5.0 Bird and Bat Collision Risk

5.1 BBUS Survey Suitability

Species accumulation curves are a valuable tool recommended by the *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland* (Eyre, Ferguson, *et al.*, 2022) to assess the adequacy of fauna surveys. These curves depict the cumulative number of species encountered within a defined sampling area (e.g. survey sites within a specific study unit) on the y-axis, plotted against increasing survey effort on the x-axis. The shape of the species accumulative curve reflects the influence of two key factors: 1) the relative abundance and diversity of species detectable through the chosen standardised methodology, and 2) the order in which individual species are encountered during the survey. The presence of a well-defined asymptote (plateau) in the species accumulation curve suggests that survey effort has likely been sufficient to capture the full species richness of the fauna assemblage.

The cumulative number of bird species observed from consecutive fixed-point count surveys at vantage points completed during the BBUS program has been plotted below (**Figure 5.1**). The species accumulation curves indicate that the cumulative number of species recorded begins to plateau for each survey period as detailed below:

- spring 2023 BBUS at approximately 71 replicates
- summer 2024 BBUS at approximately 82 replicates
- spring 2024 BBUS at approximately 117 replicates
- summer 2025 BBUS at approximately 83 replicates.

This supports the adequacy of the survey effort completed at vantage points to generate representative date on the bird species in the Project Area during the BBUS.

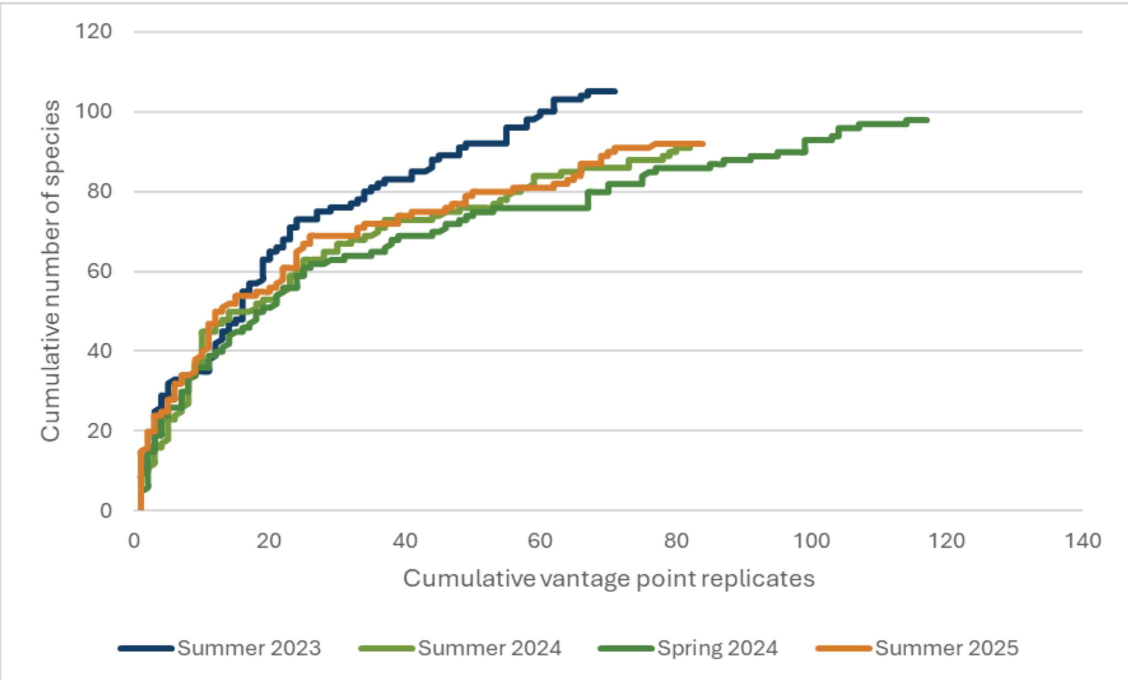


Figure 5.1 Cumulative Number of Bird Species Recorded During Consecutive Counts at Vantage Points

5.2 Risk Assessment

5.2.1 At-risk Bird Species

Twenty-seven (27) species were observed flying within or above RSA height range (60–275 m), placing these species at risk of turbine blade strike. A summary of all at-risk species and their minimum and maximum flight heights observed across all surveys are presented in **Table 5.1** below.

Table 5.1 Minimum and Maximum Flight Heights of At-risk Species

Common Name	Scientific Name	Observed Flight Height (m AGL)	
		Minimum	Maximum
straw-necked ibis	*Threskiornis spinicollis*	1	800
Australian pelican	*Pelecanus conspicillatus*	15	500
nankeen kestrel	*Falco cenchroides*	1	500
wedge-tailed eagle	*Aquila audax*	10	450
Torresian crow	*Corvus orru*	1	250
whistling kite	*Haliastur sphenurus*	10	250
white-browed woodswallow	*Artamus superciliosus*	6	240
black kite	*Milvus migrans*	10	200
brown goshawk	*Accipiter fasciatus*	3	200
white-necked heron	*Ardea pacifica*	2	200
white-throated needletail	*Hirundapus caudacutus*	15	200
Australian white Ibis	*Threskiornis moluccus*	40	150
brolga	*Antigone rubicunda*	25	150
masked woodswallow	*Artamus personatus*	15	150
black-faced woodswallow	*Artamus cinereus*	60	120
galah	*Eolophus roseicapilla*	1	112
Australian raven	*Corvus coronoides*	2	100
brown falcon	*Falco berigora*	6	100
long-billed corella	*Cacatua tenuirostris*	12	100
tree martin	*Petrochelidon nigricans*	1	100
white-breasted woodswallow	*Artamus leucoryn*	14	100
magpie-lark	*Grallina cyanoleuca*	1	80
little corella	*Cacatua sanguinea*	1	72
channel-billed cuckoo	*Scythrops novaehollandiae*	20	60
pacific black duck	*Anas superciliosa*	4	60
rock dove*	*Columba livia*	4	60
yellow-tailed black-cockatoo	*Zanda funerea*	60	60

*Introduced species

At-risk flights are single flights with maximum or minimum height that is within or greater than the lower RSA height (> 60 m AGL). The number of at-risk flights for each bird species is provided in **Table 5.2** below, along with the total number of each bird species recorded (total counts) and the number of flights recorded (total flight count). This table also highlights the percentage of at-risk flights compared to all flights recorded for these species. At-risk bird species with less than five flight observations have been excluded from **Table 5.2**, as the sample size is not considered large enough to accurately represent the occurrence of a species within the RSA height range. For species with a higher number of at-risk flight counts (wedge-tailed eagle, Australian white ibis, straw-necked ibis, tree martin etc.), this percentage highlights the frequency in which a species may occur within height range of turbine blades and placed at risk of turbine collision. This percentage was used to inform Criterion A of the Likelihood of Risk in the risk assessment (**Appendix H**).

Table 5.2 At-risk Flight Comparison to All Recorded Flights

Common Name	Scientific Name	Total Count	Total Flight Count	Total At-risk Flights	% At-risk flights
straw-necked ibis	*Threskiornis spinicollis*	227	9	7	78
wedge-tailed eagle	*Aquila audax*	46	34	24	71
white-browed woodswallow	*Artamus superciliosus*	592	22	14	64
white-throated needletail	*Hirundapus caudacutus*	228	13	5	38
whistling kite	*Haliastur sphenurus*	13	12	8	67
Torresian crow	*Corvus orru*	1096	419	30	7
galah	*Eolophus roseicapilla*	504	91	7	8

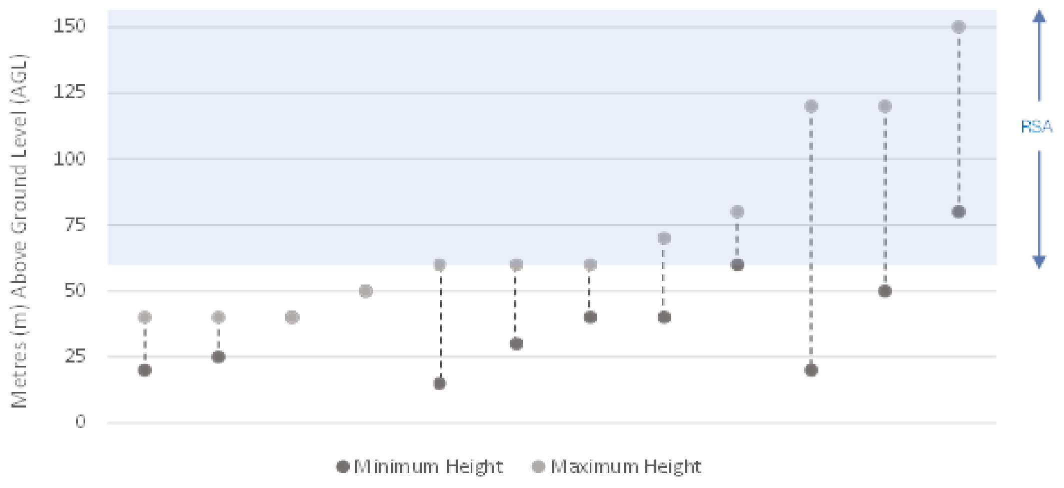
Graphs displaying the flight occurrences and heights of frequently encountered at-risk species, in comparison to the Project's proposed RSA height range are provided in **Appendix I**.

5.2.1.1 Threatened and Migratory Species

One EPBC Act and NC Act species, white-throated needletail, was recorded flying at or above (>60 m AGL) RSA height during the BBUS field program.

White-throated needletails were seen to circle and forage in flocks above Brigalow and Eucalyptus woodland and cleared non-remnant areas. Flight heights varied within the flock, ranging from 15 m to 100 m.

A summary of the white-throated needletail records made throughout the field survey program is provided in **Graph 5.1** below.



Graph 5.1 White-throated needletail flights

5.2.1.2 Diurnal Raptors

Seven diurnal raptor species have been identified from field surveys to date, encompassing vantage point surveys and incidental observations made during the BBUS program, baseline surveys and targeted surveys. **Table 5.3** provides a summary of the diurnal raptor species recorded including the total number of observations (visual and aural detections), total count per species, and minimum and maximum observed flight heights (m AGL) across all observations. Notably, none of the recorded raptor species are listed as threatened and/or migratory under the NC Act or EPBC Act.

Table 5.3 Summary of Diurnal Raptor Species Recorded during Field Surveys including Incidentals

Common Name	Scientific Name	Total Observations		Total Count		Observed Flight Height (m AGL)	
		Vantage Point	Incidental	Vantage Point	Incidental	Min	Max
Australian hobby	*Falco longipennis*	1	2	1	2	-	-
black-shouldered kite	*Elanus axillaris*	7	1	9	1	5	700
brown falcon	*Falco berigora*	6	3	6	3	6	100
brown goshawk	*Accipiter fasciatus*	3	1	3	1	3	200
nankeen kestrel	*Falco cenchroides*	29	8	30	9	1	500
wedge-tailed eagle	*Aquila audax*	34	9	46	7	10	450
whistling kite	*Haliastur sphenurus*	12	3	13	3	0	250

Of the seven diurnal raptor species identified across all surveys, all species were observed during vantage point surveys across the four BBUS survey periods. **Table 5.4** summarises the total number of counts for each species first observed within each flight height class (A = below RSA, B = at RSA, C = above RSA).

Table 5.4 Number of Diurnal Raptor Species Observed at Vantage Points

Common Name	Scientific Name	Spring 2023 BBUS			Summer 2024 BBUS			Spring 2024 BBUS			Summer 2025 BBUS			Total Count	Total at RSA
		A	B	C	A	B	C	A	B	C	A	B	C		
Australian hobby	*Falco longipennis*	1	-	-	-	-	-	-	-	-	-	-	-	1	-
black-shouldered kite	*Elanus axillaris*	5	-	-	1	-	-	-	-	-	3	-	-	9	-
brown falcon	*Falco berigora*	3	1	-	-	-	-	1	-	-	1	-	-	6	1
brown goshawk	*Accipiter fasciatus*	2	1	-	-	-	-	-	-	-	-	-	-	3	1
nankeen kestrel	*Falco cenchroides*	4	1	-	5		-	8		-	10	2	-	30	3
wedge-tailed eagle	*Aquila audax*	7	12	4	1	4	2	2	1	-	-	6	2	46	23
whistling kite	*Haliastur sphenurus*	2	4	0	-	2	-	1	-	-	2	2	-	13	8
Total														**108**	**36**

Five raptor species were identified as having an initial observed flight height within the RSA during vantage point surveys (brown falcon, brown goshawk, nankeen kestrel, wedge-tailed eagle and whistling kite). The three most frequently recorded raptors, including those most commonly recorded at RSA height, are described below:

5.2.1.3 Wedge-tailed Eagle (*Aquila audax*)

Wedge-tailed eagle is Australia's largest raptor species with a wingspan ranging from 2.3 m to 2.8 m in length. They are predominantly dark brown to blackish-brown, with a strong beak, large talons and distinct wedge-shaped tail. Notably, 50% of all wedge-tailed eagle flights observed during vantage point surveys were first observed at RSA height. When considering all wedge-tailed eagle flights observed (including maximum or minimum flight altitudes achieved within the observation period), 71% of this species' flights were deemed at-risk of blade strike (**Table 5.2**).

Wedge-tailed eagles exhibit increased vulnerability to collisions with operational wind turbines due to their foraging behaviour, which often involves extended periods of soaring flight. Numerous records from wind farms across Australia confirm that the species is susceptible to collisions (Moloney, Lumsden and Smales, 2019). Notably, a significant proportion of these mortalities involve sub-adult birds between one and two years old. Following fledging and dispersal from their natal territories (typically driven by their parents prior to the next breeding season), sub-adult wedge-tailed eagles embark on extensive exploratory movements, covering distances of up to 1,000–2,000 km as evidenced by banding records and satellite telemetry data (Hatton, Olsen and Gruber, 2015; Cherriman, 2018). This extensive dispersal behaviour suggests a continental-scale population dynamic, with estimates exceeding tens of thousands and potentially surpassing 100,000 individuals based on observed breeding densities (Marchant *et al.*, 1993).

5.2.1.4 Nankeen Kestrel (*Falco cenchroides*)

Nankeen kestrel is a small and agile raptor with pale rufous upper wings and back, contrasting with black flight feathers, a finely streaked white underbelly and yellow legs. Of all nankeen kestrel flights, 10% were first observed at RSA height during vantage point surveys (**Table 5.4**). Similar to many other diurnal raptors, nankeen kestrels show an increased vulnerability to collisions with operational wind turbines due to their foraging behaviour, which often involves hovering and making short, rapid flights to the ground to capture prey. While observations suggest that the species may actively attempt to avoid collisions (Smales, 2006), documented mortalities have occurred at several operational wind farms (Moloney, Lumsden and Smales, 2019).

