

Appendix L

Preliminary Fauna Management Plan



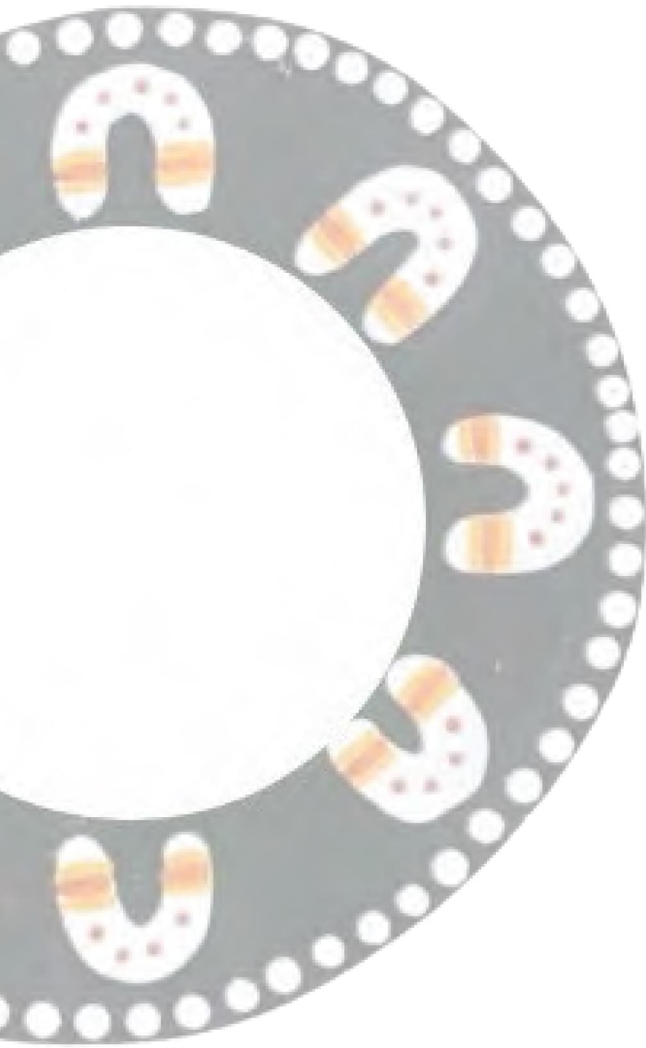
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**PRELIMINARY FAUNA MANAGEMENT PLAN
TARONG WEST WIND FARM,
IRONPOT QUEENSLAND**

December 2023
RES AUSTRALIA PTY LTD

Acknowledgement of Country

Ecosure acknowledge the Traditional Custodians of the lands and waters where we work. We pay deep respect to Elders past and present who hold the Songlines and Dreaming of this Country. We honour and support the continuation of educational, cultural and spiritual customs of First Nations peoples.



Acknowledgements

Ecosure would like to acknowledge the project team that has collaboratively contributed knowledge over the course of the project to produce this Preliminary Fauna Management Plan, including staff from icubed Consulting Pty Ltd, AECOM Australia Pty Ltd and RES Australia Pty Ltd.

Glossary, acronyms and abbreviations

BBMP	Bird and Bat Management Plan
BoM	Bureau of Meteorology
Conservation significant species	Species listed as threatened (critically endangered, endangered, vulnerable) and/or migratory under EPBC Act or threatened (critically endangered, endangered, vulnerable) and/or near-threatened under the NC Act
DAWE	Commonwealth Department of Agriculture, Water and the Environment (now DCCEEW)
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water (previously DAWE)
DES	Queensland Department of Environment and Science
DoE	Commonwealth Department of the Environment (now DCCEEW)
EA	Ecological Assessment
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth)
FMP	Fauna Management Plan
FSC	Fauna spotter catcher
HVR	High value regrowth
MNES	Matters of national environmental significance
MSES	Matters of state environmental significance
NC Act	<i>Nature Conservation Act 1992</i> (Queensland)
RE	Regional ecosystem
SARA	State Assessment Referral Agency
SEVT	Semi-evergreen vine thicket
SLC	Special least concern species under the NC Act
SMP	Species Management Program
Threatened	critically endangered, endangered, or vulnerable
VMP	Vegetation Management Plan
WTG	Wind turbine generator

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1 Introduction

1.1 Background

This preliminary Fauna Management Plan (FMP) has been produced for RES Australia Pty Ltd (RES Australia) to support a development application for the proposed Tarong West Wind Farm site (herein referred to as the project site). This FMP addresses the requirements of the State Development Assessment Provisions version 3.0 and Performance Outcome 5 of State Code 23: Wind farm development, as they relate to fauna.

The intention of this FMP is to provide avoidance, minimisation and mitigation measures to protect fauna from adverse impacts resulting from the proposed development. The FMP incorporates information identified from desktop and field assessments (Ecosure 2023a, Ecosure 2023b, Ecosure 2023c). This information includes an assessment of onsite habitat values, records of fauna presently using or likely to use the project site, potential impacts to fauna and strategies to mitigate fauna injury/impacts.

1.2 Proposed development

The proposed development is the construction and operation of a wind farm located at Ironpot, near Kingaroy in south east Queensland (Figure 1). The wind farm will have up to 97 wind turbine generators (WTG) connected by access tracks and supported by other infrastructure. The development and construction of the site will involve significant ground disturbing work and will include the construction of the following key components:

- up to 97 WTGs
- wind turbine foundations and hardstand areas (approximately 270 m by 110 m, plus a 30 m buffer around the perimeter, to allow construction and crane placement)
- three permanent and four temporary (during construction period only) meteorological masts
- internal electrical reticulation consisting of overhead lines (OHL) and underground (UG) cabling
- access tracks including widening sections of Ironpot Road
- planning corridor containing a maximum clearing footprint of 1,062.14 ha. The planning corridor allows scope to micro-site project infrastructure within the planning corridor, with the disturbance capped at the area of the clearing footprint
- on-site connection to existing 275 kilovolt (kV) transmission line
- electrical substations to facilitate connection of the project to the grid
- one battery energy storage system
- construction compounds and laydown areas
- site compounds

- operations and maintenance facilities
- batching plant
- borrow pits
- washdown areas.

Figure 2 shows the proposed planning corridor and clearing footprint to accommodate WTGs, access tracks and other associated infrastructure. The clearing footprint represents the maximum proposed clearing area (as provided in July 2023) and may be reduced by ongoing refinement in the design and micro-siting of infrastructure throughout the development phase of the project. In the planning corridor presented in this preliminary plan, no WTGs or hardstands are proposed to be placed in ecologically significant areas (e.g. areas of remnant vegetation).

The project is currently planned to be constructed in a single stage, however the development may be constructed in multiple stages. Construction is proposed to start in the third quarter of 2024 and last approximately 30 months.

Construction

The construction methodology will generally include:

- marking out areas for infrastructure installation
- clearing the areas of vegetation
- scraping off the topsoil and stockpiling for later use in rehabilitation
- construction of access tracks
- widening sections of Ironpot Road to allow transport of WTGs
- creating a level pad for infrastructure construction
- installing the infrastructure
- rehabilitating disturbed surfaces that are not required for operations.

Operation

The project is expected to have an operational life of at least 30 years excluding construction and decommissioning. The operational parameters of the project have not been finalised at this stage. However, it has been assumed that all WTGs will be operating continuously when wind speeds are sufficient, apart from occasional shut-down periods for maintenance.

Decommissioning

Decommissioning or repowering of the site is expected to occur at the end of the project's useful life. The decommissioning methodology has not been finalised at this stage.

1.3 Aims and Objectives

The aim of this FMP is to avoid, minimise and mitigate the potential impacts to native fauna and their habitats during construction and operation of the project.

The objectives of the FMP to support this aim are:

- mitigate and manage the risk (of injury or mortality) to fauna during construction and operation of the wind farm
- outline measures that will result in the humane and ethical treatment of animals during construction and operation of the wind farm
- mitigate and manage potential impacts of clearing works, gross mechanical disturbance, invasive species or impacts associated with sedimentation or escape of pollutants from the construction area on retained habitat and habitat features
- allow continued utilisation of the site by fauna, post construction.

Direct and indirect impacts to flying terrestrial fauna (birds and bats) include both impacts during construction (primarily habitat loss from clearing) and impacts during operation (primarily wind turbine strike). Impacts to birds and bats from vegetation clearing and construction activities are considered as part of this FMP. Impacts to birds and bats from operation of the project are considered and managed separately in the Preliminary Bird and Bat Management Plan (BBMP) (Ecosure 2023a).

1.4 Document context

This Preliminary FMP is supported by, and must be read in conjunction with, the following documents:

- Preliminary Bird and Bat Management Plan for Tarong West Wind Farm (Ecosure 2023a)
- Ecological Assessment Report for Tarong West Wind Farm (Ecosure 2023b)
- Ecological assessment of proposed transport route corridor for Tarong West Wind Farm (Ecosure 2023c)
- Preliminary Vegetation Management Plan (VMP) for Tarong West Wind Farm (Ecosure 2023d).

Information provided in the FMP includes:

- background (including existing site conditions)
- habitat values
- fauna register
- wildlife management measures including
 - pre-clearance requirements

- general requirements
- special considerations for known conservation significant species
- responsible authorities
- species profiles.

1.5 Report conventions

The following conventions are used throughout the report:

- The project site comprises the properties identified in Figure 1.
- The project boundary defines the outer perimeter of the project site.
- The proposed development comprises the spatial data presented in the shapefiles provided by RES in July 2023.
- The planning corridor is the area for all infrastructure and development to occur within the project site and contains the clearing footprint (Figure 2).
- The clearing footprint represents the maximum disturbance footprint of the project. While the clearing footprint in the preliminary FMP includes the entire planning corridor, the final clearing footprint is expected to be reduced via micro-siting of infrastructure within the planning corridor.
- Conservation significant species include flora and fauna species that are listed as
 - threatened (critically endangered, endangered or vulnerable) and/or migratory under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
 - threatened (critically endangered, endangered or vulnerable) or near threatened flora and fauna species and special least concern (SLC) fauna species under the *Nature Conservation Act 1992* (NC Act).
- Common and scientific names of flora and fauna species follow the Department of Environment and Science (DES) WildNet database (DES 2022).
- Introduced species are denoted by an asterisk (*).

1.6 Legislative content

Table 1 outlines statutory legislation that is relevant to:

- identifying the fauna values likely to be present on the project site
- providing guidance for the assessment of potential project impacts
- avoiding, minimising and mitigating impacts of project activities.

Table 1 Statutory legislation applicable to the FMP

Jurisdiction	Legislation / Guideline	Brief description
Commonwealth	EPBC Act Significant Impact Guidelines 1.1 - Matters of National Environmental Significance	<p>The EPBC Act provides the legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities, and heritage places identified as matters of national environmental significance (MNES). MNES are defined in the EPBC Act and include:</p> <ul style="list-style-type: none"> • Ramsar wetlands of international importance • World Heritage properties • National Heritage places • Commonwealth Marine areas • the Great Barrier Reef Marine Park • nationally listed threatened species and ecological communities • nationally listed migratory species • nuclear actions (including uranium mining) • water resources in relation to coal seam gas and large coal mining development. <p>A project or action which is likely to have a significant impact on a MNES is a 'controlled action' and must be submitted to the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) for assessment and determination by the Minister. The EPBC Act processes allow voluntary referral of a project to seek confirmation as to whether a significant impact on MNES is likely and to confirm any approval pathway.</p> <p>The Significant Impact Guidelines 1.1 - Matters of National Environmental Significance (Department of the Environment [DoE] 2013) were released to assist proponents with the assessment of the significance of impacts on MNES and are relevant to fauna and fauna habitat at the project site.</p> <p>A referral for assessment and determination by the Minister of DCCEEW is underway for this project, including the</p>

