	
Grass & grasslike (GG)	Cyperaceae	*Cyperus sp.*	
Grass & grasslike (GG)	Cyperaceae	*Fimbristylis dichotoma*	Common Fringe-sedge
Grass & grasslike (GG)	Cyperaceae	*Fimbristylis sp.*	
Grass & grasslike (GG)	Cyperaceae	*Gahnia aspera*	Rough Saw-sedge
Grass & grasslike (GG)	Juncaceae	*Juncus sp.*	
Grass & grasslike (GG)	Juncaceae	*Juncus usitatus*	
Grass & grasslike (GG)	Lomandraceae	*Lomandra filiformis*	Wattle Matt-rush
Grass & grasslike (GG)	Lomandraceae	*Lomandra filiformis subsp. coriacea*	Wattle Matt-rush
Grass & grasslike (GG)	Lomandraceae	*Lomandra multiflora subsp. multiflora*	Many-flowered Mat-rush
Grass & grasslike (GG)	Lomandraceae	*Lomandra sp.*	Mat-rush
Grass & grasslike (GG)	Poaceae	*Anthosachne scabra*	Wheatgrass, Common Wheatgrass
Grass & grasslike (GG)	Poaceae	*Aristida ramosa*	Purple Wiregrass
Grass & grasslike (GG)	Poaceae	*Aristida sp.*	
Grass & grasslike (GG)	Poaceae	*Aristida vagans*	Threeawn Speargrass
Grass & grasslike (GG)	Poaceae	*Austrostipa bigeniculata*	Yanganbil
Grass & grasslike (GG)	Poaceae	*Austrostipa scabra*	Speargrass
Grass & grasslike (GG)	Poaceae	*Austrostipa sp.*	
Grass & grasslike (GG)	Poaceae	*Austrostipa verticillata*	Slender Bamboo Grass
Grass & grasslike (GG)	Poaceae	*Bothriochloa decipiens var. decipiens*	Pitted Bluegrass
Grass & grasslike (GG)	Poaceae	*Bothriochloa macra*	Red Grass
Grass & grasslike (GG)	Poaceae	*Bothriochloa sp.*	Redgrass, Bluegrass
Grass & grasslike (GG)	Poaceae	*Bromus sp.*	
Grass & grasslike (GG)	Poaceae	*Chloris truncata*	Windmill Grass
Grass & grasslike (GG)	Poaceae	*Chloris ventricosa*	Tall Chloris
Grass & grasslike (GG)	Poaceae	*Cymbopogon refractus*	Barbed Wire Grass
Grass & grasslike (GG)	Poaceae	*Cynodon dactylon*	Common Couch
Grass & grasslike (GG)	Poaceae	*Dactyloctenium radulans*	Button Grass

BAM Growth Form Group	Family	Scientific Name	Common Name
Grass & grasslike (GG)	Poaceae	*Dichanthium sericeum*	Queensland Bluegrass
Grass & grasslike (GG)	Poaceae	*Dichelachne micrantha*	Shorthair Plumegrass
Grass & grasslike (GG)	Poaceae	*Dichelachne sp.*	
Grass & grasslike (GG)	Poaceae	*Digitaria brownii*	Cotton Panic Grass
Grass & grasslike (GG)	Poaceae	*Digitaria diffusa*	Open Summer-grass
Grass & grasslike (GG)	Poaceae	*Digitaria divaricatissima*	Umbrella Grass
Grass & grasslike (GG)	Poaceae	*Digitaria parviflora*	Small-flowered Finger Grass
Grass & grasslike (GG)	Poaceae	*Digitaria ramularis*	Finger Panic Grass
Grass & grasslike (GG)	Poaceae	*Digitaria sp.*	
Grass & grasslike (GG)	Poaceae	*Echinochloa colona*	Awnless Barnyard Grass
Grass & grasslike (GG)	Poaceae	*Echinopogon caespitosus*	Bushy Hedgehog-grass
Grass & grasslike (GG)	Poaceae	*Elymus sp.*	
Grass & grasslike (GG)	Poaceae	*Enneapogon gracilis*	Slender Nineawn
Grass & grasslike (GG)	Poaceae	*Enneapogon nigricans*	Nine-awn Grass
Grass & grasslike (GG)	Poaceae	*Entolasia marginata*	Bordered Panic
Grass & grasslike (GG)	Poaceae	*Entolasia stricta*	Wiry Panic
Grass & grasslike (GG)	Poaceae	*Eragrostis brownii*	Brown's Lovegrass
Grass & grasslike (GG)	Poaceae	*Eragrostis elongata*	Clustered Lovegrass
Grass & grasslike (GG)	Poaceae	*Eragrostis leptostachya*	Paddock Lovegrass
Grass & grasslike (GG)	Poaceae	*Eragrostis parviflora*	Weeping Lovegrass
Grass & grasslike (GG)	Poaceae	*Eragrostis sp.*	
Grass & grasslike (GG)	Poaceae	*Eragrostis trachycarpa*	
Grass & grasslike (GG)	Poaceae	*Eriochloa australiensis*	Australian Cupgrass
Grass & grasslike (GG)	Poaceae	*Eriochloa pseudoacrotricha*	Early Spring Grass
Grass & grasslike (GG)	Poaceae	*Eriochloa sp.*	
Grass & grasslike (GG)	Poaceae	*Eulalia aurea*	Silky Browntop
Grass & grasslike (GG)	Poaceae	*Microlaena stipoides*	Weeping Grass
Grass & grasslike (GG)	Poaceae	*Microlaena stipoides var. breviseta*	
Grass & grasslike (GG)	Poaceae	*Microlaena stipoides var. stipoides*	Weeping Grass
Grass & grasslike (GG)	Poaceae	*Panicum effusum*	Hairy Panic
Grass & grasslike (GG)	Poaceae	*Panicum simile*	Two-colour Panic
Grass & grasslike (GG)	Poaceae	*Paspalidium distans*	
Grass & grasslike (GG)	Poaceae	*Paspalidium sp.*	
Grass & grasslike (GG)	Poaceae	*Poa labillardierei var. labillardierei*	Tussock

