8 Terrestrial Fauna

8.1 EPA Policy and Guidance

The EPA's objective for terrestrial fauna is "To protect terrestrial fauna so that biological diversity and ecological integrity are maintained" (EPA, 2023b). The EPA defines terrestrial fauna as animals living on land or using land (including aquatic systems) for all or part of their lives (EPA 2016c). Fauna habitat is defined as the natural environment of an animal or assemblage of animals, including biotic and abiotic elements, that provides a suitable place for them to live (e.g. breed, forage, roost or seek refuge) (EPA 2016c). Relevant policy and guidance to terrestrial fauna are detailed in Table 8-1.

Table 8-1: Terrestrial Fauna Policy and Guidance

Reference	Title
EPA	
EPA 2023a	Statement of Environmental Principles, Factors, Objectives and Aims for EIA
EPA 2016c	Environmental Factor Guideline 'Terrestrial Fauna'
EPA 2016d	Technical Guidance: Sampling of Short-Range Endemic Invertebrate Fauna
EPA 2020b	Technical Guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment
EPA 2021	Technical Guidance – Subterranean Fauna Surveys for Environmental Impact Assessment.
Other	
DBCA 2020	Guideline for the survey of arid bronze azure butterfly (ABAB) in Western Australia.
DCCEEW 2024a	Onshore Wind Farm Guidance: Best practice approaches when seeking approval under Australia's national environment law (Draft for Consultation and Feedback)
DCCEEW 2024b	Department of Climate Change, the Energy, Environment and Water (DCCEEW). 2024. 'National Recovery Plan for Malleefowl Leipoa Ocellata.'
Clean Energy Council 2018	Clean Energy Council Best Practice Guidelines
NMRT, 2020	National Malleefowl Monitoring Manual
Brett Lane & Associates 2005	Wind Farms and Birds: Interim Standards for Risk Assessment
Environmental Protection and Heritage Council 2010)	National Wind Farm Development Guidelines (Draft)
DAWE 2021	Onshore Wind Farms – interim guidance on bird and bat management
DPLH 2020	Western Australian Department of Planning, Lands and Heritage, Position Statement: Renewable energy facilities

8.2 Receiving Environment

8.2.1 Studies

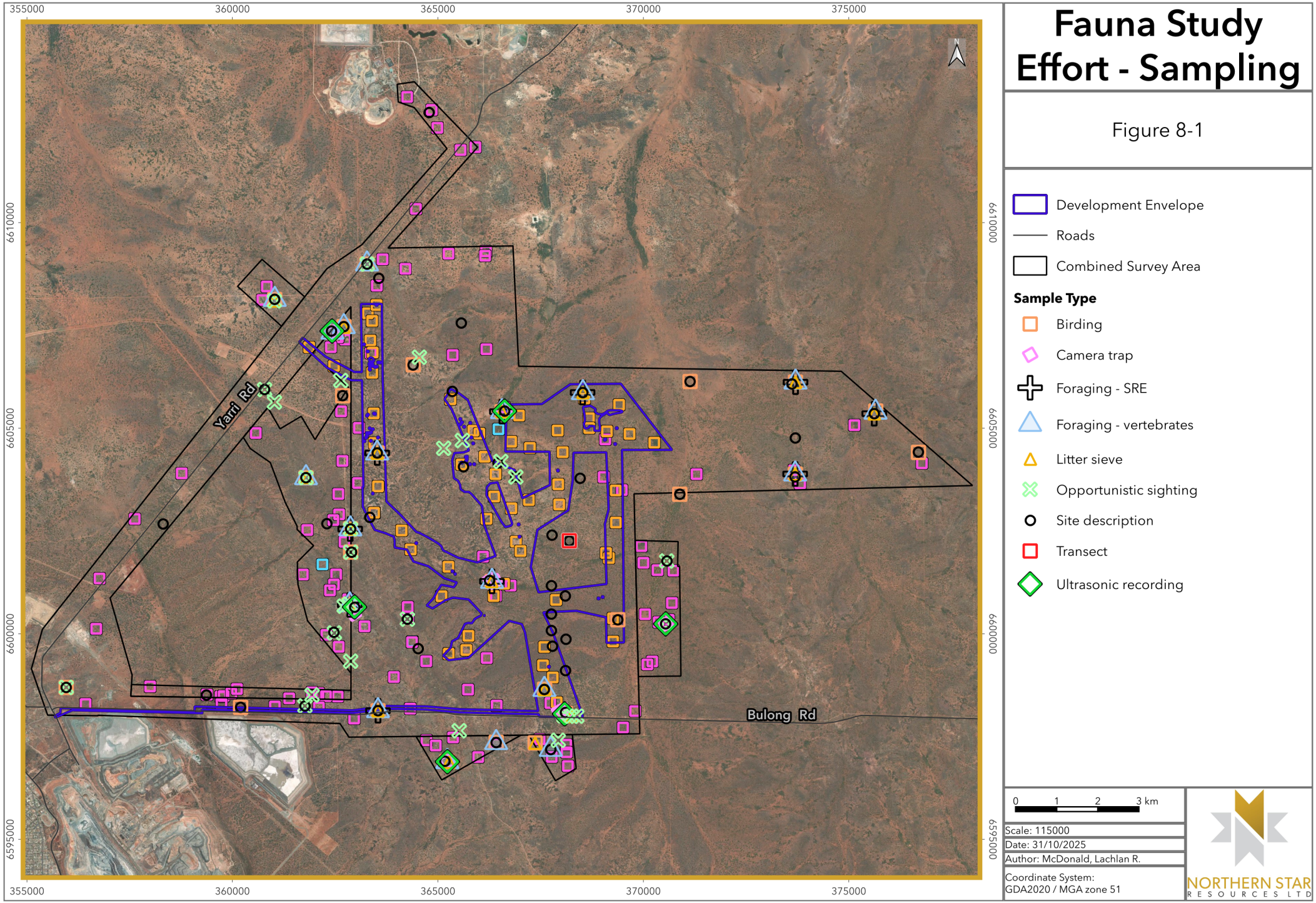
To further build on the information available, several surveys were conducted specifically for this Proposal that identified and described fauna and habitat within a 13,194ha Study Area that encompasses the DE. These studies included a review of previous surveys and studies to gain a comprehensive understanding of terrestrial fauna values within the DE and immediate surrounds.

All other fauna surveys were conducted in accordance with EPA guidelines, including desktop assessments considering potential species recorded within 40 km of the Proposal and field surveys conducted in multiple seasons between 2022 and 2024. Terrestrial Fauna studies are attached as appendices have been submitted to the IBSA where appropriate, and are summarised in Table 8-2

There are no guidelines for surveying for the Inland Hairstreak Butterfly (IHB) (*Jalmenus aridus*) (Priority 1) given it is difficult to predict when and where they might emerge. Most observations have been recorded in October to November and, as such, this is considered the best time to conduct field survey for adults (Phoenix 2025f). The surveys for IHB were undertaken in a similar method as outline sin the DBCA guidelines for sampling the Arid Bronze Azure Butterfly (DBCA 2020).

Table 8-2: Terrestrial Fauna Studies

Study	Survey Area	Study Type	Fieldwork Season	Limitations	IBSA Number
Phoenix 2025b **Appendix E**	SA including DE (15,022 ha effort across 13,185 total ha due to 1,837 overlap)	Basic and targeted terrestrial fauna survey including: • Habitat assessment and mapping • Fauna searches (22 hours) • Avifauna searches (20 hours) • Bat echolocation (20 nights) • Camera trapping (68 nights) • Malleefowl survey • Invertebrate sampling (22 hours)	September 2022 (11,413 ha) November 2023 (2,795 ha) June 2024 (814 ha)	No limitations identified.	IBSA-2025-0516
Phoenix 2025c **Appendix F**	SA including DE (8,248 ha effort)	Targeted survey for *Camponotus sp. nr. terebrans* and *Jalmenus aridus* including: • Tree sampling for ABAB host ant (1,494 trees) • IHB targeted search	August 2022 November 2023 June 2024 October – November 2024	Availability of contextual information at a regional and local scale.	IBSA-2025-0474
Phoneix 2025d **Appendix G**	SA including preliminary DE	Targeted Malleefowl survey	September 2022 November 2023 June 2024 February 2025	No limitations identified.	IBSA-2025-0517
Anditi 2025a **Appendix H**	Regional area encompassing DE (32 km^2)	Malleefowl mound analysis from LiDAR	February 2025 (LiDAR flyover)	Can identify false positive where features mimic the shape and size of mounds.	N/A
Anditi 2025b **Appendix I**	Regional area encompassing DE (160 km^2)	Malleefowl mound analysis from LiDAR	December 2024 (LiDAR flyover)	Can identify false positive where features mimic the shape and size of mounds.	N/A
Donato Environmental Services (DES) 2025 **Appendix J**	SA and Kalgoorlie Water Treatment Plant (KWTP)	Bird and bat risk assessment including: • Bird surveys (30 x 20 minute) • Bird recordings (2,110 hours) • Raptor drive searches • Electronic bat monitoring (8,203 hours)	October 2024 – ongoing	Lack of winter survey season and multiple years to adjust for annual variability.	N/A



Fauna Study Effort - Sampling

Figure 8-1

- Development Envelope
- Roads
- Combined Survey Area

Sample Type

- Birding
- Camera trap
- Foraging - SRE
- Foraging - vertebrates
- Litter sieve
- Opportunistic sighting
- Site description
- Transect
- Ultrasonic recording

0 1 2 3 km

Scale: 115000
Date: 31/10/2025
Author: McDonald, Lachlan R.
Coordinate System:
GDA2020 / MGA zone 51

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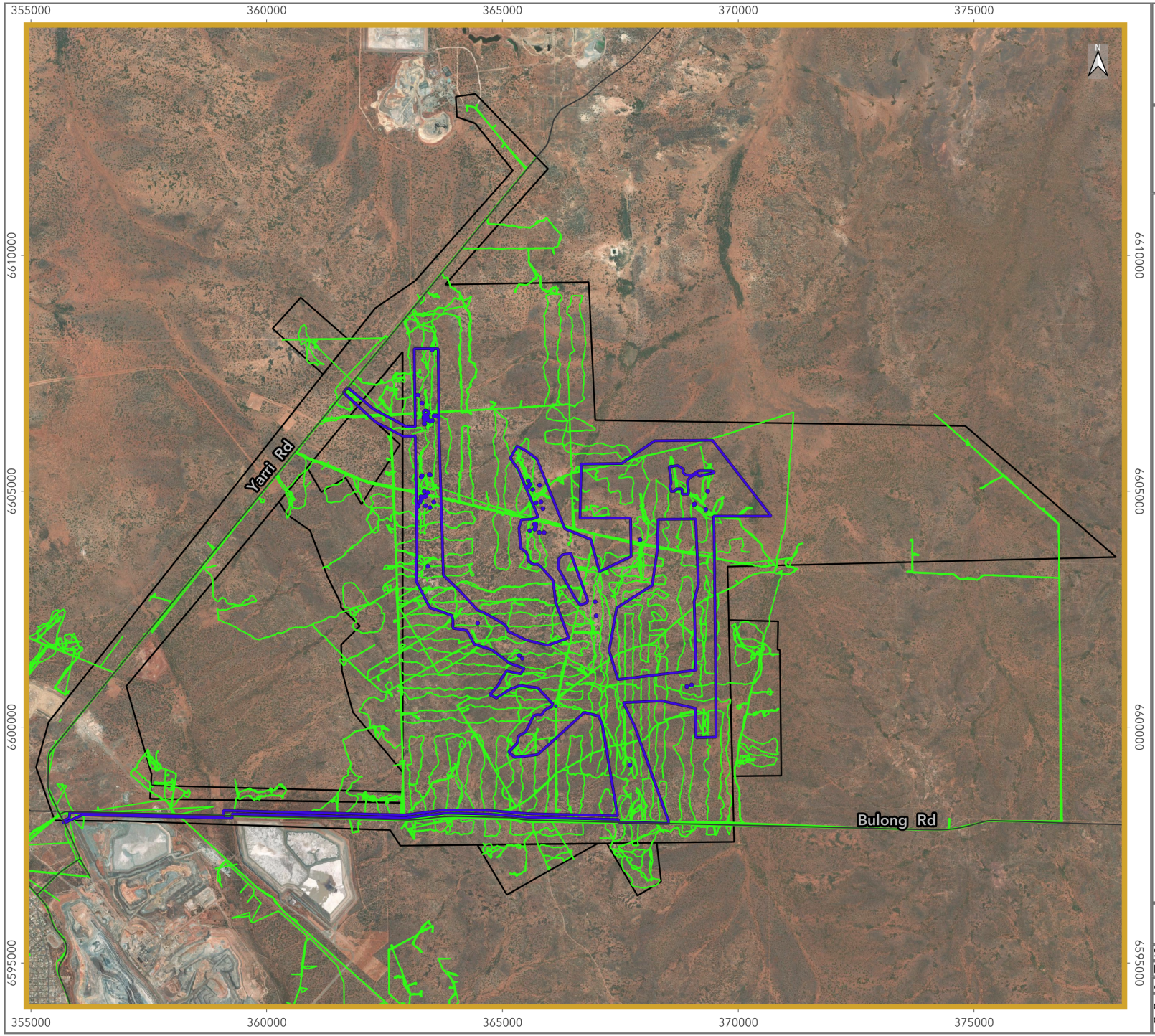

Fauna Study Effort - Track Logs

Figure 8-2

- Development Envelope
- Roads
- Track logs
- Combined Survey Area

0 1 2 3 km

Scale: 115000
Date: 31/10/2025
Author: McDonald, Lachlan R.
Coordinate System: GDA2020 / MGA zone 51

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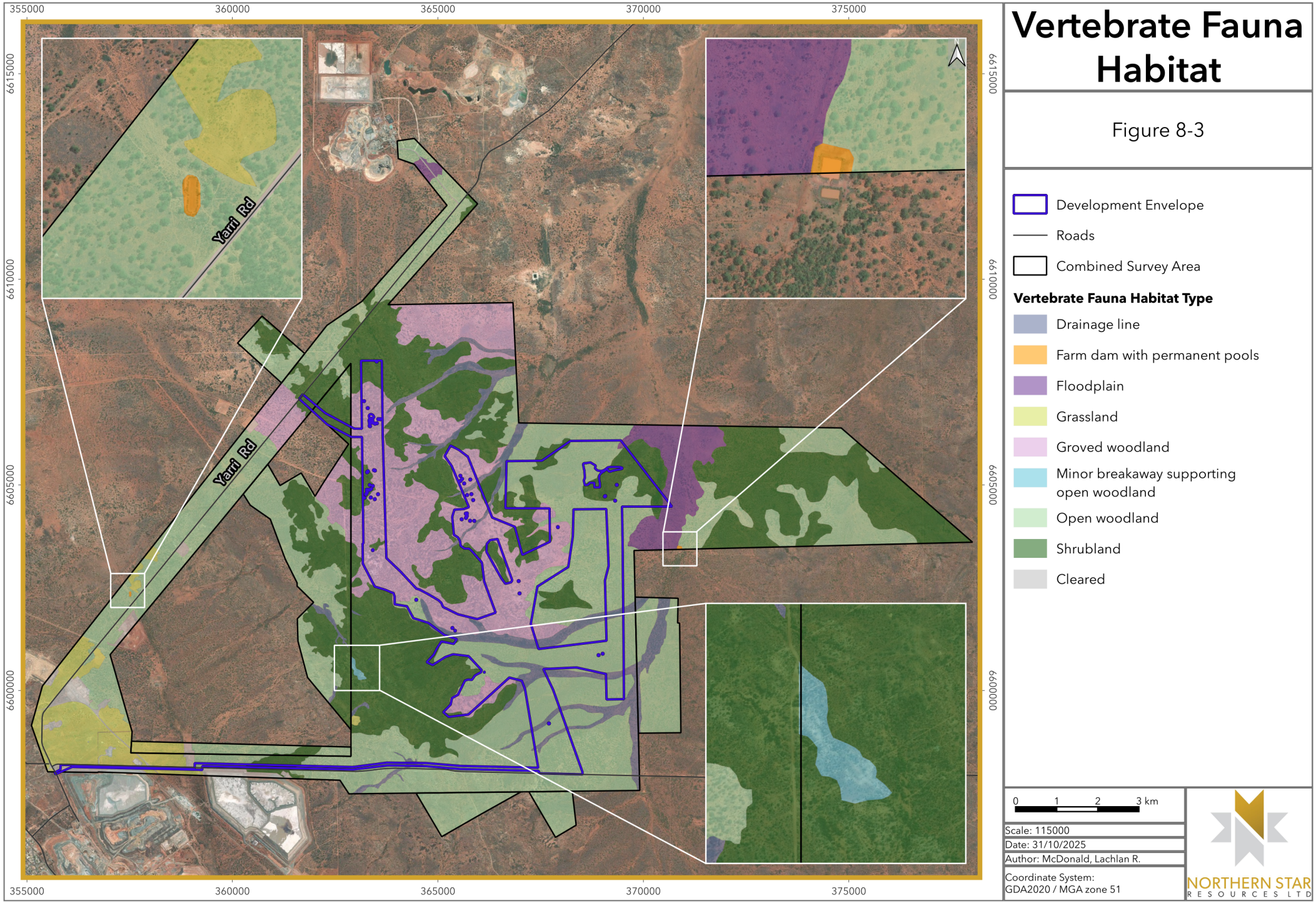
8.2.2 Fauna Habitat

Eight broad habitat types have been mapped across the Study Area, with all habitat types regionally widespread and contiguous across the Eastern Goldfields region (Phoenix 2025b). Fauna habitats within the DE and Indicative Footprint are primarily open woodland, shrubland and groved woodland, representing over 90% of both extents. These are the most well represented fauna habitats within the broader Study Area (86.5%), with rarer habitat types including minor breakaway and farm dam not included in the DE or Indicative Footprint. Fauna habitat is summarised in Table 8-3 and shown in Figure 8-3.

Table 8-3: Fauna Habitat

Habitat Type	Description	Extent SA	DE	IF
Open woodland	Open woodland over low mixed shrubs on clay loam plain. High abundance of large fallen logs, large trees with hollows and leaf litter.	5,336 ha (40.5%)	1045 ha (45.2%)	350 ha (53.7%)
Shrubland	Shrubland with scattered mallee, Eucalyptus and Allocasuarina on clay loam with gravel or sparse sand. Dense shrubby understory provides cover from predators. High abundance of flowering/seeding shrubs.	4,021 ha (30.5%)	281 ha (12.1%)	67 (10.3%)
Groved woodland	Groved Eucalyptus woodland over mixed shrubs on plains and low hills. Areas of dense vegetation interspersed with open patches.	2,051 ha (15.6%)	811 ha (35.0%)	200 (30.1%)
Floodplain	Floodplain with scattered trees, shrubs and grasses on clay loam. Likely to be seasonally inundated.	387 ha (2.6%)	6 ha (0.2%)	0 (0%)
Drainage line	Drainage line with Eucalyptus over mixed shrubs on clay loam soils. Thick patches of leaf litter.	621 ha (4.7%)	151 ha (6.5%)	20 (3.1%)
Minor breakaway	Open Eucalyptus woodland over scattered shrubs on stony hill slopes with minor breakaway.	8 ha (0.06%)	0 ha (0%)	0 (0%)
Grassland	Grassland cleared of nearly all upper story vegetation. Sparse Eucalyptus and mulga shrubs.	516 ha (3.8%)	6 ha (0.3%)	5 (0.8%)
Farm Dam	Farm dams (pastoral dam) with permanent pools with scattered low-mid shrubs and grasses on dam walls.	2 ha (0.01%)	0 ha (0%)	0 (0%)
Cleared	Cleared, infrastructure areas.	251 ha (1.9%)	13 ha (0.6%)	10 (1.5%)
All fauna habitats		**13,191 ha**	**2,312 ha**	**652 ha**



Vertebrate Fauna Habitat

Figure 8-3

- Development Envelope
- Roads
- Combined Survey Area

Vertebrate Fauna Habitat Type

- Drainage line
- Farm dam with permanent pools
- Floodplain
- Grassland
- Groved woodland
- Minor breakaway supporting open woodland
- Open woodland
- Shrubland
- Cleared

0 1 2 3 km

Scale: 115000
Date: 31/10/2025
Author: McDonald, Lachlan R.
Coordinate System: GDA2020 / MGA zone 51

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8.2.3 Fauna

A desktop review identified records of 318 vertebrate fauna taxa within the 40 km search extent, of which 77 taxa were identified during field surveys representing 24% of species identified in the desktop review (Phoenix 2025b). All species identified in the field assessment were identified in the desktop review. Secondary evidence of introduced species (all mammals) were recorded scattered throughout the survey area as expected given the proximity to Kalgoorlie-Boulder (Phoenix 2025b). Species identified by grouping across both desktop and field assessments are summarised in Table 8-4.