5.2.1.5 Whistling Kite (*Haliastur sphenurus*)

Whistling kite is a medium-sized diurnal raptor with a slender build, narrow head, long rounded tail, and pale plumage that is somewhat "scruffy" in appearance. Whistling kite was the third most frequently observed raptor species during vantage point surveys (**Table 5.3**). This species was detected on 15 separate occasions, with a total of 16 counts recorded. Of all whistling kite flights, 62% were first observed at RSA height during vantage point surveys (**Table 5.4**).

5.2.1.6 Wetland Birds

The Project Area and surrounding locality provides many ephemeral wetland environments that support the seasonal fluctuation of wetland birds. Following heavy rainfall events, large flocks of wetland birds will migrate to the locality which increases the collision risk of these birds. As a result, impacts to wetland birds can exacerbate periodically according to predicted seasonality.

To date, 17 wetland species have been identified during field surveys, inclusive of vantage point surveys and incidental observations during the BBUS program, baseline and other targeted surveys. Of these 17 species, three species experienced at-risk flights over 50% of the time: Australasian darter, Australian white ibis and brolga. The most frequently recorded species, pacific black duck has a relatively low percentage of at-risk flights at 7% (**Table 5.5**).

Table 5.5 Summary of Wetland Species Recorded during Field Surveys Including Incidentals

Common Name	Scientific Name	Total Observations		Total Count		Observed Flight Height (m AGL)		Total Flights	Total At-risk Flights	% At-risk Flights
		Vantage Point	Incidental	Vantage Point	Incidental	Min	Max			
Australasian darter	*Anhinga novaehollandiae*	1	1	3	3	300	300	1	1	100
brolga	*Antigone rubicunda*	5	-	13	-	25	150	3	2	67
Australian white ibis	*Threskiornis moluccus*	3	-	57	-	40	150	2	1	50
Australian pelican	*Pelecanus conspicillatus*	3	-	11	-	15	500	3	1	33
white-necked heron	*Ardea pacifica*	9	13	14	16	8	200	9	3	33
pacific black duck	*Anas superciliosa*	17	3	63	9	4	60	14	1	7
glossy ibis	*Plegadis falcinellus*	1	-	1	-	40	40	1	0	0
little black cormorant	*Phalacrocorax sulcirostris*	2	1	5	1	15	30	1	0	0
chestnut teal	*Anas castanea*	2	-	6	-	15	15	1	0	0
plumed whistling duck	*Dendrocygna eytoni*	3	4	7	43	15	15	1	0	0
Australian wood duck	*Chenonetta jubata*	6	3	33	12	5	20	3	0	0
little pied cormorant	*Microcarbo melanoleucos*	2	1	2	1	2	20	2	0	0
black-fronted dotterel	*Elseyornis melanops*	1	1	2	1	1	1	1	0	0
Australasian grebe	*Tachybaptus novaehollandiae*	1	4	14	5	-	-	-	-	-

Common Name	Scientific Name	Total Observations		Total Count		Observed Flight Height (m AGL)		Total Flights	Total At-risk Flights	% At-risk Flights
		Vantage Point	Incidental	Vantage Point	Incidental	Min	Max			
dusky moorhen	*Gallinula tenebrosa*	-	1	-	3	-	-	-	-	-
eastern great egret	*Ardea alba modesta*	-	1	-	1	-	-	-	-	-
grey teal	*Anas gracilis*	-	2	-	5	-	-	-	-	-

5.2.1.7 Woodland Birds

Woodland birds occur across the Project Area and were recorded at various flight heights, with many high-flying species commonly recorded within or greater than the lower RSA height (>60 m AGL). Straw-necked ibis had the highest recorded percentage of at-risk flights of 78%, followed by wedge-tailed eagle, 71%, and white-browed wood swallow, 64% (**Table 5.2**). Torresian crow had the highest recorded flight count during the BBUS program of 419 flight observations, with only 7% of these flights considered at-risk.

5.2.2 At-risk Bat Species

5.2.2.1 Threatened Species

South-eastern Long-eared Bat (*Nyctophilus corbeni*)

The south-eastern long-eared bat is listed as vulnerable under the EPBC Act and the NC Act. The species operates at a low level of flight, where their foraging habits situate them within the canopy or on the ground (Threatened Species Scientific Committee, 2015b). Whilst the species is predominately likely to forage amongst a cluttered understory (i.e. 2-6 m height), the species may make foraging flights up to 12 km outside forested areas, with flight heights of these movements unknown (Gonsalves *et al.*, 2024).

5.2.2.2 High-flying Bats

Field surveys have identified microbat species within the Project Area whose known flight patterns and foraging behaviour suggest that they may utilise the airspace within the RSA of wind turbines. These species are recognised for their susceptibility to wind turbine collisions as documented in various literature (Churchill, 2008; Hull and Cawthen, 2013; Moloney, Lumsden and Smales, 2019; Stark and Muir, 2020; Bennett *et al.*, 2022). It is important to note that while these high-flying species are not currently listed as threatened under either the NC Act or EPBC Act, these species are considered at particular risk of collision with wind turbines under the *State Code 23: Wind farm development*.

White-striped Free-tailed Bat (*Austronomus australis*)

The white-striped free-tailed bat is a fast-flying species capable of reaching speeds of up to 61 km/h while pursuing prey and has been recorded foraging at altitudes exceeding 50 m AGL (Churchill, 2008). A study conducted by Moloney et al. (2019) found that white-striped free-tailed bat had the highest annual mortality rate of any native bat or bird species across Victorian wind farms during post-construction mortality surveys with an average of 387 individuals killed per year at each wind farm investigated.

Gould's Wattled Bat (*Chalinolobus gouldii*)

Gould's wattled bat is an agile, fast-flying species capable of flying at speeds of up to 36 km/h (Churchill, 2008). The species regularly forage 5-10 km from roost sites and occasionally up to 15 km away. While the species typically flies at canopy height along forest edges, creek lines and around paddock trees, it has been frequently recorded to collide with wind turbines in Australia (Hull and Cawthen, 2013; Moloney, Lumsden and Smales, 2019).

Yellow-bellied Sheath-tailed Bat (*Saccolaimus flaviventris*)

Yellow-bellied sheath-tailed bat is a fast, high-flying species that typically forages in a straight-line flight path above the canopy, but lower over open spaces and at the forest edge (Churchill, 2008). This species is known to collide with wind turbines in Qld (Ratch-Australia Corporation Limited, 2020, 2022).

It is noted that white-striped free-tailed bat, Gould's wattled bat and yellow-bellied sheath-tailed bat were positively identified across all acoustic surveys completed to date and were detected at most locations where bat detectors were deployed within the Project Area (Australasian Bat Society Inc, 2025).

5.2.2.3 Known At-risk Microbat Species

It is important to note that all microbat species detected in the acoustic surveys have the potential to fly at high-altitude during certain stages of their lifecycle (per comms, Greg Ford 2024). However, current knowledge of bat collision risk with wind turbines in Australia is currently limited by a lack of consistent monitoring methods and of publicly available information where microbat utilisation and/or mortality data has been collected.

Based on the known lifecycle and ecology of some species, as well as data collected from acoustic surveys, other open-air foraging, higher flying microbat species detected within the Project Area are considered to potentially fly at RSA height and be at risk of collision with wind turbines. These species include:

- northern free-tailed bat (*Chaerephon jobensis*)
- inland free-tailed bat (*Ozimops petersi*)
- Ride's free-tailed bat (*Ozimops ridei*)
- little forest bat (*Vespadelus vulturnus*).

These species comprised 27% of all positively identified calls and were detected across all acoustic surveys completed to date.

5.2.2.4 Flying-foxes

Little red flying-fox was recorded on five occasions within the Project Area, however black flying-fox (*Pteropus alecto*) has not been recorded in the Project Area to date but is considered to potentially occur. Multiple known flying fox roosts occur approximately 17 km east of the site in Chinchilla (Department of Climate Change, Energy, the Environment and Water, 2024b). Several ecological factors can influence flying-fox behaviour and potentially lead them to travel greater distances and utilise higher altitude flight paths, increasing the possibility of encountering wind turbines. These factors include seasonal migrations undertaken by some populations and situations where food scarcity within their usual foraging areas forces them to travel greater distances. While black flying-fox is known to fly at RSA height, the species' propensity to collide with turbines is unknown. For little red flying-fox, this species is also recorded to fly at RSA height and is known to occasionally collide with wind turbines in Queensland (Ratch-Australia Corporation Limited, 2020, 2022). No threatened flying-foxes listed under the EPBC Act or NC Act are considered likely to occur within the Project Area.

5.2.3 Collision Risk Assessment

The full risk assessment of likelihood and consequence of impact from the Project on at-risk bird and bat species is provided in **Appendix H**. A summary of the results of the risk assessment is provided below in **Table 5.6.** Summary results have been categorised based on species type. The precautionary principle was applied in determining at risk species and including identifying four listed species as having a high risk-rating (white-throated needletail, fork-tailed swift, painted honeyeater and south-eastern long-eared bat).

Table 5.6 Overall Risk Assessment Ratings for Bird and Bat Species

Common Name	Scientific Name	Likelihood	Consequence	Overall Risk Rating
Threatened and Migratory Bird Species				
fork-tailed swift	*Apus pacificus*	High	Moderate	**High**
painted honeyeater	*Grantiella picta*	High	Moderate	**High**
white-throated needletail	*Hirundapus caudacutus*	High	Moderate	**High**
glossy ibis	*Plegadis falcinellus*	High	Low	**Moderate**
glossy black-cockatoo (south-eastern)	*Calyptorhynchus lathami lathami*	Moderate	Moderate	**Moderate**
Australian painted snipe	*Rostratula australis*	Low	High	**Moderate**
Latham's snipe	*Gallinago hardwickii*	Low	Moderate	**Minor**
diamond firetail	*Stagonopleura guttata*	Low	Moderate	**Minor**
southern whiteface	*Aphelocephala leucopsis*	Low	Moderate	**Minor**
Threatened Bat Species				
south-eastern long-eared bat	*Nyctophilus corbeni*	High	Moderate	**High**
Non-listed Bird Species				
wedge-tailed eagle	*Aquila audax*	High	Low	**Moderate**
other at-risk diurnal raptors		High	Low	**Moderate**
at-risk corvid species		High	Low	**Moderate**
at-risk wetland birds		High	Low	**Moderate**
at-risk woodland birds		High	Low	**Moderate**
Non-listed Bats				
Sheath-tailed bats (*Emballonuridae*)		High	Low	**Moderate**
Free-tailed bats (*Molossidae*)		High	Low	**Moderate**
Evening bats (*Vespertilionidae*)		High	Low	**Moderate**
Megabats (*Pteropodidae*)		High	Low	**Moderate**

5.3 Collision Risk Modelling

Umwelt engaged Symbolix Australia (Symbolix) to undertake a feasibility assessment for collision risk modelling (CRM) using the fields of the BBUS data. In accordance with this requirement, species or where more relevant, species groups at-risk At-risk species that were assessed for their suitability for a CRM included:

- painted honeyeater
- white-throated needletail
- wedge-tailed eagle
- small raptors (black falcon, black kite, black-shouldered kite, brown falcon, brown goshawk, whistling kite)
- waterbirds (Australian white ibis, Australian wood duck, chestnut teal, glossy ibis, pacific black duck, straw-necked ibis, plumed whistling-duck).

Based on the data collected to date, Symbolix concluded:

- The number of surveys is sufficient to be confident of detecting listed species on site.
- Site placement appears to be good and provide representation of the entire site.
- There are not sufficient data to undertake distance correction to estimate the flight density for any species of interest.
- There are not sufficient data to model the height distribution to reliably estimate the proportion of all flights at rotor swept height for any species of interest.
- Discussions with Umwelt indicate it is unlikely that the smaller raptors would be similar in detectability to wedge-tailed eagle and therefore using these as surrogates in fitting a detection curve is unlikely to be a feasible scenario.
- Overall, survey effort appears to be sufficient to capture the activity rate. However, Symbolix conclude that collision risk modelling at the Project Area is not feasible for any listed species, waterbirds or raptors at this time. Instead, a qualitative collision assessment (**Appendix J** and **Section 5.2.3**), or scenario modelling may be undertaken for these species.

The complete CRM feasibility assessment supplied by Symbolix can be found in Appendix H**.**

6.0 Potential Impacts

Information on the potential impacts associated with the Project are outlined in the sections below. Avoidance, mitigation and management measures to reduce the extent or severity of these potential impacts on the relevant MNES values are outlined in **Section 7.0.**

Activities proposed as part of the Project have been categorised into three phases: construction, operation and maintenance, and decommissioning and rehabilitation.

6.1 Construction Phase

The greatest risk of adverse impact on MNES values and biodiversity more broadly from the Project, will occur during the construction phase. The Disturbance Footprint has been used as the assessment unit when undertaking the assessment of direct impacts. The extent of clearing represented by the Disturbance Footprint is considered to be a 'worst-case' scenario. When assessing potential indirect impacts resulting from the Project, the Disturbance Footprint and the wider surrounding area have been considered.

The construction activities to support the installation of turbines, associated electrical lines, ancillary infrastructure, access tracks and road upgrades will involve vegetation clearing, earth works, excavation and ground reinstatement. Potential direct and indirect impacts potentially associated with these activities are described below.

6.1.1 Direct Impacts

6.1.1.1 Vegetation Clearance and Habitat Loss

The Disturbance Footprint encompasses a total area of up to 1,240.2 ha. As per vegetation community mapping completed for the Project, this includes 131.0 ha (10.5%) of remnant vegetation and 18.6 ha (1.5%) of regrowth vegetation. The remaining 1,090.6 ha (88%) of the Disturbance Footprint is in a non-remnant condition and has been highly modified by clearing and cattle grazing.

Vegetation clearing required for the Project is a direct impact that will result in the loss of vegetation and associated habitat values, including habitats that are considered suitable to support listed threatened or migratory species. Potential impacts resulting from clearing vegetation can include:

- Reduced patch size of vegetation communities potentially compromising the viability of the community and associated habitat
- Loss of habitat causing a reduction of biological diversity or loss of local populations and genotypes
- Loss of, or disturbance to, microhabitat features such as tree hollows, leaf litter, ground timber and dense shrubs
- Loss of floristic diversity and the food resources this provides such as foliage, flowers, nectar, fruit and seeds
- Fragmentation of habitats resulting in reduced dispersal opportunities for fauna
- Reduction of abiotic features necessary to support vegetation communities and habitat types.