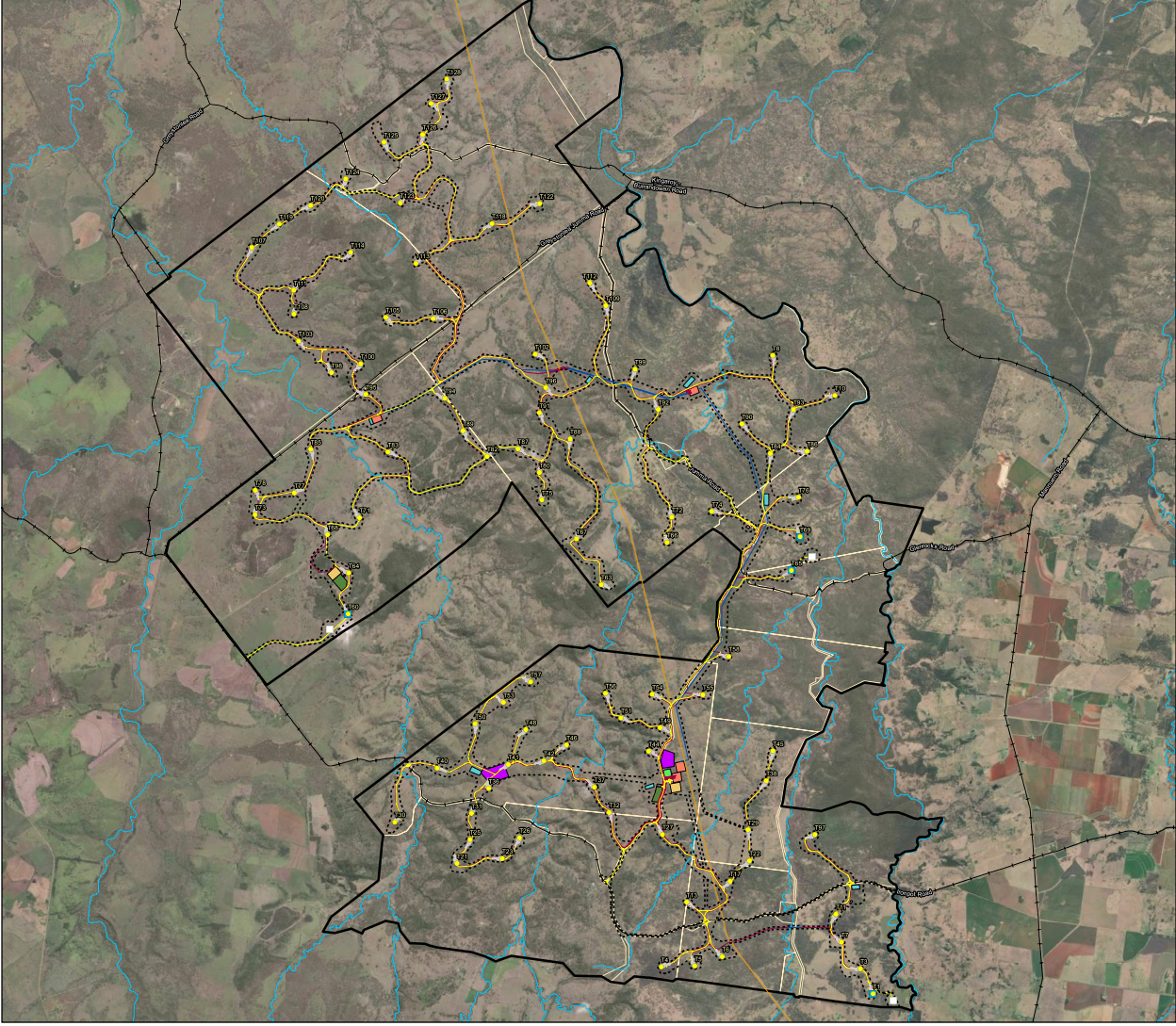
Jurisdiction	Legislation / Guideline	Brief description
		details of threatened fauna species and their habitats considered likely to occur within the project site.
State	<i>Planning Act 2016</i>	<p>The <i>Planning Act 2016</i> establishes the framework for the Queensland planning system. The purpose of the legislation is to establish an efficient and accountable system of land-use planning and development assessment that will lead to ecological sustainability. The Act defines ecological sustainability as a balance between:</p> <ul style="list-style-type: none"> · the protection of ecological processes and natural systems at local, regional, state and national levels · economic development · the cultural, economic, physical and social wellbeing of Queenslanders. <p>The Planning Regulation (2017) and the State Planning Policy (2017) guide local and state government in land use planning and development by defining the Queensland Government policies relating to matters of State interest. Applications for development approval are lodged with either the local council or the State Assessment Referral Agency (SARA), depending on the nature of the proposed development, the zoning of the land and the location. The SARA provides expert assessment of specific aspects of the proposed development and can be either the assessment manager (determining the application) or a referral agency.</p> <p>This FMP along with an accompanying Ecological Assessment (Ecosure 2023b) will be lodged as part of the assessment process for the development application to SARA.</p>
State	<p>State Development Assessment Provisions</p> <p>State code 23: Wind farm development</p> <p>State code 23: Wind farm development – Planning guideline</p>	<p>When the SARA is involved in the assessment process, the State Development Assessment provisions are enacted to provide assessment benchmarks and consistency in assessment. The State Development Assessment Provisions contain the state codes, which are specific to particular development proposals or impacts. Each code includes a purpose and performance outcomes. Some include acceptable outcomes which identify one way to achieve the relevant performance outcome.</p> <p>The State code relevant to the proposed development is State code 23: Wind farm development. Performance outcome PO5 of the code requires that “wind farm development is designed, sited and operated to ensure that flora, fauna and associated ecological processes are protected from adverse impacts”.</p> <p>The Guidelines accompanying the state code indicate the following is required as a minimum to demonstrate that a proposal is consistent with Performance Outcome PO5:</p> <ul style="list-style-type: none"> · an ecological assessment which includes identification of risks to flora, fauna and ecological processes, bird and bat flight paths, fauna habitat and corridors and worst case vegetation impacts · assessment of alternatives and mitigation measures where impacts are likely · a preliminary Vegetation Management Plan, Fauna Management Plan, and Bird and Bat Management Plan. <p>Other codes relating to native vegetation clearing, waterway barrier works and fish habitats may also require consideration as part of the broader application process.</p> <p>To address PO5 the following documents relevant to fauna and fauna habitat matters have been developed:</p>

Jurisdiction	Legislation / Guideline	Brief description
		<ul style="list-style-type: none"> · an Ecological Assessment (Ecosure 2023b) · and this Fauna Management Plan.
State	NC Act Nature Conservation (Animal) Regulation 2020	<p>The NC Act aims to conserve nature through strategies such as dedicating and declaring protected areas for those parts of Queensland with outstanding biological diversity, natural features and wilderness values. The NC Act provides for the conservation of native fauna through restriction of activities such as taking, keeping or interfering with animals or their breeding places. The act also contains provisions relating to the management of non-native wildlife.</p> <p>Unless authorised, it is an offence under the NC Act to take, keep, use, or move protected animals for commercial, recreational or other purposes. Protected animal is defined as an animal that is prescribed under this Act as threatened, near threatened or least concern wildlife. Where a proposed development will result in such impacts to fauna protected under the NC Act, authorisation from the Department of Environment and Science (DES) will be required.</p> <p>Nature Conservation (Animal) Regulation 2020</p> <p>In support of the purpose and the provisions of the NC Act, this regulation identifies all native fauna species as either 'extinct in the wild', 'endangered', 'vulnerable', 'near threatened' and 'least concern' which includes special least concern (SLC) wildlife. SLC wildlife includes echidna (<i>Tachyglossus aculeatus</i>), platypus (<i>Ornithorhynchus anatinus</i>) and migratory birds listed under international conservation agreements with Japan, Korea or China or the Bonn Convention.</p> <p>Under s335 Tampering with animal breeding place, a person must not, without a reasonable excuse, tamper with an animal breeding place that is being used by a protected animal to incubate or rear the animal's offspring. A high-risk Species Management Program (SMP) is required for near threatened, vulnerable, endangered, critically endangered, SLC species and colonial breeders (bats, some wetland bird species). A low-risk SMP is required for other least concern species. Note that due to the mobility of koala (with young in the pouch), this species is excluded from this requirement (DES 2020).</p> <p>The Ecological Assessment (Ecosure 2023b) details the threatened fauna species listed under the NC Act confirmed or likely to occur within the project site.</p>
State	<i>Vegetation Management Act 1999 (VM Act)</i>	<p>The VM Act is the planning initiative underlying regional management of vegetation in Queensland. The VM Act aims to conserve remnant endangered and of concern regional ecosystems (REs), prevent land degradation and further loss of biodiversity, manage the environmental impacts of clearing vegetation and reduce of greenhouse emissions.</p> <p>In addition to provisions related to the protection and management of native vegetation and regrowth, the VM Act contains provisions for the regulation of essential habitat for species of state significance. Essential habitat (mapped by DES) is vegetation in which a species listed as endangered or vulnerable under the NC Act has been known to occur. Clearing or disturbance to areas of essential habitat will require compensatory habitat measures to be developed.</p> <p>The Ecological Assessment (Ecosure 2023b) details the regulated vegetation, regional ecosystems and essential</p>

Jurisdiction	Legislation / Guideline	Brief description
		habitat ground truthed as fauna habitat present across the project site.
State	Biosecurity Act 2014	<p>The <i>Biosecurity Act 2014</i> is administered by the Department of Agriculture and Fisheries. The Act provides management measures to protect agricultural and tourism industries and the environment from pests, diseases and contaminants. Under the Act, invasive plants and animals are categorised as either a 'Prohibited Matter' or a 'Restricted Matter'.</p> <p>Land owners and proponents have obligations under this act to manage pest species. In the context of this FMP this includes identification of potential threats and the provision of measures to avoid or manage the spread and impacts of prohibited or restricted matters.</p> <p>The Ecological Assessment (Ecosure 2023b) details the fauna biosecurity matters ground truthed on the project site.</p>
State	<i>Environmental Protection Act 1994</i>	<p>The <i>Environmental Protection Act 1994</i> (EP Act) provides the key legislative framework for environmental management and protection in Queensland.</p> <p>The EP Act utilises a number of mechanisms to achieve its objectives. Relevant to this project is the requirement for the establishment of a general environmental duty, under Section 319 of the EP Act.</p> <p>Section 319 of the EP Act places a general environmental duty on Tarong West Wind Farm to ensure that 'it does not carry out any activity that causes, or is likely to cause, environmental harm unless the person takes all reasonable and practicable measures to prevent or minimise the harm'.</p> <p>By undertaking the preparation of this detailed ecological investigation, Tarong West Wind Farm demonstrates that it is cognisant of the responsibilities for environmental protection and management in Queensland.</p> <p>Wind farms are not environmentally relevant activities for the purposes of this act.</p>
State	<i>Water Act 2000</i>	<p>The purpose of the <i>Water Act 2000</i> is to provide for the sustainable management of water and other resources. Under Section 266 of the <i>Water Act 2000</i>, a riverine protection permit is generally required from the Department of Resources to:</p> <ul style="list-style-type: none"> · destroy vegetation in a watercourse · excavate in a watercourse · place fill in a watercourse. <p>Additionally, water supply for construction purposes (e.g. access track construction/ compaction, dust suppression etc) may be required. Where this water supply is proposed to be sourced from nearby watercourses, a permit in accordance with Section 237 of the <i>Water Act 2000</i> will be required from the Department of Resources prior to any water being extracted from the watercourse.</p> <p>The Ecological Assessment (Ecosure 2023b) details relevant water resources (watercourses and drainage lines) present within the project site.</p>

State	Environmental Offsets Regulation 2014	<p>Matters of State Environmental Significance (MSES) are referenced in the biodiversity State interest under the State Planning Policy and are mapped by the Queensland Government. The Environmental Offsets Regulation 2014 also prescribes MSES for the purposes of the environmental offsets legislation in Queensland.</p> <p>Many of the MSES in the Environmental Offsets Regulation 2014 coincide with the MSES listed under the State Planning Policy, however, there are additional items listed under the Environmental Offsets Regulation 2014 that are not listed in the State Planning Policy. The MSES mapping includes certain environmental values that are protected under Queensland legislation such as State conservation areas, marine parks, waterways and wetlands, protected habitat, fish habitat, regulated vegetation, connectivity areas and offset areas.</p> <p>The Ecological Assessment (Ecosure 2023b) details the MSES within the project site and the potential development impacts to MSES that may require offsets.</p>
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Figure 2a: Proposed development layout



- Legend**
- WTG
 - Meteorological mast (permanent)
 - Meteorological mast (temporary)
 - Turbine hardstand
 - Access track
 - Existing 275kV transmission line
 - Overhead line reticulation
 - Underground reticulation
 - Watercourse
 - Road
 - Batch plant
 - Battery energy storage system area
 - Laydown
 - Operations and maintenance building
 - Potential borrow pit
 - Site compound
 - Substation
 - Washdown area
 - Planning corridor
 - Project boundary
 - Land parcel

RES Australia
 Preliminary Fauna Management Plan for Tarong
 West Wind Farm, Ironpot, Queensland