Table 8-4: Fauna Species Summary (Phoenix 2025)

Fauna Group	Desktop	Field	Recorded %
Amphibians	6	0	0
Birds	187 (three introduced)	53	28
Mammals	40 (six introduced)	18 (four introduced)	45
Reptiles	85 (one introduced)	6	7
Total	**318**	**77**	**24**

8.2.3.1 Significant Vertebrate Fauna

Based on the desktop review, Phoenix (2025b) identified 30 conservation significant fauna as possibly occurring within the search extent, including 25 birds, four mammals and one reptile. Of these 30 species only one species (Malleefowl, *Leipoa ocellata*) was recorded during the field survey. Following the field survey and habitat assessment Phoenix (2025b) undertook a likelihood assessment based upon presence within the Study Area based upon the following ratings:

- Recorded – species recorded within study area during survey.
- Likely – study area within current known range of species and suitable habitat present, recordings within study area.
- Possible – study area within current known range of species and suitable habitat present, no recordings within study area.
- Unlikely – study area outside current known range of species and no suitable habitat present.

Five significant fauna were determined to be likely, 14 were possible, and the remaining 10 were unlikely to occur within the Study Area (Phoenix 2025b).

DES (2025) also undertook a desktop review based on a slightly broader 50 km range from the DE and only on birds and bats which identified some additional species to Phoenix (2025b). DES (2025) is also undertaking a 24-month bird and bat monitoring program to determine bird and bat utilisation within the Study Area. The baseline monitoring program commenced in October 2024 and has a nominal completion date of October 2026.

Based on the results from monitoring completed between October 2024 and mid-May 2025, DES (2025) undertook a risk assessment to determine risk of WTG collision for bird and bat fauna based upon likelihood of occurrence and flight behaviour and included both inherent risk (no mitigation) and residual risk (mitigation) scenarios.

WTG collision risk was rated as:

- Extreme
- High
- Medium
- Low

Table 8-5 presents an amalgamated assessment of likelihood of significant fauna within the DE and WTG collision risk assessment for bird and bat fauna.

Table 8-5: Significant Fauna Likelihood and WTG Risk Assessment

CR = Critically Endangered, EN = Endangered, VU = Vulnerable, MI = Migratory, MA = Marine, P = Priority

Species Name	Conservation Status		Habitat		Likelihood of Occurrence (Phoenix 2025b & DES 2025)	WTG Collision Risk Inherent / Residual (DES 2025)
	National	WA	Preference	Presence in DE		
Birds						
Southern Whiteface *(Aphelocephala leucopsis)*	VU	VU	Woodland Shrublands	Yes	**Likely** Suitable habitats within Study Area and desktop records within Study Area. Widespread across Australia, especially in arid and semi-arid areas.	**Low** Prefers low vegetation, open ground to forage. Does not sustain flight above the canopy.
Fork-tailed Swift *(Apus pacificus)*	MI	MI	Aerial (does not land in Australia)	N/A	**Recorded** Recorded within DE by DES (2025).	**Medium / Medium** Aerial forager that can fly at considerable height in large flocks. Seasonal migrant (October to May) and observed prior to storms and cyclones.
Fan-tailed Cuckoo (*Cacomantis flabelliformis*)	MA	-	Woodlands	Yes	**Recorded** Suitable habitats present within the study area. Recorded within DE by DES (2025).	**Low** Rare in the region but could occur during passage of migration. Follows the canopy on migration.
Pallid Cuckoo (*Cacomantis pallidus*)	MA	-	Woodlands	Yes	**Recorded** Suitable habitats present within the study area. Recorded within DE by DES (2025).	**Low** Night migrant that is only likely during favourable seasons.
Whiskered Tern (*Chlidonias hybrida*)	MI	MI	Wetlands, salt lakes	No	**Possible** Usually absent during dry conditions, sometimes for years. Rarely present on mine infrastructure water sources. Present at times at the KWTP, during favourable conditions.	**Medium / Low** Species is exceedingly rare in the region, low flying when not breeding and therefore unlikely to be impacted by WTG collision.
Rainbow bee-eater (*Merops ornatus*)	MI	-	Woodlands	Yes	**Recorded** Suitable habitats present within Study Area. Recorded within DE by DES (2025).	**Medium / Medium** Aerial forager above the vegetation canopy, flies at height during migration. Absent or rare during dry periods.
Hooded Plover *(Thinornis cucullatus)*	EN	P4	Wetlands, salt lakes	No	**Unlikely** Suitable habitat absent. Possible visitor to salt lakes 6 – 20 km from study area.	**Low** Not recorded in large flocks, stays near vegetation.
Grey Falcon (*Falco hypoleucos*)	-	VU	Open grasslands	Yes	**Unlikely** Rarely recorded in southern WA, may be a rare visitor. Suitable woodland, grassland and shrubland habitat present within the study area.	**Low** Habitat is unsuitable for species; presence of Peregrine Falcon will deter Grey Falcon.

Species Name	Conservation Status National	WA	Habitat Preference	Presence in DE	Likelihood of Occurrence (Phoenix 2025b & DES 2025)	WTG Collision Risk Inherent / Residual (DES 2025)
Peregrine Falcon (*Falco peregrinus*)	-	OS	Shrublands Woodlands	Yes	**Likely** Previously recorded nearby at Kanowna Belle mine, suitable habitat in study area.	**Medium** Hunts for prey above vegetation canopy, species is uncommon and low numbers with two or three in the area at any time.
Western Grasswren (*Amytornis textilis* subsp. *textilis*)		P4	-	-	**Unlikely** Not identified by Phoenix 2025b in the assessment.	**Low** Weak flyer incapable of sustained flight.
Malleefowl (*Leipoa ocellata*)	VU	VU	Shrublands Woodlands	Yes	**Recorded** Suitable nesting and foraging habitat in open woodland, woodland and shrubland habitat.	**Low** Primarily a ground dweller, flies into vegetation canopy to roost at night and evade predators. Unable to sustain flight above vegetation canopy.
Grey Wagtail *(Motacilla cinerea)*	MI	MI	Coastal areas	No	**Unlikely** Suitable stream and river habitat absent.	**N/A – not assessed**
Blue-billed Duck *(Oxyura australis)*		P4	Wetlands, salt lakes	No	**Possible** Possible rare visitor to permanent water features within the study area. Additionally, may traverse study area to salt lakes 7-20 km outside study area.	**N/A – not assessed**
Western Rosella (inland ssp.) (*Platycercus icterotis* subsp. *xanthogenys*)		P4	Woodlands	Yes	**Likely** Suitable woodland habitat present. Recorded by Phoenix twice, both records within 2.3 km of the study area (Phoenix 2013, 2014a).	**Low** Species remains close to vegetation canopy and is not high flying. Few records in the region.
Carnaby's Black Cockatoo (*Zanda latirostris*)	EN	EN	Forests Woodlands (Bankisa) Shrublands	No	**Unlikely** Study area outside of current known range of species.	**Low** Species capable of flying at height, however not within range.
Pezoporus occidentalis Night Parrot	CR	CR	Spinifex grassland	No	**Unlikely** Suitable spinifex habitat absent.	**Low** Species known to fly below or at vegetation canopy, habitat unsuitable.

Species Name	Conservation Status		Habitat		Likelihood of Occurrence (Phoenix 2025b & DES 2025)	WTG Collision Risk Inherent / Residual (DES 2025)
	National	WA	Preference	Presence in DE		
Princess Parrot (*Polytelis alexandrae*)		P4	Woodland	Yes	**Unlikely** Study area outside of core range. Possibly a very rare visitor following periods of high rainfall	**N/A – not assessed**
Common Sandpiper *(Actitis hypoleucos)*	MI	MI	Wetlands, salt lakes	No	**Possible** Possible rare visitor to permanent water features within the Study Area. Additionally, may traverse Study Area to salt lakes 7-20 km away.	**Low** Rare wetland species that is exceedingly rare to the region, can fly at heights during migration.
Sharp-tailed Sandpiper (*Calidris acuminata*)	MI	MI	Wetlands, salt lakes	No	**Possible** Possible rare visitor to permanent water features within the Study Area. Additionally, may traverse Study Area to salt lakes 7-20 km away.	**Low** Rare to inland Australia, recorded in ones or twos as passing migrants remaining for few days. Can fly at heights greater than 100 m.
Sanderling (*Calidris alba*)	MI	MI	Wetlands, salt lakes	No	**Possible** Possible rare visitor to permanent water features within the Study Area. Additionally, may traverse Study Area to salt lakes 7-20 km away.	**N/A – not assessed**
Curlew Sandpiper (*Calidris ferruginea*)	CR & MI	CR	Wetlands, salt lakes	No	**Possible** Possible rare visitor to permanent water features within the Study Area. Additionally, may traverse Study Area to salt lakes 7-20 km away.	**Low** Exceedingly rare to inland Australia, passing migrant between September and October. Can fly at heights greater than 100 m.
Pectoral Sandpiper *(Calidris melanotos)*	MI	MI	Wetlands, salt lakes	No	**Possible** Possible rare visitor to permanent water features within the Study Area. Additionally, may traverse Study Area to salt lakes 7-20 km away.	**N/A – not assessed**
Red-necked Stint *(Calidris ruficollis)*	MI	MI	Wetlands, salt lakes	No	**Possible** Possible rare visitor to permanent water features within the Study Area. Additionally, may traverse Study Area to salt lakes 7-20 km away.	**Low** Exceedingly rare to inland Australia, passing migrant between September and October. Can fly at heights greater than 100 m.
Black-tailed Godwit *(Limosa limosa)*	EN & MI	MI	Coastal	No	**Possible** Possible rare visitor to permanent water features within the Study Area. Additionally, may traverse Study Area to salt lakes 7-20 km away.	**N/A – not assessed**
Grey-tailed Tattler (*Tringa brevipes)*	MI	MI & P4	Coastal	No	**Possible** Possible rare visitor to permanent water features within the Study Area. Additionally, may traverse Study Area to salt lakes 7-20 km away.	**Low** Coastal species vagrant to the region.

Species Name	Conservation Status		Habitat		Likelihood of Occurrence (Phoenix 2025b & DES 2025)	WTG Collision Risk Inherent / Residual (DES 2025)
	National	WA	Preference	Presence in DE		
Wood Sandpiper *(Tringa glareola)*	MI	MI	Wetlands, salt lakes	No	**Possible** Possible rare visitor to permanent water features within the Study Area. Additionally, may traverse Study Area to salt lakes 7-20 km away.	**Low** Recorded annually at the KWTP in one or two staying for a few days, absent for rest of year. Flies at height during migration.
Common Greenshank (*Tringa nebularia*)	MI	MI	Wetlands, salt lakes	No	**Possible** Possible rare visitor to permanent water features within the Study Area. Additionally, may traverse Study Area to salt lakes 7-20 km away.	**Low** Rare passing migrant during August to October.
Marsh Sandpiper *(Tringa stagnatilis)*	MI	MI	Wetlands, salt lakes	No	**Possible** Possible rare visitor to permanent water features within the Study Area. Additionally, may traverse Study Area to salt lakes 7-20 km away.	**Low** Recorded annually at the KWTP in one or two staying for a few days, absent for rest of year. Flies at height during migration.
Glossy Ibis *(Plegadis falcinellus)*	MI	MI	Wetlands, salt lakes	No	**Possible** Possible rare visitor to permanent water features within the Study Area. Additionally, may traverse Study Area to salt lakes 7-20 km away.	**Low** Vagrant to region and only likely present during exceptionally favourable seasons. Closely tied to wetland habitats. Can fly at height when travelling long distances.
Mammals						
Chuditch (*Dasyurus geoffroii)*	VU	VU	Woodlands, Mallee, Heath	Yes (Woodlands)	**Unlikely*** Unconfirmed scat recorded within the study area – not definitive without genetic testing. Whilst previously widely distributed, there are no recent records of Chuditch east of the Boorabbin sandplain (over 100 km away).	**N/A**
Numbat (*Myrmecobius fasciatus*)	EN	EN	Woodlands	Yes	**Unlikely** Study area outside of current known range which is restricted to isolated populations in southwest WA.	**N/A**
Bilby *(Macrotis lagotis)*	VU	VU	Spinifex grasslands	No	**Unlikely** Study area outside of current known range and preferred habitat absent.	**N/A**

Species Name	Conservation Status		Habitat		Likelihood of Occurrence (Phoenix 2025b & DES 2025)	WTG Collision Risk Inherent / Residual (DES 2025)
	National	WA	Preference	Presence in DE		
Central Long-eared Bat (*Nyctophilus major* subsp. *tor*)	-	P3	Woodlands	Yes	**Likely** Previously observed in 2011 during bat survey at Kanowna Belle mine site (17 km north). Recorded across Goldfields region.	**Low** Nocturnal species that flies and hunts close to vegetation. Unlikely to fly above canopy.
Reptiles						
Western Spiny-tailed Skink (*Egernia stokesii* subsp. badia)	EN	VU	Woodlands	Yes	**Unlikely** Study area outside of current known range, which is limited to semi-arid areas of southwest WA.	**N/A**
Invertebrates						
Arid Bronze Azure Butterfly (*Ogyris subterrestris petrina*)	CR	CR	Woodlands (specifically smooth barked *Eucalytus* sp.)	Yes	**Unlikely** No host ant species identified within the SA, habitat does not contain all required features for species.	**N/A – not assessed.** Flight behaviour not expected to bring in contact with WTG blades.
Inland Hairstreak Butterfly (*Jalmenus aridus*)	-	P2	Woodlands (specifically *Senna artemisioides ssp. Filifolia*)	Yes	**Recorded** Recorded within the SA by Phoenix 2025c.	**N/A – not assessed.** Flight behaviour not expected to bring in contact with WTG blades.

*Assessed as Possible by Phoenix 2025 – based upon balance of probabilities it is considered that one unidentified scat record is not sufficient evidence of occurrence given distance from current known range and absence of recent local records since 1974.

8.2.3.1.1 Malleefowl

Several targeted fauna surveys have been conducted for the Proposal, including targeted searches for Malleefowl. Extensive searches have been conducted throughout the DE and surrounds. During these searches, habitat values within the area have been identified, described and mapped, and any direct or indirect evidence of Malleefowl was recorded.

To assist with the identification of potential Malleefowl mounds, LiDAR analysis was conducted by Anditi (2025a; 2025b). These surveys acknowledge that there could be some false positives resulting from the remote sensing methodology employed. However, this information is valuable for informing a targeted approach of any additional surveys for in-field verification. There were nine very close matches and 29 similar matches to Malleefowl mounds with the combined 192 km^2 area surveyed by Anditi (2025a; 2025b).

A total of 77 survey sites were visited as part of the Malleefowl surveys. In the initial fauna survey, active searches were undertaken at 19 sites throughout the basic fauna survey areas for a total of 22 hours effort. An additional 58 sites were visited within the DE during a targeted Malleefowl survey conducted in February 2025. Five active nesting mounds have been recorded in the Study Area, the nearest active nesting mounds is located approximately 600 m from the DE. Several inactive and long-unused mounds have also been identified in the Study Area.

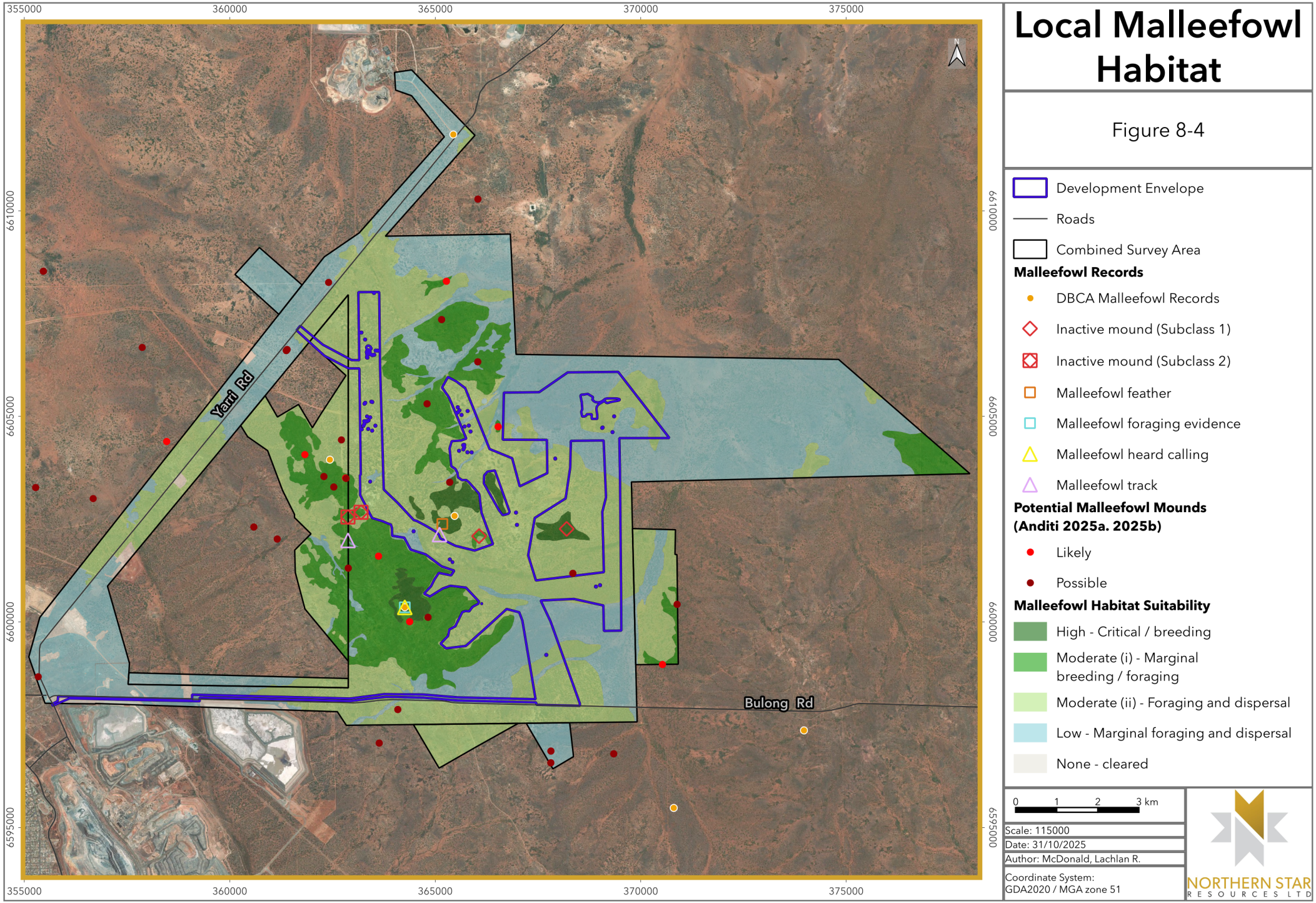
Malleefowl habitat was assigned an overall habitat suitability score depending on the sum and combination of habitat attributes:

- **High** (score of 9 or more) is characterised by dense vegetation that provides screening and is defined as primary nesting, foraging, and dispersal habitat, that is regarded as habitat critical for the survival of the species
- **Moderate** (score of 4 to 8) can be split into two subcategories based on the habitat attributes:
    - **Moderate (i)** Suitable for foraging, dispersal, and may contain marginally suitable breeding habitat depending on the combination of the environmental variables
    - **Moderate (ii)** Suitable for foraging and dispersal (not suitable for breeding)
- **Low** (score of 3 or less) does not contain enough habitat features for it to be considered suitable for breeding, however it may still be used for dispersal and occasional foraging.