BAM Growth Form Group	Family	Scientific Name	Common Name
Grass & grasslike (GG)	Poaceae	*Poa sieberiana*	Snowgrass
Grass & grasslike (GG)	Poaceae	*Poa sp.*	
Grass & grasslike (GG)	Poaceae	*Rytidosperma racemosum*	Wallaby Grass
Grass & grasslike (GG)	Poaceae	*Rytidosperma sp.*	
Grass & grasslike (GG)	Poaceae	*Rytidosperma tenuius*	
Grass & grasslike (GG)	Poaceae	*Setaria sp.*	
Grass & grasslike (GG)	Poaceae	*Sporobolus creber*	Slender Rat's Tail Grass
Grass & grasslike (GG)	Poaceae	*Sporobolus sp.*	Rat's Tail Couch
Grass & grasslike (GG)	Poaceae	*Themeda triandra*	
Grass & grasslike (GG)	Poaceae	*Tragus australianus*	Small Burrgrass
Grass & grasslike (GG)	Poaceae	*Urochloa piligera*	Hairy Armgrass
Grass & grasslike (GG)	Poaceae	*Urochloa sp.*	
Forb (FG)	Acanthaceae	*Brunoniella pumilio*	Dwarf Blue Trumpet
Forb (FG)	Acanthaceae	*Rostellularia adscendens*	Pink Tongues
Forb (FG)	Amaranthaceae	*Alternanthera sp.*	Joyweed
Forb (FG)	Anthericaceae	*Caesia parviflora*	Pale Grass-lily
Forb (FG)	Anthericaceae	*Laxmannia gracilis*	Slender Wire Lily
Forb (FG)	Apiaceae	*Daucus glochidiatus*	Native Carrot
Forb (FG)	Apiaceae	*Xanthosia pilosa*	Woolly Xanthosia
Forb (FG)	Asparagaceae	*Arthropodium milleflorum*	Pale Vanilla-lily
Forb (FG)	Asparagaceae	*Arthropodium sp.*	
Forb (FG)	Asparagaceae	*Dichopogon fimbriatus*	
Forb (FG)	Asparagaceae	*Dichopogon sp.*	
Forb (FG)	Asphodelaceae	*Dianella sp.*	
Forb (FG)	Asteraceae	*Argyrotegium poliochlorum*	
Forb (FG)	Asteraceae	*Calotis anthemoides*	Cut-leaved Burr-daisy
Forb (FG)	Asteraceae	*Calotis cuneifolia*	Purple Burr-Daisy
Forb (FG)	Asteraceae	*Calotis lappulacea*	Yellow Burr-daisy
Forb (FG)	Asteraceae	*Calotis sp.*	
Forb (FG)	Asteraceae	*Chrysocephalum apiculatum*	Common Everlasting
Forb (FG)	Asteraceae	*Cotula australis*	Common Cotula
Forb (FG)	Asteraceae	*Cymbonotus sp.*	
Forb (FG)	Asteraceae	*Euchiton involucratus*	Star Cudweed
Forb (FG)	Asteraceae	*Euchiton sp.*	
Forb (FG)	Asteraceae	*Euchiton sphaericus*	Star Cudweed

BAM Growth Form Group	Family	Scientific Name	Common Name
Forb (FG)	Asteraceae	*Senecio pinnatifolius*	
Forb (FG)	Asteraceae	*Senecio sp.*	Groundsel, Fireweed
Forb (FG)	Asteraceae	*Sigesbeckia australiensis*	
Forb (FG)	Asteraceae	*Sigesbeckia orientalis subsp. orientalis*	Indian Weed
Forb (FG)	Asteraceae	*Solenogyne sp.*	
Forb (FG)	Asteraceae	*Sonchus sp.*	Sowthistle
Forb (FG)	Asteraceae	*Triptilodiscus pygmaeus*	Common Sunray
Forb (FG)	Asteraceae	*Vittadinia cuneata*	
Forb (FG)	Asteraceae	*Vittadinia muelleri*	
Forb (FG)	Asteraceae	*Vittadinia sp.*	Fuzzweed
Forb (FG)	Asteraceae	*Xerochrysum sp.*	
Forb (FG)	Campanulaceae	*Wahlenbergia communis*	Tufted Bluebell
Forb (FG)	Campanulaceae	*Wahlenbergia gracilis*	Sprawling Bluebell
Forb (FG)	Campanulaceae	*Wahlenbergia luteola*	Bluebell
Forb (FG)	Campanulaceae	*Wahlenbergia sp.*	Bluebell
Forb (FG)	Campanulaceae	*Wahlenbergia stricta*	Tall Bluebell
Forb (FG)	Chenopodiaceae	*Atriplex spinibractea*	Spiny-fruit Saltbush
Forb (FG)	Chenopodiaceae	*Dysphania pumilio*	Small Crumbweed
Forb (FG)	Chenopodiaceae	*Dysphania sp.*	
Forb (FG)	Chenopodiaceae	*Einadia hastata*	Berry Saltbush
Forb (FG)	Chenopodiaceae	*Einadia nutans*	Climbing Saltbush
Forb (FG)	Chenopodiaceae	*Einadia polygonoides*	Knotweed Goosefoot
Forb (FG)	Chenopodiaceae	*Einadia sp.*	
Forb (FG)	Clusiaceae	*Hypericum gramineum*	Small St John's Wort
Forb (FG)	Clusiaceae	*Hypericum japonicum*	
Forb (FG)	Commelinaceae	*Commelina cyanea*	Native Wandering Jew
Forb (FG)	Convolvulaceae	*Dichondra repens*	Kidney Weed
Forb (FG)	Convolvulaceae	*Evolvulus alsinoides*	Bindweed
Forb (FG)	Crassulaceae	*Crassula sieberiana*	Australian Stonecrop
Forb (FG)	Euphorbiaceae	*Chamaesyce drummondii*	Caustic Weed
Forb (FG)	Fabaceae (Faboideae)	*Bossiaea prostrata*	
Forb (FG)	Fabaceae (Faboideae)	*Hovea linearis*	

BAM Growth Form Group	Family	Scientific Name	Common Name
Forb (FG)	Fabaceae (Faboideae)	*Zornia dyctiocarpa var. dyctiocarpa*	Zornia
Forb (FG)	Geraniaceae	*Erodium crinitum*	Blue Crowfoot
Forb (FG)	Geraniaceae	*Geranium homeanum*	
Forb (FG)	Geraniaceae	*Geranium solanderi*	Native Geranium
Forb (FG)	Geraniaceae	*Geranium sp.*	
Forb (FG)	Goodeniaceae	*Goodenia pinnatifida*	Scrambles Eggs
Forb (FG)	Haloragaceae	*Haloragis heterophylla*	Variable Raspwort
Forb (FG)	Lamiaceae	*Mentha satureioides*	Native Pennyroyal
Forb (FG)	Linaceae	*Linum marginale*	Native Flax
Forb (FG)	Malvaceae	*Sida cordifolia*	
Forb (FG)	Malvaceae	*Sida corrugata*	Corrugated Sida
Forb (FG)	Malvaceae	*Sida cunninghamii*	Ridge Sida
Forb (FG)	Malvaceae	*Sida sp.*	
Forb (FG)	Nyctaginaceae	*Boerhavia dominii*	Tarvine
Forb (FG)	Onagraceae	*Epilobium billardierianum*	
Forb (FG)	Onagraceae	*Epilobium sp.*	
Forb (FG)	Oxalidaceae	*Oxalis perennans*	
Forb (FG)	Oxalidaceae	*Oxalis sp.*	
Forb (FG)	Phyllanthaceae	*Phyllanthus virgatus*	Wiry Spurge
Forb (FG)	Plantaginaceae	*Plantago debilis*	Shade Plantain
Forb (FG)	Plantaginaceae	*Plantago gaudichaudii*	Narrow Plantain
Forb (FG)	Plantaginaceae	*Plantago sp.*	Plantain
Forb (FG)	Plantaginaceae	*Plantago varia*	
Forb (FG)	Plantaginaceae	*Veronica plebeia*	Trailing Speedwell
Forb (FG)	Plantaginaceae	*Veronica sp.*	
Forb (FG)	Polygonaceae	*Rumex brownii*	Swamp Dock
Forb (FG)	Polygonaceae	*Rumex sp.*	Dock
Forb (FG)	Portulacaceae	*Portulaca oleracea*	Pigweed
Forb (FG)	Portulacaceae	*Portulaca sp.*	
Forb (FG)	Rubiaceae	*Asperula conferta*	Common Woodruff
Forb (FG)	Rubiaceae	*Galium sp.*	
Forb (FG)	Rubiaceae	*Pomax umbellata*	Pomax
Forb (FG)	Solanaceae	*Solanum prinophyllum*	Forest Nightshade
Forb (FG)	Solanaceae	*Solanum sp.*	