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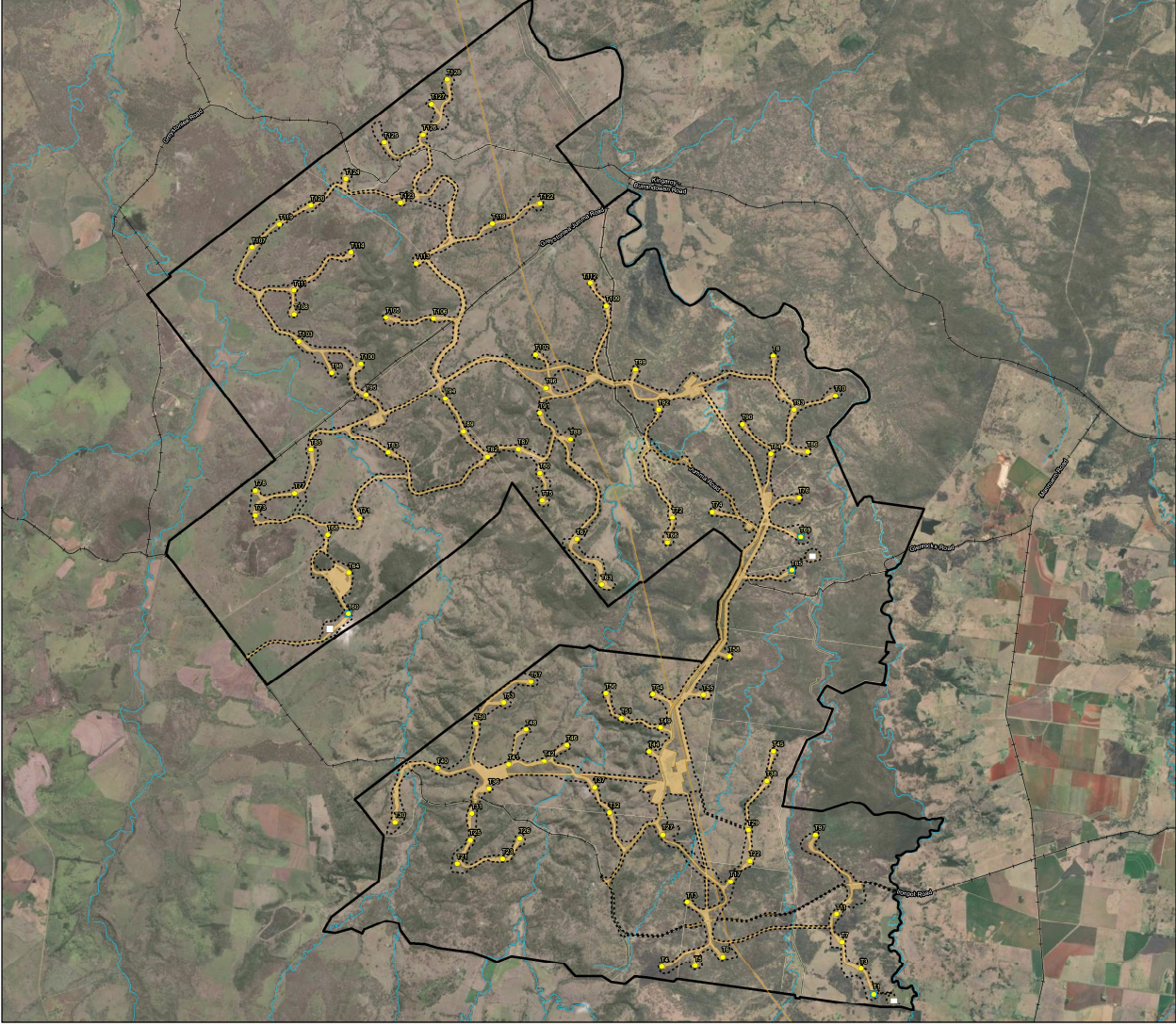
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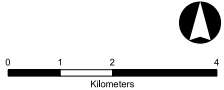
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Figure 2b: Proposed clearing footprint



- Legend**
- WTG
 - Meteorological mast (permanent)
 - Meteorological mast (temporary)
 - Watercourse
 - Road
 - Existing 275KV transmission line
 - Clearing footprint
 - Planning corridor
 - Project boundary
 - Land parcel

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 Preliminary Fauna Management Plan for Tarong
 West Wind Farm, Ironpot, Queensland



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 Revisions: 0
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GDA 1994 MGA Zone 56
 Projection: Transverse Mercator
 Datum: GDA 1994
 Units: Meter



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2 Existing environment

2.1 Landscape values and climate

The project site covers an area of approximately 17,500 ha within the South Burnett Regional Council area and lies approximately 30 km west of Kingaroy and approximately 85 km east of Chinchilla. It is currently used for cattle grazing with areas of cleared paddocks and standing vegetation. Access to the site is via Ironpot Road (Figure 1).

The site is located approximately 20 km to the north of the Bunya Mountains National Park, 7 km to the east of Diamondy State Forest and 7 km to the south of Dangore State Forest. It lies to the north, but outside, of a mapped state significant biodiversity corridor (DES 2018) and regionally significant corridors are mapped along the Boyne River and Jumma Creek.

The site is located on the south eastern boundary of the Brigalow Belt (South) bioregion in the Banana-Auburn Ranges subregion. Landforms present are primarily undulating plains and hillslopes. The project site occurs within a highly fragmented area with remnant and high value regrowth (HVR) vegetation occurring within generally small and discontinuous patches. Within the site, large patches occur along the ranges on the eastern boundary, which extends to vegetation to the north-east of the site and eventually connects to Dangore State Forest to the north. A large patch of vegetation in the western portion connects via vegetation near Kingaroy-Burrandowan Road to Diamondy State Forest to the west. Linear strips of vegetation provide some connectivity along Kingaroy-Burrandowan Road along the northern boundary of the project site. Riparian vegetation along larger watercourses (e.g. Boyne River, Jumma Creek, Middle Creek) provide some connectivity along the lower portions of the project site.

Natural wetlands do not occur within the site and there are no significant wetlands in close proximity to the site (Ecosure 2023b). There are, however, temporary wetlands to the north and north-west of site, including one palustrine wetland (Ecosure 2023b). Landholders have also constructed numerous farm dams throughout the site. These dams may provide habitat for wetland birds and waterfowl and a water source for other fauna.

The project site occurs within the Boyne-Auburn Rivers drainage sub-basin in the Burnett drainage basin, which drains to the Great Barrier Reef lagoon. One major mapped watercourse flows generally south to north within the site. The Boyne River begins as a second order stream in the south of the site, increasing in size before exiting the site along the north-western boundary. The Boyne River feeds into Boondooma Lake and the Burnett River before discharging at Bargara near Bundaberg. Other large streams that flow into Boyne River, either within or north of the site, include Mannuem Creek on the eastern boundary, Middle Creek in the south-eastern portion, Jumma Creek in the central portion, Boughyard Creek in the western portion and Ironpot Creek in the north-western portion of the site.

The climate is defined as sub-tropical with warm, humid summers and cool, dry winters. The nearest Bureau of Meteorology (BoM) weather station at Kingaroy Airport (Station 040922], approximately 30 km east of the site, has an average maximum temperature of 19.6°C in July and 30.9°C in January (BoM 2023). The average annual rainfall is 663.3 mm (BoM 2023).

2.2 Vegetation and habitats

The vegetation within the site is relatively homogenous comprising narrow bands of riparian vegetation along larger watercourses and dry sclerophyll forests and woodlands dominated by lemon-scented gum (*Corymbia citriodora*) and narrow-leaved ironbark (*Eucalyptus crebra*) on ridges and slopes. One small patch of semi-evergreen vine thicket (SEVT) occurs in the south-western corner.

Non-remnant vegetation covers most of the site (15,843.79 ha or 90.56% of the site). Field-verified remnant vegetation occurs within 1,331.08 ha (7.61%) of the site and high value regrowth (HVR) within 321.35 ha (1.84%). The ground layer is sparse to dense and is dominated by grasses, including native species (e.g. *Cymbopogon refractus*, *Aristida queenslandica*, *Bothriochloa decipiens*, *Entolasia stricta*, *Imperata cylindrica*) and exotic species (e.g. *Cynodon dactylon*, *Eragrostis curvula*, *Melinis repens*, *Megathyrsus maximus*). A variety of native and exotic forbs are common in non-remnant areas. Tree cover is variable.

Five broad habitat types were recorded across the site (Table 2, Figure 3).

Table 2 Fauna habitats recorded within the site

Habitat type	Component REs	Habitat description	Potential fauna habitat	Area (ha)
Eucalypt woodland/forest	11.5.20, 11.7.6, 11.11.4, 11.11.15, 11.12.3, 11.12.6	Sparse to mid-dense canopy of trees. Shrub layer absent to mid-dense. Ground layer sparse to mid-dense and dominated by grasses and forbs. Numerous small hollows and occasional large hollows.	<ul style="list-style-type: none"> · reptiles · arboreal and ground dwelling mammals · birds 	1,628.56 ha (9.3%)
Riparian forest	11.3.25	Sparse to mid-dense canopy of trees. Shrub layer absent to mid-dense. Ground layer sparse to dense with diverse range of grasses, forbs, sedges and rushes. Numerous small hollows and occasional large hollows.	<ul style="list-style-type: none"> · arboreal fauna · reptiles · ground dwelling mammals · birds 	980 ha mapped (5.6%) 23.25 ground-truthed remnant (0.13%)
Vine thicket	11.8.3, patches of RE 11.12.6 with developing vine thicket mid storey	Scattered emergent trees over sparse to dense canopy containing a diverse variety of vine thicket tree species. Shrub layer absent to mid-dense. Ground layer very sparse to sparse (may be denser in patches with reduced tree cover), numerous vines. Numerous small hollows and occasional large hollows in emergent eucalypts.	<ul style="list-style-type: none"> · reptiles · ground dwelling mammals · birds 	0.63 ha (0.004%)
Pasture / exotic grassland	Non-remnant	Isolated trees and shrubs. Ground layer sparse to dense and dominated by grasses and forbs. Rare hollows in large remnant paddock trees.	<ul style="list-style-type: none"> · reptiles · small mammals 	15,843.79 ha (90.56%)

Habitat type	Component REs	Habitat description	Potential fauna habitat	Area (ha)
Farm dam	Non-remnant	Banks have scattered trees and shrubs. Ground layer varies from bare dirt to dense layer of grasses, forbs and sedges. Shallow water may support sparse to dense aquatic plants including forbs, sedges and rushes. Deeper water generally open with scattered lilies or floating aquatic plants. Occasional hollows in large remnant paddock trees.	<ul style="list-style-type: none"> · amphibians · wetland birds 	Scattered throughout site.

Remnant eucalypt woodland/forest is the main remnant fauna habitat within the site. It is generally dominated by *Eucalyptus crebra* or *Corymbia citriodora*. Mature individuals of these species typically contain numerous small hollows suitable for nesting or denning by small arboreal fauna and occasional large hollows suitable for larger arboreal mammals and large birds. These species also provide important seasonal nectar resources for birds and bats. Some small areas have rock outcrops (e.g. granite, metamorphic, conglomerate and laterite outcrops) that provide shelter and habitat for fauna such as reptiles and small mammals.