Malleefowl habitat within the Study Area is characterised by a mosaic of foraging and dispersal habitat interspersed with patches of breeding and marginal breeding habitat (Table 8-6) (Figure 8-4). Breeding habitat was generally identified in areas with higher elevation where soil conditions and vegetation structure are more favourable. Several Malleefowl mounds, both active and inactive, have been identified in these areas. Malleefowl in the Study Area and more broadly in the Goldfields occur as sparse populations.

Table 8-6: Malleefowl Habitat Suitability

Habitat Suitability	Survey Description	Extent within Study Area	Extent within DE		Extent within IF	
			ha	% of SA	ha	% of SA
High	Breeding habitat	232 ha (1.8%)	0	0.0	0.0	0.0
Moderate (i)	Marginal breeding habitat / foraging habitat	1,754 ha (13.3%)	0	0.0	0.0	0.0
Moderate (ii)	Foraging and dispersal	5,541 ha (42.0%)	1,706	30.8	386	7.0
Low	Marginal foraging and dispersal	5,417 ha (41.0%)	593	10.9	256	4.7
None	Cleared area	251 ha (1.9%)	13	5.0	10	4.1
Total		**13,194**	**2,313**	**17.5**	**652**	**4.9**



Local Malleefowl Habitat

Figure 8-4

- Development Envelope
- Roads
- Combined Survey Area

Malleefowl Records

- DBCA Malleefowl Records
- Inactive mound (Subclass 1)
- Inactive mound (Subclass 2)
- Malleefowl feather
- Malleefowl foraging evidence
- Malleefowl heard calling
- Malleefowl track

Potential Malleefowl Mounds (Anditi 2025a. 2025b)

- Likely
- Possible

Malleefowl Habitat Suitability

- High - Critical / breeding
- Moderate (i) - Marginal breeding / foraging
- Moderate (ii) - Foraging and dispersal
- Low - Marginal foraging and dispersal
- None - cleared

0 1 2 3 km

Scale: 115000
Date: 31/10/2025
Author: McDonald, Lachlan R.
Coordinate System: GDA2020 / MGA zone 51

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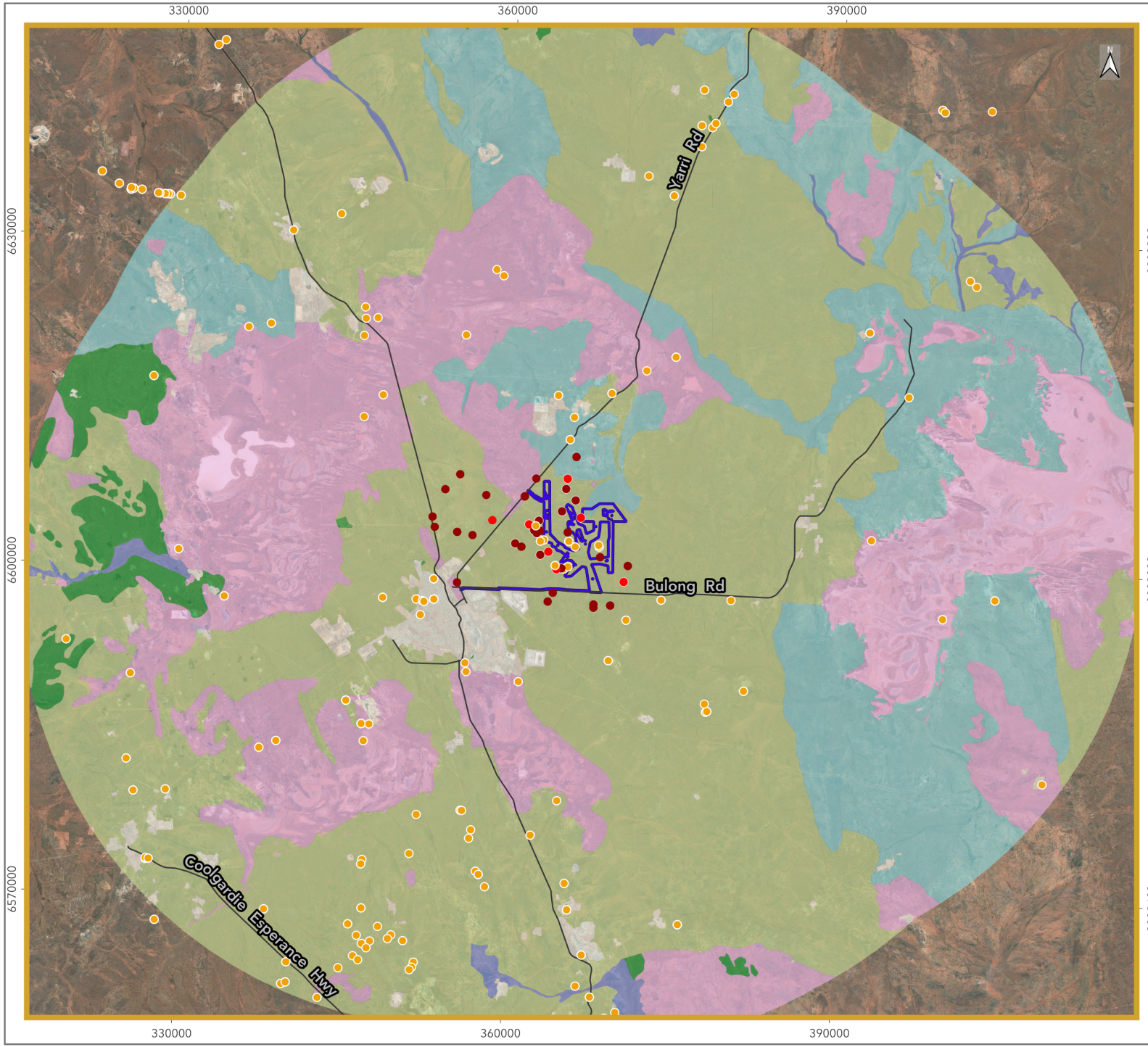
Phoenix (2024) mapped potential Malleefowl habitat within 40 km of the Proposal. Habitat was mapped more coarsely, based on publicly available data. Habitat types mapped included:

- **Suitable** – shrublands and low woodlands not dissected by drainage and with adequate tree / shrub cover to provide leaf litter, thermal shelter and visual screening from predators; presumed to represent foraging and potential nesting habitat for Malleefowl.
- **Suitable (mosaic)** – areas of suitable shrubland / woodland habitat interspersed with scattered areas of clearing (e.g. drill pads and tracks), naturally open patches, and / or drainage lines.
- **Drainage** – drainage lines with distinct channels or relatively dense fringing vegetation, may be used by Malleefowl for foraging but unlikely to support nesting.
- **Open / drainage** – open areas dissected by drainage lines with or without dense vegetation; potential foraging and dispersal habitat, not considered suitable for breeding.
- **Open** – naturally bare or sparsely vegetated areas including lakes, salt lake playa, extensive rock outcrop, scars of recent or intense fires, and sparse shrubland dominated by chenopods or hummock grass; marginal habitat value, unsuitable for breeding.
- **Cleared** – areas cleared for roads (other than single-lane unsealed access tracks), mines, and associated infrastructure, water storage dams etc., some partially regenerating as very low or open shrubland; negligible habitat value for Malleefowl.

Within the DE, the dominant Malleefowl habitat type is suitable (mosaic), covering approximately 2,191 ha. Smaller areas of open / drainage habitat (106.8 ha) and open habitat (1.4 ha) also occur. Cleared areas comprise 13 ha, while no areas mapped as Suitable or Drainage habitat types occur within the DE Table 8-7. These findings indicate that the Study Area lies within a landscape that supports extensive, regionally widespread Malleefowl habitat, with the majority remaining intact and connected. Regional Malleefowl habitat is shown in Figure 8-5.

Table 8-7: Regional Malleefowl Habitat

Habitat Type	Regional Extent (ha)	Extent within DE (ha)
Suitable	15,483	0.0
Suitable (mosaic)	349,288	2,191
Open/drainage	108,070	107
Drainage	4,946	0.0
Open	170,858	2
Cleared	19,951	13
Total	**668,598**	**2,312**



Regional Malleefowl Habitat

Figure 8-5

- Development Envelope
- Roads
- DBCA Malleefowl Records

Potential Malleefowl Mounds (Anditi 2025a. 2025b)

- Likely
- Possible

Malleefowl Habitat Type

- Suitable
- Suitable (mosaic)
- Open
- Open/drainage
- Drainage
- Cleared

0 5 10 km

Scale: 500000
Date: 31/10/2025
Author: McDonald, Lachlan R.
Coordinate System: GDA2020 / MGA zone 51

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8.2.3.1.2 Marine and Migratory Species

Migratory bird species have been recorded within the SA or have potential to visit the DE. Several of these species are known to use woodland and shrubland habitats like those in the DE for foraging and / or breeding; others prefer wetland habitats or areas that have permanent water present.

Migratory species are normally only in the SA during sporadic or seasonal migration periods or visit the area occasionally as vagrant visitors. Given similar habitats are common and widespread in the region, these species are unlikely to be restricted to or reliant on habitat within the SA. These species are generally resilient and adaptable to seasonal changes, reducing the likelihood of significant impact from habitat disturbance.

The KWTP located approximately 14 km southwest of the nearest proposed WTG has been considered as the closest reliable (permanent) water source for migratory species, which was utilised as a monitoring location by DES (2025). Other nearby water sources are semi-permanent including pastoral dams, tailing storage facilities (TSF), and salt lakes / flood prone areas. There are no permanent water sources located within the DE.

8.2.3.2 Significant Invertebrate Fauna

Four surveys were conducted for listed butterflies: Arid Bronze Azure Butterfly (ABAB) (Critically Endangered – EPBC Act and BC Act) and Inland Hairstreak Butterfly (IHB) (Priority 1 – DBCA) led by Dr Rod Eastwood, a research associate at the WA Museum. Based upon combined survey effort 8,248 ha the surveys included sampling host ant species of ABAB (*C. sp. nr. terebrans*) at a total of 1,494 smooth barked *Eucalyptus* sp. trees and sampling host ant species of IHB (*Froggattella kirbii*) at *Senna artemisioides filifolia* and *Acacia tetragonophylla*.

Whilst much of the SA contains smooth barked *Eucalyptus* sp. trees, habitat only had a fraction of the requisite features for *C. sp. nr. terebrans* and none were detected (Phoenix 2025c). Consequently, it is considered that ABAB does not occur within the SA or DE.

A total of 5,025 ha of the SA represents suitable habitat for IHB based upon presence of *Senna artemisioides filifolia* and *Acacia tetragonophylla*, with host ant *Froggattella kirbii* found throughout. In total 29 IHB were observed from five breeding sites in the north-western section of the SA. This species is known to occur from 28 subpopulations across an extent of over 15,000 km^2 as of October 2025.

To protect these conservation significant species from poaching the survey report and butterfly impact assessment has been provided confidentially.

8.2.3.3 Short Range Endemic Fauna

Short range endemic (SRE) habitat potential was assessed by Phoenix (2025b) based upon a rating scale defines as:

- **High** – defined / known areas of habitat that contain elements that often give rise to specialisation or dependency in invertebrate fauna.
- **Low** – areas of largely in-tact native vegetation that occur broadly across the landscape, are less incised and typically link more restricted habitats.
- **None** – land that has been previously cleared for other uses that no longer contains native vegetation.

High SRE potential was assigned to drainage line (151 ha in DE) and minor breakaway (not within DE). Drainage line was attributed high SRE habitat potential due to habitat complexity and availability of moisture (Phoenix 2025b). It is noted that drainage lines are ubiquitous throughout the broader landscape. The remaining 2,237 ha (or 96.7%) of the DE is classified as low or none SRE potential. Details of the extent and description of each SRE habitat is presented in Table 8-8 and shown in Figure 8-6.

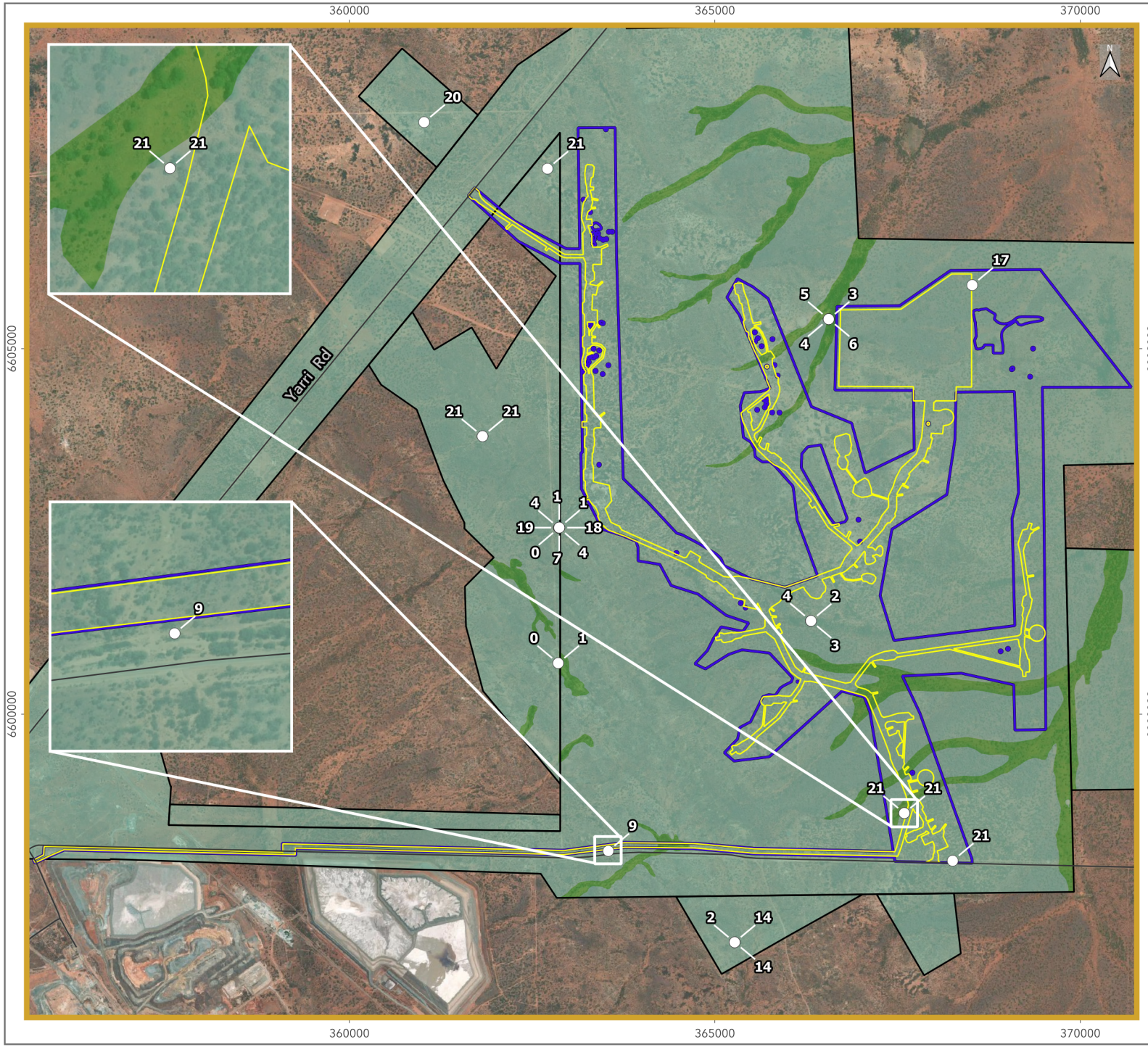
Table 8-8: Short Range Endemic Habitat Potential

SRE Potential	Habitat Type	SA	DE	IF
High	Drainage line*	621 ha	151 ha	20 ha (3.1%)
	Minor breakaway	8 ha	0 ha	0 ha (0%)
Low	Open woodland Shrubland Closed / semi-closed woodland Groved woodland Floodplain Grassland	12,314 ha	2,149 ha	622 ha (95.4%)
None	Cleared Farm dam	251 ha	13 ha	10 ha (1.5%)
Total		**13,191 ha**	**2,312 ha**	**652 ha**

A total of 52 specimens from 22 possible SRE taxa were collected from within the SA, including seven trapdoor spiders, six isopods, six pseudoscorpions, two centipedes and one scorpion. Of these, five were found within the DE of which none were confirmed SRE, four were potential SRE, and one was not an SRE (Phoenix 2025c). The four potential SRE were all located within habitat types that are widespread and contiguous with the surrounding landscape and are unlikely to be restricted to the SA (Phoenix 2025c). This includes both habitat that was assessed as high (drainage line) and low (open woodland, shrubland) SRE suitability. Nevertheless, these four species were conservatively assessed as potential SRE due to taxonomic data deficiencies and are detailed in Table 8-9.

Table 8-9: Potential SRE Species within DE

Group	Taxa	Assessment	SRE Status
Trapdoor spider	Idiosoma 'MYG244'	Collected from 4 sites in drainage and shrubland within the SA. Also known from a site located approximately 1 km south-east of the SA. The habitats from which it has been recorded extend throughout the regional area.	Potential SRE due to data deficiency.
	Cethegus 'MYG050',	Previously recorded in the SA. 2.2% divergent from PES34650 and is therefore considered conspecific.	Not a SRE – widespread.
Pseudoscorpion	Beierolpium sp. indet 'Phoenix 0187'	Collected from 2 sites in drainage (within DE) and open woodland (outside DE) which extend into surrounding region. Given the widespread nature of the habitat, it is unlikely that this species is restricted to the SA.	Potential SRE owing to data deficiency.
	Chernetidae sp. indet	Collected from 1 site in open woodland which extend into surrounding region. Given the widespread nature of the habitat, it is unlikely that this species is restricted to the SA.	SRE status uncertain owing to taxonomic data deficiency.
	Chernetidae 'Phoenix0185	Collected from 4 sites distributed across the study area and all located in open woodland (3 within DE). Given the widespread nature of the habitat, it is unlikely that this species is restricted to the SA. Insufficient resolution in the phylogeny to place this taxon into a genus group.	Potential SRE owing to taxonomic data deficiency.



SRE Habitat

Figure 8-6

Development Envelope
Roads
Indicative Footprint
Combined Survey Area

SRE Habitat (Phoenix, 2025a)

High
Low

Potenital SRE Species

- 0. *Beierolpium sp. indet.* - Uncertain
- 1. *Philosciidae KWB* - Potential
- 2. *Beierolpium 'Phoenix0187'* - Potential
- 3. *Chernetidae sp. indet.* - Widespread
- 4. *Idiosoma 'MYG244'* - Potential
- 5. *Cryptops sp. indet.* - Potential/Uncertain
- 6. *Paraplatyarthrus KWB1* - Potential
- 7. *Buddelundia cf. frontosa* - Potential
- 9. *Gaius austini* - Widespread
- 14. *Synsphyronus sp. indet.* - Uncertain
- 17. *Cethegus 'MYG050'* - Widespread
- 18. *Buddelundia sp. indet.* - Potential/Uncertain
- 19. *Lychas 'splendens'* - Widespread
- 20. *Beierolpium 'Phoenix0186'* - Potential
- 21. *Chernetidae 'Phoenix0185'* - Potential

0 1 2 km

Scale: 75000
Date: 31/10/2025
Author: McDonald, Lachlan R.
Coordinate System: GDA2020 / MGA zone 51

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8.3 Potential Environmental Impacts

Potential direct and indirect impacts to terrestrial fauna are outlined in the sections below. Potential impacts to significant fauna species known from the SA are addressed in further detail in the following Appendices:

- Butterfly impact assessment – prepared by Dr Rod Eastwood to address potential impacts of the Proposal on IHB (**Appendix K**). Provided as a confidential appendix to protect locations of known sub-populations from poachers.
- EPBC self-assessment – assesses potential EPBC listed species that may occur in DE, including Malleefowl which are known from the SA, and migratory species that may visit the area.
- Bird and bat impact assessment – impact assessment focused specifically on the potentially impact to bird and bat species from the construction and operation of wind turbines.