BAM Growth Form Group	Family	Scientific Name	Common Name
Forb (FG)	Verbenaceae	*Verbena sp.*	
Fern (EG)	Ophioglossaceae	*Ophioglossum sp.*	
Fern (EG)	Pteridaceae	*Cheilanthes distans*	Bristly Cloak Fern
Fern (EG)	Pteridaceae	*Cheilanthes sieberi*	Rock Fern
Fern (EG)	Pteridaceae	*Cheilanthes sp.*	Cloak Fern, Mulga Fern, Rock Fern
Other (OG)	Apocynaceae	*Marsdenia viridiflora*	Native Pear
Other (OG)	Apocynaceae	*Marsdenia viridiflora subsp. viridiflora*	Native Pear
Other (OG)	Convolvulaceae	*Convolvulus angustissimus*	
Other (OG)	Dilleniaceae	*Hibbertia scandens*	Climbing Guinea Flower
Other (OG)	Fabaceae (Faboideae)	*Desmodium sp.*	Tick-trefoil
Other (OG)	Fabaceae (Faboideae)	*Glycine clandestina*	Twining glycine
Other (OG)	Fabaceae (Faboideae)	*Glycine clandestina (broad leaf form)*	Scott's Head Broad-Leaved Glycine
Other (OG)	Fabaceae (Faboideae)	*Glycine tabacina*	Variable Glycine
Other (OG)	Fabaceae (Faboideae)	*Grona sp.*	
Other (OG)	Fabaceae (Faboideae)	*Grona varians*	
Other (OG)	Fabaceae (Faboideae)	*Hardenbergia violacea*	False Sarsaparilla
Other (OG)	Fabaceae (Faboideae)	*Oxytes brachypoda*	Large Tick-trefoil
Other (OG)	Loranthaceae	*Amyema sp.*	Mistletoe
Exotic (HTE)	Amaranthaceae	*Alternanthera pungens*	Khaki Weed
Exotic (HTE)	Asteraceae	*Bidens pilosa*	Cobbler's Pegs
Exotic (HTE)	Asteraceae	*Bidens subalternans*	Greater Beggar's Ticks
Exotic (HTE)	Asteraceae	*Carthamus lanatus*	Saffron Thistle
Exotic (HTE)	Asteraceae	*Senecio madagascariensis*	Fireweed
Exotic (HTE)	Asteraceae	*Xanthium spinosum*	Bathurst Burr
Exotic (HTE)	Clusiaceae	*Hypericum perforatum*	St. Johns Wort
Exotic (HTE)	Cyperaceae	*Cyperus eragrostis*	Umbrella Sedge
Exotic (HTE)	Iridaceae	*Romulea rosea var. australis*	Onion Grass
Exotic (HTE)	Poaceae	*Cenchrus clandestinus*	Kikuyu Grass

BAM Growth Form Group	Family	Scientific Name	Common Name
Exotic (HTE)	Poaceae	*Chloris gayana*	Rhodes Grass
Exotic (HTE)	Poaceae	*Paspalum dilatatum*	Paspalum
Exotic (HTE)	Polygonaceae	*Acetosella vulgaris*	Sheep Sorrel
Exotic (non HTE)	Amaranthaceae	*Amaranthus powellii*	Powell's Amaranth
Exotic (non HTE)	Amaranthaceae	*Gomphrena celosioides*	Gomphrena Weed
Exotic (non HTE)	Apiaceae	*Cyclospermum leptophyllum*	Slender Celery
Exotic (non HTE)	Apocynaceae	*Gomphocarpus fruticosus*	Narrow-leaved Cotton Bush
Exotic (non HTE)	Asteraceae	*Arctotheca calendula*	Capeweed
Exotic (non HTE)	Asteraceae	*Aster sp.*	
Exotic (non HTE)	Asteraceae	*Carduus pycnocephalus*	Slender Thistle
Exotic (non HTE)	Asteraceae	*Carduus tenuiflorus*	Winged Slender Thistle
Exotic (non HTE)	Asteraceae	*Carthamus dentatus*	Toothed Thistle
Exotic (non HTE)	Asteraceae	*Chondrilla juncea*	Skeleton Weed
Exotic (non HTE)	Asteraceae	*Cirsium vulgare*	Spear Thistle
Exotic (non HTE)	Asteraceae	*Conyza bonariensis*	Flaxleaf Fleabane
Exotic (non HTE)	Asteraceae	*Conyza sp.*	
Exotic (non HTE)	Asteraceae	*Crepis capillaris*	Smooth Hawksbeard
Exotic (non HTE)	Asteraceae	*Gamochaeta calviceps*	Cudweed
Exotic (non HTE)	Asteraceae	*Gamochaeta purpurea*	Purple Cudweed
Exotic (non HTE)	Asteraceae	*Gamochaeta sp.*	
Exotic (non HTE)	Asteraceae	*Hypochaeris radicata*	Catsear
Exotic (non HTE)	Asteraceae	*Hypochaeris sp.*	
Exotic (non HTE)	Asteraceae	*Lactuca saligna*	Willow-leaved Lettuce
Exotic (non HTE)	Asteraceae	*Lactuca serriola*	Prickly Lettuce
Exotic (non HTE)	Asteraceae	*Schkuhria pinnata*	Dwarf Marigold
Exotic (non HTE)	Asteraceae	*Schkuhria pinnata var. abrotanoides*	Dwarf Marigold
Exotic (non HTE)	Asteraceae	*Senecio vulgaris*	
Exotic (non HTE)	Asteraceae	*Silybum marianum*	Variegated Thistle
Exotic (non HTE)	Asteraceae	*Sonchus oleraceus*	Common Sowthistle
Exotic (non HTE)	Asteraceae	*Tagetes minuta*	Stinking Roger
Exotic (non HTE)	Asteraceae	*Taraxacum officinale*	Dandelion
Exotic (non HTE)	Boraginaceae	*Echium plantagineum*	Patterson's Curse
Exotic (non HTE)	Brassicaceae	*Capsella bursa-pastoris*	Shepherd's Purse

BAM Growth Form Group	Family	Scientific Name	Common Name
Exotic (non HTE)	Brassicaceae	*Lepidium africanum*	Common Peppercress
Exotic (non HTE)	Cactaceae	*Opuntia stricta*	Common Prickly Pear
Exotic (non HTE)	Caryophyllaceae	*Paronychia brasiliana*	Chilean Whitlow Wort, Brazilian Whitlow
Exotic (non HTE)	Caryophyllaceae	*Petrorhagia dubia*	
Exotic (non HTE)	Caryophyllaceae	*Petrorhagia nanteuilii*	Proliferous Pink
Exotic (non HTE)	Caryophyllaceae	*Petrorhagia sp.*	
Exotic (non HTE)	Caryophyllaceae	*Polycarpon tetraphyllum*	Four-leaved Allseed
Exotic (non HTE)	Caryophyllaceae	*Stellaria media*	Common Chickweed
Exotic (non HTE)	Chenopodiaceae	*Chenopodium album*	Fat Hen
Exotic (non HTE)	Cyperaceae	*Cyperus aggregatus*	
Exotic (non HTE)	Fabaceae (Faboideae)	*Medicago laciniata*	Cut-leaved Medic
Exotic (non HTE)	Fabaceae (Faboideae)	*Medicago minima*	Woolly Burr Medic
Exotic (non HTE)	Fabaceae (Faboideae)	*Medicago polymorpha*	Burr Medic
Exotic (non HTE)	Fabaceae (Faboideae)	*Medicago sp.*	
Exotic (non HTE)	Fabaceae (Faboideae)	*Medicago truncatula*	Barrel Medic
Exotic (non HTE)	Fabaceae (Faboideae)	*Trifolium arvense*	Haresfoot Clover
Exotic (non HTE)	Fabaceae (Faboideae)	*Trifolium campestre*	Hop Clover
Exotic (non HTE)	Fabaceae (Faboideae)	*Trifolium sp.*	
Exotic (non HTE)	Fabaceae (Faboideae)	*Trifolium subterraneum*	Subterranean Clover
Exotic (non HTE)	Gentianaceae	*Centaurium erythraea*	Common Centaury
Exotic (non HTE)	Geraniaceae	*Geranium molle subsp. molle*	Cranesbill Geranium
Exotic (non HTE)	Lamiaceae	*Marrubium vulgare*	White Horehound
Exotic (non HTE)	Lamiaceae	*Salvia reflexa*	Mintweed
Exotic (non HTE)	Lamiaceae	*Salvia verbenaca*	Vervain
Exotic (non HTE)	Malvaceae	*Malva neglecta*	Dwarf Mallow
Exotic (non HTE)	Malvaceae	*Malva parviflora*	Small-flowered Mallow
Exotic (non HTE)	Malvaceae	*Modiola caroliniana*	Red-flowered Mallow
Exotic (non HTE)	Malvaceae	*Sida rhombifolia*	Paddy's Lucerne