Construction of the Project and the associated vegetation clearing will be undertaken in a progressive or staged manner across the Disturbance Footprint. Areas within the Disturbance Footprint will only be cleared when construction activities are due to commence in that area. Although the resulting impact from clearing will be largely permanent (noting some nominated temporary construction areas, laydowns and access tracks will be rehabilitated once the construction phase is complete), staging will allow for impacts resulting from this activity to be limited at any one time to a relatively small area within the Disturbance Footprint and wider Project Area. For some localised species, this localised impact will allow time for individuals to temporarily relocate away from any disturbances. However, for species with a small home range or reduced dispersal capabilities (e.g. skinks, frogs) this may cause localised population depletion.

The maximum extent of potential direct impacts as a result of vegetation clearing within the Disturbance Footprint for MNES considered known or having a high or moderate likelihood of occurrence is provided in **Table 6.1.**

Table 6.1 Direct Impacts to MNES

MNES	Likelihood of Occurrence	Habitat Utilisation	Presence within the Project Area (ha)	Maximum Direct Impact within the Disturbance Footprint (ha)	Proportion of Disturbance Footprint within Project Area (%)	Figure Reference
Threatened Ecological Communities						
Brigalow TEC	Known	NA	492.9	16.8	**3.4%**	**Figure 8.2**
SEVT TEC	Known	NA	33.5	Completed avoidance	**0.0%**	**Figure 8.3**
Threatened Flora						
Homopholis belsonii	High	Suitable habitat	1,211.4	48.6	**4.0%**	Figure 8.4
Threatened Fauna						
painted honeyeater *Grantiella picta*	Known	Breeding, foraging and dispersal	2,933.6	125.0	**4.3%**	**Figure 8.7**
white-throated needletail *Hirundapus caudacutus*	Known	Non-breeding foraging and dispersal	12,975.6	1,161.8	**9.0%**	**Figure 8.8**
		Non-breeding potential roosting	1,199.3	78.4	**6.5%**	
south-eastern long-eared bat *Nyctophilus corbeni*	Known	Breeding, roosting and foraging	1,225.9	81.3	**6.6%**	**Figure 8.11**
		Dispersal and foraging	215.0	23.7	**11.0%**	
glossy black-cockatoo (south-eastern) *Calyptorhynchus lathami lathami*	Known	Breeding and foraging	179.5	14.1	**7.9%**	**Figure 8.5**
		Foraging and dispersal	2,084.4	95.7	**4.6%**	
grey snake	High	Shelter and foraging	332.3	23.8	**7.2%**	**Figure 8.15**

MNES	Likelihood of Occurrence	Habitat Utilisation	Presence within the Project Area (ha)	Maximum Direct Impact within the Disturbance Footprint (ha)	Proportion of Disturbance Footprint within Project Area (%)	Figure Reference
Hemiaspis damelii		Dispersal	3,634.9	302.7	**8.3%**	
koala *Phascolarctos cinereus*	High	Climate refugia	228.8	3.9	**1.7%**	**Figure 8.12**
		Breeding and foraging	1,554.1	89.8	**5.8%**	
		Shelter	10,900.2	1,089.2	**10.0%**	
		Dispersal	1,328.9	55.9	**4.2%**	
Latham's snipe *Gallinago hardwickii*	High	Foraging and roosting	615.5	27.6	**4.5%**	**Figure 8.16**
Australian painted snipe *Rostratula australis*	High	Breeding, foraging and dispersal	615.5	27.6	**4.5%**	**Figure 8.9**
yakka skink *Egernia rugosa*	Moderate	Suitable habitat	1,545.0	91.6	**5.9%**	**Figure 8.13**
Dunmall's snake *Furina dunmalli*	Moderate	Suitable habitat	1,352.9	92.9	**6.7%**	**Figure 8.14**
diamond firetail *Stagonopleura guttata*	Moderate	Breeding, foraging and dispersal	293.0	11.3	**3.9%**	**Figure 8.10**
		Marginal breeding, foraging and dispersal	426.0	11.8	**2.8%**	
southern whiteface *Aphelocephala leucopsis*	Moderate	Foraging, breeding and dispersal	1,490.8	108.0	**7.2%**	**Figure 8.6**
greater glider (southern and central)	Moderate	Likely or current breeding and denning	28.6	Complete avoidance	**0.0%**	**Figure 8.1**

MNES	Likelihood of Occurrence	Habitat Utilisation	Presence within the Project Area (ha)	Maximum Direct Impact within the Disturbance Footprint (ha)	Proportion of Disturbance Footprint within Project Area (%)	Figure Reference
Petauroides volans		Potential or future denning	10.1		**0.0%**	
		Foraging and dispersal	0.0		**0.0%**	
Migratory Species						
glossy ibis *Plegadis falcinellus*	Known	Foraging and roosting	615.5	27.6	**4.5%**	**Figure 8.17**
fork tailed swift *Apus pacificus*	High	Non-breeding foraging and dispersal	14,174.9	1,240.1	**8.7%**	**Figure 8.18**

6.1.1.2 Fauna Injury and Mortality

Physical injury or fatalities to fauna, including those listed under the EPBC Act, have the potential to occur during all phases of the Project, however the highest likelihood will be during construction activities that involve vegetation clearing, earthworks and trenching. Fauna may be injured or killed during construction principally through:

- Strike from moving vehicles/machinery – a key issue primarily for ground dwelling species, particularly those with poor mobility.
- Entrapment in habitat features during vegetation removal – particularly during tree felling for species that use tree hollows or hollow logs for roosting and denning.
- Entrapment in trenches/excavations – a key issue for ground dwelling species (reptiles and small mammals), particularly those that are active at night and cannot detect trenches to avoid.

The species which are most at risk of injuries and mortality are those that are cryptic, difficult to detect (i.e., harder to locate by fauna spotter-catchers) and/or have poorly developed dispersal mechanisms (i.e., small reptiles). Larger species with defined territories and movement patterns such as the koala are less likely to be at risk of direct mortality where appropriate mitigation measures are applied (i.e. utilising a dedicated koala fauna spotter-catcher to undertake ecological pre-clearance surveys and be present during clearing).

Mobile fauna, such as birds, are likely to relocate away from areas being disturbed and may not be adversely impacted in terms of direct physical trauma, unless fauna are nesting or are injured or killed by vehicle strike during dispersal. However, less mobile fauna, such as ground dwelling reptile and mammal species, nocturnal species that nest or roost in trees or tree hollows during the day (including arboreal mammals), may find it difficult to move away from roosts or active breeding places during construction activities.

Vehicle collision may result in fauna injury or mortality during all phases of the Project, but such risk is greater when high volumes of vehicle activity (including light vehicles, heavy vehicles and machinery) occur during the construction phase of the Project. The construction of the Project infrastructure, as well as the general use of access tracks and roads across the Disturbance Footprint will result in increased vehicle movements that may cause injury or death to fauna by vehicle strike. Mammals, reptiles, amphibians and birds are all at risk of vehicle strike, particularly those species that may utilise roads for thermoregulation, movement pathways or as foraging habitat.

In addition, entrapment of wildlife in trenches or other excavations associated with the Project's construction phase may also cause physical trauma to fauna. For example, open trenches for underground utilities are known to trap a wide variety of wildlife and can often result in fauna mortality. Species most likely to become trapped in pits or other excavations during construction of the Project are ground dwelling species that can move across modified areas and arboreal species which descend to the ground to disperse. It is intended that all underground reticulation will be trenched, with the infrastructure design currently includes an allowance for up to 229 km (Option 1) or 192 km (Option 2) of reticulation.

Management and mitigation measures proposed to reduce fauna impact and mortality through the construction and operation of the Project are detailed in **Section 7.0.**

6.1.1.3 Loss of Fauna Movement Opportunities

Vegetation clearance has the potential to dissect and disconnect vegetation communities, reducing the size of patches or potentially isolating them. Fauna movement may also be hindered by the installation of temporary ancillary infrastructure such as fences, as well as increased vehicle and plant activity on roads and tracks. This may:

- Reduce the availability of important habitat features (e.g., tall trees, vegetative groundcover) that threatened or migratory species may rely on to facilitate movement leading to reduced fauna movement opportunities.
- Create new gaps or increase the width of existing gaps between areas of potential habitat leading to reduced fauna movement.
- Reduce the genetic flow within species across the landscape.
- Impact on the success of seed dispersal and species recruitment.

Habitat within the Disturbance Footprint (and the wider Project Area) has been subject to historical clearing. Furthermore, ongoing cattle grazing and CSG development has resulted in the installation of artificial water points, including dam, tracks, firebreaks and fences leading to fragmentation.

EPBC Act species known of or considered likely to occur within the Project Area that are considered most susceptible to fragmentation impacts include threatened flora species and threatened fauna species with low dispersal ability, such as threatened reptiles. Individuals persisting within isolated habitat patches may undergo population declines due to the limited availability of essential habitat resources, deleterious impacts from stochastic events (e.g. fire / disease) as well as an absence of genetic diversity, usually afforded by the accessible neighbouring populations.

Additionally, the south-eastern long-eared bat is particularly susceptible to fragmentation, with both the *Action Plan for Australian Bats* and the *Action Plan for Australian Mammals identifying habitat loss and fragmentation as a past and current threat to the species* (Threatened Species Scientific Committee, 2015b). Given the species' requirements for large areas of land, smaller fragments may not provide viable habitat for the species (Woinarski, Burbidge and Harrison, 2014), leaving the bats more vulnerable to local extinction and reductions in fitness (Schulz and Lumsden, 2010).

6.1.2 Indirect Impacts

Construction activities required to be undertaken for the Project can potentially result in indirect impacts to MNES, such as:

- Increased edge effects in vegetation communities, reducing the condition of quality of remaining vegetation communities and habitat types.
- The establishment and spread of exotic weed and pest species that may displace native species, reduce or compete for native habitat resources, and alter fire regimes.
- Clearing activities resulting in an increased risk of erosion and sedimentation of waterbodies, reducing water quality and degrading aquatic habitats.
- Increased risk of contamination to land and waterways associated with activities such as vehicle or equipment maintenance, refuelling, or storage of chemicals.
- Changes in hydrology or flood regimes from the installation of infrastructure that may create a barrier to surface flow or increase stormwater run-off and velocities.

- Generation of dust emissions leading to excessive deposition of dust on vegetation suppressing photosynthesis and growth and reducing available foraging resources.
- Increased noise, light and vibration affecting foraging and breeding behaviour for some fauna species or resulting in avoidance and displacement of some species from preferred habitat areas.
- Periodic bursts of elevated noise and vibration (e.g. from earthworks) may startle and disorientate fauna species within proximity of the source.
- Increased human presence has the potential to disturb fauna, with fauna that roost or forage in adjacent areas being particularly vulnerable.
- Construction activities have the potential to increase the risk of fire, causing injury or loss of human life, loss of flora and vegetation, fauna and habitat, and impacting surface water quality.

It is important to note that during the construction phase the majority of these potential indirect impacts are likely to be short-term and confined to the area under construction at the time. However, it is acknowledged that some of these indirect impacts, such as increased edge effects, may cause longer term impacts.

Further information about potential indirect impacts relating is provided in the subsequent sections.

6.1.2.1 Exacerbation of Pest Fauna and Weeds

The Project Area was found to support a variety of introduced fauna including, feral pig, feral cat, cane toad, rabbit and European brown hare. These species, left unchecked, may flourish in newly disturbed areas, disperse into higher quality habitat areas and further contribute toward the degradation of fauna habitat within the Project Area. Poisoning by ingestion of cane toads is listed as a key threat to the frog-eating grey snake, with the potential impact of the cane toad on grey snake populations considered to be extremely high (Department of Climate Change, Energy, the Environment and Water, 2022b).

Given the prevalence of these species within the existing landscape, it is unlikely that the proposed works will result in further introductions of feral vertebrate species. However, habitat modification may facilitate larger populations of certain introduced species such as European brown hare where some native species will not be able to persist due to increased competition.

The introduction and/or spread of weeds is an indirect impact that can affect the integrity of remaining vegetation, increase the intensity and/or frequency of fires, as well as threaten the long-term survival of threatened fauna species. Within the Project Area weed species are common within cleared and regrowth vegetation, as well as being frequent throughout the remaining remnant vegetation patches. The weed species that pose the biggest threat to flora and vegetation values are high-biomass grass species including thatch grass (*Hyparrhenia rufa**) and buffel grass (*Cenchrus ciliaris**). High-biomass grass species can out-compete native vegetation as well as reduce the germination of native species. The high biomass of these species can also increase the intensity and / or frequency of fires posing a further risk to fauna habitat.

Invasive species could use roads, tracks and cleared infrastructure easements to move into areas that were not previously accessible to the invasive species and could be present in vehicles, equipment, machinery or materials that are used in construction. Biosecurity protocols will be in place to minimise the risk of introduction or exacerbation of pest fauna and weeds. These protocols will be detailed in and implemented via a Project-specific Weed and Pest Management Plan (refer to **Section 7.3.1**).

6.1.2.2 Edge Effects

Edge effects in ecology are identified as any difference in environment between the edge and interior of a particular vegetation patch (Murcia, 1995). Environmental characteristics which differ across edges cover many components of the environment including atmosphere (e.g., microclimate), vegetation (e.g., structure, composition, functioning), fauna and their habitat and soil (Murcia, 1995).

Edges and their effects can be created through clearing of vegetation, such as new edges created by roads and tracks. The distance the effect spreads from the edge, known as edge permeability, can be highly variable and depends upon many factors such as vulnerability of the ecosystems, degree of change in land use, intensity of this use and chance events (Murcia, 1995). The main environmental impacts to new edges created by the Project are expected to include:

- Modification of microclimate where new edges are created due to greater penetration of light and wind into the vegetation. Temperature extremes are greater, and humidity of air is generally less at the edge than in the interior of vegetation. This effect is known to increase in size if vegetation is dense or cover is high.
- Physical disturbance to vegetation at the edge. Ongoing damage to the edge of vegetation may occur due to grading and weed control of road edges and vehicle use. Similarly, unsealed tracks can facilitate an increase incident of fire ignitions.
- Changes to soil properties including compaction of the soil, less organic matter and higher erodibility.
- Introduction of weeds and pathogens through mud and dirt which falls off vehicles.
- Changes to vegetation through the above listed impacts.