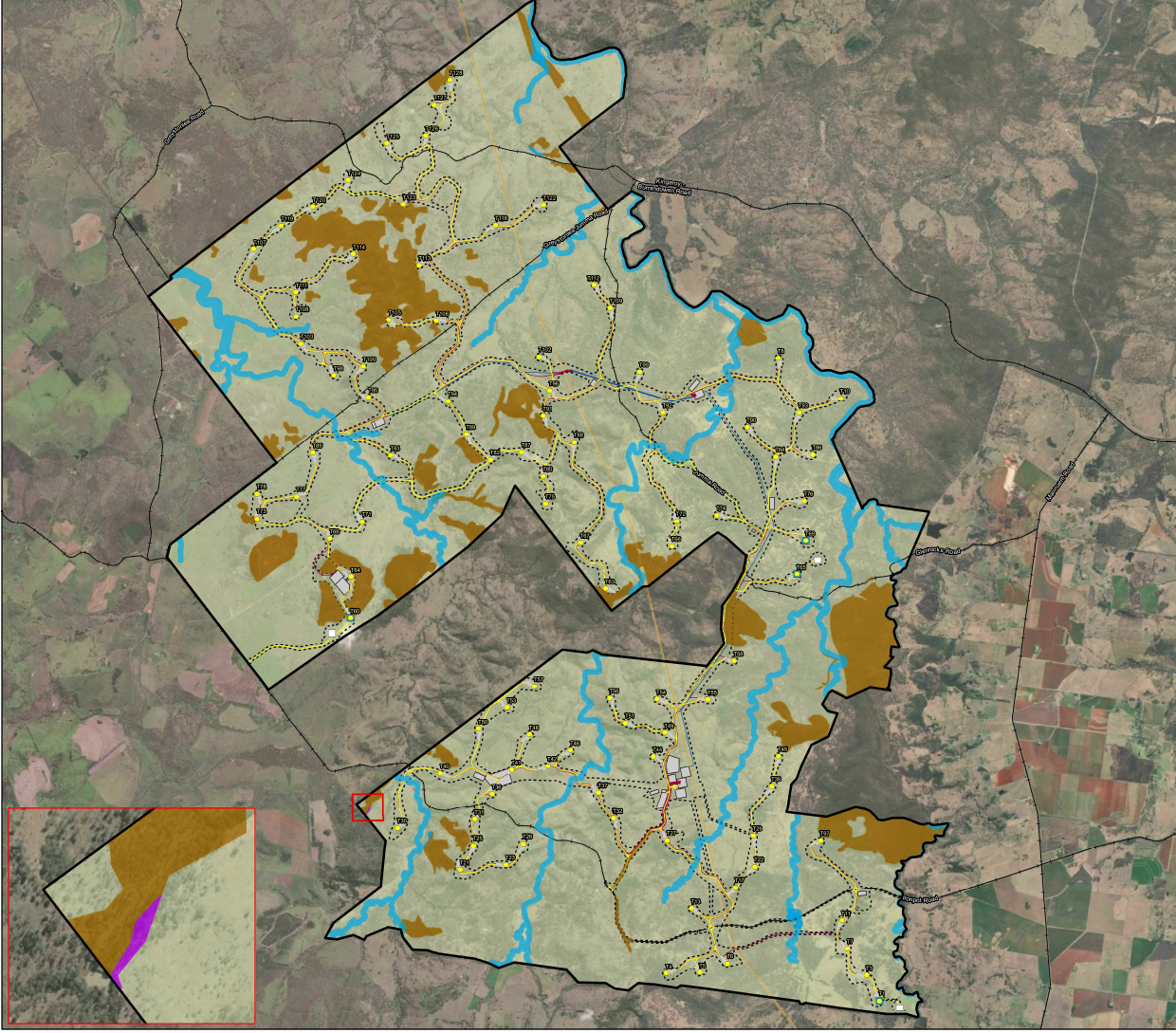
Riparian forest occurs on riparian soils along major watercourses. These areas provide a sparse to mid-dense canopy of trees usually containing scattered large and numerous small hollows, providing nesting and denning habitat for arboreal fauna, including greater gliders. Trees also provide important seasonal nectar resources. Scattered pools provide drinking and bathing water for numerous species and riparian areas can be valuable refuges during droughts and provide important corridors for wildlife travelling between remnant habitat blocks.

Vine thicket has a sparse to dense canopy of trees and shrubs that provide shelter as well as important seasonal fruit and nectar resources. The shrub layer is often mid-dense to dense, providing cover for reptiles and ground dwelling mammals and birds. Leaf litter, logs and rocks provide shelter and foraging habitat for small fauna such as reptiles and small mammals.

Cleared grassland is the main habitat type, by area, across the project site. Isolated trees provide limited food, roosting and nesting/denning resources. The sparse to dense grassy ground layer provides shelter and food resources for suitable species.

Farm dams are scattered throughout the site and provide drinking and bathing water and dense fringing vegetation on some dams provide shelter and food resources for small animals such as wetland birds.

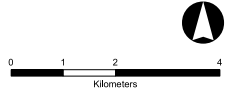
Figure 3: Field-verified fauna habitat



- WTG
- Meteorological mast (permanent)
- Meteorological mast (temporary)
- Turbine hardstand
- Access track
- Existing 275kV transmission line
- OHL reticulation
- UG reticulation
- Road
- Planning corridor
- Infrastructure
- Project boundary
- Eucalypt woodland / forest
- Riparian woodland / grassland
- Vine thicket
- Grassland

RES Australia

Preliminary Fauna Management Plan for Tarong
West Wind Farm, Ironpot, Queensland



Job number: PR6944
Revision: 0
Author: KF
Date: 8/17/2023

GDA 1994 MGA Zone 56
Projection: Transverse Mercator
Datum: GDA 1994
Units: Meter



Data Sources: © Ecosure Pty Ltd 2023. Image Source: Esri, Maxar, Earthstar Geographic, and the GIS User Community
Ecosure does not warrant the accuracy or completeness of information displayed in this map. Any errors using this map are those of the user and should be reported to the project manager at ecosure@ecosure.com.au

FIGURE_3_F3_1_2_20230817

2.3 Fauna species

A total of 262 species of fauna have been detected within the site over the combined surveys spanning from 2018 to 2023 (Ecosure 2023a and 2023b). The combined surveys recorded:

- 16 amphibians (including one pest)
- 186 birds
- 44 mammals (including six pests)
- 16 reptiles.

2.4 Threatened fauna habitat

Five EPBC Act and/or NC Act listed threatened fauna species are known to occur on site (Table 3, Ecosure 2023a and 2023b). These include:

- koala (*Phascolarctos cinereus*)
- greater glider (EPBC Act *Petauroides volans*, NC Act *Petauroides armillatus*)
- grey-headed flying-fox (*Pteropus poliocephalus*)
- white-throated needletail (*Hirundapus caudacutus*)
- glossy black-cockatoo (*Calyptorhynchus lathami lathami*).

An assessment of the potential for other threatened species to occur was completed as part of the Ecological Assessment (EA) and none were considered likely to occur (Ecosure 2023b). Profiles of these species are found in Appendix 1.

Table 3 Results of surveys for EPBC Act and/or NC Act listed fauna species

Species	Status*		Survey results	Habitat description
	NC Act	EPBC Act		
koala (<i>Phascolarctos cinereus</i>)	E	E	15 sightings (12 within and 3 outside project boundary), 21 other detections (scat or scratches)	The koala occurs in a range of temperate, sub-tropical and tropical forest, woodland and semi-arid communities dominated by Eucalyptus trees . Primarily associated with RE 11.3.25, but food species are also a component of remnant, HVR and non-remnant vegetation (including REs 11.5.20, 11.7.6, 11.11.4, 11.11.15, 11.12.3 and 11.12.6).
greater glider (<i>Petauroides volans</i>)	E	E	70 sightings	Habitat preferences were found to be within lemon-scented gum dominated forests (RE 11.7.6, 11.11.4, 11.12.6) on hill crests and in generally remnant vegetation communities (DCCEEW 2022b). Suitable habitat exists within productive communities on alluvial soils dominated by Queensland blue gum (RE 11.3.25) and tall eucalypt forests. Greater gliders within habitats containing REs 11.11.4, 11.11.15, 11.12.3 and 11.12.6, primarily on hill crests. Habitat assessments recorded large hollow-bearing trees in all of these REs, which may provide denning resources.
grey-headed flying-fox (<i>Pteropus poliocephalus</i>)	LC	V	12 sightings	Sub-tropical and temperate rainforest, tall open forest, swamps, heaths and urban areas. Roosting sites usually in dense forest adjacent to waterbodies. Forages within 50 km of camp in flowering trees or rainforests, eucalypts, paperbarks and banksias (DAWE 2021). Observed foraging within the site during the spring 2021 surveys when food species were in flower, although no habitats are considered to be critical food sources for this species.
white-throated needletail (<i>Hirundapus caudacutus</i>)	V	V, M	232 sightings	Low to very high, open airspace over almost any habitat, including oceans, forests and deserts. At times gather over ranges, headlands, often in humid, unsettled weather preceding thunderstorms (TSSC 2019). Observed foraging aerially on site.
glossy black-cockatoo (<i>Calyptorhynchus lathami lathami</i>)	V	V	4 sightings, 21 other detections	Suitable foraging habitat exists in small patches amongst forest and woodland communities across the site. A total of four glossy black-cockatoo individuals were observed, two adjacent to a dam and two in a forested area. Signs of chewings (orts) have been observed in patches of woodland containing <i>Allocasuarina torulosa</i> , <i>A. littoralis</i> , <i>A. luehmannii</i> and <i>Casuarina cunninghamiana</i> . Habitat assessments recorded large hollow-bearing trees in remnant REs, which may provide nesting resources.

* Conservation status: NC Act: E – Endangered, V – Vulnerable, LC – Least concern
 EPBC Act status: E - Endangered, V – Vulnerable, M – Migratory Species.

2.5 Other conservation significant species

Other conservation significant species detected within the site include species listed as special least concern (SLC) under the NC Act and birds listed as migratory under the EPBC Act.

The echidna, listed as SLC under the NC Act, was detected (includes sightings of live animals and scats) at several locations within the project site. Rufous fantail, satin flycatcher and fork-tailed swift, listed as SLC under the NC Act and migratory under the EPBC Act, were also detected within the project site. Table 4 summarises the other conservation significant species confirmed on the project site. Profiles of these species are found in Appendix 1.

Table 4 Results of surveys for other conservation significant fauna species

Species	Status*		Survey results	Habitat description
	NC Act	EPBC Act		
short-beaked echidna (<i>Tachyglossus aculeatus</i>)	SLC	-	6 sightings	Found throughout all Australian states. Inhabits forests and woodlands, heath, grasslands and arid environments (Menkhorst & Knight 2011). The entirety of the project site is suitable habitat for the echidna.
rufous fantail (<i>Rhipidura rufifrons</i>)	SLC	M	3 sightings	Wet sclerophyll forests, often in gullies dominated by eucalypts such as tallow-wood (<i>Eucalyptus microcorys</i>), mountain grey gum (<i>E. cypellocarpa</i>), narrow-leaved peppermint (<i>E. radiata</i>), mountain ash (<i>E. regnans</i>), alpine ash (<i>E. delegatensis</i>), blackbutt (<i>E. pilularis</i>) or red mahogany (<i>E. resinifera</i>); usually with a dense shrubby understorey often including ferns (DoE 2015). Surveys recorded this species in eucalypt forest with an understorey of shrubs and/or vine thicket species.
satin flycatcher (<i>Myiagra cyanoleuca</i>)	SLC	M	3 sightings	Inhabits forests and woodlands, mangroves, coastal heath scrubs but avoids rainforests (DoE 2015). Sightings were mainly within non-remnant open woodland with a grassy understory near the Boyne River.
fork-tailed swift (<i>Apus pacificus</i>)	SLC	M	2 sightings	Non-breeding habitat only. Found across a range of habitats, from inland open plains to wooded areas, where it is exclusively aerial (DoE 2015). Sighting occurred over open woodland and grassland in the east of the project site.

* Conservation status: NC Act: SLC – Special Least Concern
EPBC Act status: M – Migratory Species.

3 Proposed impacts and mitigation

3.1 Impacts on fauna and fauna habitat

Potential impacts to fauna habitat may result from a number of aspects of the project including clearing of remnant and regrowth areas of vegetation and the resulting loss or fragmentation of habitats. These impacted habitats and habitat features provide shelter or foraging resources for fauna. Shelter resources include hollow-bearing trees (nesting and denning locations for arboreal birds and mammals), woody debris including bark (shelter for reptiles), and complex vegetation structures (shelter for small birds). Foraging resources include flowers/fruits and invertebrates sheltering within the habitats (food for a variety of species). The maximum clearing footprint is 1,062.14 ha.

Habitat can also be adversely impacted by:

- deterioration of aquatic habitats due to installation of drainage works and watercourse crossings for access
- loss or alteration of habitat due to weed infestation
- facilitation of the movement of pest animals into new areas, including scavenger species attracted by carrion, resulting in habitat degradation or predation
- edge effects resulting from the exposure of increased extents of the vegetation interface with fire, weed, grazing, dust and other pressures (e.g. noise and light).

In addition to the loss of habitat and the reduced quality of habitat due to fragmentation and edge effects, impacts on fauna may result from:

- interactions between fauna and construction vehicles or personnel resulting in direct mortality or movement of animals away from preferred habitats
- ongoing disturbance to wildlife (e.g. avoidance of habitat adjacent to WTGs)
- entrapment of fauna in trenching during construction
- disturbance of nocturnal species as a result of night time works
- infection by pathogens carried on equipment and machinery.

3.1.1 Proposed impacts on threatened fauna habitats

Table 5 outlines the impact of project infrastructure on threatened fauna habitat.

The koala could potentially be impacted as the result of the proposed project due to loss of foraging habitat. Construction impacts to koalas include the clearing of up to 186.03 ha of habitat (16.98 ha of remnant vegetation and 169.05 ha of non-remnant vegetation) that could reduce habitat availability and connectivity, increase risk of predation from terrestrial predators such as dogs and exacerbate stress-induced disease. Mainly during construction, but also during ongoing operational activities post-construction, the risk of vehicle strike for koalas will increase, particularly when koalas are most active (e.g. at night and in the lead up to the breeding season from July to September).