8.3.1 Direct Impacts

Potential direct impacts to terrestrial fauna resulting from the implementation of the Proposal are predominantly associated with clearing of native vegetation in the construction stage and WTG collision in the operational stage. Direct impacts are anticipated to include:

- Fauna deaths and habitat loss from construction activities (clearing, vehicle strike, entrapment etc.)
- Fauna deaths from WTG collision (including barotrauma)
- Habitat loss from clearing up to 652 ha of vegetation

8.3.1.1 Fauna deaths from construction activities

Clearing of native vegetation will result in the loss of small fauna that retreat into burrow such as lizards and mammals. Larger animals and birds will temporarily relocate into adjacent areas. The risk of impacting any significant fauna species (most notably Malleefowl) during clearing activities is low. Vehicle strike presents a higher risk due to the construction workforce and associate vehicle movements; however, the risk will be somewhat offset by other anthropogenic factors (light, noise etc.) deterring fauna. Entrapment risks are present where surface water is made available (i.e. construction turkey nest) and during open trenching.

8.3.1.2 Fauna deaths from WTG collision

International studies have extensively examined bird strikes at wind farms, while wind farms are known to result in bird strikes, this only represents approximately 0.01% of human-related bird deaths, which is low compared to other sources such as aviation and roadkill (Queensland Government 2025). Bird species with higher wing loading, such as soaring birds that fly fast and utilise updrafts (e.g. raptors) are more susceptible to collisions due to reduced manoeuvrability (DES 2025). In contrast, many non-migratory granivorous and fruit-eating birds, which typically fly close to or within canopy levels, face a lower collision risk.

Bats are vulnerable to turbine collisions, particularly aerial insectivores that forage in open and edge spaces. Vulnerability is influenced by habitat preference, wing morphology, behaviour, and echolocation challenges around moving blades (DES 2025). Barotrauma, a form of fatal internal injury caused by rapid pressure changes near turbine blades, has been suggested as a cause of bat fatalities, though some argue pressure changes are only significant when the individual is very close to the blades, where collision is likely inevitable (WREN, 2023).

A comprehensive bird and bat risk assessment was conducted by DES (2025) to determine potential impacts from turbine interactions. The assessment was informed by the baseline fauna surveys completed for the Proposal, historic bird and bat monitoring conducted nearby for KCGM, and the preliminary results of the 24-month bird and bat monitoring program being implemented for this Proposal, which commenced in October 2024.

The risk assessment considered 155 avifauna species and 12 bat taxa with potential to occur within the area, as well as the behavioural ecology of these species and applied a qualitative risk framework to determine potential for turbine interactions. Consideration was also given to boom-and-bust seasons associated with exceptional rainfall and longer periods of dry conditions, which can occur roughly once every ten years.

The risk assessment identified three bat species with a high inherent risk of impact from WTGs i.e. if no management and mitigation measures are adopted. An additional 14 bird and bat species were identified with a moderate inherent risk. No species were identified as having an extreme risk level of risk.

The risk assessment determined that without mitigation the risk of collision was high for three species of free-tailed bat, and medium for 13 species of avifauna and one additional bat species (DES 2025).

- White-striped Free-tailed Bat (*Austronomus australis*)
- Inland Free-tailed Bat (*Ozimops petersi*)
- Southern Free-tailed Bat (*Ozimops planiceps*).

A medium inherent risk rating was identified for:

- Fork-tailed Swift (*Apus pacificus*) – Migratory (EPBC Act / BC Act)
- Rainbow Bee-eater (*Merops ornatus*) – Marine (EPBC Act)
- Whiskered Tern (*Chlidonias hybrida*) – Migratory (EPBC Act)
- Peregrine falcon (*Falco peregrinus*) – (DBCA OS)
- Common Bronzewing (*Phaps chalcoptera*)
- Crested Pigeon (*Ocyphaps lophotes*)
- Black-shouldered Kite (*Elanus axillaris*)
- Wedge-tailed Eagle (*Aquila audax*)
- Whistling Kite (*Haliastur sphenurus*)
- Black Kite (*Milvus migrans*)
- Nankeen Kestrel (*Falco cenchroides*)
- Brown Falcon (*Falco berigora*)
- Budgerigar (*Melopsittacus undulatus*)
- Gould's Wattled Bat (*Chalinolobus gouldii*).

Following consideration of proposed management and mitigation measures, the risk assessment identified no bird or bat species with a high residual risk. Fourteen (14) bird and bat species were identified with a moderate residual risk (DES 2025).

A medium residual risk rating was identified for:

- Fork-tailed Swift (*Apus pacificus*) – Migratory (EPBC Act)
- Rainbow Bee-eater (*Merops ornatus*) – Migratory (EPBC Act)
- Peregrine falcon (*Falco peregrinus*) – (DBCA OS)
- Black-shouldered Kite (*Elanus axillaris*)
- Wedge-tailed Eagle (*Aquila audax*)
- Whistling kite (*Haliastur sphenurus*)
- Black Kite (*Milvus migrans*)
- Nankeen Kestrel (*Falco cenchroides*)
- Brown Falcon (*Falco berigora*)
- Budgerigar (*Melopsittacus undulatus*)
- White-striped Free-tailed Bat (*Austronomus australis*)
- Inland Free-tailed Bat (*Ozimops petersi*)
- Southern Free-tailed Bat (*Ozimops planiceps*)
- Gould's Wattled Bat (*Chalinolobus gouldii*).

Risk of WTG collisions for significant fauna species is also summarised in Table 8-5.

Bird and bat deaths are almost certain to occur at all commercial wind farms across the world, and the risk assessment determines that the Proposal would not differentiate from this assessment (DES 2025). Most of the risk associated with WTGs to birds and bats are weighted towards species more likely to utilise the DE in numbers, which by nature are more likely to be common species than rarer conservation significant species. The assessment concluded that while wildlife fatalities are expected, ongoing targeted surveys and risk assessments will refine understanding and inform adaptive mitigation strategies (DES 2025).

Based upon DES (2025) the level of risk acceptability has been assessed by the Proponent as per Table 8-10 for the development of this BBAMP. Based on this level of risk and acceptability, the Proposal and specifically commissioning and operation of WTGs can be implemented to an acceptable level of risk subject to implementation of controls specified in this BBAMP.

Table 8-10: Risk Level Acceptability

Risk Level	Measure (DES 2025)	BBAMP Risk Acceptability	
		Listed Species	Non-Listed Species
Extreme	Immediate action required	Level of risk not acceptable	Level of risk not acceptable
High	Senior management attention required	Level of risk not acceptable	Level of risk may be acceptable subject to controls.
Medium	Management responsibility must be specified	Level of risk acceptable subject controls.	Level of risk acceptable subject controls.
Low	Managed by routine procedure	Level of risk acceptable.	Level of risk acceptable.

8.3.1.3 Fauna habitat loss from land clearing

Direct fauna habitat loss will occur from implementing the Proposal including:

- 652 ha of fauna habitat including an estimated:
  - 350 ha of open woodland
  - 67 ha of shrubland
  - 200 ha of groved woodland
  - 20 ha of drainage line
  - 5 ha of grassland
  - 10 ha of cleared
- Up to 652 ha of foraging and dispersal habitat (including marginal habitat) for Malleefowl
- Up to 20 ha of high SRE potential habitat (drainage line)

8.3.2 Indirect Impacts

Potential indirect impacts on terrestrial fauna resulting from implementation of the Proposal are also primarily related to construction activities. Very minimal risk of indirect impact is applicable during the operational sage of the Proposal. Indirect impacts are anticipated to include:

- Habitat fragmentation
- Introduced fauna
- Degradation of fauna habitat from dust generation
- Degradation of habitat from changes to surface water drainage
- Degradation of habitat from bushfire
- Displacement or disruption of fauna behaviour from anthropogenic activity (unnatural light, shadow effects, noise and vibration, dust, movement etc.)

8.3.3 Cumulative Impacts

Potential cumulative impacts to terrestrial fauna are predominantly related to habitat loss and fragmentation at a landscape level. Cumulative impacts are discussed further in Section 14.

8.4 Mitigation Hierarchy

The Proposal has been developed in accordance with the mitigation hierarchy: avoid, minimise, and rehabilitate, to reduce direct and indirect impacts on fauna. The detailed design for the Proposal has been developed in parallel with the implementation of baseline environmental surveys and an iterative approach has been taken with the design being modified to avoid potential impacts to significant fauna such as Malleefowl and IHB. Specific mitigation measures for the Proposal are outlined in Table 7-6.

Table 8-11: Terrestrial Fauna: Mitigation Hierarchy

Mitigation Hierarchy	Aspect	Adopted Mitigation Measures	Efficacy of Controls
Avoid	Significant fauna	• Avoidance of all identified active and inactive Malleefowl mounds in SA • All IHB host plants excised from Disturbance Envelope in Exclusion Zones with a minimum 50m buffer around plants.	**Best Practice** The avoidance of direct impacts to significant fauna and associated habitat is consistent with minimising risk ALARP by eliminating the risk pathway.
	Fauna habitat	• Avoidance of all critical breeding habitat (high suitability) and marginal breeding habitat (moderate i) for Malleefowl via exclusion from DE • High potential SRE habitat (drainage line) limited to 20 ha of clearing.	
Minimise	WTG collision	• Implementation of a site specific BBAMP. • Use of largest turbine available – collision rates correlate with visibility of turbines. • Turbines widely spaced to reduce the diversionary responses by birds and bats • Curtailment to minimise fauna deaths attributable to WTG interactions. Curtailment predicted to avoid about 94% of bat activity. • Implementation of a carcass search and carrion removal program to reduce risk of attracting raptors to the area. • Transmission cabling will be underground, reducing opportunities for birds to perch in the area. • Data will continually be collected on bird and bat mortality to inform adaptive management.	**Best Practice** Adaptive curtailment is considered best practise in reducing WTG collision risk particularly to bat species.
	Fauna habitat	• Clearing of fauna habitat minimised to extent necessary for Proposal. • Proposal preferentially siting infrastructure within Low suitability Malleefowl habitat where practicable. • Clearing of High potential SRE habitat (drainage line) minimised, limited to 20 ha of clearing.	**Standard Industry Practice** The minimising of clearing and degradation of significant fauna habitat is consistent with minimising risk ALARP by eliminating the risk pathway.
	Anthropogenic impacts (dust, light spill, noise and vibration)	• Dust suppression as required. • Speed limits on unsealed roads and access tracks to minimise dust. • Night works to be minimised. • Light spill during be minimised • Regular maintenance of equipment, vehicles and machinery to minimise noise. • Weed control as required.	
	Vehicle strike	• Speed limits implemented to minimise the risk of fauna injury or mortality from vehicle strike • Vehicle traffic will be confined to delineated site access roads • Signage will be implemented in high-risk areas (e.g. near Exclusion Zones) • Humane euthanasia procedure implemented if required	**Standard Industry Practice** Controls will minimise impacts to fauna species ALARP but will not avoid all injuries and deaths. These are consistent with industry practise and widely utilised as effective mitigation measures.
	Fauna entrapment	• Artificial water sources (i.e. turkey nest) fitted with fencing and egress matting. • Open trenches fitted with temporary egress (e.g. ramps) when open for longer than 24 hours. • Regular inspections of artificial water sources and open trenches (12 hourly). • Relocation of any trapped fauna to outside of the DE	
	Fire	• Development of a Proposal Emergency Response Plan. • Provision of firefighting equipment and onsite water supply.	

Mitigation Hierarchy	Aspect	Adopted Mitigation Measures	Efficacy of Controls
	Introduced fauna	• Waste management • Inspections • Pest control (as required)	
Rehabilitate	Fauna habitat	• Progressive rehabilitation of temporary disturbances • Rehabilitation of remaining disturbance following decommissioning	**Standard Industry Practice**
Offset	Habitat offsets	The Proposal will not result in any significant residual impacts to terrestrial fauna or fauna habitat and therefore no environmental offsets are proposed.	**N/A – not required.**

8.4.1.1 Birds and Bats

The proposed mitigation and managing measures for minimising potential impacts to birds and bats during wind farm operations have been based on advice provided by David Donato from Donato Environmental Services (DES). David has experience conducting similar work for several other wind farms in the Goldfields, as well as a long history of supporting Northern Star with bird and bat monitoring for the nearby Fimiston Operations.

The bird and bat risk assessment included several recommendations for management measures that could be implemented to minimise the risk to bird and bat species. However, DES emphasised the importance of taking an adaptive management approach to ensure that measures implemented were based upon data and performance.

A preliminary BBAMP has been developed to provide a framework for minimising potential impacts to birds and bats from WTG operations. Monitoring of bird and bat activity will be used to identify the risk profile for each turbine and/or collector group. This strategy should enable targeted management, applied at the appropriate locations and times.

Key management strategies considered for minimising impacts to birds and bats have included:

- Use of largest turbine available - Large turbines are more visible and have lower blade rotational speeds than smaller turbines. Collision rates also appear to be related to ease of visibility.
- Turbines are designed to be widely spaced to reduce the diversionary responses by birds and bats
- Implementation of a bird and bat adaptive monitoring programme that detects and quantifies impacts to birds and bats
- Implementation of a carcass search and carrion removal program
- Transmission cabling to connect into the existing transmission line present on site will be underground, hence avoiding/reducing impacts to terrestrial fauna
- Curtailment of turbines in accordance with BBAMP to avoid periods of high bat activity. Curtailment will include increasing the cut-in speed for WTGs to 4.5 m/s between 630PM and 530AM in January, March, April and August to December. The results of bird and bat utilisation surveys indicate this curtailment regime will avoid about 94% of bat activity.

This approach has been informed by studies of WTG management in Australia and further afield. While there are few studies specific to Australia, a study by Bennett et al. (2022) conducted in southern Australia found increasing the cut-in speed from 3.0 m/s to 4.5 m/s from dawn to dusk reduced bat fatality by 54% and White-striped Free-tailed bats mortality by two-thirds.

Curtailment of WTGs will be adaptive and informed by the results of ongoing environmental monitoring conducted throughout the planning, construction, commissioning and operations. Further details on the adaptive management of potential impacts to birds and bat is provided in the BBAMP (**Appendix L**).

8.5 Significance of Residual Impacts

Residual impacts to terrestrial fauna are unlikely to be significant. The sections below outline the potential residual impacts, assuming the mitigation measures detailed above are implemented. The Proposal has been designed to effectively mitigate potential impacts to faunal diversity. While there may be some acute changes to fauna activity near the proposed turbines, fauna assemblages in this environment generally occur as sparse populations, and changes to regional fauna density are unlikely to be significant. The Proposal is therefore expected to align with EPA objectives to conserve terrestrial fauna and maintain ecological integrity Table 8-12

Table 8-12: Terrestrial Fauna: Assessment and Significance of Residual Impacts

Impact Type	Aspect	Residual Impact	Assessment
Direct	Fauna habitat loss	• Loss of up to 652 ha of fauna habitat types that area well represented in the Study Area. Over 90% of each fauna habitat type within in the Study Area will be retained. • Loss of up to 652 ha of dispersal and foraging habitat for Malleefowl, which is common and widespread in the region. 12,292 ha (95.1%) of Malleefowl habitat to be retained in the Study Area. No clearing of Malleefowl breeding habitat will take place. • Loss of 162 ha of habitat considered potentially suitable for IHB. 4,863 ha (97%) of IHB habitat within the Study Area will be retained. No clearing of conservation significant IHB habitat (i.e. IHB host plants) will take place. • Loss of 20 ha of high SRE habitat (96.8% retained within SA), and 632 ha of low or no SRE habitat (94.7% retained within SA).	Not likely to be significant
	Fauna deaths	• Minor loss of animals associated with construction activities (clearing, vehicle strike), unlikely to include any significant species.	Not significant
	Fauna deaths from WTG collision	• Medium risk of turbine collisions for fourteen species (11 birds and 3 bats), including three conservation significant species: Fork-tailed Swift (Migratory), Rainbow Bee-eater (Migratory) and Peregrine Falcon. Potential impacts would be localised, acute and reversible. Potential impacts will be reduced to an acceptable level through implementation of the BBAMP.	Not likely to be significant
Indirect	Fragmentation	• Fragmentation of fauna habitat, unlikely to create barrier to fauna dispersal due to the foraging and dispersal behaviour of fauna species present.	Not significant
	Introduced fauna	• Low risk of introduced fauna proliferation. • Low risk of new introduced fauna species to DE.	Not significant
	Hydrological regimes	• Surface water drainage flows to be maintained with appropriate surface water infrastructure (e.g. drains and culverts). • No downstream impacts to hydrological regimes.	Not significant
	Fire regimes	• Minor increase of bushfire risk during construction stage. • Negligible increase of bushfire risk during operations.	Not significant
	Anthropogenic impacts (light spill, noise and vibration)	• Moderate increase in anthropogenic impacts during construction stage. • Minor increase in anthropogenic impacts during operational and subsequent stages.	Not significant
Cumulative	Fauna habitat loss	• Loss of up to 652 ha well represented fauna habitats. As with vegetation, over 96% of these habitat types will persist.	Not likely to be significant

Impact Type	Aspect	Residual Impact	Assessment
		• Cumulative impacts to Malleefowl habitat represents a loss of about 1.2% Malleefowl habitat available in the region. Habitat will continue to be common and widespread.	

8.6 Environmental Outcomes

With consideration of the adopted mitigation measures and residual environmental impacts, the anticipated environmental outcomes for the Proposal meet the EPA's objective for terrestrial fauna. The Proposal is not expected to significantly impact biological diversity or ecological integrity, and proposed environmental outcomes can be managed under other approvals as outlined in Table 8-13

Table 8-13: Terrestrial Fauna Environmental Outcomes

Environmental Outcome	Manageable under Other Approval	Monitoring and Reporting
No more than 652 ha of fauna habitat loss within the DE	**Yes – NVCP and MDCP** Clearing can be managed under NVCP and Mining Act Approval Statement conditions.	• Internal Disturbance Permit. • Post-clearing survey. • GIS database recording of clearing disturbances. • NVCP Annual Compliance Reports. • AER and MRF reporting (DMPE)
No direct impacts to fauna habitat beyond the DE.	**Yes - MDCP** Impacts can be managed under Approvals Statement conditions, specifically DMPE standard environmental outcome F3: *Mining activities undertaken in a manner that avoids detrimental impacts to native fauna outside the activity envelope*	• Weekly environmental compliance inspections during construction. • Internal Disturbance Permit. • Post-clearing survey. • GIS database recording of clearing disturbances. • AER and MRF reporting (DMPE).
No direct impacts to IHB within Exclusion Zones	**Yes – MDCP** Impacts can be managed under Approvals Statement conditions, specifically DMPE standard environmental outcome F3: *Mining activities undertaken in a manner that avoids detrimental impacts to native fauna outside the activity envelope*	• Weekly environmental compliance inspections during construction. • Internal Disturbance Permit. • Post-clearing survey. • GIS database recording of clearing disturbances. • AER and MRF reporting (DMPE).
Implementation of EMP to mitigate impacts to Terrestrial Fauna.	**Yes – MDCP** Impacts can be managed under Approvals Statement conditions, specifically a nonstandard condition can be requested to ensure the EMP is a statutory requirement of approval.	• Monitoring on accordance with EMP. • AER (DMPE).
Implementation of BBAMP to mitigate impacts to Terrestrial Fauna during operations.	**Yes – MDCP** Impacts can be managed under Approvals Statement conditions, specifically a nonstandard condition can be requested to ensure the BBAMP is a statutory requirement of approval.	• Monitoring on accordance with BBAMP. • AER (DMPE).
Progressive rehabilitation of fauna habitat	**Yes – MCP** Impacts can be managed under MCP conditions, specifically DMPE standard environmental outcome C10: *Rehabilitated areas provide habitat for native fauna, indicative of the target ecosystem and post-mining land use.*	• Monitoring in accordance with MCP. • GIS database recording of rehabilitation status • AER and MRF reporting (DMPE).