Many of these potential environmental impacts including introduction of weeds and physical disturbance to vegetation can be managed through good site practices and vehicle restrictions. Measures to manage potential impacts are provided in **Section 7.0.**

6.1.2.3 Changes to Hydrological Regimes, Soil Erosion and Sedimentation

Activities such as vegetation clearing, excavation, and filling during construction, particularly near or within waterway corridors can alter local hydrology and increase the risk of erosion and sedimentation. These impacts may be short-term, resulting from inadequate sediment controls during active works, or long-term due to changes in flow patterns and volumes caused by the construction footprint.

Alterations to surface water regimes through the introduction of infrastructure that redirects flow or elevates stormwater runoff can significantly affect downstream environments. These changes can modify runoff characteristics, increase flood intensity, and destabilise waterway banks. Accelerated erosion may lead to vegetation decline, habitat disturbance, and greater sediment loads, contributing to reduced biodiversity both on-site and further downstream. Additional effects such as scouring and waterlogging can compromise soil integrity and ecosystem function. In-stream sediment deposition, particularly in culverts or under bridges may raise the channel bed, impeding fish movement. Furthermore, culverts that restrict the width of natural watercourses can cause increased flow velocities during high rainfall events, intensifying downstream erosion and disrupting aquatic habitats (Department of Transport and Main Roads, 2024c).

Within terrestrial environments, erosion-related impacts from the Project are anticipated primarily in areas of exposed soil, stockpile sites, or other disturbed locations near infrastructure such as access tracks and WTG during rainfall events. Changes in surface flow paths may locally affect terrestrial habitats, mainly through destabilisation of the substrate supporting vegetation, potentially reducing ground cover and ecological condition. These impacts are expected to be most prominent during construction and are likely to diminish over time as disturbed areas are progressively revegetated and soil stability is restored.

To minimise these risks, best-practice stormwater, erosion, and sediment control strategies will be implemented in accordance with Project-specific management plans, as stipulated in **Section 7.3.1**.

6.1.2.4 Contamination from Spills and Leaks

During the construction phase, the inappropriate disposal of liquid and solid wastes, including spills and leaks from transfers (fuel, chemicals) and inadequate storage could result in point-source contamination of surrounding land, including habitats of threatened and migratory species. Potential direct adverse impacts include toxic impacts on vegetation (resulting in degradation or loss), direct toxic impacts on fauna (from contact, inhalation or ingestion) or indirect impacts on fauna from habitat loss. Direct adverse impacts on surface and groundwater quality (including gilgai) are also possible.

These risks are considered low with the implementation of on-site spill management protocols, as detailed in **Section 7.3.2.5.**

6.1.2.5 Dust Impacts

Construction activities have the potential to generate dust emissions, primarily from vegetation clearing and wheel-generated dust on unsealed access tracks. Although temporary, these emissions may result in localised indirect impacts to vegetation, fauna and open waterbodies. Excessive deposition of dust on leaves of plants can suppress growth and photosynthesis and result in reduced habitat quality for fauna. High levels of airborne dust particles can irritate the respiratory systems of fauna and potentially result in ingestion of dust-coated seeds and other foods. Excessive deposition of dust on open water bodies may also degrade water quality, and overall habitat quality for fauna.

As detailed in **Section 7.3.2.9,** Project-specific management plans will be developed that will detail additional controls to manage increased dust emissions during the construction phase of the Project.

6.1.2.6 Increased Human Activities

Preliminary estimates of the construction workforce required for the Project indicate a peak of up to 300 personnel. Construction activities will be undertaken during standard daytime construction hours, between 6:30 am to 6:30 pm, Monday to Saturday. Any construction outside of these normal working hours will be undertaken with prior approval from Council.

Increased human activities within the Project Area and surrounds has the potential to disturb fauna, with fauna that roost or forage in adjacent areas being particularly vulnerable. Impacts can include disruption to foraging and roosting efficiency or deterring animals from using particular areas that may have been used prior to the works beginning (resulting in the effective reduction in habitat availability).

While temporary disturbances to fauna may occur, these impacts will be mitigated through the implementation of standard construction protocols and the and the *Preliminary Vegetation and Fauna Management Plan* (VFMP) (as detailed in **Section 7.3.1).** Construction of the Project and the associated vegetation clearing will be undertaken in a progressive or staged manner across the Disturbance Footprint. These measures will ensure that any effects associated with increased human presence remain localised, short-term, and low risk to fauna populations.

6.1.2.7 Increased Risk of Fire Incursion

The risk of fire incursion is primarily associated with construction activities, which have the potential to cause injury or loss of human life, damage to flora, fauna, and habitat, and impacts on surface water quality. Key factors that may contribute to an increased fire risk include:

- introduction of ignition sources such as vehicles, machinery, and equipment
- hot works activities, including welding and grinding
- introduction or spread of weed species that elevate fuel loads

The extent, severity, and frequency of fire events will influence whether impacts are short-term or long-term. However, with the implementation Project-specific management plans, and strict adherence to local bushfire regulations, particularly during the dry season, the overall fire risk is considered low. Further details of the bushfire mitigation measures are provided in **Section 7.3.2.8.**

6.1.2.8 Increased Noise, Vibration and Artificial Light

Artificial lighting can impact both nocturnal and diurnal fauna by disrupting natural behavioural patterns. Factors such as light quality (wavelength, colour), intensity, and duration can influence species differently. Increased light levels may lead to disorientation or attraction to artificial sources, raising the risk of collisions with structures. Additionally, artificial light can interfere with species' light-sensitive cycles, such as breeding and migration. Enhanced illumination may also benefit predators by increasing their hunting efficiency, potentially causing fauna to avoid certain areas due to a heightened perception of predation risk or making them more susceptible to predation.

Noise pollution is the '*elevation of natural ambient noise levels due to sound-generating human activities, which may have detrimental consequences*' (Department of Transport and Main Roads, 2024a). Noise can have both direct and indirect impacts on fauna (Department of Transport and Main Roads, 2024a), including:

- reduced ability of species to hear prey, predators, and mates
- reduced breeding success
- increased stress levels
- alterations in the timing, volume, and/or frequency of calling or activity, with potential energy costs associated with these changes
- modified development, physiology, and behaviour of species in aquatic systems
- hearing damage, which may be temporary or permanent
- lower survival rates
- reduced density, richness, and/or activity of affected fauna species in noisy habitats.

Research on Australian fauna indicates that birds are particularly susceptible to noise disturbance and are more likely to relocate from affected habitat areas, whereas mammal and reptile species tend to be less impacted (Lindenmayer *et al.*, 2016). Noise levels greater than existing ambient noise are expected during construction within the Disturbance Footprint. Sources of noise are likely to consist of noise in short, intense pulses from mobile plant equipment, and more prolonged noise, with consistent vibration, pitch and volume from generators and pumps, in addition from noise from vehicles. It is expected that excavation, construction and earthmoving associated with the Project will potentially cause disturbance to all groups of fauna. This may result in the temporary avoidance of the area for the duration of these activities.

Potential impacts from artificial lighting are expected to be minor, as construction activities will be undertaken during standard daytime construction hours, between 6:30 am to 6:30 pm, Monday to Saturday. Construction activities that may require artificial lighting include concreting pouring of the WTG, and testing/commissioning of the WTGs. Lighting may be required for the safe undertaking of these work activities.

Construction noise impacts will be temporary and only lasting for the duration of the construction phase (approximately 36 months). Noise, vibration and light impacts will be managed via a Project-specific CEMP which will include mitigations to minimise the overall risk of adverse impacts (as detailed in **Section 7.3.2**).

6.2 Operation and Maintenance Phase

Once the construction phase is complete the Project will become operational. As the Project is a wind farm development, a key risk for MNES that are bird and bat species during operation is collision with wind turbines. A detailed discussion on potential impacts on MNES related to vehicle strike, collisions, barotrauma and barrier effects is provided below in **Section 6.2.1.1** to **Section 6.2.2.5.**

6.2.1 Direct Impacts

6.2.1.1 Vehicle Strike

During operation, the risk of vehicle strike will be present along the access road corridors, particularly during peak times of wildlife activity (i.e. dawn and dusk). Although the frequency of vehicle movements during operations is expected to be minor, there is some risk of vehicle strike to fauna species including medium to large mammals, woodland birds which forage on the ground and reptiles. Of the known and potentially occurring EPBC Act listed species, those species considered vulnerable to vehicle strike include threatened reptiles and the koala.

6.2.1.2 Collision and/or Entanglement Risk

Turbine Infrastructure

Mortality at wind farms can result from birds or bats colliding with wind turbine blades, towers, nacelles, guy cable, power lines and meteorological masts. There are a range of factors that influence risk of collisions with such infrastructure including:

- physical attributes of a wind turbine generator (i.e. turbine dimensions, lighting)

- species-specific variables (i.e. abundance, flight behaviour, turbine avoidance capacity)
- biophysical attributes (i.e. landscape position, topography, vegetation type).

Factors falling under the latter two points are often interrelated and generally highly spatially and temporally variable by nature. Proximity to roost locations, migratory flight pathways and wetlands appear to be particularly important factors that influence bird and bat utilisation. A range of other factors not necessarily related to a site's biophysical state such as weather conditions (including wind speed, temperature and relative humidity) can also affect utilisation and therefore collision risk.

Data from Australia, Europe and North America indicate that the risk of collision is likely to be highest in any given area or landscape where species most susceptible to collision (i.e. migratory species, raptors, swifts, waterbirds, high flying microbats) most frequently occur and lowest in areas where activity of such species is comparatively low. The consequence of mortality resulting from collision for any given species is largely influenced by the species' population size and life history traits such as longevity and fecundity which combine to determine a species' capacity to Indirect Impacts.

Of the known and potentially occurring EPBC Act listed species, four species (white-throated needletail, painted honeyeater, south-eastern long-eared bat and fork-tailed swift) have been identified as being at High overall risk of collision-based impacts from the Project. Several non-listed microbat species are also at Moderate to High overall risk of impacts from the Project due to the probability that they may fly at RSA height, noting the very high level of uncertainty inherently associated with any estimate relating to whether each species rarely, occasionally or regularly flies at RSA height. The full risk assessment is provided in **Appendix H** which informs the Preliminary BBMP.

Overhead Transmission Line

Of the known and potentially occurring EPBC Act species, six are known to be susceptible to OHTL collision and electrocution: the glossy black-cockatoo (south-eastern), painted honeyeater, south-eastern long-eared bat, the fork-tailed swift and the white-throated needletail. These species are highly mobile and have complex and irregular movement patterns.

Electrocution is a recognised impact pathway for EPBC Act listed species capable of contacting electrical conductors (Department of Transport and Main Roads, 2024b). This occurs when an individual (i.e., bird or bat species) simultaneously contacts a phase conductor and an earthed component, resulting in electrocution (Bevanger, 1988). The risk of electrocution varies due to the considerable diversity in electrical infrastructure design and configuration (Bevanger, 1988). Research by Guil and Perez-Garcia (2022) indicates that avian electrocutions predominantly occur on distribution lines operating below 66 kV, where the reduced spacing between conductors and between conductors and support structures increases the likelihood of fatal contact. Conversely, transmission lines operating at higher voltages (especially those operating at a ≥150 kV) pose a lower electrocution risk due to the greater separation distances between conductors and from conductors to ground (Moreira *et al.*, 2023). Despite the lower electrocution risk associated with transmission lines, bird and bat-related electrical faults can still occur (Moreira *et al.*, 2023).

The Project will involve the construction of a 275 kV OHTL, with an approximate separation distance of 20 m between conductors and conductors to ground. In consideration of the separation distance between conductors, the potential of electrocution of MNES species (i.e., migratory birds/bats) is considered to be low.

Associated Infrastructure

Flying-foxes and arboreal mammals, including the greater glider (southern and central) are highly susceptible to entanglement in barbed-wire fences. Barbed-wire fencing is widespread throughout the Project Area, primarily used for stock management on the agricultural properties where the Project is located. Construction of new barbed wired fences will be avoided by the Project except where essential, such as for landowner purposes or as security or safety measures (e.g. security fencing around the substation compounds).

The Project design has undergone an avoidance and minimisation process to reduce impacts on vegetation and habitat for EPBC Act species. As a result, no barbed-wire fences will be constructed in greater glider (southern and central) denning or future denning habitat. No threatened flying-foxes are considered likely to occur within the Project Area.

6.2.2 Indirect Impacts

6.2.2.1 Barotrauma

Barotrauma is a phenomenon in which rapid air pressure changes cause tissue damage to air-containing structures, most notably the lungs of bats (Baerwald *et al.*, 2008). It has also been hypothesised that barotrauma can also result in non-lethal injuries, such as hearing impairments and other internal injuries that may result in bats succumbing to their injuries away from turbines (Lawson *et al.*, 2020). Due to the unique respiratory anatomy of birds, they are considered less susceptible to barotrauma than that of mammals, specifically bats (Baerwald *et al.*, 2008).

Research conducted in North America on the relative risk of barotrauma compared with direct collisions has resulted in mixed findings regarding the proportion of deaths that have been attributed to each factor (Ellison, 2012), though it appears the majority of fatalities are due to collisions (Grodsky *et al.*, 2011; Rollins *et al.*, 2012). Baerwald *et al.* (2008) found that barotrauma to the lungs and possibly other organs accounted for 46% of bats killed at turbines with 92% of the barotrauma in those bats displaying as haemorrhaging in the thoracic and/or abdominal cavities. However, Rollins *et al.* (2012) found that only 6% (5/81) of bats collected at a wind farm in Illinois had lesions possibly consistent with causation by barotrauma, leading the authors to conclude that “traumatic injury is the major cause of bat mortality at wind farms, and, at best, barotrauma is a minor etiology”. Lawson *et al.*, (2020) used computational fluid-dynamics to model changes in air pressure around moving turbine blades to assess the likelihood of bats occurring within areas of extremely high or lower pressure. The modelled air pressures were also compared to those associated with mortality in rats to assess the likelihood of barotrauma resulting in lethal or sub-lethal injuries to bats. Barotrauma was determined unlikely to be a leading cause of death supporting the alternative hypothesis that collisions are more likely to be the predominant pathway for bat mortalities as a result of operating turbines.

Due to the difficulty in diagnosing barotrauma unless the carcass is examined immediately after death, it is possible that cases attributed to barotrauma have been confused with traumatic injury associated with direct collisions. There is currently no published information on barotrauma in Australia.

Of the 15 bat species detected during field surveys, there is potential for a number of species to fly at RSA height, at least during some period of their lifecycle (one of which are listed under the EPBC Act: south-eastern long-eared bat).