Up to 16.98 ha of potential habitat for greater glider will be cleared within the clearing footprint for the construction of project infrastructure. In addition to the impacts of habitat loss, fragmentation of remnant habitat patches by clearing areas greater than 50 m wide will likely force gliders to traverse across the ground increasing their susceptibility to predation (Taylor and Goldingay 2014). Operational activities are unlikely to directly impact significantly on greater gliders. However, construction and operational activities may disrupt the breeding cycle of greater glider.

The current design may remove up to 186.03 ha of potential foraging habitat for the grey-headed flying-fox, which is only 3.19% of potential habitat within the project site. Given the high mobility of this species and the abundance of flowering eucalypts in the region, construction activities are unlikely to disrupt the breeding cycle of grey-headed flying-fox. Operational impacts to grey-headed flying-fox are likely to be limited to direct strike if travelling within the rotor swept area (RSA) and disturbance from WTGs to foraging habitat when trees are in flower and fruit. Blade strike issues are assessed and discussed in more detail in the BBMP (Ecosure 2023a).

Approximately 16.98 ha of potential roosting habitat for white-throated needletail will be cleared for the construction of project infrastructure. However, surveys did not record any roosting and large areas of similar habitat are available within the project site and the surrounding region. Construction activities are unlikely to impact significantly on feeding habitat, as this species is an aerial forager, nor breeding activities as this species does not breed in Australia. Potential operational impacts include blade strike when flying and foraging at RSA height.

Approximately 16.98 ha of potential habitat for glossy black-cockatoo will be cleared for the construction of project infrastructure but large areas of similar habitat are available within the project site and the surrounding region. Construction activities are unlikely to significantly reduce foraging and breeding habitat. Some hollow-bearing trees may be removed during construction, micro-siting of WTGs and other infrastructure will avoid clearing these trees where possible. Operational impacts to glossy black-cockatoo are likely to be limited to direct strike if travelling within the RSA and disturbance from WTGs to breeding behaviours.

Table 5 Impact of project infrastructure on threatened fauna habitat

Species	Potential habitat	Maximum proposed clearing within clearing footprint (ha)	Total habitat within project site (ha)	% of total habitat within project site
koala	Remnant/HVR REs containing koala food trees Non-remnant vegetation with -woody vegetation foliage projective cover > 125 and mapped as pre-clear REs containing koala food trees	186.03 (16.98 remnant, 169.05 non-remnant)	5,833.99 (1,651.8 remnant/HVR, 4,182.19 non-remnant)	3.19%
greater glider	Remnant/HVR REs 11.3.25, 11.11.4, 11.11.15, 11.12.3 and 11.12.6	16.98	1,651.8	1.03%
grey-headed flying-fox	Remnant/HVR REs containing foraging habitat Non-remnant vegetation containing foraging habitat	186.03 (16.98 remnant, 169.05 non-remnant)	5,834.62 (1,652.43 remnant/HVR, 4,182.19 non-remnant)	3.19%
glossy black-cockatoo	Remnant/HVR REs containing foraging and nesting habitat	16.98	1,651.8	1.03%
white-throated needletail	Roosting habitat: Remnant/HVR REs	16.98	1,652.43	1.03%

3.1.2 Impacts on other significant fauna habitats

Table 6 outlines the impact of project infrastructure on other significant fauna habitat.

Proposed clearing may result in the loss of feeding habitat and removal of some ecologically significant resting sites (e.g. logs, protective understorey vegetation) for the echidna. However, echidnas can utilise a wide range of remnant and non-remnant vegetation communities, sufficient habitat is likely to remain at the site during construction activities. In addition, echidnas can easily transverse the proposed access tracks. While some habitat may be removed during clearing works, the project is unlikely to cause disruption to breeding sites that would impact significantly on local population. Operational activities may increase the risk of vehicle strike for echidna.

The project will require clearing of 27.72 ha of potential habitat for rufous fantail, which is unlikely to impact on the foraging and breeding success of this species. Areas within the planning corridor have limited understorey vegetation so are marginally suitable for this species. Areas of more suitable habitat are available within the eastern edge of the project site and the surrounding region. As this species is highly mobile, the limited level of clearing is unlikely to lead to significant fragmentation of potential habitat. Potential operational impacts include collisions with WTGs and disturbance of WTGs to habitat used for foraging or nesting. Rufous fantails are unlikely to collide with WTGs during operation as they generally forage in

the lower and mid strata and rarely fly above the canopy (Ecosure 2023e).

Approximately 186.03 ha of potential satin flycatcher habitat (16.98 ha of remnant vegetation and 169.05 ha within non-remnant areas) will be cleared for the construction of project infrastructure. As this species is highly mobile, the limited level of clearing is unlikely to lead to significant fragmentation of potential habitat. Potential operational impacts include collisions with project infrastructure and disturbance of WTGs to habitat used for foraging or nesting. Satin flycatchers are unlikely to collide with WTGs during operation as they generally forage in the canopy and mid-canopy and rarely fly above the canopy (Ecosure 2023e).

Fork-tailed swifts have only been observed aurally and none were observed roosting across the project site. Construction impacts are not considered to impact this species as the project site is highly unlikely to provide roosting habitat, as they forage aurally and roost on the wing. Potential operational impacts include blade strike if flying and foraging at RSA height and disturbance of foraging habitat caused by the WTG operations. Blade strike issues are assessed and discussed in more detail in the BBMP (Ecosure 2023a).

Table 6 Impact of project infrastructure on other significant fauna habitat

Species	Potential habitat	Maximum proposed clearing within clearing footprint (ha)	Total habitat within project site (ha)	% of total habitat within project site
echidna	Entire project site	1,062.14	17,496.23	6.07%
rufous fantail	SEVT Riparian zones Eucalypt forest with dense understorey.	27.72	2,594.01	0.11%
satin flycatcher	Eucalypt forest and woodland Riparian zones	186.03 (16.98 remnant, 169.05 non-remnant)	5,833.99	3.19%
fork-tailed swift	Airspace over farmland, woodlands, riparian zones, SEVT and ridges.	0	17,496.23	0%

3.2 Proposed avoidance, minimisation and mitigation measures

The potential impacts of the project will be addressed in accordance with the impact minimisation hierarchy to:

- firstly avoid, then minimise, then mitigate any potential impacts on ecological values
- compensate (i.e. offset) any significant residual impacts.

3.2.1 Avoidance of impacts

Most impacts to ecological values have been avoided through siting of infrastructure away from sensitive values. This includes the placement of WTGs and tracks away from regulated vegetation and watercourses as far as possible. As detailed design progresses, micro-siting of infrastructure will be implemented to avoid important habitat features such as hollow-bearing trees and food trees, where possible.

The development process for wind farms occurs gradually over time as new data is gained and analysed and solutions are developed to overcome resource, engineering, environmental and social issues. In practical terms, this means that the locations of WTGs, construction pads, cable routes and tracks change frequently, but generally within a defined planning corridor. This process is termed 'micro-siting' and allows for small changes to the project design to overcome site constraints. The current planning corridor shown in Figure 2 represents the maximum proposed clearing footprint and is expected to be reduced by ongoing refinement in the design and micro-siting of infrastructure.

The current design will remove up to a maximum of 16.98 ha of ground-truthed vegetation, comprising of remnant REs. This clearing represents 1.03% of the total remnant and HVR vegetation in the project site. As the project design progresses, all practicable efforts will be made to avoid impacts to vegetation communities and fauna habitats, including seasonal impacts (including foraging periods or breeding seasons) to flora and fauna.

Pre-clear surveys will be conducted prior to construction activities to allow for identification of fauna habitat features which can be potentially avoided during the micro-siting phase.

3.2.2 Minimisation of impacts

Where avoidance of an impact is not possible, impacts may be minimised by redesign and/or relocation of infrastructure or low impact construction methods. Impacts to ecological values can be minimised by implementing various strategies, such as the following:

- siting of infrastructure in areas that have already been cleared
- siting of infrastructure on the edge of vegetation patches to reduce fragmentation
- where possible, micro-site WTGs to maximise separation from the edges of remnant vegetation
- where possible, micro-siting the location of access tracks and other infrastructure based on the results of pre-clear fauna surveys reconfiguring infrastructure to minimise the amount of vegetation impacted (e.g. elongating pad dimensions may be possible on some sites)
- upgrading existing farm tracks for construction traffic to minimise the amount of vegetation requiring removal and reducing fragmentation (compared with clearing required for new tracks)
- minimising track width where possible

- minimising the width of new and upgraded tracks within sensitive habitats such as stream crossings or through remnant/HVR vegetation
- retaining the ground stratum and top soil (e.g. by trimming trees and woody shrubs) may be possible in some areas (e.g. adjacent to tracks and watercourse crossings) rather than ground disturbance works in order to retain soil structure and prevent erosion
- retaining large hollow-bearing trees that provide important nesting habitat for threatened species (e.g. greater glider or glossy black-cockatoo) where possible, these hollows are to be identified during pre-clearing surveys (as detailed in section 4.3.2)
- demarcation of clearing boundaries and designation of areas outside clearing boundaries as “no go” zones to avoid accidental damage to adjacent vegetation
- pre-clear surveys to identify habitat features before clearing commences and allow development of an appropriate tree removal procedure
- developing a traffic management plan to minimise damage to sensitive ecological areas and injury/mortality of fauna. A traffic management plan for the project must incorporate measures to reduce the risk of collisions with vehicles including:
 - limiting vehicle traffic to authorised tracks and roads
 - minimise travel at dawn and dusk and at night, wherever possible
 - reduced traffic speed limits at night
 - minimise the number of vehicles on site by carpooling wherever possible
 - enforcing strict speed limits and fauna safe behaviour through signage and staff training
- presence of a fauna spotter catcher during habitat clearing works (e.g. trees, shrubs, earthen banks, built infrastructure, waterbodies or grassed areas) to detect fauna and conduct appropriate capture and release methods
- avoiding seasonal foraging or breeding seasons of threatened fauna where possible
- protecting trees to be retained adjacent to work sites via tree protection zones (TPZs) (e.g. refer to Australian Standard AS4970-2009 Protection of trees on development sites) or as advised by a suitably qualified and experienced arborist (Australian Qualification Framework Level 5)
- development of appropriate environmental management procedures in a construction environmental management plan (e.g. erosion and sediment control, dust suppression, weed and pest animal management, offsite rubbish disposal)
- implementation of wildlife management measures during construction to reduce the potential for entrapment of fauna in trenches
- implementation of monitoring programs to enable management of pest animals.

3.2.3 Mitigation of impacts

After impacts have been avoided and minimised as far as practicable, remaining impacts will

be mitigated. Mitigation strategies may include:

- rehabilitating disturbed areas following completion of construction activities such as temporary WTG construction pads, laydown areas and other infrastructure (e.g., construction compounds)
- rehabilitating unused verges alongside tracks within sensitive habitats (e.g. remnant vegetation, habitat containing hollow-bearing trees, vegetation adjacent to watercourses) following construction
- protection and potential restoration of any vegetation corridors that may facilitate the long-term survival and dispersal of the threatened fauna species identified within the project site
- installation of wildlife movement or nesting furniture or structures (e.g., glider poles, nest boxes for unavoidable loss of hollows)
- pest animal management plan.

General minimising and mitigating strategies are provided in Table 7.

Table 7 Potential impacts to ecological values and recommended avoidance, minimisation and mitigation measures

Potential impact	Recommended avoidance, minimisation and mitigation measures
Removal of habitat	Keep clearing footprints to a minimum. Set clear boundaries for clearing works. Where possible, remove limbs from trees rather than entire trees (e.g. adjacent to tracks and waterway crossings). Avoid removal of vegetation through micro-siting infrastructure in already cleared areas within the planning corridor.
Declines in threatened species populations	Avoid vegetation clearing where previously cleared areas in the project site are available for the location of infrastructure. Avoid removal of critically important features of threatened species habitats (e.g. large hollow-bearing trees for greater gliders) where possible. Use fauna spotter catchers to identify and, if necessary, relocate threatened fauna before clearing works. Clearing will be completed in a sequential manner to allow fauna to first self-relocate. Establish temporary exclusion fencing to minimise entrapment, injury and/or mortality of fauna in sensitive areas during construction, where possible. Enforce traffic speed limits to minimise fauna injury/mortality.
Erosion of waterways	Best Practice Erosion and Sediment Control Guidelines (IECA 2008) to be followed to prevent off-site impacts to downstream receiving environments.
Removal of hollow-bearing trees or logs	Where possible, logs and hollow limbs cleared during construction will be placed in adjacent vegetation, so they can be used for habitat.
Removal of potential and active breeding sites	Fauna spotter catcher to undertake pre-clear survey to identify habitat features and potential breeding sites prior to clearing works so that eggs or young can be removed and taken to qualified carer. A Queensland approved SMP high risk of impacts will be implemented for potential impacts to the breeding places of threatened and colonial breeding species.
Death or injury to fauna	Fauna spotter catcher to check fauna habitat prior to and during clearing. Fauna spotter catcher to check creeks and drainage lines for frogs and aquatic fauna prior to any proposed works in waterways.