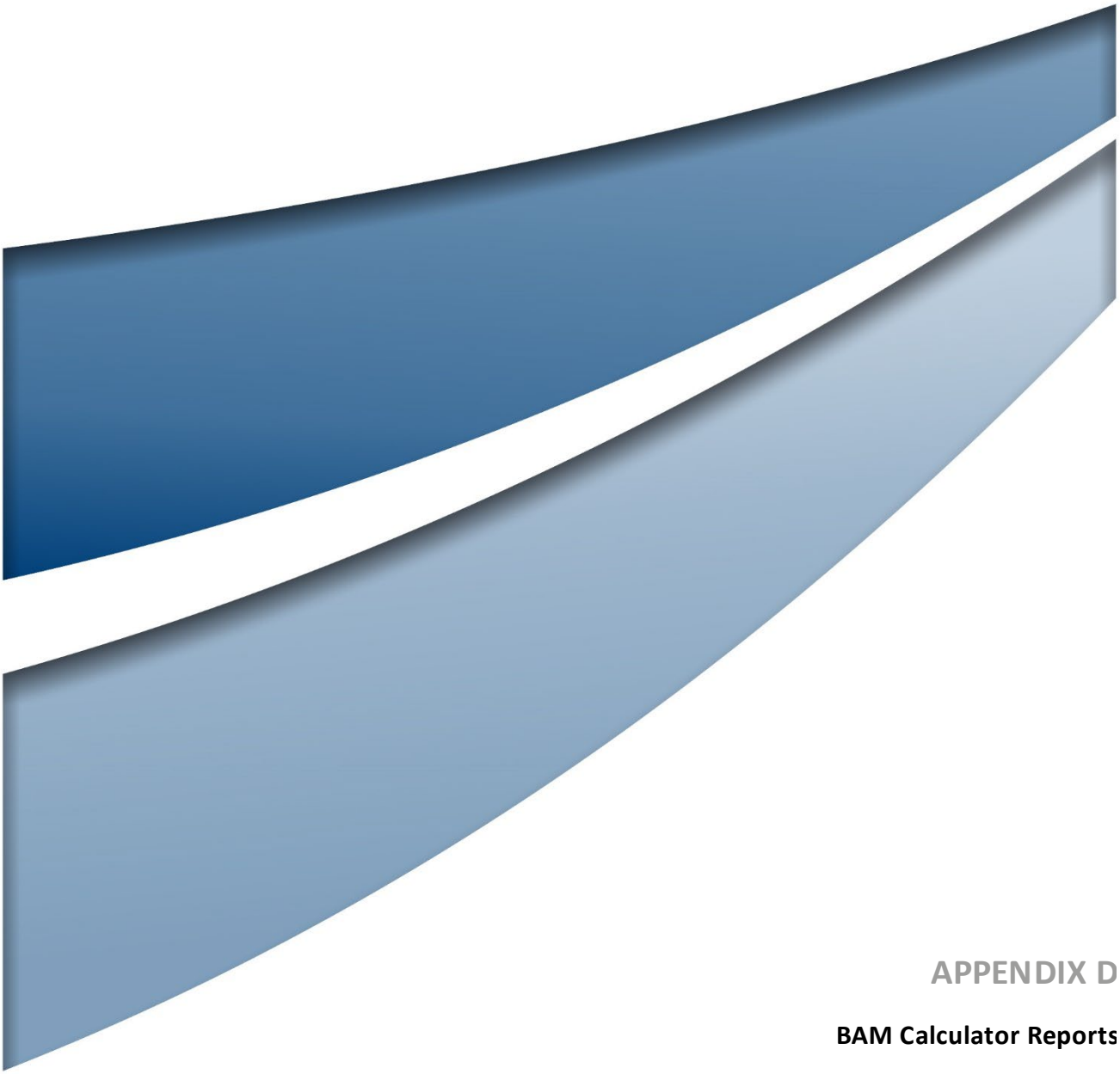
BAM Growth Form Group	Family	Scientific Name	Common Name
Exotic (non HTE)	Oxalidaceae	*Oxalis corniculata*	Creeping Oxalis
Exotic (non HTE)	Plantaginaceae	*Plantago lanceolata*	Lamb's Tongues
Exotic (non HTE)	Poaceae	*Aira sp.*	
Exotic (non HTE)	Poaceae	*Anthoxanthum odoratum*	Sweet Vernal Grass
Exotic (non HTE)	Poaceae	*Avena sativa*	Oats
Exotic (non HTE)	Poaceae	*Avena sp.*	Oats
Exotic (non HTE)	Poaceae	*Bromus catharticus*	Praire Grass
Exotic (non HTE)	Poaceae	*Bromus hordeaceus*	Soft Brome
Exotic (non HTE)	Poaceae	*Chloris virgata*	Feathertop Rhodes Grass
Exotic (non HTE)	Poaceae	*Digitaria sanguinalis*	Crab Grass
Exotic (non HTE)	Poaceae	*Echinochloa crus-galli*	Barnyard Grass
Exotic (non HTE)	Poaceae	*Eleusine indica*	Crowsfoot Grass
Exotic (non HTE)	Poaceae	*Eleusine tristachya*	Goose Grass
Exotic (non HTE)	Poaceae	*Eragrostis cilianensis*	Stinkgrass
Exotic (non HTE)	Poaceae	*Holcus lanatus*	Yorkshire Fog
Exotic (non HTE)	Poaceae	*Hordeum hystrix*	Mediterranean Barley Grass
Exotic (non HTE)	Poaceae	*Hordeum leporinum*	Barley Grass
Exotic (non HTE)	Poaceae	*Lolium perenne*	Perennial Ryegrass
Exotic (non HTE)	Poaceae	*Setaria parviflora*	
Exotic (non HTE)	Poaceae	*Urochloa panicoides*	Urochloa Grass
Exotic (non HTE)	Poaceae	*Vulpia bromoides*	Squirrel Tail Fesque
Exotic (non HTE)	Polygonaceae	*Polygonum arenastrum*	Wireweed
Exotic (non HTE)	Polygonaceae	*Polygonum aviculare*	Wireweed
Exotic (non HTE)	Polygonaceae	*Rumex crispus*	Curled Dock
Exotic (non HTE)	Primulaceae	*Lysimachia arvensis*	Scarlet Pimpernel
Exotic (non HTE)	Rubiaceae	*Richardia stellaris*	
Exotic (non HTE)	Scrophulariaceae	*Verbascum sp.*	
Exotic (non HTE)	Scrophulariaceae	*Verbascum virgatum*	Twiggy Mullein
Exotic (non HTE)	Solanaceae	*Datura ferox*	Fierce Thornapple
Exotic (non HTE)	Solanaceae	*Solanum chenopodioides*	Whitetip Nightshade
Exotic (non HTE)	Solanaceae	*Solanum nigrum*	Black-berry Nightshade
Exotic (non HTE)	Urticaceae	*Urtica urens*	Small Nettle
Exotic (non HTE)	Verbenaceae	*Verbena bonariensis*	Purpletop
Exotic (non HTE)	Verbenaceae	*Verbena quadrangularis*	