However, in the absence of data from RSA height in the Project Area a very high level of uncertainty is inherently associated with any estimate relating to whether each species rarely, occasionally or regularly flies at RSA. The risk of barotrauma is therefore relevant to all microbat and megabat individuals when flying within RSA.

Impacts associated with any mortality of bird and bat species attributed to the Project will be managed through the implementation of the Preliminary BBMP.

6.2.2.2 Barrier Effects

Barrier effects can be caused by wind turbines disrupting links between feeding, roosting and/or nesting areas, or diverting flights, including migratory flights, around a wind farm (Hötker, Thomsen and Köster, 2006; Schuster, Bulling and Köppel, 2015). Migrating species that pass wind farms frequently such as swifts appear to be of higher concern than other species (Hötker, Thomsen and Köster, 2006). However, these effects on birds, possibly resulting in higher energy consumption or injuries as a result of collision, are not yet well known (Schuster, Bulling and Köppel, 2015). There is currently no published information on barrier effects from wind farms in Australia.

Construction and expansion of existing roads and access tracks has the potential to cause further barrier effects. Species with limited dispersal capacity over short distances (i.e. reptiles, frogs and smaller passerines) are likely to be most susceptible to these impacts.

6.2.2.3 Exacerbation of Pest Fauna and Weeds

Similar to the construction phase of the Project **(Section 6.1.2.1**), the prevalence of introduced flora and fauna species within the existing landscape suggests that the proposed works are unlikely to significantly exacerbate these impacts beyond their current levels. However, the movement of maintenance vehicles across along access tracks may inadvertently introduce or spread weed species.

Additionally, during the operation phase, inadequate waste management, such as the improper disposal of food scraps and organic waste may attract pest species, increasing competition with native fauna, disrupting local ecosystems, and posing biosecurity risks. To mitigate these impacts, effective waste management strategies, including secure waste containment, vehicle and machinery hygiene practices and regular disposal, will be implemented. Further details on these measures are provided in **Section 7.3.2.4.**

6.2.2.4 Increased Risk of Fire Incursion

Once the Project is operational, only a portion (approximately 46%) of the Disturbance Footprint will be maintained, including stabilisation, vegetation mowing, slashing and pruning (as necessary). The remainder of the Disturbance Footprint will be subject to rehabilitation and revegetation. Although operational footprint areas may act as fire breaks and limit fire spread, bushfire risk and existing fire regimes in areas of retained habitat should be unchanged from existing.

The primary land use of the Project Area is cattle grazing and it is anticipated that once the Project is operational, cattle grazing activities will still occur across most areas previously utilised at a similar intensity to current levels. This assisting in managing fuel loads in the ground layer through grazing. Based on this, it is considered unlikely that the Project will significantly alter existing fire regimes within the Project Area. Nonetheless, bushfire management protocols, as detailed in **Section 7.3.1** will be implemented.

6.2.2.5 Noise Impacts

Anthropogenic noise pollution can have detrimental impacts to wildlife throughout urban, rural and natural landscapes. Typical noise pollution includes a non-strike continuous but usually low decibel (dB) noise emitted from wind turbines, construction or a highway, whilst acute, impulse noise is short-lasting but usually a high dB (Dooling and Popper, 2007). The severity of the noise impact to the surrounding wildlife is determined by several factors including acoustic duration and intensity of the noise source and the biology and ecology of the surrounding species (Lawrence *et al.*, 2015).

Noise impacts can occur over an acute or chronic timescale, representing both sub-lethal and lethal impacts that have the potential to cause permanent damage; a factor that is influenced by acoustic duration, intensity, and the biology and ecology of the specific species (Lawrence *et al.*, 2015).

The potential effects of these types of noises on wildlife may include:

- Producing significant changes in behaviour (e.g. an animal having to go further from its nesting site to find food).
- Masking signals used by animals to communicate between conspecifics or recognise biological signals to reduce the distance signals can be detected.
- Impairing detection of sounds of predators and/or prey by masking.
- Decreasing hearing sensitivity temporarily or permanently; and/or increasing stress and altering reproductive and other hormone levels (Lawrence *et al.*, 2015).
- Directly perceiving noise as a threat resulting in anti-predatory behaviour or complete avoidance (Teff-Seker et al., 2022).

A Detailed Noise Assessment Report is being prepared for the Project. Noise impacts will be managed via the Project's CEMP, minimising the overall risk of adverse impacts.

6.3 Decommissioning and Rehabilitation Phase

The Project will be decommissioned in accordance with the Project's State and Commonwealth approval conditions.

Decommissioning a wind farm is the responsibility of the approval holder and will be undertaken in accordance with a *Decommissioning Management Plan* (DMP). Decommissioning activities that will be detailed in management plans will ensure that there are no adverse impacts on individuals, communities and the natural environment.

Rehabilitation activities will be undertaken in accordance with a *Preliminary Rehabilitation Plan* (PRP). The PRP is to detail the rehabilitation goals and objectives of the Project, site rehabilitation plans, the rehabilitation strategy to achieve the rehabilitation goals and objectives and define a maintenance period. During rehabilitation activities, only select areas of the site would be accessed and no clearing activities would be required.

Overall, impacts on ecological MNES values associated with the decommissioning and rehabilitation phases are expected to be minor. However, there is some potential for direct and indirect impacts to occur on threatened fauna species and their habitat.

Direct impacts may include:

- slashing and pruning of recolonised vegetation in specific locations, that may support threatened species habitat

- vehicle and other operational equipment strike.

Indirect impacts associated with decommissioning and rehabilitation are expected to be similar (although less severe) to construction phase impacts including:

- elevated noise and light
- soil erosion and sedimentation
- edge effects
- increased dust generation as a result of increased vehicles and machinery.

7.0 Avoidance, Mitigation and Management

The Proponent has implemented the hierarchy of management principles in the planning for and development of the Project. These principles and the order in which they have been applied is as follows:

- **avoid**: locating activities to avoid direct and indirect impacts on MNES
- **minimise**: minimising direct and indirect impacts where they cannot be completely avoided
- **mitigate**: implementing mitigation and management measures to reduce direct, indirect and cumulative impacts
- **remediate and rehabilitate**: actively remediate and rehabilitate impacted areas to promote long-term recovery
- **offset (where necessary)**: provide suitable offsets for activities that result in significant residual impacts to MNES even with the implementation of the above principles.

Section 7.1 to **Section 7.2** describes how impacts on MNES have been avoided and minimised for the Project and **Section 7.3** describes the mitigation and management measures.

7.1 Avoidance Measures

The avoidance of MNES values has been implemented demonstrated through both site selection of the Project Area and the development of the Disturbance Footprint. Significant revisions to both have occurred throughout the progressive and iterative design and development of the Project, as a result of community and landholder consultation, wind resource data, grid connectivity options and an understanding of on-ground constraints including the presence and distribution of MNES and habitat.

7.1.1 Site Selection

The Proponent has undertaken extensive desktop and site-based investigations since 2022, to determine the Project Area as the ideal location for a wind farm development. The approach to site selection for a wind farm incorporates the following key elements:

- environmental values
- wind resource
- transport access
- topography
- existing land use
- grid connection capacity and proximity.

The management of these key elements, in addition to community consultation, the consideration of construction and operational expenditure, power purchase agreements, and project-specific factors, require active management by the Proponent, throughout the Project lifecycle.

Sites with suitable qualities described above generally progress to a detailed due diligence process, layout development and engineering studies.

Wind resource is a critical factor for the selection of a suitable wind farm site. Typically, areas that the contain most wind resources are located on undulating terrain, along ridge lines, and separated from obstacles that create turbulence. A visual representation of this is shown in **Figure 7.1.**

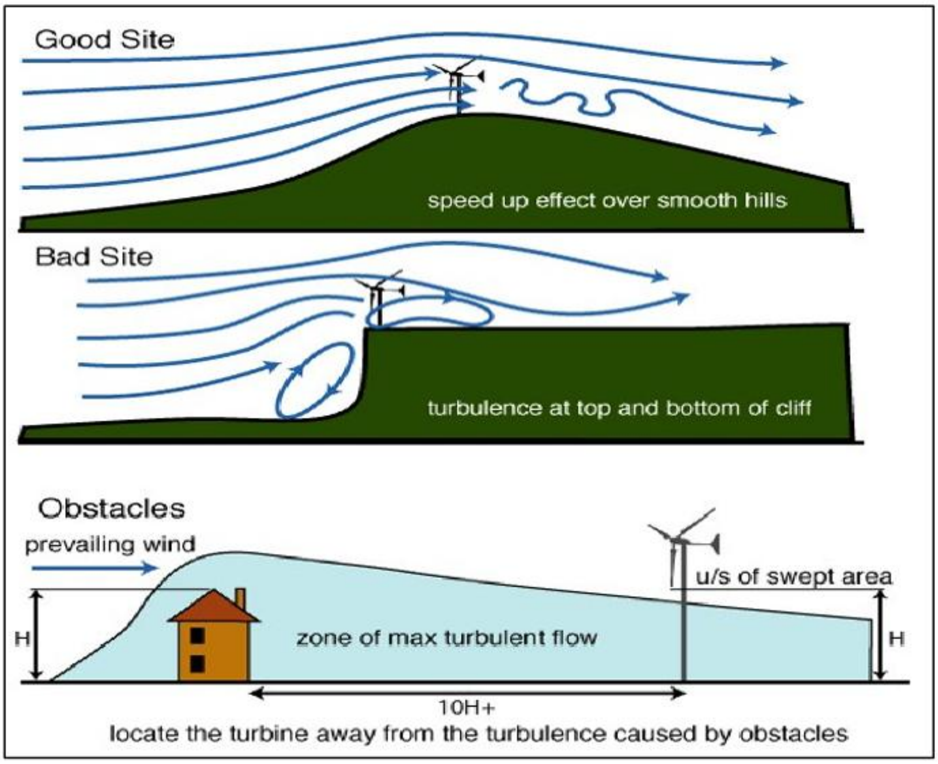


Figure 7.1 Example of Suitable Wind Turbine Locations

Source: Olabi, et al., 2021.

The Project Area is characterised by gentle slopes in the north and the west, with higher ground elevations in south-east. Ground elevations within the Project Area ranges between 310 m and 390 m AHD. Optimised wind data was developed in late 2024, which indicated that wind resources are the most prominent in the south-east, reflective of the higher ground elevations in this portion of the Project Area.

Due to the nature of the wind resource in the Project Area, the Proponent has deliberately taken a pragmatic and considered approach to site selection with a focus on minimising environmental impacts, whilst delivering an economically viable and productive project. An updated WTG layout was developed based on optimised wind data in late 2024. Prevailing north-easterly wind within the Project Area has influenced the orientation and alignment of turbines, as this is critical to optimising energy generation and delivering power at the lowest cost to consumers.

7.1.2 Design Approach

The Proponent has worked collaboratively with design engineers and stakeholders through a highly iterative design process to produce a Project design that aims to avoid impacts to environmental, heritage and social values whilst maintaining economical viable and complying with necessary engineering and design criteria.

The first design iteration was developed in July 2022, which encompassed approximately 10,276 ha of land and 112 proposed WTGs. This iteration proposed a maximised WTG layout that was based on grid pattern and the greatest extent of land available. The first iteration had limited consideration of potential site constraints. Since this time, more than 12 primary design iterations have been produced for the Project which accommodated various changes, technical findings and stakeholder inputs, which were progressively identified throughout the Project's development process. The inputs were based on findings from early due diligence assessments for planning and approvals, ecology, cultural heritage and flooding, as well as optimised wind data, a suite of technical assessments (including terrestrial ecology), and stakeholder consultation.

Across certain areas of the Project Area, full avoidance of MNES values has not been possible due to competing requirements to avoid existing agricultural and CSG activities, sensitive land uses and other technical considerations such as noise and shadow flicker. Further, certain MNES values when located linearly, e.g. parallel to an existing road, are impossible to fully avoid without complete fragmentation of the Project Area and/or a significant loss of available wind turbines which would render the Project uneconomic. Where avoidance has not been fully achieved, minimisation measures have been incorporated across the Project Area to reduce impacts on MNES values, as outlined in **Section 7.2.**

A frozen design iteration was developed in August 2025, which forms the basis for the proposed Project EPBC Act referral. A description of the frozen layout is provided in **Section 1.4.** Key ecological design considerations are provided in the following sub-sections.

7.1.2.1 General Principles

Existing environment within and surrounding the Project Area has been heavily modified and disturbed due to historic land use and operations. A key consideration of Project design was to minimise impacts to ecological values by siting Project infrastructure within non-remnant areas / pre-existing disturbed areas, where possible. Where this was not possible was due to competing stakeholder interests (i.e. proposed infrastructure and/or land use by landholders).

Additional design optimisation initiatives to further reduce impacts to remnant vegetation and ecological values include:

- Restriction of land clearing to the minimum required for the feasible construction of the wind farm. Future detailed design, geotechnical and land surveys will inform micro-siting of infrastructure with consideration of further reducing the extent of clearing required. As such, the expected area of clearing is likely to be less than that currently proposed.
- Where it cannot be avoided, reduce encroachment on Brigalow TEC to minimise fragmentation / edge effects (**Figure 7.2**).
- Laydowns, site offices, construction stockpiles and facilities, and other temporary activities will, where practicable, be placed in already disturbed or cleared areas. Where temporary construction activities cannot be placed in these areas, rehabilitation of the areas will be undertaken as soon as practicable after the facilities are no longer required.
- Ensuring that the use of existing tracks and roads is maximised and widened only where necessary. This will result in reduced vegetation clearing to minimise new disturbance and fragmentation of habitat.

- Access tracks and OHTL have been designed using direct routes where practicable, to minimise the total amount of clearing required.

Additional measures to minimise impacts that have been incorporated into the design of the Project include the use of infrastructure elements that do not preclude fauna movement. There will be limited new permanent fences constructed (except around the switching station or to replace fences removed for construction purposes).