Potential impact	Recommended avoidance, minimisation and mitigation measures
	Have contact details of qualified carer to take any fauna injured or orphaned during works for rehabilitation.
Spread of weeds	<p>Restricted weed species within the clearing footprint must be treated prior to construction commencing using an appropriate control technique to minimise the spread of weeds. Weed control may require additional treatments during construction if new or seasonal weeds are identified and or may require additional treatment. Refer to the Vegetation Management Plan (Ecosure 2023d) for effective treatment options.</p> <p>Reasonable control would include treating individual plants with a registered herbicide, which must be applied by an experienced and licenced weed control contractor.</p> <p>Ensure all plant is washed down prior to entering site.</p>
Spread of pest animals	Restricted pest animals must be managed to minimise biosecurity risks. During construction and operation, rubbish and food waste must be appropriately stored and disposed off-site to minimise attracting foxes, wild dogs and pigs.

4 Fauna management

4.1 Applicable legislation

All native vertebrate fauna are protected animals under the NC Act. It is an offence to take (wound, kill, harm or injure) a protected animal without approval. It is also an offence to tamper with the breeding place of a protected animal unless in accordance with an authorised SMP for the project (Section 1.6).

Following the actions detailed within this FMP will help meet the purpose of the NC Act and meet the requirements of the associated guidelines. This FMP provides the appropriate guidance to minimise direct or indirect impacts on fauna during construction and operation works. The management and mitigation actions detailed within the FMP have been developed for species identified as confirmed at the project site through the onsite and desktop assessment (see Section 2.4 and 2.5, Ecosure 2023a, Ecosure 2023b).

4.2 Timing of clearing

Ideally, vegetation clearing within mapped threatened fauna habitats should be completed outside of threatened species breeding or foraging seasons. Although, this is not always possible, it is important to understand these sensitive seasons to minimise potential impacts and refine the clearing schedule wherever possible. Regardless of when clearing is completed, contractors and visitors to site must be aware, through inductions, of these sensitive periods for threatened fauna.

The threatened and SLC species breeding seasons to be aware of, include:

- koala mating occurs between December and March and young are born 35 days later. The young remain in the pouch for up to five to six months and are weaned at seven months and start to consume leaves. The young rides on its mothers back up to 12 months old, whereby the mother will become pregnant again (Martin et al. 2008)
- greater glider breed between March and June and young emerge from the pouch when they are three to four months old and are carried on their mothers back or remain in the den tree. Juveniles become independent at seven months old (McKay 2008)
- grey-headed flying-foxes breed between January and April and young are born in October. Young are carried on the chest of the foraging mothers for the first four to five weeks of age (Martin et al. 1996)
- white-throated needletails do not breed within Australia (Tarburton 2021)
- glossy black-cockatoo lay eggs between March and June. The female incubates the egg/s and the fledgling leaves the nest at around three months and is fed by both parents until the following breeding season. Glossy black-cockatoos that successfully

raise a chick will forgo the following breeding season (Glossy Black Conservancy 2010)

- echidna mating occurs in July and August. Female echidna constructs a short burrow in which to lay their solitary egg. Some females remain in the burrow until the egg/s hatch while others carry the egg in their pouch. When the mother leaves the burrow with the young inside, she seals the entrance. Juvenile echidnas generally emerge from September to November (Augee 2008)
- rufous fantails breed October to February with incubation lasting 14-16 days. Both parents care for the hatchling. One or two broods may be raised in a season (DoE 2015)
- satin flycatchers lay eggs in December in Queensland, with clutch sizes averaging three or sometimes four eggs. Both sexes brood and feed the nestlings (DoE 2015)
- fork-tailed swifts do not breed within Australia (DoE 2015).

Clearing of vegetation outside of these species' breeding seasons will be difficult and parental care is given for koala, greater glider and glossy black-cockatoo for up to one year following birth/hatching. Therefore, the location of threatened and SLC habitat within the project site combined with the breeding behaviour of the relevant species will be used to guide the vegetation clearing location and schedule as best as possible. As such, identification and avoidance of breeding trees and habitat will be prioritised, where ever possible. Should an active breeding place be identified, clearing must comply with an approved SMP. An appropriate SMP will be prepared for low-risk and high-risk species prior to any activities that may involve tampering with a breeding place.

4.3 Management approach prior to clearing

4.3.1 Targeted field surveys

Targeted field surveys have been completed by Ecosure, refer to the EA (Ecosure 2023b). The results from targeted fauna surveys have been used in the final WTG layout to minimise impacting fauna habitat.

4.3.2 Pre-clear surveys

Pre-clearance surveys will be completed at varying stages before and during construction. Pre-clear surveys identify the potential presence of threatened fauna and fauna habitat within all significant habitats to be disturbed. The pre-clear survey includes:

- walk-through assessment:
 - to identify the potential presence of threatened fauna within all significant habitats to be disturbed
 - occur 1 - 2 months before any clearing or construction commences
 - will cover the area proposed to be disturbed

- will identify hollows to be cleared which are suitable for greater glider denning or glossy black-cockatoo nesting, and inform the installation of replacement nest boxes
- completed by a suitably qualified ecologist
- first pre-clear survey
 - to identify active and inactive breeding locations where accessible
 - completed up to seven days prior to clearing (at least 24 hrs prior to clearing)
 - identify and mark potential animal breeding places and hollow-bearing trees
 - assess nearby vegetation/fauna habitat for suitability for animal relocation
 - completed by a suitably qualified ecologist
- second pre-clear survey
 - to identify whether fauna is still present that needs to be relocated or left in situ and avoided for the time being, whether breeding or foraging places are being utilised, or to identify other features that need to be retained at that time and or works rescheduled
 - assessments undertaken immediately prior to clearing
 - completed by a fauna spotter catcher.

4.4 Management approach during clearing

During clearing works the following will occur:

- all vegetation clearing and tree felling must be conducted under the guidance of a suitably qualified FSC
- a FSC is to be present for each piece of clearing equipment (i.e. excavator or bulldozer), unless they are working nearby and the FSC is able to safely and effectively service more than one machine
- communication (e.g. UHF radio) between the FSC and the clearing machine operator is to be maintained at all times
- the FSC is to search ahead of clearing works for the presence of fauna in trees, beneath logs, bark or in hollows or shrubs and for burrowing bird nests
- in the event of a non-threatened animal being located that cannot be immediately captured and relocated, an area of 5 m radius will be established around the tree / location and felling / construction activities must cease in that area until the animal has relocated or an alternative capture method has been agreed upon
- in the event a threatened animal is located, an area of 50 m will be established around the tree or any tree with an overlapping crown that is proposed to be removed and felling / construction activities must cease in that area until the animal has self-relocated or an alternative capture method has been agreed upon
- a FSC will be present during mulching of cleared vegetation if stockpiled longer than 24 hours prior to processing to assess for fauna which has moved into the stockpile.

4.4.1 Hollow-bearing trees

Hollow-bearing trees may contain nesting or denning fauna which are at risk of injury or mortality if the tree is felled without consideration of this risk. Fauna may reside in hollows within branches, within the trunk of the tree, or within vents.

- hollow-bearing trees will be avoided where possible as they provide significant resources for threatened and least concern fauna species
- where possible, hollow bearing trees will be left in situ as long as possible (minimum 24 hours where possible) prior to felling, while smaller trees around them are cleared to encourage fauna to relocate on their own
- if fauna breeding activity is confirmed within tree hollows, nests or arboreal termite mounds and fauna cannot be safely removed by any method, the tree will be left in-situ until the breeding activity has completed, unless otherwise stated in the approved SMP (i.e. high-risk or low-risk of impacts)
- trees with hollows, arboreal termite mounds or nests where no obvious breeding activity is observed will be laid over as gently as possible (soft felled) in a direction that is likely to reduce damage to the habitat feature and minimise deceleration injuries and/or death to any animals that may be inside the hollows or nests
- where possible, felled trees with hollows will be moved adjacent to the work area to remain as potential habitat for animals.

4.4.2 Relocation of fauna

If fauna are to be relocated from the clearing footprint, there is a hierarchy from first preference (ideal) to lowest preference (last resort):

- relocation to suitable habitat within project site
- relocation to suitable habitat adjacent/near project site
- placement within a rehabilitation program with the individual to be released in the future
- individual to be placed into an educational, research or conservation facility.

All vegetation is proposed to be removed from the clearing footprint, however there will be suitable habitat for fauna relocation remaining on the project site in the areas of retained vegetation outside the clearing footprint. Relocation areas must be assessed for suitability during the pre-clear assessment prior to the commencement of any clearing works. If the relocation site is deemed unsuitable, an alternative site will be required to be sourced prior to clearing works.

Where possible, stags and any large logs designated for removal will be retained as timber logs to be placed on the ground outside the vegetation clearing area, to be used as fauna habitat.

4.5 Threatened and conservation significant species management

Species-specific measures to manage threatened and conservation significant species considered likely or confirmed to occur on the site are detailed below.

4.5.1 Koala

Clearing works in koala habitat are to be conducted with a suitably qualified FSC present to identify if koala are present within or adjacent to habitat to be cleared. Clearing works should be completed in a sequential manner to allow koalas to self-relocate. If koalas are observed, clearing works and/or earthworks are to be temporarily suspended within a range of 50 m from any tree which is occupied by a koala, until the koala has self relocated. Works will be avoided in any area between the koala and the nearest areas of habitat to be retained, to allow the animal to move to adjacent undisturbed areas. In addition, clearing will follow the guidelines established in the Nature Conservation (Koala) Conservation Plan 2017 for koala habitat within koala district C (State of Queensland 2023).

Specific actions to minimise impacts to koala include strict traffic management procedures (e.g. limited access routes, speed controls, limited night traffic) with reduced speeds during breeding season); rehabilitation works, where possible, will include planting of locally important koala trees, especially in areas that provide connectivity between larger habitat patches; predator control if signs of koala predation or increased predator numbers are observed during construction; and weed and pest animal management during construction and operational phases to ensure safe movement of koalas within the project site.

4.5.2 Greater glider

Greater gliders shelter in tree hollows, with a preference for large hollows (diameter > 10 cm) in large trees, that usually take 150 years to form in eucalypts, however both live and dead standing trees are used for denning (DCCEEW 2022c). Great gliders use 4-20 den trees each and will co-utilise the same dens at different times (Smith et al. 2007). Active searches for greater gliders by the FSC are required during pre-clearance surveys and for any signs of denning prior to clearing works each day.

To minimise breeding disruption to this species, where possible, clearing will avoid areas of greater glider habitat during March to June, as females give birth to a single young during this period (DCCEEW 2022c). If a tree in which a greater glider is suspected to be denning is identified for clearing, the tree shall be inspected for the presence of denning individuals.

If fauna denning or breeding activity is confirmed or suspected as likely within tree hollows an elevated work platform should be used (unless the site is unsuitable or inaccessible), to safely remove and relocate fauna to suitable habitat or appropriate care. If an elevated work platform can not be used, where possible and safe to do so, an excavator with a vertical tree grab should be used to gently lower the tree and safely remove and relocate fauna to suitable habitat or appropriate care. Where sheltering or breeding fauna can not be safely removed by any method, the tree should be left in-situ until the fauna has self-relocated.

Trees with hollows where no evidence of sheltering or breeding activity is observed should be laid over as gently as possible using any method available, in a direction that is likely to reduce damage to the hollow and minimise deceleration injuries and/or death to animals.

Nest boxes will be installed in advance of clearing active glider hollows, to allow the resident population to become aware of their availability. Nest boxes for greater gliders will be installed at a minimum ratio of two nest boxes for every one hollow cleared which is suitable for greater glider use.

Vegetation clearing within greater glider habitat along Jumma Road may act as a barrier to the movement and dispersal of the greater glider. Installation of glide poles at 30 m intervals across this corridor (in greater glider habitat only where the clearing footprint is greater than 30 m in width) will facilitate the gap crossing by the greater glider (Environment and Heritage 2016) and mitigate the impacts to their movement and dispersal. Glide poles will be installed as soon as possible after clearing and earthworks.