1.2 Vegetation Integrity Plot Data

Plot	PCT	Patch Size	Condition Class	Zone	Easting	Northing	Bearing	Composition (Species Richness)						Structure (Percentage Cover)						Function									
								Tree	Shrub	Grass	Forbs	Ferns	Other	Tree	Shrub	Grass	Forbs	Ferns	Other	Large Trees	Hollow Trees	Litter Cover (%)	Length Fallen Logs (m)	Tree Stems (cm)					Tree Regen	High Threat Exotics
																								5 to 9	10 to 19	20 to 29	30 to 49	50 to 79		
P2	1661	100	1_Scattered	56	228426.5	6426009	185	4	3	9	11	1	5	3.9	0.5	81.8	5.5	0.1	2.3	4	0	3	43.5	0	1	1	1	1	1	1.1
P23	1661	100	1_Scattered	56	228383.5	6425874	188	1	2	11	12	1	1	45	1.1	18.5	7.9	0.1	0.3	3	1	73	1	0	0	0	0	1	0	0.6
P26	1661	100	1_Scattered	56	227892.2	6426407	262	3	6	21	17	1	3	8.1	1.2	65.5	2.1	0.1	0.3	1	1	48.4	73	0	1	1	1	1	1	0.6
P43	1661	100	1_Scattered	56	225287.1	6424393	37	2	7	22	16	1	3	15.3	5	85.5	27.6	0.1	0.5	2	1	38	7	0	0	0	1	1	1	0.3
P1	1661	100	2_Mod_Low_DNG	56	228642	6427140	278	0	1	13	8	1	1	0	0.1	94.7	3.7	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0.8
P4	1661	100	2_Mod_Low_DNG	56	228450.9	6425834	164	0	0	22	14	1	1	0	0	82.8	2	0.1	0.1	0	0	6.2	0	0	0	0	0	0	0	0.9
P5	1661	100	2_Mod_Low_DNG	56	228867.2	6427118	72	0	1	14	9	1	0	0	0.1	91.7	0.9	0.1	0	0	0	95	0	0	0	0	0	0	0	0.1
P27	1661	100	2_Mod_Low_DNG	56	225258.7	6424301	88	0	0	7	7	0	2	0	0	91.6	0.8	0	0.2	0	0	19	0	0	0	0	0	0	0	1.2
P30	1661	100	2_Mod_Low_DNG	56	227863.1	6426467	222	0	0	17	8	1	1	0	0	82.3	0.8	0.1	0.1	0	0	5	0	0	0	0	0	0	0	0.6
P50	483	100	2_Mod_Low_DNG	56	228495	6427128	15	0	1	10	8	1	1	0	0.1	35.8	6.1	0.2	0.1	0	0	0.4	0	0	0	0	0	0	0	5
P59	483	100	1661_2_Mod_Low_DNG	56	228270.7	6426023	340	0	0	9	2	0	1	0	0	79	0.3	0	0.1	0	0	41	0	0	0	0	0	0	0	15.6
P60	483	100	2_Mod_Low_DNG	56	228024.4	6426495	0	0	0	7	3	0	1	0	0	26.8	0.3	0	0.2	0	0	13	0	0	0	0	0	0	0	4
P76	483	100	2_Mod_Low_DNG	56	225409.6	6424192	40	0	0	10	7	1	0	0	0	65	0.7	0.1	0	0	0	11	0	0	0	0	0	0	0	31.5
P77	483	100	2_Mod_Low_DNG	56	225184.5	6424191	240	0	0	11	5	1	0	0	0	18.5	3.8	0.1	0	0	0	11	0	0	0	0	0	0	0	31.1
P78	483	100	2_Mod_Low_DNG	56	224775.8	6424258	330	0	0	12	15	1	3	0	0	96.3	10.4	0.1	2.3	0	0	10	0	0	0	0	0	0	0	1.5
P3	1661	100	3_Low_DNG	56	224548.7	6424016	314	0	0	16	11	1	2	0	0	94.2	1.9	0.1	0.3	0	0	0	0	0	0	0	0	0	0	0.2
P28	483	100	3_Low_DNG	56	226033.6	6423362	123	0	0	3	2	0	0	0	0	78	0.8	0	0	0	0	9	0	0	0	0	0	0	0	2
P29	483	100	3_Low_DNG	56	226329.7	6423228	355	0	0	6	1	0	0	0	0	29.4	0.1	0	0	0	0	0.2	0	0	0	0	0	0	0	0.6
P71	483	100	3_Low_DNG	56	226119.8	6423120	0	0	0	3	0	0	0	0	0	90.1	0	0	0	0	0	8	0	0	0	0	0	0	0	0.6
P72	483	100	3_Low_DNG	56	225932.5	6422877	80	0	0	15	10	1	2	0	0	82.6	6.8	0.1	0.2	0	0	2.6	0	0	0	0	0	0	0	13.2
P18	483	100	1_Scattered	56	225588.1	6424282	57	1	0	13	9	0	2	20	0	43.5	2.3	0	0.3	1	0	10.4	0	0	0	0	0	0	1	1	1
P20	483	100	1_Scattered	56	228024	6422427	167	2	4	18	16	2	2	37	1.3	107.4	3.8	0.2	3.2	3	0	67	11	0	1	0	0	1	1	0.2
P21	483	100	1_Scattered	56	226464.9	6425744	277	2	0	8	12	1	1	12	0	47.4	2.3	0.1	3	3	1	4	5	0	0	0	0	1	0	2.5
P22	483	100	1_Scattered	56	228239	6427124	185	2	6	22	12	1	5	5.3	1.1	35.1	1.5	0.1	0.5	0	0	17.8	5	1	1	0	1	0	1	0.2
P45	483	100	1_Scattered	56	225310.9	6424567	350	3	1	5	5	0	1	21	0.1	85.1	1	0	0.1	5	4	17	38	0	1	1	1	1	0	1.2
P6	483	100	2_Mod_DNG	56	228314.3	6427010	103	0	0	11	6	1	1	0	0	95.8	1.4	0.1	0.1	0	0	2.4	0	0	0	0	0	0	0	0.3
P8	483	100	2_Mod_DNG	56	226708.4	6425077	237	0	0	13	10	0	2	0	0	68.5	20.9	0	0.2	0	0	0	0	0	0	0	0	0	0	0.4
P44	483	100	2_Mod_DNG	56	225015.2	6424457	270	0	0	9	6	0	0	0	0	36.4	7.8	0	0	0	0	39	0	0	0	0	0	0	0	8
P51	483	100	2_Mod_DNG	56	228469	6427025	40	0	0	7	8	0	1	0	0	37.2	1.2	0	0.1	0	0	15.2	0	0	0	0	0	0	0	5.1
P52	483	100	2_Mod_DNG	56	228624.7	6426942	20	0	0	11	11	0	2	0	0	62.8	4.4	0	0.2	0	0	15	0	0	0	0	0	0	0	1.7
P61	483	100	2_Mod_DNG	56	227518	6425121	0	0	0	6	4	0	1	0	0	56.4	5.7	0	0.1	0	0	15	0	0	0	0	0	0	0	2.1
P62	483	100	2_Mod_DNG	56	228278.1	6425185	35	0	0	8	9	0	0	0	0	92.1	2.9	0	0	0	0	25	0	0	0	0	0	0	0	0.7
P63	483	100	2_Mod_DNG	56	228526.3	6424994	70	0	0	10	9	0	2	0	0	90.6	2.7	0	0.2	0	0	22	0	0	0	0	0	0	0	1.1