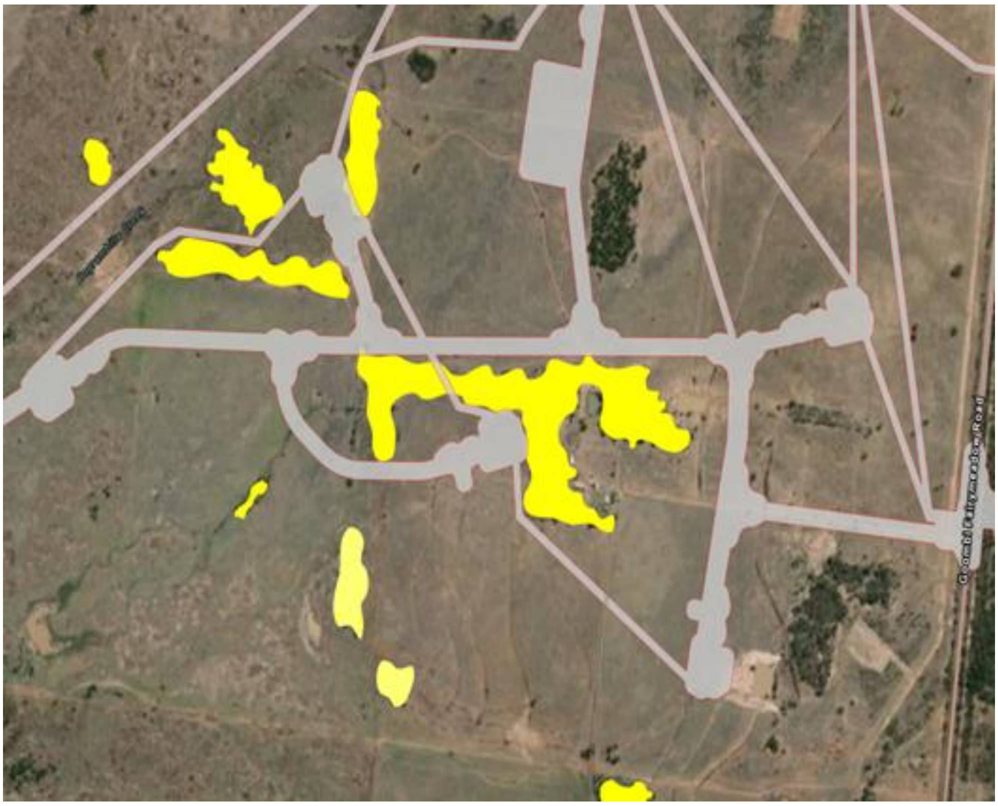


Figure 7.2 Example of Project avoidance on Brigalow TEC (yellow)

7.1.2.2 Ecology No-Go Zones

Following the implementation of general avoidance principles, specific ecological No-Go Zones were established where the Project has committed to no direct impacts. These include within:

- SEVT TEC.
- HES Wetlands.

Details of this avoidance are described below.

SEVT TEC Avoidance

Following completion of the field survey program and subsequent refinement of the TEC mapping, the Proponent undertook a review of the location and extent of mapped TECs in relation to the Project design. This review informed a redesign process, which involved the realignment of access tracks, wind turbine positioning and associated infrastructure. As a result, the SEVT TEC has been completely avoided (**Figure 7.3**) and the Project has committed to no direct impacts to this TEC.

Figure 7.3 Outcomes of design to show complete avoidance of SEVT TEC (green)

High Ecological Significance Wetland Avoidance

Two Queensland State-mapped HES wetlands are located within the central portion of the Project Area. Under optimal seasonal conditions, these wetlands are expected to function as congregation points for transient birds, including EPBC Act listed species, and provide potential climate refugia for the koala. The design refinement process has ensured the complete avoidance of HES wetland values, with a minimum avoidance buffer of 100 m maintained from both the Micro-siting Corridor and the Disturbance Footprint. (**Figure 7.4**).

Figure 7.4 Outcome of design to show complete avoidance of HES wetland areas (green), including a 100 m avoidance buffer (yellow)

7.2 Minimisation Actions

At a Project-wide level, the following avoidance and minimisation measures were incorporated as part of the design process and are listed in order of priority:

1. locating as much infrastructure as possible in areas of non-remnant vegetation
2. avoiding State Regulated Vegetation Management Mapped (DNRMMRRD, 2024b) 'Category C high-value regrowth' areas as far as practicable and placing infrastructure in these locations where this could not be reasonably avoided
3. following the application of the above measures, and where impacts to remnant Regulated Vegetation could not be avoided, prioritising impacts to least concern 'Category B remnant' Regulated Vegetation
4. seeking to only locate Project infrastructure within the following areas only where avoidance of these areas was not possible:
    a. Confirmed and potential TECs
    b. State mapped 'Category B' of concern remnant vegetation
    c. State mapped 'Category B' endangered remnant vegetation
    d. areas within close proximity to watercourses, drainage features and wetlands
    e. areas containing known threatened ecological values (e.g., threatened species under the EPBC Act) where avoidance of these areas was not possible.

Ground-truthed survey data was utilised to refine design effort for the Project as it became available, ensuring that impacts to threatened species, TECs and regulated vegetation was minimised to the greatest extent possible.

Where impacts on ecological values cannot be avoided, all reasonable efforts have and will be made to minimise Project impacts. For example, whilst the Brigalow TEC cannot be fully avoided due to its dispersed extent across the Project Area, design iterations have limited impacts such that only 3.4% of the total Disturbance Footprint intersects the 492.9 ha of Brigalow TEC within the Project Area. Similarly, impacts to *Homopholis belsonii* are limited to 4.0% and impacts to the fork tailed swift (non-breeding foraging and dispersal) are limited to 8.7%. Overall, the iterative design process has resulted in impacts to ecological values generally being 10% or less, with the majority of impacts significantly below 10%.

Vegetation clearing and the subsequent construction of the Project will occur progressively and in stages. By doing this, only a small subset of the Disturbance Footprint will be impacted at one time, thereby allowing opportunity for fauna that may be impacted by disturbance activities to relocate to adjacent areas that are not subject to disturbance. Indirect impacts resulting from the construction of the Project will be localised, mostly short-term, and actively managed as detailed in **Section 7.3**. Furthermore, the estimated clearing impacts detailed in **Table 6.1** present a worse-case scenario.

7.2.1 Micro-siting

Project infrastructure may be shifted within the proposed Micro-siting Corridor based on detailed design and the final infrastructure location and on-ground constraints such as threatened species and habitat. Additional field surveys specific to terrestrial ecology (as well as other types of constraints) will be conducted prior to construction, including pre-clearance surveys. This data will allow for increased accuracy and detail in mapped terrestrial ecological values within the Disturbance Footprint and identify the potential requirement to micro-site Project infrastructure to minimise impacts to listed ecological values. Ground-truthed ecological field data has strongly influenced the final design of the Project, with the avoidance hierarchy principles applied. Future refinement of the Disturbance Footprint will seek to avoid threatened species individuals and habitat, particularly species where significant impacts may occur.

Infrastructure micro-siting will aim to avoid or further minimise disturbance (where practicable) to:

- any identified threatened flora
- habitat features required by threatened fauna species including hollow bearing trees and stags, large hollow logs and complex boulder piles
- breeding habitat for threatened and listed fauna species
- riparian zones, including avoiding placement of turbines within 50 m of waterways.

7.3 Mitigation and Management Actions

Mitigation and management measures developed for the Project vary in scope and include both general and species-specific measures. These mitigation and management measures have been developed in direct response to the impacts identified in **Section 6.0,** with the intent of reducing any residual impacts to ecological values after the avoidance measures have been implemented. Management plans detailed in **Section 7.3.1** will be prepared for the Project once the necessary approvals are gained and will include performance criteria and general requirements / standard operational controls.

7.3.1 Management Plans

Potential Project impacts on terrestrial ecological values during all phases of the Project will be managed via Project specific management plans. Management plans that have been prepared for inclusion in this referral include:

- **Preliminary Bird and Bat Management Plan (Preliminary BBMP):** The Preliminary BBMP addresses operational impacts along with site-specific and regional considerations of wind farm-species interactions.
- **Preliminary Vegetation and Fauna Management Plan (Preliminary VFMP):** The Preliminary VFMP includes measures specific to the clearing of vegetation and habitat, including No-Go Zones, clearing methods and survey requirements.

Other management plans that may be prepared include a site-specific CEMP, an Erosion and Sediment Control Management Plan (ESCP), a Weed and Pest Management Plan, a Bushfire Management Plan (BMP), a PRP and a DMP.

Management plans will be prepared for the Project as required by regulatory approval processes and conditions of approval. Project management plans will be developed in accordance with relevant State and Commonwealth guidance, notably the Wind Farm Development State Code 23 (Department of Infrastructure, Local Government and Planning, 2025) and the DCCEEW Environmental Management Plan Guidelines (Department of Climate Change Energy, Environment and Water, 2024).

These will include proposed measures, timing of proposed measures, trigger levels, corrective actions, responsible parties and reporting requirements. All measures included in the management plans will be developed to be consistent with the S.M.A.R.T. principles, ensuring they are:

- **S**pecific – prescriptive, with no uncertainty or ambiguity around their purpose or implementation.
- **M**easurable – the status (i.e. success or failure) and outcomes/results can be measured.
- **A**chievable – through the chosen method of implementation, by the responsible personnel and within the specified timeframe.
- **R**elevant – to the action/impact being controlled and to the protected matter.
- **T**ime bound – Measures were given specific and achievable timeframes for implementation in relation to specific development activities or stages.

7.3.2 General Environmental Management and Mitigation Controls

Relevant measures for minimising/mitigating Project direct and indirect impacts on ecological values mentioned in **Section 6.0** within, adjacent and downstream of the Disturbance Footprint included in the abovementioned management plans are detailed below. Unknown and unpredictable impacts identified during monitoring and maintenance activities will be addressed through relevant incident management and emergency response procedures.

7.3.2.1 Vegetation and Native Flora Management

General mitigation measures pertaining to native flora and vegetation management are provided in the Preliminary VFMP and include but are not limited to the following:

- Site preparation, including the identification of areas to be cleared as well as No-Go Zones to avoid inadvertent clearing.
- Micro-siting of Project infrastructure will maximise the use of existing breaks in vegetation and areas of previously cleared land as much as practical.
- Disturbed areas that do not form part of the operational footprint will be re-profiled to stable and/or original contours, re-establishing surface drainage lines and other land features.
- Where clearing is proposed in areas of mapped potential habitat, pre-clearance surveys will include searches for the respective potentially occurring threatened flora species.
- Stockpile locations will be identified during the pre-clearing survey for storing soil and vegetation for rehabilitation purposes. These stockpile locations will be within previously cleared areas and will not impact on retained vegetation by spill or runoff.
- Rehabilitation will be undertaken in disturbed areas no longer required for active use or construction.
- Dust suppression measures, as detailed in **Section 7.3.2.9** will be implemented as required (i.e., on high wind days during extended dry periods).

7.3.2.2 Native Fauna Management

General mitigation measures pertaining to native fauna are provided below, including:

- A qualified fauna-spotter will be present at all times during clearing and undertake pre-clearance surveys. In areas of habitat planned to be cleared, qualified spotter-catchers will scout the area immediately prior to the commencement of disturbance for the presence of habitat trees and other features (i.e. coarse woody debris, hollow logs). This will include an inspection of terrestrial habitat features (hollows, potential dens, surface rocks and fallen logs) prior to disturbance using inspection cameras, or other methods deemed safe and suitable. Habitat features/trees will be marked using flagging tape.
- Where they cannot be retained, hollow bearing trees and stags will be 'slow felled' to minimise the chances of injury or death and will be inspected after felling by a qualified fauna spotter to confirm no injured wildlife are present.
- Where they cannot be retained in situ, habitat features (i.e. ground timber including hollow logs, large stones and boulders) will be relocated to adjacent area of suitable habitat if safe and practical (i.e. the relocation of habitat features must not cause unnecessary disturbance) at the discretion of the fauna spotter-catcher.
- Any open excavations will be checked for trapped fauna regularly. Trench ladders, ramps, sticks, ropes and moist hessian sacks at regular intervals (or similar) will be utilised where trenches or excavations are anticipated to remain open for extended periods (over 24 hours). This will help trapped fauna escape and/or survive until removed by a fauna spotter-catcher or site environmental officer.
- Fauna will be preferentially allowed to move off on their own accord. Where this does not occur and immediate relocation is required, as determined by the fauna spotter-catcher, located fauna (excluding koalas, see **Table 7.1**) will be moved to a nearby and suitable undisturbed location in a manner appropriate for the species, or if injured or orphaned, given to a wildlife veterinarian or licensed wildlife carer. *The Code of Practice - Care of sick, Injured or Orphaned Protected Animals in Queensland* (Department of Environment, Science and Innovation, 2020) will be used as a guide to inform fauna management strategies.
- As specified in **Section 7.3.2.3,** vehicles, plant and machinery operating on site will adhere to the site-specific speed limits of 40 km/hr on private roads and tracks to minimise dust generation throughout the construction and operation phase of the Project.
- Vegetation clearing will be conducted in a sequential and staged manner to guide fauna towards adjacent habitat and away from hazardous areas. Where possible, this process will include staged habitat removal, starting with the clearing of non-remnant areas first, followed by the clearing of regrowth and remnant areas at least 24 hours later. This approach aims to minimise impacts on fauna by allowing them sufficient time to relocate to safer adjacent habitats.
- Where there is the potential for an active breeding place to be tampered with, this will only be done in accordance with an approved and appropriate (low or high) Species Management Plan
- The death of a species listed under the NC Act or EPBC Act will be considered a reportable incident, with DETSI and DCCEEW to be notified by the proponent within a maximum period of two business days.

- Night works within or adjacent to areas of habitat will be avoided where practicable to reduce impacts from construction light and noise on threatened species (i.e. by interrupting male koala mating calls during breeding season). Where night works are required, lights will be directed to minimise light spill into adjacent habitat and the use of alternative, low-noise construction equipment considered.
- As specified in **Section 7.3.2.3**, during the operation phase, movement within the Project Area will be via approved access tracks only. The requirement to enter and traverse the Project Area will be minimised and limited to those required for essential Project activities.

7.3.2.3 Vehicle and Machinery Management Controls

Vehicle and machinery operations will be implemented to minimise environmental impact, including:

- During the construction stage of the Project, machinery and vehicles will remain within the Disturbance Footprint and will not enter exclusion areas or No-Go Zones. Once operational, light vehicle movement within the Project Area will be via approved access tracks only, except in the event of an emergency. The requirement to enter and traverse the Project Area will be minimised and limited to those required for essential Project activities.
- Personnel operating vehicles and machinery will remain within areas approved for operations (cleared work zones) and not drive off approved access tracks or enter exclusion areas or No-Go Zones.
- Vehicle speed limits (maximum 40 km/hr) will apply throughout construction and operation phase of the Project on private roads and tracks.