Other specific measures important for mitigating impacts to greater glider include pre-clear surveys, sequential clearing and use of fauna spotter-catchers to identify and allow greater gliders to self-relocate during construction or be relocated, traffic management to minimise collisions, minimise track widths, undertake pest management and clearly identify and mark the extent of vegetation clearing and “no-go” zones prior to clearing activities to minimise the risk of accidental clearing (refer to Ecosure 2023d) in areas of mapped glider habitat during the construction phase.

4.5.3 *Grey-headed flying-fox*

Active searches for flying-fox camps by the FSC are recommended during pre-clearance surveys and for any signs of roosting or foraging prior to clearing works each day. As reliable foraging sources in spring are critical to the survival of the grey-headed flying-fox, removal of flowering eucalypts (as identified by a suitably qualified ecologist) during this period should be avoided where possible. Further management measures are outlined in the BBMP (Ecosure 2023a).

4.5.4 *White-throated needletail*

If a tree in which a white-throated needletail is suspected to be roosting is identified for clearing, the tree shall not be felled until the bird has vacated the tree on its own accord. Mitigating impacts for the white-throated needletail are challenging, as this species is an aerial forager, demonstrating an intermittent presence at the site in response to varying weather patterns. Ongoing carcass monitoring to assess strike numbers of white-throated needletail, revised risk assessments and adaptive management measures will be applied during the operational phase, which is outlined in the BBMP (Ecosure 2023a).

4.5.5 *Glossy black-cockatoo*

As per section 4.2, where possible, it is recommended the removal of glossy black-cockatoo foraging and breeding habitat be scheduled outside of the breeding season (late January to

late July) (Garnett et al. 1999). Glossy black-cockatoos require large old tree hollow, positioned 10 to 20 m above the ground in eucalypt species, in branches/stems 30 cm in diameter, at a branch/stem angle of vertical or no more than 45 degrees from vertical and with a minimum entrance diameter of 15 cm (Cameron 2006, Glossy Black Conservancy 2010). Habitat disturbance will be minimised by siting WTGs and other infrastructure as far away as practicable from remnant vegetation, and will avoid the removal of hollow bearing trees, in particular areas where (if any) suitable nesting hollows are identified and watering points or large stands of foraging areas (where identified and possible). Further mitigation measures are outlined in the BBMP (Ecosure 2023a).

4.5.6 *Short-beaked echidna*

If a hollow log is suspected to contain a breeding female or young, then the hollow log will be picked up and moved to adjacent habitats, if possible. If the hollow log cannot be picked up or breaks apart, the FSC must capture the echidna and/or young and relocate to a suitable log in adjacent habitat. The young may be taken to a wildlife carer if the FSC deems this necessary.

If a burrow is suspected to contain a breeding female or young, then the burrow will be checked by the FSC and if animals are present, the FSC must capture the echidna and/or young and relocate to a suitable burrow or hollow log in adjacent habitat. The young may be taken to a wildlife carer if the FSC deems this necessary.

4.5.7 *Rufous fantail*

If a rufous fantail nest is identified within vegetation to be cleared, the FSC will attempt to relocate and attach the nest to a suitable branch within adjacent habitat. If nest relocation is not possible, the FSC may take the eggs to a wildlife carer for incubation and rearing. Further mitigation measures are outlined in the BBMP (Ecosure 2023a).

4.5.8 *Satin flycatcher*

If a satin flycatcher nest is identified within vegetation to be cleared, the FSC will attempt to relocate and attach the nest to a suitable branch within adjacent habitat. If nest relocation is not possible, the FSC may take the eggs to a wildlife carer for incubation and rearing. Further mitigation measures are outlined in the BBMP (Ecosure 2023a).

4.5.9 *Fork-tailed swift*

If a tree in which a fork-tailed swift is suspected to be roosting is identified for clearing, the tree will not be felled until the bird has vacated the tree on its own accord. Mitigating impacts for the fork-tailed swift are challenging, as this species is an aerial forager and the intermittent presence at the site is in response to varying weather patterns. Ongoing carcass monitoring to assess strike numbers of for-tailed swift, revised risk assessments and adaptive management measures will be applied during the operational phase, which is outlined in the BBMP (Ecosure 2023a).

4.5.10 SMPs

A high-risk SMP will be required for prior to any activities that may involve tampering with a breeding place of greater gliders, grey-headed flying-fox, glossy black-cockatoo, rufous fantail, satin flycatcher, echidna, and least concern colonial breeding species. Least concern colonial breeding species identified to occur on site are the striated pardalote (*Pardalotus striatus*), spotted pardalote (*Pardalotus punctatus*), fairy martin (*Petrochelidon ariel*), and welcome swallow (*Hirundo neoxena*). Interfering with the breeding places of these species (for example, nesting hollows or earthen banks containing hollows) must be conducted in accordance with the measures set out in the SMP.

An SMP is not required for koala, as they do not have a habitual breeding place (DES 2020). SMPs are also not required for white-throated needletail or fork-tailed swift as these migratory species do not breed in Australia.

4.6 Management approach during construction

During the construction phase, the following will occur:

- appropriate speed limits and signage, education of personnel, implementation of buffers as outlined above will manage the increased interactions between fauna and construction vehicles or personnel resulting in direct mortality or movement of animals away from preferred habitats
- during trenching activities, open trenches will be monitored daily. If species are trapped in the trench they will be released by a FSC. The amount of open trench will be minimised and trenches will preferably be backfilled prior to nightfall. Escape ramps, ropes or planks and/or shelter (e.g. sawdust filled bags) for trapped fauna will be installed at 30 m intervals in open trenches where left open overnight
- no works are permitted to occur within ground-truthed greater glider habitat during night-time hours (between local dusk and dawn) to avoid disturbance of nocturnal species. Should night works be undertaken adjacent to greater glider habitats, all lighting used will be configured (i.e. guards and angle of lighting) to minimise light spill into adjacent habitats
- weed washdown facilities will be constructed at key access points and runoff contained on site to reduce transmission of weeds and infection by pathogens carried on equipment and machinery. For more information, refer to the VMP (Ecosure 2023d)
- development of an erosion and sediment control plan to prevent deterioration of aquatic habitats due to installation of drainage works and watercourse crossings for access
- progressively rehabilitate cleared areas, post-construction.
- pest animal management as per Section 4.8 to reduce the movement of pest animals into new areas

- cleared vegetation stockpiles must not be pushed against retained vegetation including within the structural root zone of retained trees, to reduce fuel load present in retained vegetation should a fire occur
- vegetation stockpiles must not be stored on site for extended periods of time (e.g. periods of several months) as local fauna may take up residence and be injured when the materials are eventually moved. If fauna have taken up residence in stockpiled materials (vegetation or construction materials) during construction, all activities must be stopped until the FSC removes the fauna from the immediate vicinity
- proper storage of chemicals and fuel, and spill management and response measures are to be developed and implemented in a construction environmental management plan.

4.7 Management approach during operation

Routine mitigation measures during operation will be undertaken to minimise the risks to fauna and fauna habitat. These mitigation measures include:

- fencing installed during construction should consider movement of fauna through or over the fence to minimise possible fauna entanglement (e.g. gliders, flying-foxes and birds). However, it is noted that this may not always be possible due to specific project requirements such as maintaining the existing farming use of the land, security and safety fencing
- appropriate speed limits to be enforced, signage installed and education of personnel conducted to reduce interactions between fauna and vehicles
- weed washdowns to reduce loss or alteration of habitat due to weed infestation
- pest animal management as per Section 4.8 to ensure the existing populations in the area do not increase
- reduce night time security lighting where possible to decrease insect attraction to lighting.

4.8 Pest animal management

Pest animals, including introduced predators, are present on the site and may impact on fauna displaced from cleared habitat. Therefore, the site must be managed to avoid increasing populations and attracting exotic predators to the work site.

All putrescible wastes must be disposed of in sealed bins and regularly emptied.

Evidence or sightings of pest animals on the site will be recorded in a register to remain on site. If sightings increase in frequency or new pest species are observed, humane pest controls will be implemented.

4.9 Treatment / removal of injured fauna

If fauna are injured and require transportation to appropriate care, clearing work shall cease until the FSC advises clearing work can continue.

Any native fauna orphaned or injured during construction shall be reported to Queensland Parks and Wildlife Service 1300 130 372 and / or RSPCA on 1300 852 188 / 07 5575 6146.

Should least concern fauna become seriously injured to the extent that the injuries are likely to be fatal, euthanasia may be conducted in the field where safe to do so (suitably qualified personnel holding appropriate permits) or by a veterinarian or wildlife carer.

5 Roles and responsibilities

5.1 Training

All construction contractors and visitors will complete an induction prior to work on or visiting the site. The induction must include a component on fauna present on the site and management measures in place to avoid, minimise or mitigate impacts to fauna. Inductions must include:

- significant fauna habitat
- “no-go” zones
- threatened fauna likely to be present
- other environmentally sensitive areas.

A record of inducted personnel and visitors must be kept on site at all times.

5.2 Roles and responsibilities

- The implementation of the FMP requirements across the project site is the responsibility of the site supervisor.
- A suitably qualified Ecologist is a person with formal qualifications and/or experience in fauna identification and wildlife ecology and environmental management. A person is suitably qualified and experienced if they meet one or more of the following criteria:
 - an ecological consultant with experience in conducting fauna surveys
 - a person who possesses a degree in natural science or similar with experience in conducting fauna surveys.
- A suitably qualified FSC is a person qualified to take and keep protected wildlife under a current rehabilitation permit extended to authorise the take, keep or use of an animal whose habitat is about to be destroyed by human activity in accordance with the Nature Conservation (Animals) Regulation 2020.
- Appropriate permits to undertake fauna management are to be retained and followed by the suitably qualified FSC / Ecologist.
- All project contractors are to examine and understand this FMP. The FMP advises all individuals of their responsibilities toward the ethical management of fauna within the project site.
- All project contractors shall comply with all reasonable directions from the FSC and suitably qualified ecologist in fulfilling the measures in this FMP.
- All construction contractors and visitors will complete an induction prior to work on or visiting the project site. The inductions must include a component on fauna and fauna habitat present on the site and how to avoid, minimise or mitigate potential impacts of these species.

- A log of inducted personnel and visitors must be kept on site at all times.
- All construction contractors and site visitors have a duty of care as per section 319 of the *Environmental Protection Act 1994* to prevent environmental harm.
- All construction contractors and site visitors are obligated to report incidents involving fauna or their habitat. Reports must be made to the contractor's immediate supervisors or responsible person in charge of visitors.

5.3 Monitoring and reporting

- Monitoring and reporting requirements will be implemented as part of this FMP.
- The FSC must keep records of all fauna species and breeding places interfered within during clearing. The Principal Contractor must report the records of all breeding places to DES in accordance with their approved SMP and the FSC must report all fauna species relocated in accordance with the Rehabilitation Permit conditions.
- The construction contractor must report on activities undertaken in accordance with any SMP conditions.
- Records of all monitoring activities (e.g. pest animal monitoring) must be recorded and reported to the relevant authorities. Additionally, any sightings of conservation significant (as listed in the induction material) fauna on site and its location should be recorded and kept in a register to inform construction and operations for the project.

6 Corrective actions

An impact trigger is when clearing works cause mortality or injury of threatened or SLC species or clearing of a breeding place or threatened fauna habitat (outside the clearing footprint). Consequently, triggers may be reviewed regularly depending upon the significance ascribed to various situations and the corrective actions employed throughout this management plan.

Triggers for corrective action would be reviewed prior to the final FMP and the list of triggers agreed between the project owner, DES, and the suitably qualified ecologist. Draft triggers for clearing operations will be detailed in future SMPs (as required).

6.1 Contingency planning

A wildlife carer will be immediately contacted in an unforeseen event that an animal is injured or orphaned during the clearing works. Additionally, any incident relating to activities covered under the required high-risk SMP will be recorded by the site environmental officer and reported to DES within 24 hours. Monitoring will occur throughout the project. If required, the required high-risk SMP management measures will be reviewed, and contingency measures determined by a suitably qualified ecologist. Any changes to the scope of the required high-risk SMP, including detection of new species breeding places, will be detailed in an amended version and submitted to DES prior to works continuing.