Plot	PCT	Patch Size	Condition Class	Zone	Easting	Northing	Bearing	Composition (Species Richness)						Structure (Percentage Cover)						Function									
								Tree	Shrub	Grass	Forbs	Ferns	Other	Tree	Shrub	Grass	Forbs	Ferns	Other	Large Trees	Hollow Trees	Litter Cover (%)	Length Fallen Logs (m)	Tree Stems (cm)					Tree Regen	High Threat Exotics
																								5 to 9	10 to 19	20 to 29	30 to 49	50 to 79		
P64	483	100	2_Mod_DNG	56	228679.1	6425212	35	0	0	12	8	1	3	0	0	99.1	3.1	0.1	0.3	0	0	29	0	0	0	0	0	0	0	0.6
P65	483	100	2_Mod_DNG	56	227007.8	6426219	50	0	0	5	3	0	0	0	0	10.8	10.2	0	0	0	0	27	0	0	0	0	0	0	0	0.4
P66	483	100	2_Mod_DNG	56	227057.4	6425677	60	0	2	8	6	0	3	0	1.1	90.6	4.5	0	0.4	0	0	34	0	0	0	0	0	0	0	2.6
P67	483	100	2_Mod_DNG	56	226510	6424496	100	0	0	9	9	0	3	0	0	91.2	2.5	0	0.3	0	0	17	0	0	0	0	0	0	0	1.4
P68	483	100	2_Mod_DNG	56	226460	6423727	225	0	1	9	7	1	2	0	0.1	101	2.2	0.1	0.2	0	0	16	0	0	0	0	0	0	0	5.3
P69	483	100	2_Mod_DNG	56	226377.7	6425289	290	0	0	9	13	0	3	0	0	55.8	5.8	0	0.6	0	0	13	0	0	0	0	0	0	0	0.5
P79	483	100	2_Mod_DNG	56	224768	6424761	195	0	1	14	9	1	1	0	0.1	77.8	22.5	0.1	0.1	0	0	8	3	0	0	0	0	0	0	0.3
P80	483	100	2_Mod_DNG	56	225100.3	6424583	80	0	0	7	4	0	0	0	0	71.1	8.3	0	0	0	0	17	0	0	0	0	0	0	0	0.4
P81	483	100	2_Mod_DNG	56	224908.5	6424511	90	0	0	9	7	1	0	0	0	28.1	5.6	0.5	0	0	0	14	0	0	0	0	0	0	0	1.8
P82	483	100	2_Mod_DNG	56	224680.3	6424430	250	0	1	17	14	1	1	0	0.1	123.2	22.8	0.1	0.1	0	0	16	0	0	0	0	0	0	0	0.1
P7	483	100	3_Mod_Low_DNG	56	227864.6	6425887	239	0	1	18	8	1	3	0	0.7	89.8	0.8	0.1	0.3	0	0	3.4	0	0	0	0	0	0	0	0.6
P9	483	100	3_Mod_Low_DNG	56	228601.6	6424339	290	0	0	15	8	0	1	0	0	121.1	3.3	0	0.1	0	0	4.4	0	0	0	0	0	0	0	0.6
P10	483	100	3_Mod_Low_DNG	56	227672.3	6422533	14	0	0	13	10	0	2	0	0	61.1	3.8	0	1.5	0	0	4.8	0	0	0	0	0	0	0	1.4
P11	483	100	3_Mod_Low_DNG	56	225740.8	6422886	144	0	1	12	10	0	2	0	0.1	89	5.9	0	0.2	0	0	0	0	0	0	0	0	0	0	0.6
P16	483	100	3_Mod_Low_DNG	56	227437.7	6423409	0	0	0	9	8	0	2	0	0	89.1	0.8	0	4.1	0	0	7.4	0	0	0	0	0	0	0	0.2
P17	483	100	3_Mod_Low_DNG	56	227502.4	6423918	10	0	0	9	10	1	2	0	0	92	1	0.1	0.2	0	0	5	0	0	0	0	0	0	0	0.1
P34	483	100	3_Mod_Low_DNG	56	227973.6	6421934	9	0	0	22	9	2	3	0	0	97.8	1.8	0.2	0.3	0	0	1.2	0	0	0	0	0	0	0	0.3
P36	483	100	3_Mod_Low_DNG	56	227783.1	6424666	353	0	0	7	11	0	1	0	0	100.7	1.1	0	0.2	0	0	2.4	0	0	0	0	0	0	0	0.2
P37	483	100	3_Mod_Low_DNG	56	227319.4	6424742	342	0	0	6	8	0	2	0	0	77.6	2.6	0	0.2	0	0	0	0	0	0	0	0	0	0	0.2
P41	483	100	3_Mod_Low_DNG	56	228193.9	6426749	116	0	1	11	7	0	1	0	0.1	33.4	25.6	0	0.1	0	0	0	0	0	0	0	0	0	0	0.5
P53	483	100	3_Mod_Low_DNG	56	228603.7	6426787	145	0	1	6	6	0	0	0	0.1	26.2	2.6	0	0	0	0	7	0	0	0	0	0	0	0	5.1
P55	483	100	3_Mod_Low_DNG	56	228060.7	6426930	215	0	0	11	1	1	0	0	0	39.7	0.1	0.1	0	0	0	8	0	0	0	0	0	0	0	10.5
P56	483	100	3_Mod_Low_DNG	56	227814.9	6426644	350	0	1	12	5	0	0	0	0.3	78.9	1.7	0	0	0	0	6.2	0	0	0	0	0	0	0	1.6
P57	483	100	3_Mod_Low_DNG	56	228393.8	6426547	260	0	0	11	6	0	2	0	0	64.9	1.5	0	0.2	0	0	6.2	0	0	0	0	0	0	0	21.3
P58	483	100	3_Mod_Low_DNG	56	228036.2	6426101	5	0	0	5	3	1	1	0	0	89	0.4	0.1	0.1	0	0	11	0	0	0	0	0	0	0	10.2
P70	483	100	3_Mod_Low_DNG	56	227444.7	6422931	100	0	1	12	12	1	3	0	0.2	113	10.4	0.1	0.3	0	0	1.8	0	0	0	0	0	0	0	0.2
P73	483	100	3_Mod_Low_DNG	56	225635.6	6423431	90	0	0	10	17	1	3	0	0	105.5	15.6	0.1	1.2	0	0	2.4	0	0	0	0	0	0	0	0.3
P74	483	100	483_3_Mod_Low_DNG	56	225702.4	6423110	170	0	0	6	7	0	2	0	0	83	2.8	0	0.2	0	0	9	0	0	0	0	0	0	0	27.4
P75	483	100	3_Mod_Low_DNG	56	225668.4	6422753	80	0	2	13	9	1	2	0	1.1	95.1	7.1	0.1	0.2	0	0	7.4	0	0	0	0	0	0	0	0.1
P15	483	100	4_Low_DNG	56	227011.5	6422634	355	0	1	11	13	1	2	0	0.1	65.4	4.5	0.1	2	0	0	2	0	0	0	0	0	0	0	2.2
P38	483	100	4_Low_DNG	56	227324.4	6424382	346	0	0	7	7	0	1	0	0	9.4	70.7	0	0.1	0	0	0.8	0	0	0	0	0	0	0	0.2
P39	483	100	4_Low_DNG	56	227203.7	6423654	264	0	0	4	6	0	0	0	0	15.5	0.6	0	0	0	0	0	0	0	0	0	0	0	0	0.3
P40	483	100	4_Low_DNG	56	226953.4	6423192	170	0	0	4	6	0	0	0	0	0.5	0.6	0	0	0	0	1.2	0	0	0	0	0	0	0	75.2
P42	483	100	4_Low_DNG	56	228361.4	6426378	100	0	0	2	8	0	0	0	0	0.2	10.6	0	0	0	0	0.4	0	0	0	0	0	0	0	2.2
P46	483	100	4_Low_DNG	56	224581.2	6424648	260	0	0	3	4	0	0	0	0	2.4	1.2	0	0	0	0	7	0	0	0	0	0	0	0	0.2