9 Social Surroundings

9.1 EPA Policy and Guidance

The EPA's objective for social surroundings is 'To protect social surroundings from significant harm' (EPA, 2023a). The EPA considers social surroundings as aesthetic, cultural, economic and other social surroundings to the extent to which they directly affect or are affected by physical or biological surroundings (EPA 2023a). Social surroundings include:

- Aboriginal cultural heritage
- Natural and historic heritage
- Amenity (noise, dust, odour, visual)
- Economic impacts

The policies and guidance relevant to the social surrounds are described in Table 9-1

Table 9-1: Social Surroundings Policy and Guidance

Reference	Title
EPA	
EPA 2023a	Statement of Environmental Principles, Factors, Objectives and Aims for EIA
EPA 2023b	Environmental Factor Guideline 'Social Surroundings
EPA 2023c	Technical Guidance Environmental impact assessment of Social Surroundings – Aboriginal cultural heritage
EPA 2005	Guidance for the Assessment of Environmental Factors Separation Distances between Industrial and Sensitive Land Uses No. 3
Other	
DPLH	Department of Planning, Lands and Heritage (DPLH). 2023. Aboriginal Heritage Act 1972 Guidelines.
EPASA 2021	Wind Farms – Environmental noise guidelines – July 2009, Updated November 2021
WAPC 2016	Transport Impact Assessment Guidelines Volume 4 Individual Developments

9.2 Receiving Environment

9.2.1 Studies

To understand the potential impacts of the Proposal on social surroundings, a range of specialist studies and assessments were undertaken for Aboriginal Social Surroundings (archaeological and ethnographic heritage) and other Social Surroundings (visual amenity, noise, aviation impacts, electromagnetic interference) as outlined in Table 9-2.

Table 9-2: Social Surroundings Studies

Reference	Survey Area	Survey Type	Survey Dates
Aboriginal Social Surroundings			
Integritat 2025 (Confidential)	Part of DE	Report on a Heritage Survey with Traditional Knowledge Holders	August 2025
Terra Rosa 2025a (Confidential)	Part of DE	Ethnographic Site Avoidance Assessment	September 2024 March 2025
Terra Rosa 2025b (Confidential)	Part of DE	Archaeological and Ethnographic Site Avoidance Assessment	April 2025
Terra Rosa 2025c (Confidential)	Part of DE	Archaeological and Ethnographic Site Avoidance Assessment	February 2025
Other Social Surroundings			
Moir Studio 2025 **Appendix M**	DE + impact area	Kalgoorlie Wind & Solar Farm Desktop Landscape and Visual Impact Assessment	Desktop study
GHD 2025a **Appendix N**	Solar farm + impact area	Glare Assessment Report Kalgoorlie Solar Farm	Desktop study
GHD 2025b **Appendix O**	Wind farm + impact area	Kalgoorlie Wind Farm Shadow Flicker Impact Assessment	Desktop study

Reference	Survey Area	Survey Type	Survey Dates
Herring Storer 2025 **Appendix P**	Wind farm + impact area	Wind Farm Kalgoorlie Noise Impact Assessment	Desktop study
DNV 2025 **Appendix Q**	Wind farm + impact area	Initial EMI review and layout constraints for the proposed Kalgoorlie Wind Farm	Desktop study
Aviation Projects 2024 **Appendix R**	Wind farm + impact area	East Kalgoorlie Wind Farm – Update Preliminary Aviation Impact Assessment	Desktop study
RJAET 2025 **Appendix S**	WTG transport route	Route Study Goldwind Australia Superpit Wind Farm	Desktop study

9.2.2 Aboriginal Social Surroundings

9.2.2.1 Land Use

Aboriginal people have a long history of occupation and land use over the Country on which the Proposal sits, and their custodianship over the land long pre-dates the European establishment of Kalgoorlie in 1893. According to the 2021 Census, Aboriginal people make up 7.3% of the population of Kalgoorlie-Boulder, significantly higher proportion than the Western Australia (3.2%) and Australia (2.9%) (ABS 2021). The nearest Aboriginal community, Ninga Mia Village is located approximately 1 km north of the Development Envelope nearest to the transmission line.

9.2.2.2 Aboriginal Heritage Sites

A review of the Aboriginal Cultural Heritage Inquiry System (ACHIS) in October 2025 shows nine registered sites and three lodged places within 1 km of the Development Envelope as listed in Table 9-3 and shown in Table 9-1. It is noted all nine registered sites are held by DPLH to be restricted in nature and therefore have a 4 km^2 buffer (2 km x 2 km) shown on ACHIS to protect the specific site location. The confidential administrative locations of these sites have been confirmed through heritage survey, and the Development Envelope intersects with the non-administrative buffered boundary of these sites only. All registered sites and lodged places are in proximity to the transmission line infrastructure, with only one lodged site (ID 39859) within 1 km of the renewable energy infrastructure.

Table 9-3: ACHIS Registered Sites and Lodged Places

Place Status	Distance to DE (m)	DPLH ID	Name	Place Type
Registered	500	1417	Ninga Mia Hill	Creation / Dreaming Narrative
	0	1418	Karlkurla	Creation / Dreaming Narrative; Water Source
	0	1421	Paddy Hannans Tree	Creation / Dreaming Narrative
	170	1422	Mulyinyu Rockhole	Creation / Dreaming Narrative; Landscape / Seascape Feature; Water Source
	115	1476	Muruntjarta	Camp; Creation / Dreaming Narrative
	0	1540	Kalgoorlie Rockhole	Creation / Dreaming Narrative; Water Source
	140	1541	Nanny Goat Hill (Pilyurru)	Camp; Ritual / Ceremonial; Creation / Dreaming Narrative
	0	1542	Microwave Tower Hill	Creation / Dreaming Narrative
	0	3010	Mt Charlotte	Creation / Dreaming Narrative
Lodged	185	40237	MG2242_NC05	Artefacts / Scatter
	400	39859	MG2321-01	Plant Resource
	740	36959	Karlkurla Tjurra Rockhole	Water Source

9.2.2.3 Aboriginal Heritage Surveys

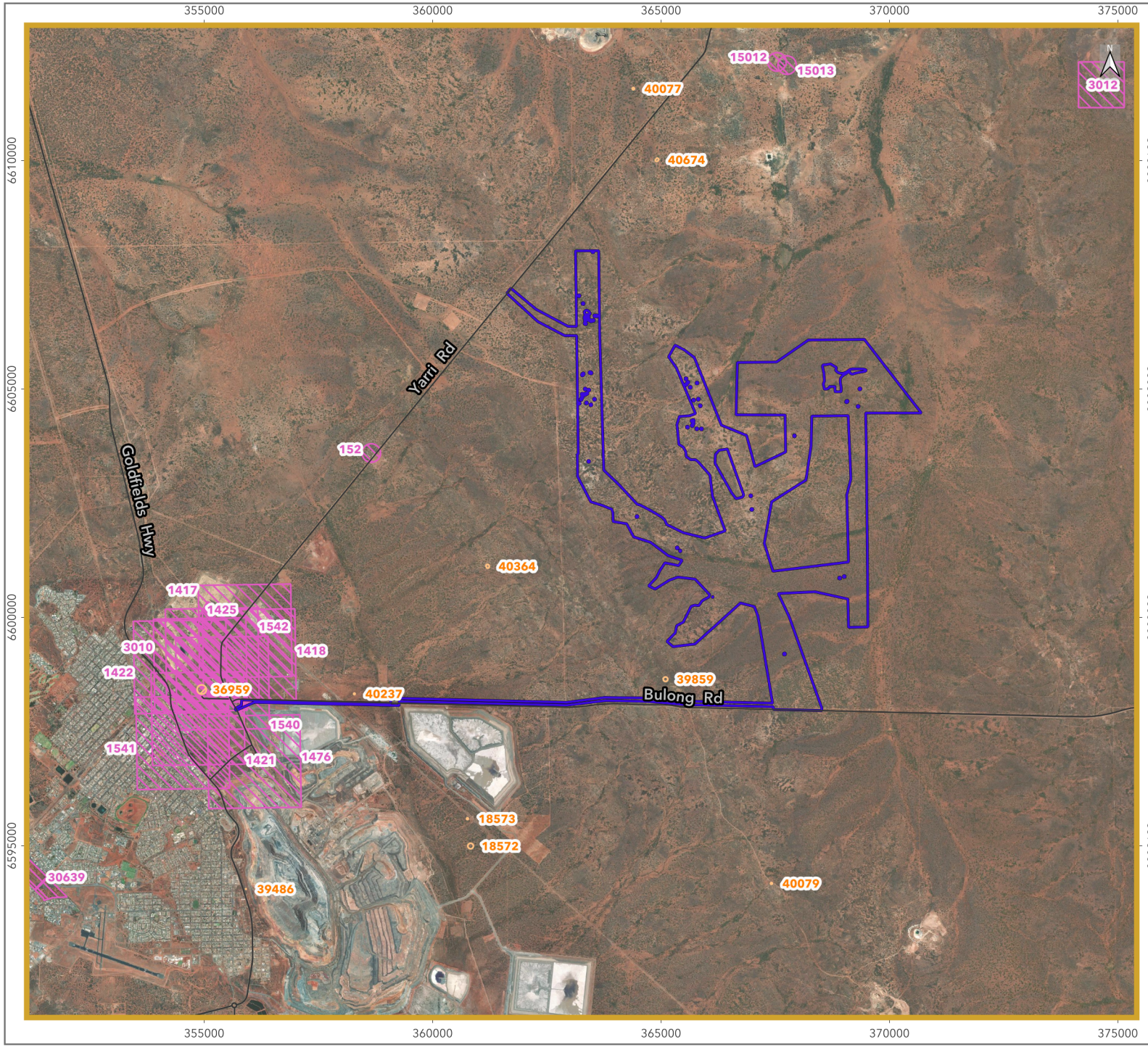
Heritage surveys (archaeological and ethnographic) within the DE have been conducted with appropriate Knowledge Holders which have resulted in the identification of sites of ACH value. The location and nature of these sites is confidential; however, they have all been excised from the DE as Exclusion Zones to protect them from potential impacts from the Proposal activities. Buffers have been applied within Exclusion Zones based upon advice received within heritage survey reports.

The heritage survey reports contain broad recommendations in addition to identification of ACH sites (Terra Rosa 2025b). Investigations of cultural values outside of heritage sites have identified that:

- All waterways including ephemeral drainage lines hold cultural value, and undue disturbance should be avoided.
- Mature trees should be avoided (where possible) as they emphasise the connection to Country.
- Medicine Bush (*Scaevola spinescens*) is culturally significant for its medicinal value and where disturbance cannot be avoided these should be harvested by cultural monitors.
- Mallefowl (*Leipoa ocellata*) is culturally significant and impacts to Malleefowl mounds should be avoided.

A key recommendation from the heritage survey report is that cultural monitors should be engaged during initial ground disturbing activities (clearing, earthworks). This recommendation will be adopted to ensure that cultural values are protected during the higher risk construction stage of the Proposal so that Knowledge Holders can provide direct feedback on-ground.

A Proposal specific CHMP will be developed with Native Title Claimants to outline specific arrangements around ACH management. This CHMP will be developed concurrently with submission and assessment of approvals.



Aboriginal Cultural Heritage Sites

Figure 9-1

- Development Envelope
- Roads
- Aboriginal Cultural Heritage (ACH) Register (DPLH-099)
- Aboriginal Cultural Heritage (ACH) Lodged (DPLH-100)

0 1 2 3 km

Scale: 120000
Date: 31/10/2025
Author: McDonald, Lachlan R.
Coordinate System: GDA2020 / MGA zone 51

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9.2.3 Other Social Surroundings

9.2.3.1 Natural and Historic Heritage

Kalgoorlie was first established in 1893 and is one of the oldest European inland settlements in Western Australia. Accordingly, there are many European heritage sites located within the townsite. A number of State registered places occur within 10 km of the Development Envelope, the closest being Mt Charlotte Reservoir (ID 15727) located approximately 1.3 km west of the Development Envelope. The nearest local heritage inventory place (CKB) is located approximately 850 m west of the Development Envelope in Williamstown. No European heritage will be impacted by implementation of the Proposal.

9.2.3.2 Visual Amenity

Implementation of the Proposal has the potential to impact on the visual amenity of the DE and surrounding landscape. The construction of 32 WTGs represents a change to the visual landscape of Kalgoorlie-Boulder and will be the first wind farm in the local area. With a maximum blade height of 241 magl, the WTGs will be prominent features in the local landscape. To further understand the landscape character and identify and assess the significant of potential impacts, a desktop visual impact assessment was undertaken (Moir Studio 2025) which included:

- Zone of visual influence which utilised a digital terrain model to determine where WTGs may be visible in the landscape from a 'bare ground' (standing at ground level) scenario.
- Selection of seven key viewpoints (VP) within a 14 km radius of the DE as shown in Plate 9-1 to reflect high scenic or community value, public accessibility, and elevation, including:
  - VP01: Bulong Road
  - VP02: Yarri Road
  - VP03: Nhalpa Drive (Ninga Mia Community)
  - VP04: Mt Gleddon
  - VP05: Sir Richard Moore Oval
  - VP06: Mt Charlotte Lookout
- Visual impact modelling for both daytime and nighttime conditions

The visual impact assessment identified WTGs will be visually dominant in the landscape within approximately 3 km from the wind farm. From about 3 km to 5.5 km from the wind farm, WTGs will be highly visible, and from 5.5 km to 14 km the wind farm may be potentially noticeable. The results indicated that daytime visual impacts across all VPs representing Kalgoorlie-Boulder townsite are negligible to low. WTGs were barely perceptible at Mt Gleddon and were not visible from the other locations, as shown in Table 9-4.

Screening by existing roadside vegetation and natural landforms further reduces potential visual intrusion, ensuring that the Proposal's presence remains subtle within the broader landscape. For the majority of Kalgoorlie-Boulder the wind farm will not be noticeable given the townsite sits lower in elevation than VP04 and VP06. Consequently, there will be minimal visual amenity impacts to Kalgoorlie-Boulder as a whole and the wind farm is considered amenable to the landscape.

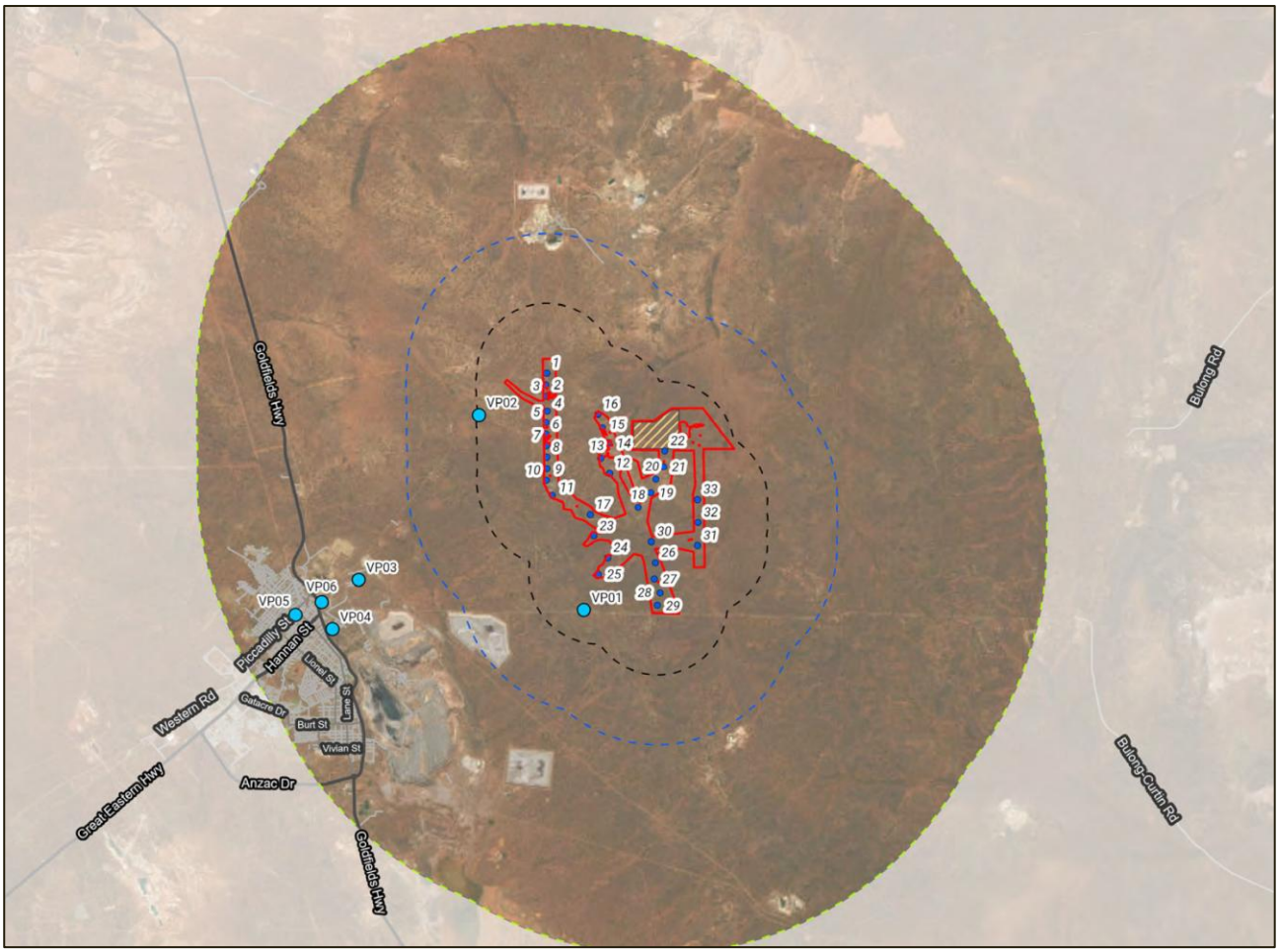
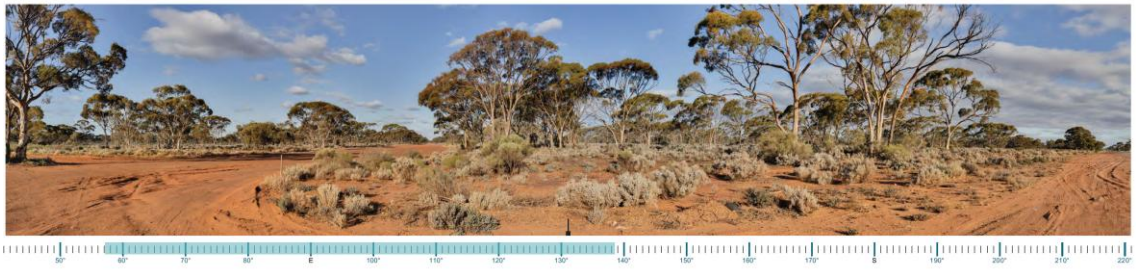
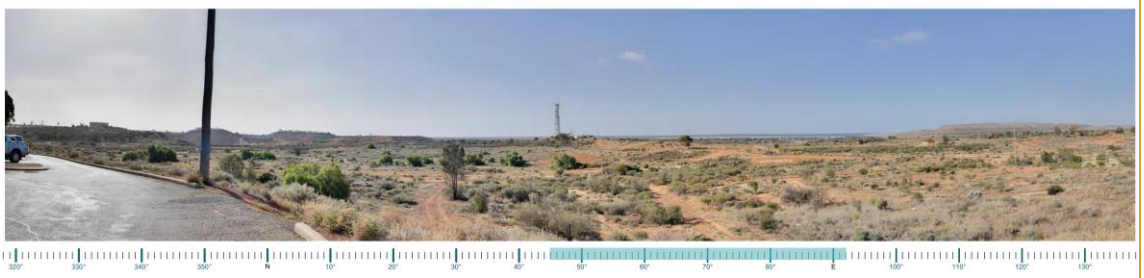


Plate 9-1: Viewpoints for Photomontage (Moir Studio 2025)

Table 9-4: Photomontage

Location	Photomontage
VP01: Bulong Road	 180° Existing View  180° Proposed View
VP02: Yarri Road	 180° Existing View  180° Proposed View

Location	Photomontage
VP03: Nhalpa Drive	 180° Existing View  180° Proposed View
VP04: Mt Gleddon	 180° Existing View  180° Proposed View

Location	Photomontage
VP05: Sir Richard Moore Oval	 180° Existing View  180° Proposed View - No Visibility
VP06: Mt Charlotte Lookout	 180° Existing View  180° Proposed View

9.2.3.3 Glare

Glare (in the context of solar farms) is caused by the reflection of sunlight by the surface of solar panels (GHD 2025a). The magnitude of the reflected light is dependent on the surface of the solar panel and the angle at which light hits the solar panel surface. This angle is called the angle of incidence ($i°$) and it is formed between the panel perpendicular or normal and the beam of light. Solar panels are all manufactured with a glass layer to shield the underlying photovoltaic layer from weather-related damage.