7.3.2.4 Pests, Weeds and Disease Management

Several mitigation and management measures have been developed to minimise the proliferation and/or introduction of introduced weeds and pests. These measures will be managed through the implementation of the Weed and Pest Management Plan. The plan will define measures, objectives, performance criteria and monitoring activities required for the relevant Project Area, including:

- Weed and pest monitoring will be undertaken as per the Weed and Pest Management Plan.
- Chemical treatment adjacent to sensitive areas should be avoided, where possible. If chemical treatment is required, spot spraying methods are preferred.
- All personnel accessing the Project Area will be made aware of significant weed species (these may be listed species or ones of key concern to landholders) known to the Project Area via toolbox meetings and notices in the common areas of the site office.
- Site vehicles (mobile plant including light vehicles) and equipment are to arrive on site 'clean' of weed seeds and other organic matter.
- Any Project equipment sourced from international origins will be subject to State and Commonwealth quarantine protocols.
- No viable weed species are to be mulched or chipped in rehabilitation works.
- The siting of stockpile areas, spills dumps, refuse areas and vehicle parking areas will be within areas already cleared or proposed to be cleared to minimise feral animal occurrences.

- All food scraps are to be placed into designated waste bins and their lids securely closed to reduce attracting pest fauna on site, such as the cane toad, red fox, feral cat, dog, house mouse or black rat.

7.3.2.5 Chemical Use, Fuel Storage and Land Contamination Management

- All management measures, monitoring and recording, and corrective actions in response to the risk of the spill of contaminants during construction activities are detailed in the CEMP.
- All fuels, chemicals and liquids are to be stored in an impervious bunded area.
- All personnel will be trained in the use of spill kits as part of the site induction process.
- All spills will be reported to the Environment Manager.
- Refuelling will not occur within 50 m of drainage lines, waterways or high value vegetation (Endangered or Of Concern regional ecosystems).
- Emergency spill kits are to be kept on site at all times.

7.3.2.6 Waste Management

Waste will be activity managed in accordance with the CEMP. The following control measures will be implemented to minimise environmental impact and ensure compliance:

- Waste will be appropriately managed to avoid or minimise the potential for:
  - Release of hazardous waste to land or waters either through inappropriate waste disposal or accidental release.
  - Inadequate waste management leading to inappropriate disposal or inadequate re-use and recycling.
  - Impacts to the environment, land use or well-being of people resulting from inappropriate storage, handling or disposal of waste.
- All waste generated will be stored, handled and transported in accordance with the appropriate standards and regulatory requirements
- Waste material (including domestic waste) will be collected and stored in covered bins to prevent loss and scavenging by animals.
- All regulated wastes will be transported offsite by a licensed contractor to a suitably licensed facility for reuse, recycling or disposal.
- All construction waste materials will be removed from site once construction activities are completed.
- All sites will be kept free from litter.
- Items of general waste are not to be disposed of in open trench or pits.

7.3.2.7 Stormwater, Soil Erosion and Sedimentation Management

A range of mitigation measures have been identified to minimise potential impacts from the Project on both onsite and downstream environments, particularly in relation to sediment and erosion control and stormwater quality. The mitigation measure will include, but will not be limited to the following:

- Erosion and sediment controls will be established around topsoil stockpiles to minimise the loss of soil during rain and slumping events. Stockpiles and sediment controls are to be routinely checked.
- If necessary, soil stripping will not be undertaken in periods of high wind, rainfall or within the immediate period after rainfall to help avoid soil degradation.
- Topsoil stockpiles will be located away from watercourses, natural drainage and flow lines to minimise erosion and waterway sedimentation.
- Where new crossings or improvements to existing tracks are required, the construction methodology will be dependent upon the size of the watercourse and will be in line with the *Queensland Accepted development requirements for operational work that is constructing or raising waterway barrier works* (DPI, 2018).
- Watercourse crossing points will be adequately stabilised to prevent erosion.
- Clean stormwater will be diverted around land disturbed for ancillary aboveground infrastructure wherever practical.
- Where a watercourse crossing must be established, bed level crossings will be prioritised in order avoid impeding natural flow regions.
- Watercourse crossings to be limited to those strictly necessary for the construction of the Project.
- Removal of riparian vegetation at creek and crossings will be minimised and vegetation connectivity across riparian zones will be maintained where possible.
- Construction activities will be managed to minimise interference with overland flow paths.
- Safe storage of fuels, chemicals and hydrocarbon materials to ensure that any spillages are safely contained. These will be stored >50 m from watercourses, ephemeral wetlands and drainage lines, with an on-site spill kit available to manage potential incidents.
- During all phases of the Project, appropriate spill response equipment will be available on site and/or with vehicles and regularly maintained.

The ESCP will be finalised during detailed design and implemented during construction to minimise sediment-laden runoff leaving the site.

7.3.2.8 Bushfire Management

General mitigation measures pertaining to bushfire management are provided below and will be detailed within the BMP that will be prepared for the Project. Project mitigation and management measures may include, but not be limited to:

- Fire weather warnings will be monitored daily and communicated to work teams.
- Adequate setbacks, access and firefighting equipment facilities are to be maintained onsite during all stages of the Project.
- Vehicles shall be regularly inspected for build-up of combustible materials including grass and debris, to ensure fire risk is low.
- Burning of cleared vegetation will be prohibited.
- Access roads will meet the design specifications for a heavy attack fire-fighter vehicle.

- The construction and operation phases of the Project will have access to water supplies which are suitable for fire-fighting.
- Machinery capable of causing an ignition would not be used during bushfire danger weather, including total fire ban days.
- If "hot-work" activities are to occur on site then a risk assessment will be completed considering forecast weather, fire hazard ratings and site conditions prior to the activity occurring
- Reflective wayfinding signage must be installed at the intersection of access roads and identify the location of Project infrastructure and fire-fighter water storage tanks.

7.3.2.9 Dust and Air Quality Management

General mitigation measures pertaining to dust and air quality will be detailed within the CEMP that will be prepared for the Project. Project mitigation and management measures may include, but not be limited to:

- Construction activities will generally be limited to daylight hours, with standard construction hours expected to be 6:30 AM to 6:30 PM, Monday to Saturday.
- Site personnel will be made aware through general site induction and training of the potential to generate dust emissions and mitigation and management measures that will be implemented.
- Vehicles, plant and equipment will be regularly maintained to ensure that all machinery is in good working order and does not generate excessive air emissions.
- As specified in **Section 7.3.2.3,** vehicles, plant and machinery operating on site will adhere to the site-specific speed limits of 40 km/hr on private roads and tracks, to minimise dust generation throughout the construction and operation phase of the Project.
- As specified in **Section 7.3.2.3,** vehicles and personnel will only enter and exit the site at designated access points from designated access tracks and roads. During operation, vehicles, plant, machinery and equipment will always remain on formed access tracks unless agreed otherwise for specific Project activities. This will prevent any unnecessary land and vegetation disturbance.

7.3.2.10 Noise and Vibration Management

Elevated noise levels and vibration will be managed via the Project's CEMP. The following general mitigation and management measures will be implemented throughout the construction and operational phases of the Project to mitigate the risk to flora, fauna and vegetation, including:

- Noise abatement devices (e.g. mufflers, silencers and screens) will be utilised where relevant.
- Equipment and machinery will be shut down (or throttled down if shut down is not feasible) when not in use.
- Construction activities will generally be limited to daylight hours, with standard construction hours expected to be 6:30 AM to 6:30 PM, Monday to Saturday.

7.3.2.11 Artificial Light Management

General mitigation measures pertaining to artificial light management are provided below and will be detailed in the CEMP. Best practice control measures will be undertaken in accordance with the *National Light Pollution Guidelines* (Department of Climate Change, Energy, the Environment and Water, 2023d) and *Light pollution reduction: Methods to reduce the environmental impact of artificial light at night* (Schroer and Holker, 2017). Measures will include, but will not be limited to the following:

- Construction activities will generally be limited to daylight hours, with standard construction hours expected to be 6:30 AM to 6:03 PM, Monday to Saturday.
- Light requirements identified during the detailed design will consider positioning security lighting at permanent facilities to minimise the potential for lighting impacts on fauna.
- If works are required to be undertaken at night, directional lighting will be used and directed away from vegetated areas where possible. Where practical, warm-white, yellow, or amber or red-light colours will be used. Blue and violet spectral components will be avoided or minimised.
- Timers, sensors and dimmers will be used to keep light use to a minimum in areas near fauna habitat.

7.3.3 MNES-specific Mitigation Measures

Mitigation and management measures specific to the known and potentially occurring MNES within the Project Area are detailed in **Table 7.1.** Key threatening processes as detailed in made/adopted National Recovery Plans, SPRAT Profiles, Threat Abatement Plans, Approved Conservation Advices or Listing Advices have been reviewed in order to propose meaningful mitigation and management measures that take into consideration species-specific threats. Measures proposed incorporate industry best practices, statutory or policy-based mitigation and management of MNES, or peer reviewed literature, where available.

Greater consideration has been given to MNES values that may be particularly sensitive to potential Project-related impacts and to MNES that may have existing threatening processes exacerbated by Project activities.

Table 7.1 Species-specific Mitigation Measures

Phase	Measures
Threatened Flora	
Pre-construction and construction	• Vegetation outside of the clearing area will not be tampered with or used in any way. For example, trees outside of the clearing area will not be used as signposts or markers, will not have objects tied to them and will not be interfered with or used for fencing. • Areas proposed to be cleared will be clearly identified using visible markers such as flagging tape, signage or other appropriate markers to ensure no accident clearing outside of the approved Disturbance Footprint. • The sighting of Project infrastructure will aim to minimise fragmentation of potential habitat as much as possible (i.e. clear edges rather than dissect patches) to maintain core patch and population viability. Vegetation clearing is to be kept to a minimum necessary for the construction of the Project. • Threatened flora also considered a protected plant under the NC Act. The *Nature Conservation (Plants) Regulation 2020* outlines the regulatory requirements for managing potential impacts on a protected plant. Should the Project's clearing impact area (footprint inclusive of a 100 m buffer) contain high risk trigger area mapping or protected plant individuals, a protected plants permit will be required. The permit application will need to be supported by a protected plants assessment and survey in accordance with the *Flora Survey Guidelines – Protected Plants* (DES, 2020), and if necessary an impact management plan will be developed and implemented. If required, this will be developed in accordance with the *Queensland Government Nature Conservation (Plants) Regulation 2020 – Protected Plants Assessment Guidelines* (DES, 2021). This survey and the targeted threatened flora surveys would be undertaken simultaneously if possible. • Implementation of the Unexpected Finds Protocol (see **Section 7.3.3.1**) will include targeted threatened flora surveys within potential habitat for these species to inform potential changes during the detailed design phase to avoid or minimise impacts where possible. If any individuals or populations are located during the targeted surveys, a detailed account of their occurrence must be recorded including number of individuals, GPS location and extent. The plants or population area including a 5 m buffer must be clearly identified. If the species is located, surveys will be followed by updating habitat mapping, determination of avoidance and mitigation strategies, updating significant residual impact assessments and determining next steps in consultation with DCCEEW.
All phases	• All requirements within the Weed and Pest Management Plan will be implemented to minimise the introduction and spread of pest and weed species within areas of habitat.

Phase	Measures
	• Site inspections will be undertaken during operation to ensure compliance with the Impact Management Plan (if required under the NC Act) and to ensure there is no further loss or decline of known populations of threatened flora species and associated habitat. • Toolbox talks for all site personnel are to be held to raise awareness of the location and significance of threatened species together with the management measures necessary to avoid potential impacts to the species. • Rehabilitation will be undertaken in accordance with the PRP. • Wherever landholder seed mix is not requested, rehabilitation works in adjacent to threatened flora habitat will prioritise the use of native species, to reduce increased incursion of weed species and/or exotic grasses (i.e., buffel) within the Project Area. • Appropriate erosion and sediment control measures are to be implemented in accordance with the ESCP to reduce the potential for run-off, sedimentation and erosion.
All known and potentially occurring MNES bird and bat species	
Pre-construction and construction	• Within suitable habitat for the painted honeyeater, micro-siting will aim to retain trees with heavy loads of suitable mistletoe (i.e. *Amyena spp*.) wherever possible. • During the breeding season for painted honeyeater (October to March), nest searches will be undertaken within areas of suitable habitat during pre-clearance surveys. If an active nest/s is located, this will be managed in accordance with protocols developed under a preapproved High-Risk Species Management Program (High-risk SMP)
Pre-commissioning and Operation	• The Preliminary BBMP will provide proposed trigger thresholds for listed threatened and migratory species and present the adaptive management framework to be initiated in the event that a trigger threshold is reached or exceeded. **Bird and Bat Utilisation Surveys** • Post-commissioning BBUS will be conducted for the first two years of operation and are to be conducted twice annually to coincide with the seasonal migration of EPBC Act and NC Act listed birds, including white-throated needletail and fork-tailed swift. Surveys will be conducted between October and April, with the preferred timing being late October to November and February to mid-March. The requirement for ongoing post-commissioning bird utilisation surveys will be reviewed after the initial two years of surveying. • Full details of the BBUS monitoring are provided in the Preliminary BBMP. The BBUS will consist of: ○ Post-commissioning vantage point surveys will be conducted including the undertaking of point-based visual and aural counts of bird species within the Project Area.