Plot	PCT	Patch Size	Condition Class	Zone	Easting	Northing	Bearing	Composition (Species Richness)						Structure (Percentage Cover)						Function								
								Tree	Shrub	Grass	Forbs	Ferns	Other	Tree	Shrub	Grass	Forbs	Ferns	Other	Large Trees	Hollow Trees	Litter Cover (%)	Length Fallen Logs (m)	Tree Stems (cm)					Tree Regen	High Threat Exotics
																								5 to 9	10 to 19	20 to 29	30 to 49	50 to 79		
P54	483	100	4_Low_DNG	56	228369.5	6426177	330	0	0	2	2	0	0	0	0	2.1	0.3	0	0	0	0	32	0	0	0	0	0	0	0	20
P83	483	100	4_Low_DNG	56	224427	6424801	80	0	1	9	11	0	0	0	0.1	21.1	11.8	0	0	0	0	4.2	0	0	0	0	0	0	0	0.4
P84	483	100	4_Low_DNG	56	224381.3	6424534	350	0	0	7	8	0	0	0	0	61.2	2	0	0	0	0	1.4	0	0	0	0	0	0	0	5.1
P85	483	100	4_Low_DNG	56	227940.2	6426136	270	0	1	6	2	0	0	0	0.1	8.6	0.2	0	0	0	0	6.2	0	0	0	0	0	0	0	5



APPENDIX D

BAM Calculator Reports

BAM Credit Summary Report

Proposal Details

Assessment Id
00032861/BAAS17099/22/00032862

Proposal Name
Goulburn River Solar Farm

BAM data last updated *
14/04/2023

Assessor Name
Jacob Manners

Report Created
02/05/2023

BAM Data version *
58

Assessor Number
BAAS17099

BAM Case Status
Finalised

Date Finalised
02/05/2023

Assessment Revision
9

Assessment Type
Major Projects

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Ecosystem credits

Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley												
4	483_3_Mod_Low_DNG	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	12.4	12.4	308.4	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	0

5	483_2_Mod_DNG	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	33.1	33.1	168.5	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	3490

6	483_4_Low_DNG	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	9.9	9.9	199.1	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	0

7	483_1_Scattered	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	78	78.0	23.6	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	1152
											Subtotal	**4642**
Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin												
1	1661_2_Mod_Low_DNG	Not a TEC	13.2	13.2	36.8	PCT Cleared - 50%	High Sensitivity to Gain			1.75		0
2	1661_1_Scattered	Not a TEC	51.1	51.1	6.1	PCT Cleared - 50%	High Sensitivity to Gain			1.75		136

3	1661_3_Low_DNG	Not a TEC	3.3	3.3	53.2	PCT Cleared - 50%	High Sensitivity to Gain			1.75		0
											Subtotal	**136**
											Total	**4778**

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAII	Species credits
Anthochaera phrygia / Regent Honeyeater (Fauna)									
483_1_Scattered	78.0	78.0	16.9			Critically Endangered	Critically Endangered	True	988
1661_2_Mod_Low_DNG	13.2	13.2	3.4			Critically Endangered	Critically Endangered	True	34
1661_1_Scattered	51.1	51.1	4			Critically Endangered	Critically Endangered	True	155
1661_3_Low_DNG	3.3	3.3	0.44			Critically Endangered	Critically Endangered	True	1
483_3_Mod_Low_DNG	12.4	12.4	5.9			Critically Endangered	Critically Endangered	True	54
483_2_Mod_DNG	33.1	33.1	11.9			Critically Endangered	Critically Endangered	True	296
483_4_Low_DNG	9.9	9.9	2.4			Critically Endangered	Critically Endangered	True	18

								Subtotal	**1546**
Ninox connivens / Barking Owl (Fauna)									
483_2_Mod_DNG	33.1	33.1	0.01			Vulnerable	Not Listed	False	1
483_4_Low_DNG	9.9	9.9	1.2			Vulnerable	Not Listed	False	6
								Subtotal	**7**

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00032861/BAAS17099/22/00032862

Proposal Name
Goulburn River Solar Farm

BAM data last updated *
14/04/2023

Assessor Name
Jacob Manners

Assessor Number
BAAS17099

BAM Data version *
58

Proponent Names

Report Created
02/05/2023

BAM Case Status
Finalised

Assessment Revision
9

Assessment Type
Major Projects

Date Finalised
02/05/2023

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	Critically Endangered Ecological Community	483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley

Species
Anthochaera phrygia / Regent Honeyeater

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
1661-Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin
483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley

Predicted Threatened Species Not On Site

Name
No Changes

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

BAM Biodiversity Credit Report (Like for like)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
1661-Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	Not a TEC	96.1	136	0	136
483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	699.6	1152	3490	4642

483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley

Like-for-like credit retirement options

Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267,	-	483_3_Mod_Low_DNG	No	0	Kerrabee, Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
	White Box - Yellow Box - Blakely's Red Gum	-	483_2_Mod_DNG	No	3490	Kerrabee, Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and

	Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331,					Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437,	-	483_4_Low_DNG	No	0	Kerrabee, Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin,	-	483_1_Scattered	Yes	1152	Kerrabee, Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415,					

	3533, 4147, 4149, 4150					
1661-Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	Western Slopes Dry Sclerophyll Forests This includes PCT's: 54, 110, 217, 255, 273, 287, 330, 333, 341, 343, 346, 348, 358, 403, 455, 456, 472, 577, 581, 592, 617, 673, 676, 713, 940, 956, 1277, 1279, 1313, 1316, 1381, 1610, 1661, 1668, 1709, 3753, 3754, 3756, 3768, 3769, 4153	Western Slopes Dry Sclerophyll Forests >=50% and <70%	1661_2_Mod_Low_DNG	No	0	Kerrabee, Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	Western Slopes Dry Sclerophyll Forests This includes PCT's: 54, 110, 217, 255, 273, 287, 330, 333, 341, 343, 346, 348, 358, 403, 455, 456, 472, 577, 581, 592, 617, 673, 676, 713, 940, 956, 1277, 1279, 1313, 1316, 1381, 1610, 1661, 1668, 1709, 3753, 3754, 3756, 3768, 3769, 4153	Western Slopes Dry Sclerophyll Forests >=50% and <70%	1661_1_Scattered	Yes	136	Kerrabee, Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Western Slopes Dry Sclerophyll Forests This includes PCT's: 54, 110, 217, 255, 273, 287, 330, 333, 341, 343, 346, 348, 358, 403, 455, 456, 472, 577, 581, 592, 617, 673, 676, 713, 940, 956, 1277, 1279, 1313, 1316, 1381, 1610, 1661, 1668, 1709, 3753, 3754, 3756, 3768, 3769, 4153	Western Slopes Dry Sclerophyll Forests >=50% and <70%	1661_3_Low_DNG	No	0	Kerrabee, Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Anthochaera phrygia / Regent Honeyeater	**483_1_Scattered, 1661_2_Mod_Low_DNG, 1661_1_Scattered, 1661_3_Low_DNG, 483_3_Mod_Low_DNG, 483_2_Mod_DNG, 483_4_Low_DNG**	45.0	1546.00
Ninox connivens / Barking Owl	**483_2_Mod_DNG, 483_4_Low_DNG**	1.2	7.00