The assessment of the potential glare impact from solar farm is conservative and follows guidelines and industry practice in the absence of specific Australian Standards for solar farm glare. This section outlines

the key steps and processes involved in conducting the glare assessment, including data collection, glare analysis, impact assessment and effective mitigation strategies.

The impact assessment evaluates the risk of glare, considering the frequency, duration, and intensity of glare events. The assessment is compared against industry requirements to determine compliance and identify any exceedances. The solar farm is proposed to be located approximately 15 km northeast of Kalgoorlie at a site that is approximately 18 km from the Kalgoorlie Boulder Airport.

9.2.3.4 Shadow Flicker

GHD (2025b) conducted a shadow flicker assessment to evaluate the potential effects of turbine blade movement on the DE and adjacent areas, particularly the neighbouring proposed solar farm. Shadow flicker occurs when rotating turbine blades intermittently cast shadows across a fixed observation point, creating a flickering effect. There are no residences located in the vicinity of the proposed wind farm and therefore the focus of the shadow flicker assessment was to determine the potential impact shadow flicker may have on the proposed solar farm.

The duration, intensity, and location of shadow flicker are influenced by the relative position of the sun, the turbine, and the receptor. These relationships vary based on factors such as:

- Turbine specifications: including rotor diameter and height of the tower
- Surface topography: which may obscure or enhance shadow paths
- Surrounding vegetation or objects: which can act as screening elements
- Rotor orientation: determined by prevailing wind direction
- Weather conditions: such as cloud cover, smoke/mist or fog.

The assessment used windPRO 4.1 modelling software and incorporated the proposed wind turbine layout to simulate the theoretical extent of shadow flicker. The model traces the sun's path in relation to turbine blade movement and surrounding terrain to predict potential flicker exposure, based on a worst-case scenario with clear sky conditions and no screening from vegetation or buildings.

The model calculates dynamic shading, shadow flicker caused by sunlight passing through the rotating blades. It does not include static shading, which results from the turbine tower or nacelle and does not create a flickering effect. Results of the shadow flicker include identification of potentially affected areas and an evaluation of whether any receptors may exceed commonly accepted threshold values for shadow flicker duration.

9.2.3.5 Dust

Kalgoorlie-Boulder is in a semi-arid climate, with sparse vegetation, and extensive land disturbance. The region's natural soils area characterised as loose fine soils, making it susceptible to wind erosion and dust, particularly in the warmer months. Fugitive dust in the area is amplified by existing land uses, including open pit mining, haul roads, tailings storage facilities and urban development and grazing. Therefore, dust is a persistent feature of the Goldfields region.

Dust emissions have the potential to adversely impact air quality and the health of people through the inhalation of particulate matter (PM). PM with a diameter of less than 10 microns (PM10) and less than 2.5 microns (PM2.5) are most typically utilised for regulatory purposes given their ability to be inhaled into the lungs and induce adverse health effects, particularly PM2.5 which is more likely to travel deep into the lungs. In addition to health impacts, fugitive dust can also have amenity impacts via deposition to residential areas and dwellings, typically measured as total suspended particulates (TSP).

No specific dust impact assessment was undertaken for this Proposal given the distance from Kalgoorlie-Boulder. The Proponent will comply with the standards for dust emissions as outlined in Table 9-5 at all sensitive receptors locations.

Table 9-5: Standards for Dust Emissions

Category	Averaging Period	Permitted Concentration	Source
PM_{10}	1 day	50 µg / m^3	NEPM 2021
	1 year	25 µg / m^3	
TSP	1 day	90 µg / m^3	Kwinana EPP 2009
Dust deposition	30 days	4 g / m^2	NSW EPA 2016

Visual dust impacts on adjacent public roads (Yarri Road and Bulong Road) will be closely monitored during construction activities (i.e. when construction is occurring within 100 m of road reserves). This will include having a spotter monitoring wind and dust conditions at the road interface and ceasing activities if strong winds are towards the direction of roads. Water carts will be continuously available for dust suppression to minimise dusting, however, should wind conditions be extreme then activities will be ceased or redirected to areas away from public roads.

9.2.3.6 Noise

Implementation of the Proposal has the potential to result in noise emissions during the construction, operational and decommissioning stages. Noise during construction and decommissioning stages will primarily occur during daylight hours and will be temporary for the short-term durations of these stages. Consequently, the impacts of construction and decommissioning noise are expected to be minimal and a noise impact assessment for these staged was not conducted.

Noise emissions during operations is primarily associated with WTGs, with the predominant noise caused by aerodynamic noise from the passage of air over turbine blades. To understand the potential impacts associated with WTG emissions, a noise impact assessment was undertaken for the Proposal (Herring Storer 2025). The noise assessment included:

- Background noise monitoring at five locations around the Proposal
- Identification of nearby sensitive receptors
- Noise modelling including predictions of operational noise (SoundPlan model) using topographical information, WTG parameters, and other relevant data.
- Assessment of conformance with Noise Regulations

The noise assessment identified that predicted noise levels comply with adopted assessment criteria as shown in Table 9-6.

Table 9-6: Noise Assessment

Receiver ID	Type of Receiving Premises	Assigned Noise Level dbA LA_{10}	Predicted Noise Level (worst case scenario of wind speeds up to 9m/s) dbA LA_{10}	Assessment
1	Highly sensitive area	35	34	Complies
2	Highly sensitive area	35	34	Complies
3	Highly sensitive area	35	25	Complies

9.2.3.7 Electromagnetic Interference

DNV (2025) conducted an electromagnetic interference (EMI) review for the Proposal. The purpose of this review was to identify radiocommunication services in the area surrounding the proposed wind farm that could be affected by turbine operations. The review focused on signal paths including fixed point-to-point and fixed point-to-multipoint receivers to assess the likelihood and extent of interference from turbine operations. This approach ensures relevant mitigations can be identified and implemented to prevent disruption to existing radiocommunications. Potential mitigations include changes to turbine locations or installation of additional radiocommunications infrastructure to maintain radio signals.

9.2.3.8 Aviation

The Proposal is located 13 km northeast of the aerodrome reference point of Kalgoorlie-Boulder Airport and 49 km north of Kambalda Aerodrome with a nominal maximum project height of 691 m Australian Height Datum (Aviation Projects 2024). Turbulence impacts from WTGs created by rotating blades may be notable up to 16-rotor blades distance from the turbine. The Proposal is located where there would not normally be aircraft operating within a 16-rotor blade diameter distance or approximately 1.5 km, and thus there are no wake turbulence impacts anticipated (Aviation Projects 2024).

The height of the WTGs places them above the Kalgoorlie Airport Minimum Sector Altitude (MSA) for Kalgoorlie-Boulder Airport, the lowest altitude that ensures at least 1,000 feet of obstacle clearance within a radius of the airport, in this case 10 nautical miles (nm) and 25 nm. The MSA for the airport will need to be increased. An increase in the lowest safe altitude mapping would also be required. The WTGs are not anticipated to impact aviation navigation facilities or surveillance radar installations for either airport (Aviation Projects 2024).

9.2.3.9 Traffic

The Proposal will result in increases to traffic volumes on surrounding public roads (notably Yarri Road and Bulong Road) primarily for the construction stage. The potential impacts during the construction stage represent a moderate impact (10-100 vehicle trips in the development's peak hour) based upon WAPC (2016), noting that this is temporary and both roads are located outside of Kalgoorlie-Boulder townsite. Consultation will continue to occur with CKB on any required upgrades to intersections between public roads and access to the DE, and the Proponent will bear any responsibility for such upgrades.

All workforce personnel will be required to strictly adhere to WA public road rules, and any public complaints will be investigated seriously by the Proponent. Once construction concludes, traffic impacts will reduce substantially to the estimated 10-person workforce associated with the operational stage which represents a low impact. Any road closures or detours required for WTG transport will be managed via the preparation of an OOTMP which will include specific targeted engagement prior to submission to MRWA for approval.

9.3 Potential Environmental Impacts

9.3.1 Direct Impacts

Potential direct impacts to Social Surroundings from implementation of the Proposal are primarily related to clearing of native vegetation and earthworks. Potential direct impacts during the operational stage are primarily related to WTG activities and access restrictions.

Potential direct impacts include to Aboriginal Social Surroundings include:

- Direct disturbance to Country via clearing and earthworks including potential
  - Loss of sense of place and broad cultural value
  - Loss of culturally significant flora (Medicine Bush) and fauna (Malleefowl)
  - Disturbance to waterways (ephemeral creek lines)
- Inadvertent damage to an ACH site
- Temporary access restrictions to Country (either supervised or restricted) due to safety purposes
- Permanent change (minimum 30 year) to visual landscape of Country

Potential direct impacts to Other Social Surroundings include:

- Noise and vibration impact to surrounding land users
- Increased traffic on public roads (Yarri Road and Bulong Road) during construction stage
- Impacts to surrounding land users (EMI, aviation, glare etc.)
- Permanent change (minimum 30 year) to visual landscape directly east of Kalgoorlie-Boulder

9.3.2 Indirect Impacts

Potential indirect impacts to Social Surroundings are predominantly related to the emissions arising from construction activities including dust, noise and vibration, light spill etc. into the surrounding landscape.

Potential indirect impacts include to Aboriginal Social Surroundings include:

- Loss of amenity in surrounding Country due to Proposal activities (dust, noise and vibration etc.)
- Impacts to an ACH site from emissions associated with the Proposal (dust, noise and vibration etc.)

Potential indirect impacts to Other Social Surroundings include:

- Dust and noise impacts to surrounding receptors and public roads

9.3.3 Cumulative Impacts

Cumulative impacts to Social Surroundings are associated with compounding impacts to Country, visual landscapes, and amenity. Cumulative impacts to Social Surroundings are discussed further in Section 14.

9.4 Mitigation Hierarchy

Mitigation measures to reduce potential impacts to Social Surroundings have been selected in accordance with the mitigation hierarchy, with the preference to avoid impacts to Social Surrounding where practicable. Where impacts cannot be avoided, they have been minimised, and following utilisation will be rehabilitated. Mitigation measures in accordance with the mitigation hierarchy are summarised in Table 7-6.

Table 9-7: Social Surroundings: Mitigation Hierarchy

Mitigation Hierarchy	Aspect	Adopted Mitigation Measures	Efficacy of Controls
Avoid	Disturbance to Country	• Design optimisation (15 revisions) has resulted in reduced overall disturbance. • All Malleefowl mounds within the broader Study Area have been avoided by design optimisation.	**Best Practice** Avoiding impacts by design optimisation is the most effective method to prevent potential impacts
	ACH sites	• ACH sites have been identified within the DE and are protected via Exclusion Zones with buffers • No access permitted to Exclusion Zones during implementation of the Proposal.	
	Access restrictions	• Supervised access to Country / ACH sites during implementation of the Proposal	**Standard Industry Practice** Required to ensure the safety of all personnel entering the Proposal.
	Visual landscape	• Siting of WTGs has considered visual impacts to landscape (i.e. spacing and topography) and resulted in low overall viewshed impacts from Kalgoorlie-Boulder • Siting of solar farm away from public roads (approximately 4.8 km) to avoid glare impacts	**Above Standard Practice** Siting of WTGs has balanced the production output with landscape impacts, resulting in suboptimal placement to avoid hills, reducing height.
Minimise	Disturbance to Country	• Progressive clearing to enable ongoing design optimisation and preventing unnecessary clearing. • Cultural monitors engaged during ground disturbing activities to identify potential cultural values and direct appropriate responses (i.e. harvesting of Medicine Bush before removal).	**Best Practice** Where clearing is necessary for infrastructure, cultural values can be maintained by engaging cultural monitors to supervise activities.
	Dust	• Visual dust monitoring during construction activities with additional controls for works adjacent to public roads • Provision of watercarts for proactive dust suppression during clearing and earthworks • Speed limits implemented for site access roads • Cessation of activities during high winds	**Standard Industry Practice** Required for all projects approved under Mining Act tenure, the MCP requires ongoing stakeholder engagement with Traditional Owners.
	Noise and vibration	• Majority of construction works to occur during daylight hours • Regular inspection and maintenance on mobile plant to ensure efficient operations	
	Traffic	• All construction traffic to abide by WA road rules • Development of OOTMP for WTG transport • Upgrade of intersections if required	
Rehabilitate	Disturbance to Country	• Progressive rehabilitation of temporary disturbances during operations • Rehabilitation of remaining disturbance following decommissioning. • Ongoing consultation throughout life of Proposal to refine MCP (triennial updates)	**Standard Industry Practice** Required for all projects approved under Mining Act tenure, the MCP requires ongoing stakeholder engagement with Traditional Owners.
Offset	Residual impacts	The Proposal is not expected to have any significant residual impacts to Social Surroundings and therefore no environmental offsets are proposed.	**N/A – not required.**

9.5 Social Surroundings: Significance of Residual Impacts

Table 9-8 outlines the potential residual impacts to Social Surroundings, assuming the mitigation measures detailed outlined in Section 0 are implemented. In summary, there are not expected to be any significant impacts to Social Surroundings that would prevent the implementation of the Proposal.

Table 9-8: Social Surroundings: Assessment of Residual Impacts

Impact Type	Aspect	Residual Impact	Assessment
Direct	Disturbance to Country	• 652 ha of disturbance to Country • Minor impacts to 20 ha of waterways (ephemeral drainage lines) • Unlikely loss of culturally significant fauna (Malleefowl) • Likely localised loss of culturally significant flora individuals (Medicine Bush)	Not likely to be significant
	ACH sites	• No damage to any ACH sites	Not significant
	Access restrictions	• Potential full access restrictions during some periods of construction stage (i.e. particularly near high risk activities such as cranage). • Some access restrictions during operational phase (i.e. supervised access).	Not likely to be significant
	Visual Landscape	• Installation of 32 WTGs within 2,313 ha DE (approximately one WTG per 72 ha) • Installation of solar farm • Moderate visibility from Mt Charlotte Lookout • Low visibility from Kalgoorlie-Boulder	Not likely to be significant
Indirect	Dust	• Minor increases to noise emissions remaining compliant with Nosie Regulations	Not significant
	Noise	• Minor increases to dust emissions remaining complaint with NEPM	Not significant
	Traffic	• Temporary moderate increase to public road traffic outside of Kalgoorlie-Boulder townsite	Not significant
Cumulative	Disturbance to Country	• 652 ha construction disturbance (2 years) • 432 ha operational disturbance (30 years) • 0 ha net disturbance following closure	Not significant

9.6 Environmental Outcomes

With consideration of the adopted mitigation measures and residual environmental impacts, implementation of the Proposal is consistent with the EPA's objective for Social Surroundings. The Proposal is not expected to cause significant harm to either Aboriginal or Other Social Surroundings and proposed environmental outcomes can be managed under other mechanisms as outlined in Table 9-9.

Table 9-9: Social Surroundings Environmental Outcomes

Environmental Outcome	Manageable under Other Mechanism	Monitoring and Reporting
Clearing limited to maximum 652 ha of Country.	**Yes – NVCP and MDCP** Clearing can be managed under NVCP Mining Act Approvals Statement conditions following grant (pending the Proposal not being assessed by the EPA).	• Internal Disturbance Permit. • Post-clearing survey. • GIS database recording of clearing disturbances. • NVCP Annual Compliance Reports. • AER and MRF reporting (DMPE)
No direct or indirect impacts to any ACH site.	**Yes – AH Act (Section 18)** Approval is required under the AH Act to disturb an ACH site, protecting ACH sites from. Significant penalties exist for disturbance to an ACH site, as well as major reputational and relationship risks.	• Weekly environmental compliance inspections during construction. • Internal Disturbance Permit. • Post-clearing survey. • GIS database recording of clearing disturbances. • AER and MRF reporting (DMPE).
No dust or noise exceedances at sensitive receptors.	**Yes – Noise Regulations / NEPM and MDCP** The Noise Regulations and NEPM both set criteria for maximum permissible emissions at sensitive receptors. These will be met by the Proposal. Impacts can also be managed under Approvals Statement conditions, specifically a nonstandard condition can be requested to ensure the EMP is a statutory requirement of approval.	• Complaints recording and investigation • Monitoring in accordance with EMP. • AER (DMPE).
Rehabilitation is consistent with agreed post-closure land use, and the DE is safe to access for other land users.	**Yes – MCP** Impacts can be managed under MCP conditions, specifically DMPE standard closure outcome C12: *The rehabilitated landscape is made safe to humans and animals.*	• Monitoring in accordance with MCP. • GIS database recording of rehabilitation status • AER and MRF reporting (DMPE).

10 Other Environmental Factors

In addition to the three preliminary Key Factors identified in Section 0, four Other Factors were also identified to be related to implementation of the Proposal including:

- Air Quality
- Greenhouse Gas Emissions
- Inland Waters
- Terrestrial Environmental Quality

Due to the minor nature of potential environmental impacts to these Other Factors, and with consideration of mitigation measures proposed to be implemented, there are not considered to be significant impacts to any Other Factor. An assessment of potential impact to Other Factors is detailed in Table 10-1 to Table 10-4

10.1.1 Air Quality

Table 10-1: Air Quality Summary

Aspect	Description
Objective	To maintain air quality and minimise emissions so that environmental values are protected (EPA 2020a).
Definition	The chemical, physical, biological and aesthetic characteristics of air.
Receiving Environment	Kalgoorlie-Boulder local airshed. Publicly available data from the Kalgoorlie air quality monitoring station managed by DWER shows no exceedances in September 2025 above the NEPM PM_{10} criteria of 50 µg / m_3 based on 24 clock hour rolling averages, which is considered "Good" air quality (DWER 2025b).
Potential Impacts	• Fugitive dust emissions from ground disturbing activities (clearing, earthworks) • Fugitive dust emissions from mobile crushing and screening activities • Fugitive dust emissions from vehicle movements on unsealed roads and access tracks. • Fugitive dust emissions created by wind blown dust from topsoil stockpiles. • Combustion of diesel for mobile and stationary plant (minor CO_x, NO_x, SO_x, PM)
Mitigation	**Minimise** • Dust suppression via watercart • Crushing and screening plant to be operated in accordance with works approval / operating licence conditions. • Regular maintenance of mobile and stationary plant • Vehicle speed limits • Topsoil management in accordance with Northern Star's Land Disturbance Procedure (NSR-ENV-001-PRO), including: ▪ Maximum topsoil stockpile height of 2 m and stored in locations. ▪ Stockpile locations should be located away from impacts of grazing animals, machinery and vehicles, and saline water used in dust suppression **Rehabilitate** • Progressive rehabilitation of 229 ha of construction disturbances will reduce risk of erosion creating wind-blown dust by establishing vegetation and soil structure.
Assessment	The EPA's objective for Air Quality is expected to be met, with the Proposal not expected to result in significant impacts to sensitive receptors due to the distance to receptors and proposed management measures adopted. The impacts to the local airshed

10.1.2 Greenhouse Gas Emissions

Table 10-2: Greenhouse Gas Emissions Summary

Aspect	Description
Objective	To minimise the risk of environmental harm associated with climate change by reducing greenhouse gas emissions as far as practicable (EPA 2024a).
Definition	Carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulphur hexafluoride (SF_6), hydro fluorocarbons (HFCs), perfluorocarbons (PFCs) and nitrogen trifluoride (NF_3).
Receiving Environment	Global atmosphere which includes both Western Australia's and Australia's contributions to GHG concentrations, estimated at 425 ppm CO_2 as of August 2025 (NOAA 2025).
Potential Impacts	• Scope 1 emissions estimated 55,507 tCO_2-e (maximum in first year with attributable land clearing carbon sink loss) • Scope 2 emissions 0 tCO_2-e (no purchased power) • Scope 3 emissions estimated 70,256 tCO_2-e • Total GHG emissions 125,762 tCO_2-e
Mitigation	The design has been optimised multiple times to avoid clearing of vegetation where possible, resulting in direct decrease in Scope 1 emissions attributable to carbon sink loss.
Assessment	The implementation of the Proposal will result in a significant net reduction in GHG emissions, offsetting the Scope 1 + 3 emissions associated with construction. The EPA's objective for GHG emissions is directly addressed by the implementation of the Proposal.