Phase	Measures
	○ Diurnal bird area adopting a standard two hectare, 20-minute search of habitat while recording all bird species observed or heard. ○ Raptor-specific surveys and waterbird surveys will be undertaken in the same regard, due to their particular vulnerability to collision. ○ Microchiropteran (microbat) echolocation call detectors (Anabat Swift units) will be placed at hub height on turbines to determine bat presence at heights above canopy. ○ Due to the species susceptibility to habitat fragmentation, as detailed in the Preliminary VFMP, a south-eastern long-eared bat monitoring program will commence after commissioning of the first turbine and will occur annually for the first two years. Annual surveys will be conducted in March to reflect the recommended survey season (October to April) and replicate those surveys conducted during Project baseline surveys. Details will be specified in the final VFMP, however, surveys during the monitoring program should occur at the four sites where records of the species were previously confirmed rough harp trapping methods. The aim of this survey is to assess the ongoing persistence of the species within the Project Area following construction impacts. Adaptive management will be implemented in response to monitoring results. **Bird and Bat Carcass Collection** • All operational turbines will be surveyed for carcasses, as detailed in the Preliminary BBMP.
All phases	• All requirements within the Weed and Pest Management Plan will be implemented to minimise the introduction and spread of pest and weed species within areas of habitat. • As outlined in the Preliminary VFMP, a single death resulting from Project operations will be a reportable incident to DCCEEW.
Koala	
Pre-construction and construction	• Where clearing is proposed for areas of koala habitat (all utilisation types), a dedicated suitably qualified fauna spotter-catcher must be present. Prior to vegetation clearing commencing, the fauna spotter-catcher will include canopy searches for koalas. If a koala is located during the pre-clearance survey or during clearing activities: ○ The individual must not be forcibly relocated ○ Any tree which houses a koala as well as any tree with a crown that overlaps that tree will not be cleared until the koala vacates the tree on its own volition ○ Allow a clearing buffer surrounding the tree, equal to the height of the tree or deemed suitable by the fauna spotter-catcher

Phase	Measures
	○ Any injured koala (and fauna in general) should be transported to a wildlife veterinarian or recognised wildlife carer ○ Requirements for koalas subject to handling to be examined and if suspected of Chlamydia infection will be taken to a predesignated wildlife veterinarian/wildlife care facility for treatment prior to release • Where micro-siting opportunities exist, non-juvenile (i.e. DBH > 10 cm) LIKTs will be preferentially retained.
All phases	• Management of koalas within the Project Area during all phases of the Project will follow additional procedures in accordance with current Queensland regulatory guidelines (if a koala is detected within the Disturbance Footprint or immediately adjacent during pre-clearance surveys), as detailed in the *Code of Practice for Rehabilitation of Sick, Injured, or Orphaned Koalas in Queensland* (Department of Environment and Science, 2023). • If a koala is sighted within the Project Area, the details of this observation will be communicated via the daily toolbox and on notices in the common areas of the site office in order to increase vigilance in the area and compliance with enforced speed limits. ○ The presence of exposed trenches or holes which may entrap dispersing, ground-dwelling MNES species such as the koala should be minimised as much as practical. Where open trenches will occur for prolonged periods (over 72 hours), trench ladders, ramps, sticks, ropes and the use of moist hessian sacks at regular intervals (or similar) will be utilised to help trapped fauna escape and/or survive until removed by a fauna spotter-catcher. ○ Revegetation works in areas of potential koala habitat cleared for the Project will consider the recommendations outlined in the *Revegetating koala habitat* document (Beale, Marsh & Youngentob, 2022). • To minimise the chances of a collision, speed limits (in private areas) will be reduced to 40 km/hr or less, as specified in the Preliminary VFMP. • As outlined in the Preliminary VFMP, a koala death resulting from Project construction and operations will be a reportable incident to DCCEEW. • All requirements within the Weed and Pest Management Plan will be implemented to minimise the introduction and spread of pest and weed species within areas of habitat.
Threatened reptiles	
Pre-construction and construction	• To account for unexpected finds, prior to the clearing of vegetation (i.e., areas mapped as suitable habitat), a qualified fauna spotter-catcher will complete ground area (i.e. areas containing coarse woody debris, rocks and logs, decorticating bark and ground litter) inspections. Clearing will only be conducted where required necessary and suitable microhabitat/ shelter features such as large fallen logs will be relocated to areas of adjacent potential habitat.

Phase	Measures
	• In the event that an individual is identified during pre-clearance surveys, located fauna will be moved to a nearby and suitable undisturbed location in a manner appropriate for the species, or if injured or orphaned, given to a veterinarian or licensed wildlife carer. • Micro-siting of Project infrastructure will aim to maximise the vegetated buffer surrounding suitable habitat to limit edge effects. • In the event that a yakka skink colony is identified during pre-clearance surveys, clearing will only be conducted where required necessary and suitable microhabitat/ shelter features such as large fallen logs are relocated to areas of adjacent potential habitat. Furthermore, the identified yakka skink colony will be managed in accordance with the protocols developed under a pre-approved High-risk SMP.
All phases	• All requirements within the Weed and Pest Management Plan will be implemented to minimise the introduction and spread of pest and weed species within areas of habitat. • To minimise the chances of a collision, speed limits (in private areas) will be reduced to 40 km/hr or less, as specified in the Preliminary VFMP. • As outlined in the Preliminary VFMP, a single death resulting from Project operations will be a reportable incident to DCCEEW.
Grey snake	
Pre-construction and construction	• Pre-clearance surveys will be conducted in accordance with the Preliminary VFMP. Clearing will only be conducted where required necessary and suitable microhabitat/ shelter features such as large fallen logs are relocated to areas of adjacent potential habitat. • As detailed in the Preliminary VFMP, in the wet season preceding construction, suitably qualified ecologists will conduct targeted nocturnal surveys for grey snake. Nocturnal surveys will occur in suitable conditions, preferably following heavy rainfall events (i.e. enough rainfall to inundate soil cracks and gilgais), as recommended in Rowland (2012). Found individuals will be relocated to suitable gilgai habitat, at least 100 m away to adjacent and functionally connected habitat outside the Disturbance Footprint. • Sequential clearing will be conducted to allow individuals to disperse out of the clearing area towards retained habitat.
All phases	• To minimise the chances of a collision, speed limits (in private areas) will be reduced to 40 km/hr or less, as specified in the Preliminary VFMP.

Phase	Measures
	• Light vehicle movement within the Project Area will be via approved access tracks only, except in the event of an emergency. The requirement to enter and traverse the Project Area will be minimised and limited to those required for essential Project activities. • Vehicle access to gilgai habitat at night will be restricted following wet weather (rainfall > 1 mm). • All requirements within the Weed and Pest Management Plan will be implemented to minimise the introduction and spread of pest and weed species within areas of habitat. • Best practice erosion and sediment control measures are to be implemented to maintain the condition of gilgai habitat that will be retained. • The safe storage of fuels, chemicals and hydrocarbon materials will be adhered to ensure that any spillages are safely contained. These will be stored >50 m from watercourses drainage lines, and ephemeral wetlands with an on-site spill kit available to manage potential incidents. • As outlined in the Preliminary VFMP, a single death resulting from Project operations will be a reportable incident to DCCEEW.
Latham's snipe, Australian painted snipe and glossy ibis	
All phases	• As outlined in the Preliminary VFMP, a wetland migratory bird death resulting from Project operations will be a reportable incident to DCCEEW. • No clearing will occur within 100 m from the identified HES Palustrine Wetlands. No dams will be completely drained as a result of the Project. • All requirements within the Weed and Pest Management Plan will be implemented to minimise the introduction and spread of pest and weed species within areas of habitat. • To minimise the chances of a collision, speed limits (in private areas) will be reduced to 40 km/hr or less, as specified in the Preliminary VFMP.
Threatened Ecological Communities	
Pre-construction and construction	• During the micro-siting of Project infrastructure, all reasonable efforts will be made to ensure clearing works do not intersect or dissect a patch of Brigalow TEC in a way that reduces the patch size below 0.5 ha as per the Approved Conservation Advice (Threatened Species Scientific Committee, 2013) • The Disturbance Footprint has been designed to avoid all direct impacts to SEVT TEC

Phase	Measures
	• Site preparation must include the identification of areas to be cleared as well as No-Go Zones to avoid inadvertent clearing.
All phases	• Implementation of dust suppression measures (water truck) to minimise patch degradation caused by increased dust. • All requirements within the Weed and Pest Management Plan will be implemented to minimise the introduction and spread of pest and weed species within areas of habitat. • No stockpiling of construction materials including excavated soil will occur in areas identified as TEC. • Rehabilitation will be undertaken in accordance with the PRP • Best practice sediment and erosion control measures will be implemented for the life of the Project, as guided by a site-specific ESCP.

7.3.3.1 Targeted Flora Unexpected Finds Protocol

This section defines an adaptive management response which is to be engaged if unexpected MNES finds are observed during pre-clearance surveys or any other surveys undertaken prior to construction. As the process for managing threatened reptiles and mammals located during pre-clearance surveys is defined in **Table 7.1** and for threatened or migratory birds will be defined in the Project's Preliminary BBMP, this protocol relates specifically to threatened flora with a high likelihood of occurrence. Whilst the occurrence of new MNES is considered unlikely, the intent of this protocol is to ensure the appropriate adaptive management response is implemented and adverse impacts mitigated should they be discovered.

The first step in the targeted flora unexpected finds protocol is to undertake detailed flora surveys of mapped potential habitat within the Disturbance Footprint for the relevant MNES species. If any individuals or populations are located during the targeted surveys, a detailed account of their occurrence must be recorded including number of individuals, GPS location and extent. The outcomes of these surveys will be used to inform potential changes during the detailed design phase to avoid or minimise impacts where possible.

If the detailed design process determines that these individuals or populations cannot be suitably avoided (inclusive of a prescribed buffer), Steps 2 and 3 will be triggered (see below).

STEP 1: Conduct targeted flora surveys where the Disturbance Footprint (and adjacent areas as determined by a suitably qualified ecologist) directly impacts potential habitat for threatened flora species.

STEP 2: Undertake investigation into potential impacts on the species. This should include:

- Updating of habitat mapping.
- Determination of avoidance and mitigation strategies.
- Updating of Significant Impact Assessment.
- Determine next steps.

STEP 3: Communicate outcomes with DCCEEW.

A flow diagram of the pre-clearance constraints surveys protocol process is presented below in **Figure 7.5.**

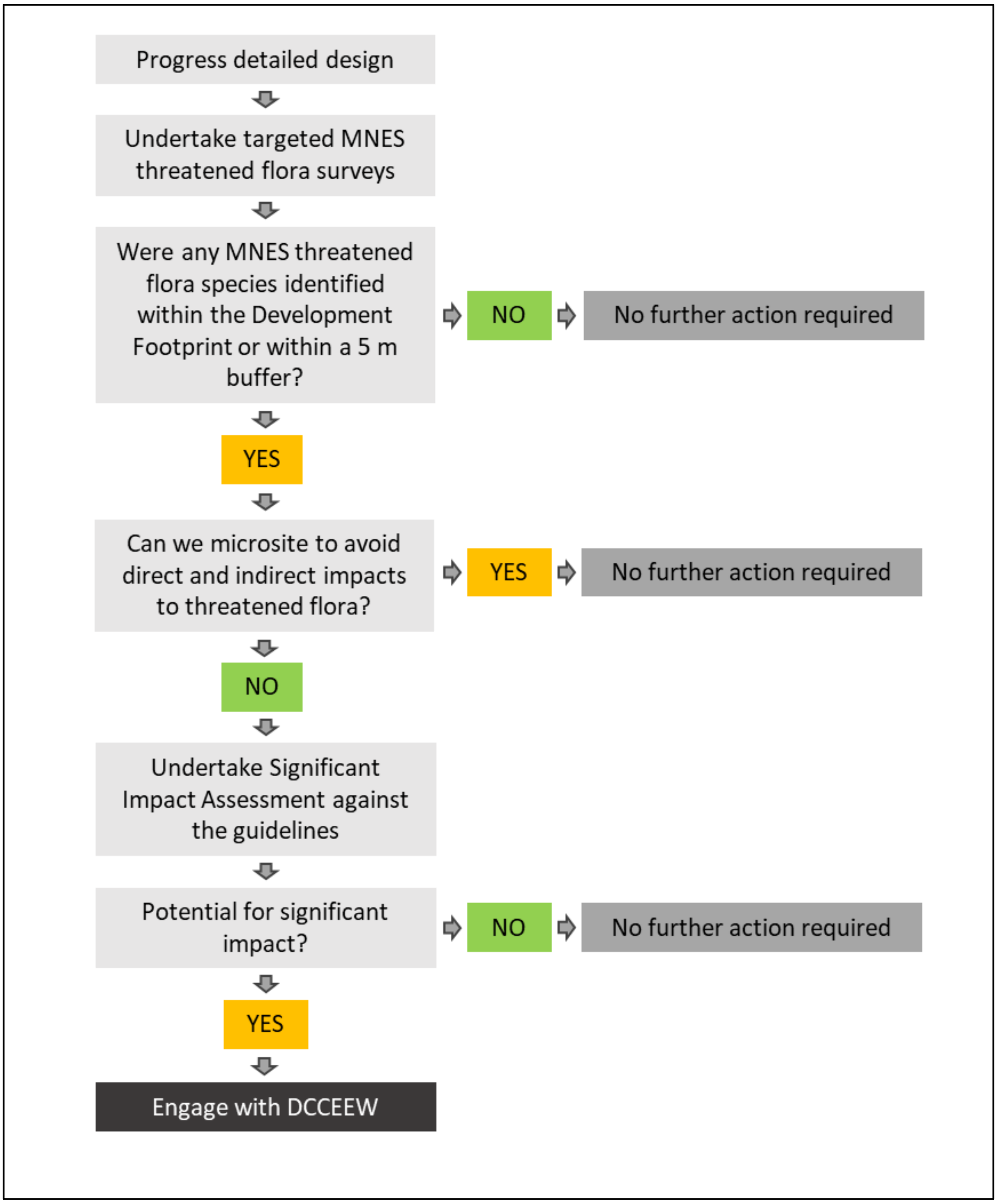


Figure 7.5 Pre-Clearance Survey Constraints Protocol

7.4 Decommissioning and Rehabilitation

Decommissioning a wind farm is the responsibility of the approval holder and will be undertaken in accordance with a DMP and the Decommissioning Security Plan required to be prepared and submitted with the State development application. Decommissioning activities that will be detailed in management plans will ensure that there are no adverse impacts on individuals, communities and the natural environment. This typically involves activities to 'make good' the land and remove infrastructure. The DMP will be informed by consultation with relevant stakeholders including landowners and will outline all actions required to:

- Deconstruct and remove off-site above ground structures and infrastructure (including turbines, substations, and above ground cabling).
- Manage impacts on the transport network arising from removal of materials from the site.
- Dismantle turbine bases to a depth of 1 m below surface level and cover with topsoil.
- Lightly rip and reseed with native vegetation all hardstand areas (after being cleared of stone and geotextile material).
- Decontaminate any affected areas in accordance with requirements of the *Environmental Protection Act 1994*.

The DMP will aim to maximise the recycling, repurposing and/or reuse of all materials removed from the site during decommission. A key objective of a decommissioning plan is to minimise materials destined for landfill and to implement the full decommissioning of the project as efficiently and sustainably as possible.

Rehabilitation will be undertaken in accordance with the Preliminary Rehabilitation Plan. Rehabilitation will also involve monitoring and management, including erosion prevention, management of weed species and protection and enhancement of any impacted water sources to achieve a rehabilitation outcome that is consistent with the preclearing condition of the site.

It should be noted that during decommissioning, only hardstand areas, access tracks and swept paths would require pruning or clearing to remove infrastructure from the site. Further rehabilitation works will be undertaken as part of the decommissioning phase after infrastructure has been removed. The overall objective of these rehabilitation activities would be to return the site to pre-construction conditions; however specific rehabilitation outcomes will be developed in consultation with the landowners prior to the decommissioning process.

Rehabilitation will occur at various stages of the Project. All rehabilitation will be undertaken in accordance with best practice environmental management principles and in consultation with host landowners and appropriate regulatory authorities.