Credit Retirement Options

Like-for-like credit retirement options

Anthochaera phrygia / Regent Honeyeater	Spp	IBRA subregion
	Anthochaera phrygia / Regent Honeyeater	Any in NSW
Ninox connivens / Barking Owl	Spp	IBRA subregion
	Ninox connivens / Barking Owl	Any in NSW

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id
00032861/BAAS17099/22/00032862

Proposal Name
Goulburn River Solar Farm

BAM data last updated *
14/04/2023

Assessor Name
Jacob Manners

Assessor Number
BAAS17099

BAM Data version *
58

Proponent Name(s)

Report Created
02/05/2023

BAM Case Status
Finalised

Assessment Revision
9

Assessment Type
Major Projects

Date Finalised
02/05/2023

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	Critically Endangered Ecological Community	483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley

Species
Anthochaera phrygia / Regent Honeyeater

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
1661-Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin
483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley

Predicted Threatened Species Not On Site

Name
No Changes

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
1661-Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	Not a TEC	96.1	136	0	136.00
483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	699.6	1152	3490	4642.00

483-Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the	-	483_3_Mod_Low_DNG	No	0	Kerrabee,Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and Yengo. or Any IBRA subregion that is within 100

	NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533,					kilometers of the outer edge of the impacted site.

	4147, 4149, 4150					
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611,	-	483_2_Mod_DNG	No	3490	Kerrabee,Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840,	-	483_4_Low_DNG	No	0	Kerrabee,Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511,	-	483_1_Scattered	Yes	1152	Kerrabee,Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698, 3314, 3359, 3363, 3373, 3376, 3387, 3388, 3394, 3395, 3396, 3397, 3398, 3399, 3406, 3415, 3533, 4147, 4149, 4150					
1661-Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	Western Slopes Dry Sclerophyll Forests This includes PCT's: 54, 110, 217, 255, 273, 287, 330, 333, 341, 343, 346, 348, 358, 403, 455, 456, 472, 577, 581, 592, 617, 673, 676, 713, 940, 956, 1277, 1279, 1313, 1316, 1381, 1610, 1661, 1668, 1709, 3753, 3754, 3756, 3768, 3769, 4153	Western Slopes Dry Sclerophyll Forests >=50% and <70%	1661_2_Mod_Low_DNG	No	0	Kerrabee,Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Western Slopes Dry Sclerophyll Forests This includes PCT's: 54, 110, 217, 255, 273, 287, 330, 333, 341, 343, 346, 348, 358, 403, 455, 456, 472, 577, 581, 592, 617, 673, 676, 713, 940, 956, 1277, 1279, 1313, 1316, 1381, 1610, 1661, 1668, 1709, 3753, 3754, 3756, 3768, 3769, 4153	Western Slopes Dry Sclerophyll Forests >=50% and <70%	1661_1_Scattered	Yes	136	Kerrabee,Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Western Slopes Dry Sclerophyll Forests This includes PCT's: 54, 110, 217, 255, 273, 287, 330, 333, 341, 343, 346, 348, 358, 403, 455, 456, 472, 577, 581, 592, 617, 673, 676, 713, 940, 956, 1277, 1279, 1313, 1316, 1381, 1610, 1661, 1668, 1709, 3753, 3754, 3756, 3768, 3769, 4153	Western Slopes Dry Sclerophyll Forests >=50% and <70%	1661_3_Low_DNG	No	0	Kerrabee,Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Variation options

Formation	Trading group	Zone	HBT	Credits	IBRA region

	Dry Sclerophyll Forests (Shrubby sub-formation)	Tier 3 or higher threat status	1661_2_Mod_Low_DNG	No	0	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Dry Sclerophyll Forests (Shrubby sub-formation)	Tier 3 or higher threat status	1661_1_Scattered	Yes (including artificial)	136	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Dry Sclerophyll Forests (Shrubby sub-formation)	Tier 3 or higher threat status	1661_3_Low_DNG	No	0	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Anthochaera phrygia / Regent Honeyeater	**483_1_Scattered, 1661_2_Mod_Low_DNG, 1661_1_Scattered, 1661_3_Low_DNG, 483_3_Mod_Low_DNG, 483_2_Mod_DNG, 483_4_Low_DNG**	45.0	1546.00
Ninox connivens / Barking Owl	**483_2_Mod_DNG, 483_4_Low_DNG**	1.2	7.00

Credit Retirement Options

Like-for-like options

Anthochaera phrygia/ Regent Honeyeater	Spp		IBRA region
	Anthochaera phrygia/Regent Honeyeater *Note: Variation rules do not apply for Critically Endangered species and impacts on Commonwealth listed entities that are a controlled action.*		Any in NSW
Ninox connivens/ Barking Owl	Spp		IBRA region
	Ninox connivens/Barking Owl		Any in NSW
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Vulnerable	Kerrabee, Hunter, Inland Slopes, Liverpool Range, Pilliga, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Plant community types (PCT) & ecological communities

Formation *	Class *	Plant community type *	PCT % cleared	Associated TEC *	BC Act listing status	EPBC Act listing status	Action	Delete
Dry Sclerophyll Forests (Shrubby sub-formation)	Western Slopes Dry Sclerophyll Forests	**1661** - Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	50	Not a TEC			ADD VEG ZONE Default benchmarks modified	✖

Select type:	Tree (5)	Shrub (17)	Grass & grass like (9)	Forb (9)	Fern (2)	Other (3)
Composition	5	18	8	9	2	3

Select type:	Tree (69)	Shrub (70)	Grass & grass like (22)	Forb (6)	Fern (1)	Other (1)
Structure	59	73	25	6	1	1

Select type:	Number of large trees (1)	Stem size class (4)	Length of fallen logs (55)	Regeneration stems (Present)	Litter cover (63)
Function	1	4	58	Present	64

Plant community types (PCT) & ecological communities

Formation *	Class *	Plant community type *	PCT % cleared	Associated TEC *	BC Act listing status	EPBC Act listing status	Action	Delete
Grassy Woodlands	Western Slopes Grassy Woodlands	**483** - Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley	90	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	Critically Endangered Ecological Community	Not Listed	ADD VEG ZONE Default benchmarks modified	✖

Select type:	Tree (4)	Shrub (6)	Grass & grass like (10)	Forb (13)	Fern (1)	Other (3)
Composition	4	7	11	13	1	3

Select type:	Tree (21)	Shrub (5)	Grass & grass like (45)	Forb (8)	Fern (0)	Other (1)
Structure	19	5	44	8	0	1

Select type:	Number of large trees (2)	Stem size class (4)	Length of fallen logs (34)	Regeneration stems (Present)	Litter cover (35)
Function	2	4	34	Present	35

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