10.1.3 Inland Waters

Table 10-3: Inland Waters Summary

Aspect	Description
Objective	To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected (EPA 2018a).
Definition	The occurrence, distribution, connectivity, movement, and quantity (hydrological regimes) of inland water including its chemical, physical, biological and aesthetic characteristics (quality).
Receiving Environment	Surface waterways (ephemeral drainage lines) within the DE reporting to salt lake system approximately 10 km north. Further details of surface water and drainage within the study area is included in the supporting surface water assessment attached as **Appendix T**. Groundwater resources below the DE (Roe subarea, fractured rock aquifer). Groundwater levels are typically about 35 mbgl. No public drinking water sources within 100 km.
Potential Impacts	• Changes to downstream hydrological regimes (i.e. reduced or increased surface water flows) from local drainage modifications. • Contamination of surface water resources from erosion / sedimentation. • Contamination of groundwater resources from hydrocarbon and chemical spills.
Mitigation	**Avoid** • Project designed to avoid main drainage channel through local catchment area located to east of DE. • Infrastructure has been sited to avoid flood-prone areas. **Minimise** • All linear infrastructure (access roads, transmission line) will be designed to maintain natural surface water flows via installation of flood ways, culverts etc. • Waterway crossings run perpendicular (90°) to minimise disturbance required. • Storage of hydrocarbons and chemicals in appropriately sized bunds. • Provision of spill kits in higher risk areas (workshop, go-line, hydrocarbon and chemical storage areas, refuelling truck). **Rehabilitate** • Progressive rehabilitation of 229 ha temporary disturbances will reduce erosion / sedimentation risk by establishing vegetation and soil structure.
Assessment	The Proposal is not expected to significantly impact surface water or groundwater resources. With the mitigation measures applied, the EPA's objective for Inland Waters is expected to be met.

10.1.4 Terrestrial Environmental Quality

Table 10-4: Terrestrial Environmental Quality Summary

Aspect	Description
Objective	To maintain the quality of land and soils so that environmental values are protected.
Definition	The chemical, physical, biological and aesthetic characteristics of soils.
Receiving Environment	Soil resources within and surrounding the DE. All soils within the DE are mapped as extremely low probability of acid sulphate soils. No contaminated sites within the DE (DWER 2025b).
Potential Impacts	• Erosion of soil resources following ground disturbing activities (clearing and earthworks). • Contamination of soil resources from hydrocarbon and chemical spills. • Salinisation of topsoil resources via dust suppression activities. • Loss of topsoil resources due to poor stripping and handling methods.
Mitigation Measures	**Minimise** • Clearing conducted progressively to minimise risk of disturbance of loose soils. • Storage of hydrocarbons and chemicals in appropriately sized bunds. • Provision of spill kits in higher risk areas (workshop, go-line, hydrocarbon and chemical storage areas, refuelling truck). • Provision of spill kits in higher risk areas (workshop, go-line, hydrocarbon and chemical storage areas, refuelling truck). **Rehabilitate** • Progressive rehabilitation and remediation in accordance with MCP.
Assessment	Considering the scale of the Proposal, receiving environment and mitigation measures, the Proposal is not expected to have detrimental impacts on soil resources. The EPA's objective for Terrestrial Environmental Quality will be met.

11 Offsets

Environmental offsets are required where application of the mitigation hierarchy (avoid, minimise, rehabilitate) cannot reduce the residual environmental impact to an acceptable level, and compensatory environmental benefits are required to counterbalance the significant residual impacts of a proposal (EPA, 2023). Consequently, offsets are the least preferred mitigation measure and should only be considered following application of the mitigation hierarchy as shown in Plate 11-1

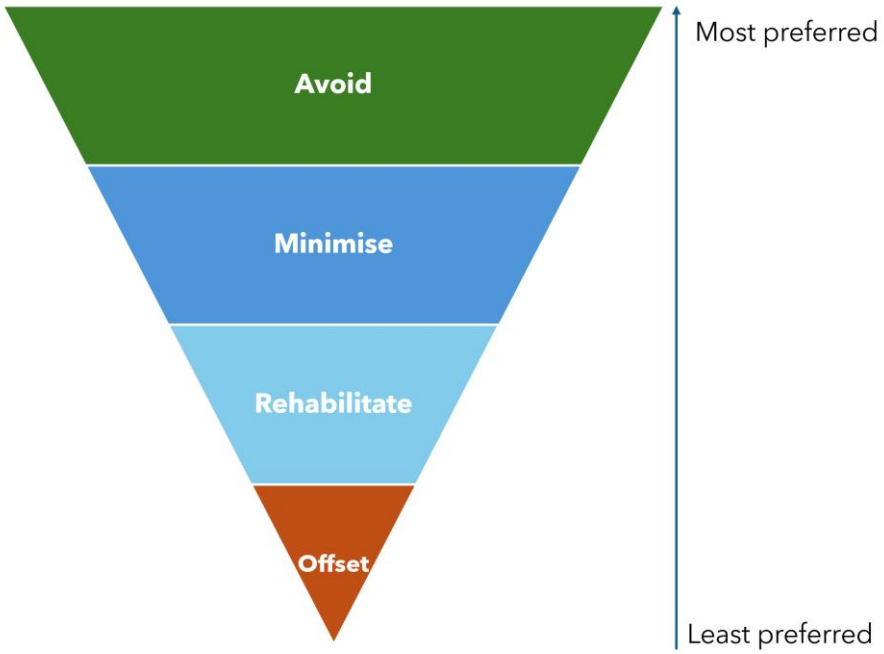


Plate 11-1: Mitigation Hierarchy

When considering offsets, the Proponent has assessed the potential significance of residual impacts in accordance with the Statement of Environmental Principles, Factors, Objectives and Aims of EIA (EPA, 2023). This assessment considered the context, scale, and potential irreversibility of impacts, and focused on the preliminary key environmental factors identified:

- Flora and Vegetation
- Terrestrial Fauna
- Social Surroundings

With consideration of proposed mitigation measures outlined in this RSD, particularly the emphasis on avoiding direct impacts through design optimisation to get to the DE, the residual impacts to environmental factors are considered not significant or not likely to be significant. As the assessment of these residual impacts concluded that they are not significant, no environmental offsets are proposed as part of the Proposal.

12 Matters of National Environmental Significance

Impacts on MNES are regulated through the EPBC Act by DCCEEW. A review of MNES was undertaken in 2025 to inform the environmental assessment of the Proposal, including a search of the Protected Matters Search Tool (PMST) within 10 km of the Proposal. The PMST identified one National Heritage Place, nine Threatened Species and seven Listed Migratory Species as potentially occurring within the search radius as summarised in Table 12-1.

Table 12-1: PMST Summary

MNES	PMST	Description
World Heritage Properties	0	-
National Heritage Places	1	Goldfields Water Supply Scheme (not impacted – closest point approximately 1.4 km from DE)
Wetlands of International Importance	0	-
Great Barrier Reef Marine Park	0	-
Commonwealth Marine Area	0	-
Threatened Ecological Communities	0	-
Listed Threatened Species	9	Southern Whiteface (*Aphelocephala leucopsis*) Sharp-tailed Sandpiper (*Calidris acuminata*) Curlew Sandpiper (*Calidris ferruginea*) Grey Falcon (*Falco hypoleucos*) Malleefowl (*Leipoa ocellata*) Night Parrot (*Pezoporus occidentalis*) Common Greenshank (*Tringa nebularia*) Arid Bronze Azure Butterfly (*Ogyris petrina*) Chuditch (*Dasyurus geoffroii*)
Listed Migratory Species	7	Fork-tailed Swift (*Apus pacificus*) Grey Wagtail (*Motacilla cinerea*) Common Sandpiper (*Actitis hypoleucos*) Sharp-tailed Sandpiper (*Calidris acuminata*) Curlew Sandpiper (*Calidris ferruginea*) Pectoral Sandpiper (*Calidris melanotos*) Common Greenshank (*Common Greenshank*)
Nuclear Action	0	-
Water Source Related to Coal Seam Gas or Coal Mining	0	-

Based upon the PMST, fauna surveys, and bird and bat risk assessment, an EPBC Act self-assessment was conducted for the Proposal by CDM Smith (2025) in accordance with the *Significant Impact Guidelines 1.1: Matters of National Environmental Significance* (DoE, 2013). The purpose of the self-assessment was to determine whether referral to DCCEEW was required under the EPBC Act based upon any proposed action to MNES.

The self-assessment included a review of legislative and policy context, desktop review of literature including fauna surveys and risk assessments, assessing the likelihood of occurrence based upon fauna sightings and preferred habitat, and undertaking impact assessment for each potential species. The self-assessment was limited to fauna species as these were the only identified MNES as potentially utilising the DE. A total of 30 species were assessed for their potential to be significantly impacted by the Proposal.

Where the likelihood of occurrence was "possible" or greater, a significant impact assessment was undertaken for each species listed below in accordance with applicable significant impact criteria species:

- Malleefowl (Vulnerable) – Likely
- Fork Tailed Swift (Migratory) - Likely
- Rainbow Bee-Eater (Migratory) – Likely
- Fan-Tailed Cuckoo (Migratory) – Likely
- Pallid Cuckoo (Migratory) – Likely
- Sacred Kingfisher (Migratory) – Likely

- Southern Whiteface (Vulnerable) – Possible
- Black-eared Cuckoo (Migratory) – Possible

Based upon the significant impact assessment, the authors concluded that the Proposal in unlikely to result in significant impact on important populations of MNES listed species nor will it have a significant impact on habitat critical for the survival of MNES species (CDM Smith 2025). Further detail is provided in the EPBC Act Self-Assessment attached in **Appendix U**.

The Proponent has considered the findings of the self-assessment and has determined that a referral under the EPBC Act is not necessary as the proposal is unlikely to be significant on MNES. This is consistent with "Not a controlled action" determinations for similarly scaled Proposals including Parron Windfarm (79 WTGs) and Narrogin Windfarm (25 WTGs).

13 Holistic Impact Assessment

It is important to recognise that the Proposal will not affect relevant environmental factors in isolation, and that there are connections and interactions between parts of the environment (environmental factors). Furthermore, while an impact on a factor may not be significant when considered in isolation, the impact on factors holistically may be significant. This section of the RSD considers the connections and interactions between the preliminary key environmental factors relevant to the Proposal, as well as Other Factors.

Broad potential connections between these environmental factors are presented in Plate 13-1, with detail on interactions between factors outlined in Table 13-1.

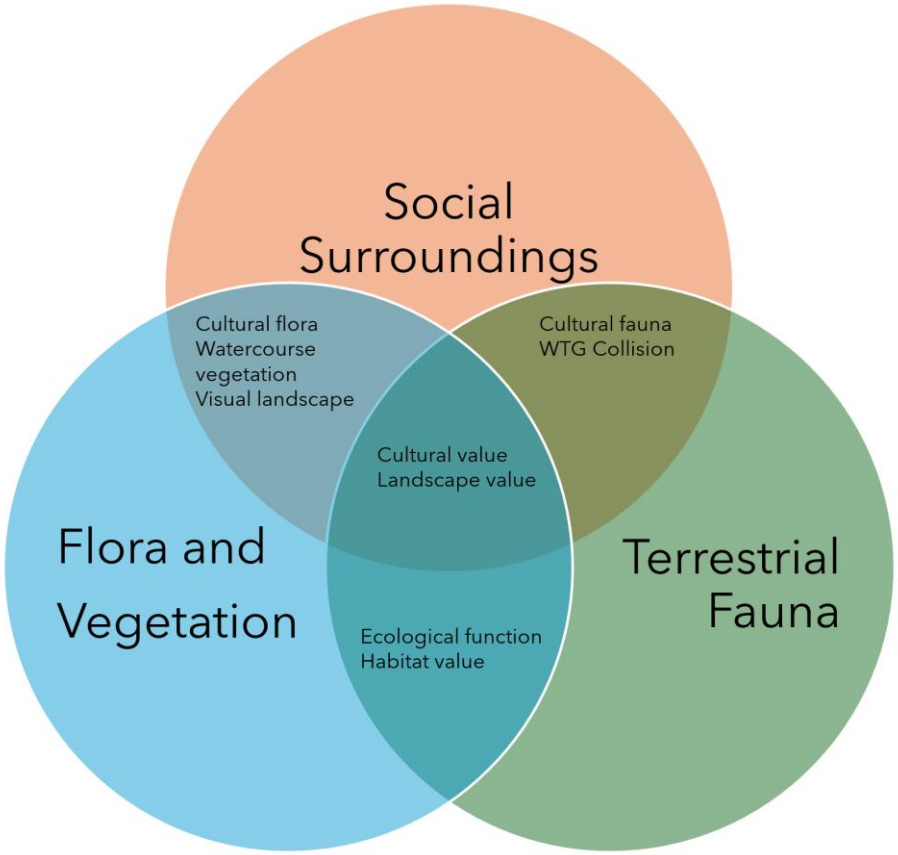


Plate 13-1: Holistic Impact Assessment

Table 13-1: Holistic Impact Considerations

Environmental Factor	Interacting Factor	Nature of Interaction	Mitigation	Holistic Assessment
Flora and Vegetation	Greenhouse Gas Emissions	Clearing of native vegetation will result in loss of carbon sink associated with vegetation and soil carbon, with an attributable Scope 1 GHG emissions of 52,634 tCO_2-e.	Reductions in clearing requirements resulting from design optimisation has reduced the total attributable Scope 1 emissions.	Implementation of the Proposal will counterbalance all GHG emissions attributed to native vegetation clearing and result in a net decrease in GHG emissions of 336,690 tCO_2-e per annum. The holistic impacts are not significant.
	Inland Waters & Social Surroundings	All watercourses, including ephemeral drainage lines within the DE, are considered to have cultural value due to the importance of water within the landscape.	Avoidance of ephemeral waterways has been considered in the design optimisation, reducing the area impacted. Downstream hydrological regimes will be maintained, with any impacts to drainage patterns localised and addressed via engineering controls (culverts etc.).	No impacts to waterways will occur without the prior ability to provide direction by MG cultural monitors. The holistic impacts are not likely to be significant.
	Social Surroundings	Clearing of native vegetation will result in loss of cultural plants (Medicine Bush) and other high value flora (mature trees) which contribute to the cultural value of the environment.	Engagement of cultural monitors during all vegetation clearing activities to provide on-ground knowledge and direction when encountering cultural flora.	No impacts to culturally significant flora will occur without the prior ability to provide direction / harvest by MG cultural monitors. The holistic impacts are not likely to be significant.
		Clearing of native vegetation will contribute to the change to the visual landscape resulting from installation of WTGs.	Design optimisation has considered local topography (hills) and WTG spacing to contribute to visual landscape integration. Clearing is limited to 652 ha within a DE of 2,312 ha (approximately 28%) in intact landscape.	Clearing of native vegetation is unlikely to present a visual impact on a landscape scale given the high amount of remnant vegetation in the surrounding local area.
Terrestrial Fauna	Flora and Vegetation	Displacement of fauna (dust, noise and vibration, light spill) may reduce the ability for some flora and vegetation to disperse and reproduce, reducing ecological function within the DE.	Mitigation measures have been implemented to minimise the impacts of dust, noise and vibration and light spill during the construction stage. Notwithstanding it is expected that fauna will be displaced during the construction stage due to the increased activity within the DE.	Based on short timeframe of construction stage (tentatively 2 years) there is unlikely to be impacts on a timescale required to impact ecological function. During operations it is expected that fauna will return to the DE given the reduced activity. The holistic impacts are not likely to be significant.
	Social Surroundings	Potential fauna losses attributed to construction (clearing, earthworks, etc.) and operations (WTG collision) leading to loss of cultural fauna (Malleefowl) or other important species.	Implementation EMP and BBAMP will minimise impacts to fauna, particularly Malleefowl which has been identified within heritage surveys to avoid impacts to any mounds (active and inactive). Engagement of cultural monitoring during clearing activities to provide direction on fauna.	Impacts to native fauna may have cultural impacts, with impacts expected to be greater for culturally significant fauna (Malleefowl), however with the mitigations adopted the Proposal is unlikely to have a significant impact on these species.

14 Cumulative Impact Assessment

The EPA defines cumulative environmental impacts as the successive, incremental, and interactive impacts on the environment of a proposal with one or more past, present and reasonably foreseeable future activities (EPA 2024). For the purposes of this assessment, foreseeable future activities include third-party or proponent-led developments that are already approved, under active environmental assessment, or otherwise reasonably likely to proceed.

14.1 Spatial and Temporal Scope

Cumulative impacts have been assessed within a 40 km radius of the DE (Local Impact Area). This spatial boundary was selected based on:

- Ecological scale at which land system and vegetation association-level impacts are likely to occur
- Geographic distribution of current and proposed mining and industrial activities that may interact with the Proposal.

Within the Local Impact Area, reasonably foreseeable projects were limited to those associated with native vegetation clearing under the following categories:

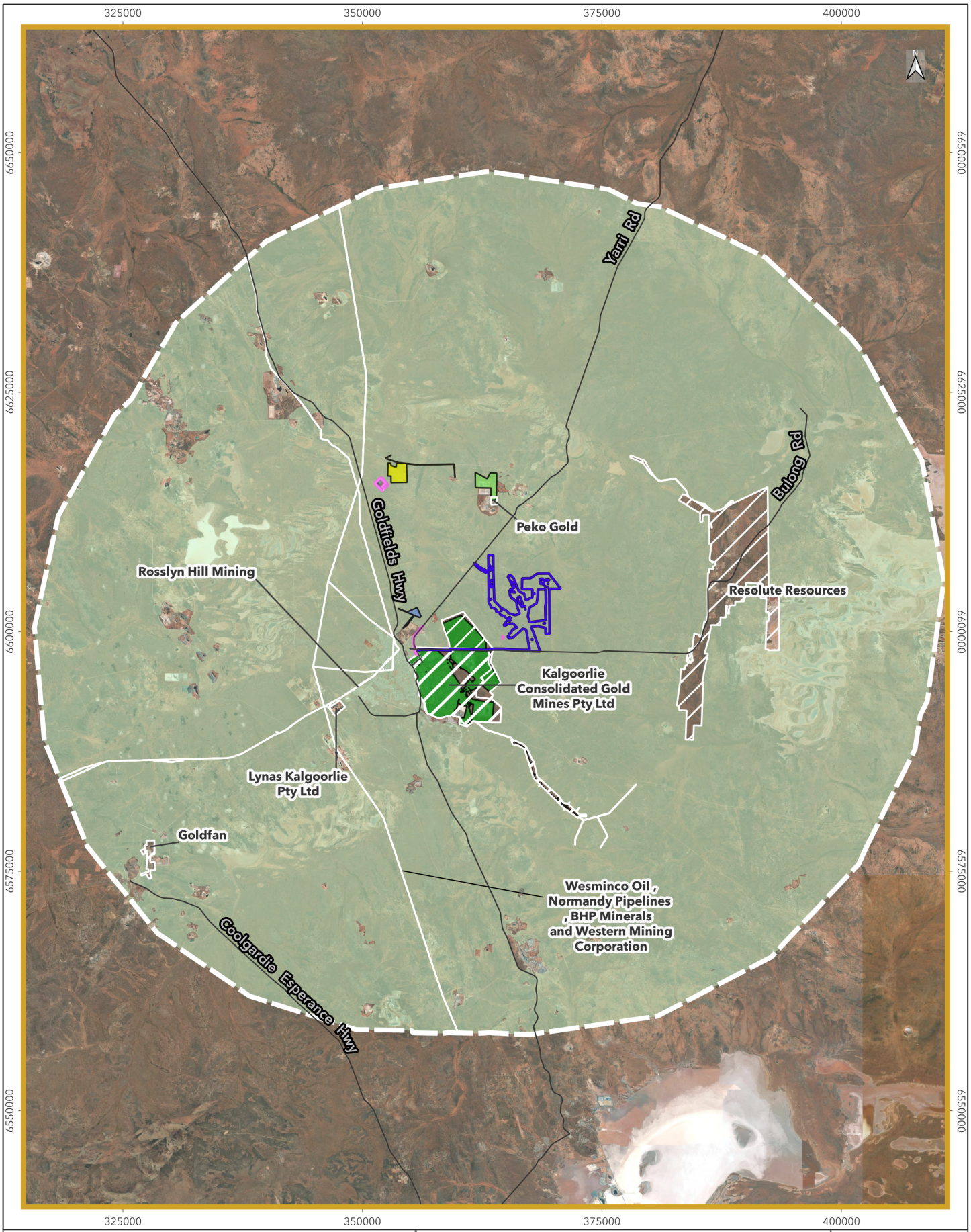
Approved Impacts:

- Mining, industrial and exploration projects assessed under Part IV of the EP Act
- Clearing Permits issued under Part V of the EP Act (revoked or withdrawn permits excluded)
- Zoned urban areas under the City of Kalgoorlie-Boulder Local Planning Scheme No. 2, excluding areas designed as drainage/waterway, environmental conservation reserve, no zone and rural.