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Appendix 1 Species profiles

Koala *Phascolarctos cinereus*

EPBC Act status	Endangered
NC Act status	Endangered
Likelihood of occurrence	Known
Species description	687 mm (females), 705 mm (males) body length 4.1 – 7.3 kg (females), 4.2 – 9.1 kg (males) Short, pale grey fur, vestigial tail, large ears (DAWE 2022)
Habitat within the site	15 individuals sighted (12 within and 3 adjacent to the project site), 14 scat detections, 7 scratched trees recorded during fauna surveys within the project site. Primarily associated with RE 11.3.25, but food species are also a component of remnant, HVR and non-remnant vegetation (including REs 11.5.20, 11.7.6, 11.11.4, 11.11.15, 11.12.3 and 11.12.6).
Relevant biology / ecology	<p>The koala is an arboreal folivore (leaf eater) that feeds on a variety of leaves from <i>Eucalyptus</i>, <i>Corymbia</i> and <i>Angophora</i> genera. Within Queensland, Queensland blue gum <i>Eucalyptus tereticornis</i> is an important food source as it provides a relatively high abundance of nutrients and higher leaf moisture than other species.</p> <p>They are solitary animals and generally stay within a home range that varies depending upon local food trees. Home ranges outside of high quality habitats (such as those on the Koala Coast in South East Queensland) may be up to 100 ha and males have larger home ranges than females.</p> <p>The breeding season occurs from spring to summer (December to March) with females giving birth after a 35 day gestation. The young remains in the pouch until 5-6 months when it weans and starts eating 'pap' which the mother produces. The young is fully weaned at 7 months, but will stay with the mother until the following breeding season (Martin et al. 1996).</p>



Photo: Koala, Source: Ecosure

Greater glider *Petauroides volans volans*

EPBC Act status	Endangered
NC Act status	Endangered
Likelihood of occurrence	Known
Species description	350 – 400 mm body length 900 – 1700 g Dark grey, cream or mottled grey and cream above, whitish below. Long furry tail, short snout, very large furry ears (DCCEEW 2022).
Habitat within the site	Suitable habitat exists within productive communities on alluvial soils dominated by Queensland blue gum (RE 11.3.25) and tall eucalypt forests. A total of 70 greater gliders were detected during spotlighting surveys within habitats containing REs 11.11.4, 11.11.15, 11.12.3 and 11.12.6, primarily on hill crests. Habitat assessments recorded large hollow-bearing trees in all of these REs, which may provide denning resources.
Relevant biology / ecology	The greater glider is an arboreal folivore (leaf eater). It is nocturnal, emerging from its hollow den to feed on the leaves of Eucalyptus species. It is an agile climber and glider, covering up to 100 m in a glide and can change direction of up to 90 degrees. It is a known prey item of powerful owl. Greater gliders have a defined home range and males do not overlap. Female home ranges may overlap with other females and males. During the breeding season, males and females will share a den. Trees with a diameter at breast height of over 50 cm and old living trees are primarily used as denning trees. Gliders will utilise between 4-20 den trees, with females utilising more denning trees on average than males (Smith, Mathieson & Hogan 2007). The breeding season is from March to June and one young is born into the female's pouch. The young emerges at 3-4 months and may be carried on the mother's back or left in the den. Juveniles are independent at 9 months (DCCEEW 2022b; Smith, Mathieson & Hogan 2007).



Photo: Greater gliders within the site. Source: D. Fleming

Grey-headed flying-fox *Pteropus poliocephalus*

EPBC Act status	Vulnerable
NC Act status	Least concern
Likelihood of occurrence	Known
Species description	<p>244 mm body length 410 – 1270 (average 780) g</p> <p>Large bat, has a mantle of rusty coloured fur completely encircling the neck. Fur on the back is dark grey, often with silver frosting. Fur extends down the legs to the toes.</p>
Habitat within the site	<p>Habitat preferences include all remnant and HVR vegetation within the site as well as non-remnant vegetation where food trees are present. Observed foraging within the site during the spring 2021 surveys when food species were in flower, although no habitats are considered to be critical food sources for this species.</p>
Relevant biology / ecology	<p>Feeds on a variety of nectar and blossom producing species as well as fruiting species. Their major food source is <i>Eucalyptus</i> blossom and are likely to feed within the site during infrequent large blossom events. Grey-headed flying-fox are seasonally nomadic and follow food resources throughout their range (central Qld to Victoria and South Australia). Camps occur in dense vegetation usually near water within paperbark <i>Melaleuca</i>, river oak <i>Casuarina cunninghamiana</i> or exotic trees. Individual bats can forage up to 50 km from camps (DAWE 2021).</p> <p>Male fertility peaks in March and females gestate for 6 months. Females congregate in maternity camps where a single young is born. The young is carried with the mother during early foraging trips and then is increasingly left in the maternity camp. The young bats leave the camp to forage with the females in January and February and are weaned by March.</p>



Photo: Grey-headed flying-fox. Source: National Park NSW <https://www.nationalparks.nsw.gov.au/plants-and-animals/grey-headed-flying-fox>

White-throated needletail *Hirundapus caudacutus*

EPBC Act status	Vulnerable, migratory
NC Act status	Vulnerable
Likelihood of occurrence	Known
Species description	19-21 cm body length 93 g Largest swift species. Heavy looking body tapering to a broad, short, square-cut tail white forehead and throat, glossy dark green above, brown below.
Habitat within the site	White-throated needletails are almost entirely aerial, occurring within high, open airspaces above almost all habitats including oceans. They will roost occasionally in trees within any habitats. This species is widespread across eastern and south-eastern Australia during the months of October – May (Higgins 1999).
Relevant biology / ecology	The species does not breed in Australia, migrating to their breeding grounds in northern Asia in May and returning in October. Like other swifts, the needletail at times gathers over ranges, headlands preceding thunderstorms when aerial insect activity is high (DoE 2015).



Photo: White-throated needletail. Source: Steve Burrows, via Atlas of Living Australia

Glossy black-cockatoo *Calyptorhynchus lathami lathami*

EPBC Act status	Vulnerable
NC Act status	Vulnerable
Likelihood of occurrence	Known
Species description	<p>460 – 510 mm body length 422 – 480 g (males), 430 – 500 g (females)</p> <p>Smallest of the black-cockatoos. They are generally black to sooty brown with bright red undertail coverts. The female has yellow feathers scattered through the head and neck. The beak is large and rounded. The crest is subdued (Glossy Black Conservancy 2010).</p>
Habitat within the site	<p>Suitable foraging habitat exists in small patches amongst forest and woodland communities across the site. A total of four glossy black-cockatoo individuals were observed, two adjacent to a dam and two in a forested area. Signs of chewings (orts) have been observed in patches of woodland containing <i>Allocasuarina torulosa</i>, <i>A. littoralis</i>, <i>A. luehmannii</i> and <i>Casuarina cunninghamiana</i>. Habitat assessments recorded large hollow-bearing trees in remnant REs, which may provide denning resources.</p>
Relevant biology / ecology	<p>The glossy black-cockatoo is a habitat specialist that preferentially feeds on the seeds of oaks (<i>Casuarina</i>) and she-oaks (<i>Allocasuarina</i>) trees. They are essentially a temperate zone species and inhabits higher altitude sites in the north of their range. They prefer a range of woodland habitats where preferred food sources occur including <i>Eucalyptus</i>, <i>Corymbia</i> and <i>Angophora</i> woodlands or in patches dominated by oaks and she-oaks or brigalow <i>Acacia harpophylla</i>. Food trees can be identified by the presence of discarded seed cones (termed orts) at the base of trees.</p> <p>They mostly roost in the canopy of live, leafy trees such as eucalypts but breed in a hollow stump or limb of living or dead trees as well as holes in trunks of tall trees (Higgins et al. 2001). Roosts are usually less than 1 km from reliable water (e.g. dam). Glossy black-cockatoos lay a single egg from March to June and if a young is successfully raised, the parents will forgo the subsequent breeding season. Incubation of the egg lasts for 30 days and the chick fledges after 84-96 days. The chick is fed by both parents for 12 months following hatching and will roost with its parents (Glossy Black Conservancy 2010).</p>



Photo (left): Glossy black-cockatoo (female), (right) – chewed cones or ‘orts’. Source: D Fleming

Short-beaked echidna *Tachyglossus aculeatus*

EPBC Act status	N/A
NC Act status	Special least concern
Likelihood of occurrence	Known
Species description	<p>30 – 45 cm in body length 2 – 7 kg</p> <p>Dorsal surface of body and rudimentary tail covered with spines. Fur present and becomes longer and thicker in southern areas of its range. Long tubular snout.</p>
Habitat within the site	Echidna were opportunistically encountered in several locations throughout the project site including detection of live animals, and scats. They are expected to occur throughout the site within remnant and non-remnant habitats.
Relevant biology / ecology	<p>Echidna does not have specific habitat requirements other than a ready supply of ants and termites on which it feeds. Its powerful forepaws rip apart termite mounds and ant nests and ingest the insects and their eggs that get adhered to the sticky tongue.</p> <p>Echidnas enter a reduced hibernation state (torpor) during winter in some parts of its range. Mating occurs in July and August. Female echidna construct a short (less than 1 m) long burrow in which to lay their solitary egg. Some females remain in the burrow until the egg hatches while others carry the egg in their pouch. When the mother leaves the burrow with the young inside, she seals the entrance. Juvenile echidnas generally emerge from September to November (Augee 2008).</p>



Photo: Short-beaked echidna. Source: E. Hancock

Rufous fantail *Rhipidura rufifrons*

EPBC Act status	Migratory
NC Act status	Special least concern
Likelihood of occurrence	Known
Species description	15-16 cm body length 10 grams Orange-rufous eyebrow, lower back and base of fanned tail. Outer tail blackish with greyer tips. Head, mantle and wings grey-brown. White throat with black banding on the upper chest, lower chest black.
Habitat within the site	Prefers dense, often wetter habitats such as rainforest, dense wet forests, swamp woodlands and mangroves, preferring to be active in shaded areas. A seasonal migrant that flies to northern Australia for winter, during migrations, the species will traverse more open habitats. Within the site, the rufous fantail was observed within SEVT vegetation.
Relevant biology / ecology	The species feeds on insects that occur within the mid to lower levels of vegetation. The fantail breeds from October to February and constructs a small, compact cup nest of fine grasses held together with spider webs. The nest is usually suspended from a tree fork about 5 m above the ground. Both parents help build the nest and rear the clutch of 2-3 chicks (DoE 2015).



Photo: Rufous fantail. Source: D. Fleming

Satin flycatcher (*Myiagra cyanoleuca*)

EPBC Act status	Migratory
NC Act status	Special least concern
Likelihood of occurrence	Known
Species description	<p>17.5 cm body length 17 g</p> <p>Species is characterised by an upright posture, short erectile crest, and a distinctive habit of quivering the tail when perched.</p> <p>Males are glossy blue-black above, with a blue-black chest and white below, while females are duskier blue-black above, with an orange-red chin, throat and breast, and white underparts and pale-edged wing and tail feathers.</p>
Habitat within the site	<p>This species prefers Eucalypt forest and woodlands and they are particularly common in tall wet sclerophyll forest, often in gullies or along water courses.</p> <p>Within the site this species was mainly recorded within non-remnant open woodland with a grassy understory near the Boyne River. It could also utilise Eucalypt forest and woodland and riparian zones.</p>
Relevant biology / ecology	<p>Satin flycatchers are arboreal feeders and generally forage in the canopy and subcanopy, rarely flying above the canopy. They are mainly insectivorous, occasionally eating seeds. In Queensland this species has been known to breed in December, building a nest in a fork of the outer branches of trees. Pairs nest in loose colonies or nest can be clustered in small numbers (DoE 2015).</p>



Photo: (left) Male Satin flycatcher, (right) Female Satin flycatcher. Source: Charles Dove, via Atlas of Living Australia

Fork-tailed swift (*Apus pacificus*)

EPBC Act status	Migratory
NC Act status	Special least concern
Likelihood of occurrence	Known
Species description	<p>18-21 cm body length 30-40 g</p> <p>Species is characterised by a long and deeply forked tail. It is a medium-sized Swift, with a slim body and long scythe-shaped wings that taper to a fine point.</p> <p>The body, tail and upper wings are black-brown, and it has a white band across the rump, in addition to a white patch on the chin and throat (Higgins 1999).</p>
Habitat within the site	Fork-tailed swifts have only been observed aeri ally and none were observed roosting across the project site.
Relevant biology / ecology	In Australia, fork-tailed swifts are believed to be exclusively aerial, flying at heights up to 1,000 m above the ground and roosting on the wing (DoE 2015). The species migrates to Australia in October and November and departs in April to breed in east Asia (DoE 2015). Fork-tailed swifts occur mostly over inland plains, but are also seen above vegetated areas, coastal habitats and urban environments, where they forage ahead of storm fronts to feed on aerial insects (DCCEEW 2023).



Photo: Fork-tailed swift. Source: Sandy Horne, via *Atlas of Living Australia*

Distribution List

Copy #	Date	Type	Issued to	Name
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