Other Foreseeable Projects

- Northern Star Thermal Project – not associated with the Proposal activities but will provide backup power source to KCGM.

These projects are shown in Figure 14-1.



Local Impact Area Projects

Figure 14-1

Development Envelope
Roads
Local Impact Area (40km DE Buffer)
Known Projects
Native Vegetation Extent
Other Foreseeable Projects

Northern Star Resources Operations
Kanowna Belle Clearing Permit
Fimiston South
Crossroads
Regional Core Yard

NORTHERN STAR RESOURCES LTD

Date: 31/10/2025 | Autor: McDonald, Lachlan R. | Coordinate System: GDA2020 / MGA zone 51 | Scale: 530000

0 5 10 15 20 km

14.2 Cumulative Disturbance Impacts

Table 14-1 summarises known and reasonably foreseeable projects contributing to cumulative disturbance in the Local Impact Area, based on publicly available data and proponent information (minimum 10 ha size). The table includes both third-party projects and additional Northern Star activities not captured under existing approvals. The cumulative disturbance of approximately 3,777 ha of native vegetation (excluding the Proposal) indicates low landscape-scale clearing pressure given the high proportion of remaining vegetation in the region. When this Proposal is added, total clearing increases to 4,429 ha, which still represents low landscape-scale clearing pressure.

Table 14-1: Cumulative Disturbance

Project	Proponent	Native Vegetation Clearing (ha)	Notes
Known Projects (Approved Impacts)			
Bulong Nickel Cobalt Laterite project	Resolute Resources	425	Clearing within a 909-ha project area.
Lynas Kalgoorlie Rare Earths Processing Facility	Lynas	120	Clearing within a 217-ha project area.
Fimiston Gold Mine Operations Extension (Stage 3)	KCGM	1,580	Clearing within a 5,917-ha project area.
Magellan Lead Carbonate Project, Wiluna	Rosslyn Hill Mining	540	Full extent of proposed clearing boundary assumed to be native vegetation.
Three Mile Hill Gold Project	Goldfan	283	Full extent of proposed clearing boundary assumed to be native vegetation.
Gold roaster to treat refractory ore, Kanowna Belle mine, Stage 2	Peko Gold	49	Full extent of proposed clearing boundary assumed to be native vegetation.
Crossroads (CPS 10242/1)	Northern Star	350	Clearing within a 380.4 ha project area.
Kanowna Belle Clearing Permit (CPS 7808/1)	Northern Star	300	Clearing within a 376.8 ha project area.
Regional Coreyard (CPS 10290/1)	Northern Star	98	
Other Foreseeable Projects			
Thermal Project	Northern Star	32	Proposed clearing boundary
The Proposal			
Kalgoorlie Regional Renewable Energy Project	The Proponent	652	Proposed clearing boundary
Total Impact Area		**4,429**	**<1% of Local Impact Area**

14.2.1 Flora and Vegetation

The most recent available dataset (DBCA 2019) does not reflect clearing that may have occurred after 2018, which may result in minor discrepancies in baseline vegetation estimates used for this assessment. To improve accuracy, additional analysis was undertaken to exclude clearly non-vegetated areas, such as the Kalgoorlie-Boulder townsite, major roads, and other developed land, which were not previously removed from the statewide native vegetation layer. These exclusions were applied prior to cumulative assessment calculations to avoid overestimating existing native vegetation extent and to ensure a more accurate representation of regional vegetation cover.

Projects that are either existing (not within DBCA 2019), approved or reasonably foreseeable (excluding the current Proposal) account for approximately 14,485 ha of native vegetation clearing within the region. Including this Proposal, total clearing increases to approximately 15,169 ha, representing roughly 2.27% of native vegetation within 40 km of the DE. Table 14-2 summarises the extent of pre-European vegetation associations and extent within the region and cumulative impacts, demonstrating that less than 5% of the pre-European vegetation extent will be impacted following implementation of the Proposal.

Table 14-2: Cumulative Impacts to Vegetation Associations

Vegetation Association	Extent within Local Impact Area (ha)	Approved Impacts from Existing and Known Projects (ha)	Other Foreseeable Projects (ha)	Indicative Footprint (ha)	Total Cumulative Impacts
20	156,326	6,840	0	383	7,223 ha (4.6%)
468	170,728	7,596	32	268	7,896 ha (4.6%)
1294	6,296	49	0	1	50 ha (0.8%)
Total	**333,350**	**14,485**	**32**	**652**	**15,169 (4.5%)**

14.2.2 Terrestrial Fauna

The distribution of fauna habitat generally reflects the patterns of vegetation and underlying land systems. As outlined above, all vegetation within the DE are well represented in the surrounding regional area, and therefore, cumulative impacts to fauna habitats at a landscape scale are not expected. Table 14-3 presents the cumulative impact on Malleefowl habitat types based on up to date mapping and this Proposal. Given the regional abundance of high-quality habitat in the Local Impact Area and the relatively small clearing from the Proposal, significant cumulative impacts to Malleefowl habitat are not expected.

Table 14-3: Cumulative Impacts to Malleefowl Habitat

Habitat Type	Habitat Area (ha)	Percentage of Local Impact Area	Other Foreseeable Projects (ha)	Indicative Footprint (ha)	New Habitat Area (ha)	Total Cumulative Impact (% Change)
Suitable Habitat	364,771	55%	3,777*	541	360,453	-1.18%
Marginal Habitat	283,874	42%	0	101	283,773	-0.03%
Cleared / No Habitat	19,951	3%	0	10	24,370	+22%
Total	**668,596**	**100%**	**3,777**	**652**	**668,596**	**N/A**

* worst case assumption assuming all other projects are within suitable habitat.

14.2.3 Social Surroundings

As identified in heritage surveys (Terra Rosa 2025b) all clearing of vegetation goes against cultural obligations to maintain the environmental integrity of Country. This becomes more significant as cumulative disturbance occurs over time. Whilst there are likely to be cumulative impacts of vegetation clearing on Aboriginal social surroundings, the commitment to development of a CHMP for the Proposal and undertake progressive rehabilitation are considered to mitigate cumulative impacts.

14.3 Cumulative WTG Impacts

Cumulative impacts of the Proposal together with other wind farms have potential to have adverse visual landscape effects, amenity impacts and increased overall WTG bird and bat collision risk. The Goldfields region of WA does not have substantial development of wind farms, with the few existing wind farms associated with mining projects dispersed across the region. Given the separation distance between the Proposal and other wind farms, as well as generally small scale of these projects, it can be considered that there are low cumulative impacts associated with the proposed 32 WTGs. A summary of these wind farm projects is outlined in Table 14-4.

Table 14-4: Cumulative WTG Impacts

Project	Number of WTGs	Distance from DE
St Ives Gold Mine	7 (construction)	75 km southeast
Bellevue Gold Mine	4 (construction)	350 km north
Mt Weld Rare Earth Mine	4 (operational)	220 km northeast
Kathleen Valley Lithium Mine	5 (operational	370 km north
Agnew Gold Mine	5 (operational)	310 km northwest
Jundee Gold Mine	4 (operational)	490 km north
Esperance Power Project	2 (operational	340 km south
Western Green Energy Hub	3000 (under assessment)	650 km southeast

14.4 Assessment of Cumulative Impacts

Cumulative impacts are not considered significant in the context of land disturbance or WTG operations associated with the Proposal. The selected location for the Proposal is considered environmentally suitable for such a project given the overall lack of cumulative pressure on the environment compared to other regions of WA. The implementation of the EMP, BBAMP and CHMP will further mitigate cumulative impacts therefore it is expected that the Proposal can be implemented in an environmentally sustainable manner.

15 References

Anditi. 2025a. 'Black Flag KRRE Malleefowl Mound Analysis from LIDAR'.

Anditi. 2025b. KCGM Malleefowl Mound Analysis from LIDAR – Revision 1.

AQ2. 2025. 'East Kalgoorlie Solar and Wind Farm Surface Water Assessment'.

Aviation Projects. 2024. 'East Kalgoorlie Wind Farm – Update Preliminary Aviation Impact Assessment'.

Australian Bureau of Statistics (ABS). 2021. Kalgoorlie-Boulder 2021 Census. Accessed via https://abs.gov.au/census/find-census-data/quickstats/2021/LGA54280

Bennett, E.M., Florent, S. N., Venosta, M., Gibson, M, Jackson, A, and Stark, E. (2022). Curtailment as a successful method for reducing bat mortality at a southern Australian wind farm. Austral Ecology, 2022(47): p. 1329–1339.

Brett Lane & Associates. 2005. 'Wind Farms and Birds: Interim Standards for Risk Assessment'.

Bureau of Meteorology (BoM). 2025. 'Climate Statistics for Australian Locations.'

CDM-Smith. 2025. Kalgoorlie Regional Renewable Energy Project EPBC Act Self-Assessment. Prepared for Northern Star Resources.

Clean Energy Council. 2018. 'Clean Energy Council Best Practice Guidelines'.

Cowan, M. 2001a. Coolgardie 3 (COO3 - Eastern Goldfields Subregion). In J. E. May, & N. L. McKenzie, A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002. Department of Conservation and Land Management.

Cowan, M. 2001b. Murchison 1 (MUR1 - East Murchison Subregion). In J. E. May, & N. L. McKenzie, A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002. Department of Conservation and Land Management.

Department of Agriculture, Water and the Environment (DAWE). 2021. 'Onshore Wind Farms – Interim Guidance on Bird and Bat Management'.

Department of Biodiversity, Conservation and Attractions (DBCA). 2020. 'Guideline for the Survey of Arid Bronze Azure Butterfly (ABAB) in Western Australia'. September.

Department of Climate Change, the Energy, Environment and Water (DCCEEW). 2024. 'National Recovery Plan for Malleefowl Leipoa Ocellata.'

Department of Climate Change, the Energy, Environment and Water (DCCEEW). 2024. Best practice approaches when seeking approval under Australia's national environment law (Draft for Consultation and Feedback)

Department of Planning, Lands and Heritage (DPLH). 2020. 'Western Australian Department of Planning, Lands and Heritage, Position Statement: Renewable Energy Facilities'.

Department of Planning, Lands and Heritage. 2025. Aboriginal Cultural Heritage Inquiry System. https://espatial.dplh.wa.gov.au/ACHIS/index.html?viewer=ACHIS.

Department of the Environment (DotE). 2013. 'Matters of National Environmental Significance - Significant Impact Guidelines 1.1'. Commonwealth of Australia.

Department of Water and Environmental Regulation (DWER). 2025a. Air quality index (Kalgoorlie A.Q.M.S.). Accessed via https://www.der.wa.gov.au/your-environment/air/air-quality-data

Department of Water and Environmental Regulation (DWER). 2025b. Contaminated Sites Database. https://dow.maps.arcgis.com/apps/webappviewer/index.html?id=c2ecb74291ae4da2ac32c441819c6d47.

DNV. 2025. 'Initial EMI Review and Layout Constraints for the Proposed Kalgoorlie Wind Farm'.

Donato Environmental Services (DES). 2025. Wind Turbine Electricity Generators: Avian and Microbat Risk Assessment.

Environmental Protection and Heritage Council. 2010. 'National Wind Farm Development Guidelines (Draft)'.

Environmental Protection Authority (EPA). 2000. Environmental Protection of Native Vegetation in Western Australia. Clearing of Native Vegetation, with Particular Reference to the Agricultural Area. Position Statement No. 2.

Environmental Protection Authority (EPA). 2016a. 'Environmental Factor Guide: Subterranean Fauna'.

Environmental Protection Authority (EPA). 2016b. Environmental Factor Guideline - Flora and Vegetation. EPA, Western Australia.

Environmental Protection Authority (EPA). 2016c. Environmental Factor Guideline - Terrestrial Environmental Quality. EPA.

Environmental Protection Authority (EPA). 2016d. 'Environmental Factor Guideline - Terrestrial Fauna'. EPA, Western Australia.

Environmental Protection Authority (EPA). 2016e. 'Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment'.

Environmental Protection Authority (EPA). 2016f. 'Technical Guidance Sampling of Short Range Endemic Invertebrate Fauna'. EPA, Western Australia.

Environmental Protection Authority (EPA). 2018a. 'Environmental Factor Guideline - Inland Waters'. EPA, Western Australia.

Environmental Protection Authority (EPA). 2018b. 'Environmental Factor Guideline - Landforms'. EPA, Western Australia.

Environmental Protection Authority (EPA). 2020a. 'Environmental Factor Guideline - Air Quality'. EPA, Western Australia.

Environmental Protection Authority (EPA). 2020b. 'Technical Guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment'. EPA, Western Australia.

Environmental Protection Authority (EPA). 2021. Technical Guidance – Subterranean Fauna Surveys for Environmental Impact Assessment.

Environmental Protection Authority (EPA). 2023a. 'Statement of Environmental Principles, Factors, Objectives and Aims of EIA'.

Environmental Protection Authority (EPA). 2023b. Environmental Factor Guideline - Social Surroundings. EPA, Western Australia.

Environmental Protection Authority (EPA). 2023c. 'Technical Guidance EIA of Social Surroundings – Aboriginal Cultural Heritage'. Environmental Protection Authority (EPA).

Environmental Protection Authority (EPA). 2024a. 'Environmental Factor Guideline - Greenhouse Gas Emissions'. EPA, Western Australia.

Environmental Protection Authority (EPA). 2024c. How to Prepare Environmental Protection Act 1986 Part IV Environmental Management Plans - Instructions. EPA.

Environmental Protection Authority (EPA). 2024d. 'Referral of a Proposal under Section 38 of the Environmental Protection Act 1986'.

Environmental Protection Authority of South Australia. (EPASA) 2021. 'Wind Farms – Environmental Noise Guidelines– July 2009, Updated November 2021'.

GHD. 2025a. 'Glare Assessment: Kalgoorlie Solar Farm'.

GHD. 2025b. 'Kalgoorlie Wind Farm Shadow Flicker Impact Assessment'.

Government of Western Australia (GoWA). 2011. WA Environmental Offsets Policy. GoWA.

Government of Western Australia (GoWA). 2019. '2018 Statewide Vegetation Statistics Incorporating the CAR Reserve Analysis (Full Report)'.

Government of Western Australia (GoWA). 2025. 'InHerit'. InHerit. https://inherit.dplh.wa.gov.au/Public/.

Herring Storer. 2025. 'Wind Farm Kalgoorlie: Noise Impact Assessment'.

Moir Studio. 2025. 'Kalgoorlie Wind and Solar Farm Desktop Visual Impact Assessment'.

National Environmental Protection Council (NEPC). 2021. 'National Environmental Protection (Ambient Air Quality Measure)'.

National Malleefowl Recovery Team (NMRT). 2020. 'National Malleefowl Monitoring Manual'.

Payne, AL, and KA Leighton. 2004. 'Land Systems'. Department of Agriculture.

Phoenix Environmental Sciences (Phoenix). 2020. Regional Survey for Eremophila Praecox for the FIM IIE Project.

Phoenix Environmental Sciences (Phoenix). 2023a. Basic and Targeted Terrestrial Fauna Survey for the Kalgoorlie Operations- Prepared for Northern Star Resources Ltd.

Phoenix Environmental Sciences (Phoenix). 2023b. 'Memo Report: Jalmenus Aridus at Fimiston.'

Phoenix Environmental Sciences (Phoenix). 2023c. Reconnaissance Flora and Vegetation Survey for the Kalgoorlie Operations Project- Prepared for Northern Star Resources Ltd.

Phoenix Environmental Sciences (Phoenix). 2023d. Terrestrial Fauna Survey for the Kalgoorlie Operations.

Phoenix Environmental Sciences (Phoenix). 2024a. 'Malleefowl Habitat Extrapolation for the Black Flag Windfarm'.

Phoenix Environmental Sciences (Phoenix). 2024b. Reconnaissance Flora and Vegetation Survey for the Kalgoorlie Operations Project- Prepared for Northern Star Resources Ltd.

Phoenix Environmental Sciences (Phoenix). 2024c. Revised Flora and Vegetation Assessments for the Fimiston Gold Mine Operations.

Phoenix Environmental Sciences (Phoenix). 2025a. Basic and Targeted Terrestrial Fauna Survey for the Black Flag Windfarm- Prepared for Northern Star Limited.

Phoenix Environmental Sciences (Phoenix). 2025b. Bird and Bat Risk Assessment for the Black Flag Windfarm Project for the Kalgoorlie Operations- Prepared for Northern Star Resources Ltd.

Phoenix Environmental Sciences (Phoenix). 2025c. 'Detailed Flora and Vegetation Survey for the East Kalgoorlie Wind Farm Project'.

Phoenix Environmental Sciences (Phoenix). 2025d. 'Detailed Flora and Vegetation Survey for the East Kalgoorlie Wind Farm Project, Prepared for Northern Star Resources Limited'.

Phoenix Environmental Sciences (Phoenix). 2025e. Targeted Malleefowl Survey for the Black Flag Windfarm Project- Prepared for Northern Star Resources Ltd.

Phoenix Environmental Sciences (Phoenix). 2025f. Targeted Survey for Camponotus Sp. Nr. Terebrans and Jalmenus Aridus for the Black Flag Windfarm- Prepared for Northern Star Resources. Final.

Phoenix Environmental Sciences (Phoenix). 2025g. Jalmenus aridus impact assessment for the Kalgoorlie Regional Renewable Energy Project. Prepared for Northern Star Resources. Final.

Queensland Government. 2025. 'Wind Energy Fact Check'. Queensland Treasury, May 22.

Rex J Andrews Engineered Transportation (RJAET). 2025. 'Route Study Goldwind Australia Superpit Wind Farm'.

Thackway, R. and Cresswell, I. D. (ed) (1995). An Interim Biogeographic Regionalisation for Australia.

Waddell, P A, and P Galloway. 2024. 'Land Systems, Soils and Vegetation of the Southern Goldfields and Great Western Woodlands of Western Australia'. Department of Primary Industries and Regional Development,.

Working Together to Resolve the Environmental Effects of Wind Energy (WREN). 2023. 'Tethys'. Short Science Summary: The Likelihood of Bats Experiencing Barotrauma Near Moving Wind Turbine Blades, March 10. https://tethys.pnnl.gov/summaries/short-science-summary-likelihood-bats-experiencing-barotrauma-near-moving-wind-turbine.

16 Appendices

Appendix	Report	Reference
Appendix A	Detailed flora and vegetation survey	Phoenix 2025c
Appendix B	Reconnaissance flora and vegetation survey	Phoenix 2024b
Appendix C	Reconnaissance flora and vegetation survey	Phoenix 2022
Appendix D	CONFIDENTIAL: Environmental Management Plan	EMP
Appendix E	Basic and targeted terrestrial fauna survey	Phoenix 2025b
Appendix F	CONFIDENTIAL: Targeted Butterfly Survey	Phoenix 2025c
Appendix G	Targeted Malleefowl survey	Phoenix 2025d
Appendix H	Malleefowl mound analysis from LiDAR	Anditi 2025a
Appendix I	Malleefowl mound analysis from LiDAR	Anditi 2025b
Appendix J	Bird and Bat Risk Assessment	DES 2025
Appendix K	CONFIDENTIAL: Butterfly Impact Assessment	Phoenix 2025g
Appendix L	Bird and Bat Adaptive Management Plan	BBAMP
Appendix M	Landscape Visual Impact Assessment	Moir Studio 2025
Appendix N	Glare assessment report	GHD 2025a
Appendix O	Shadow flicker impact assessment	GHD 2025b
Appendix P	Wind farm noise impact assessment	Herring Storer 2025
Appendix Q	Initial EMI Assessment	DNV 2025
Appendix R	Aviation Impact Assessment	Aviation Projects 2024
Appendix S	Route study for WTG transport	RJAET 2025
Appendix T	Surface Water Assessment	AQ2 2025
Appendix U	EPBC Act Self-Assessment	CDM-Smith 2025