

Theodore Wind Farm

NOTICE OF PUBLICATION OF FINALISED PUBLIC ENVIRONMENT REPORT

Theodore Energy Development Pty Ltd (the Proponent) proposes to construct, operate and decommission the Theodore Wind Farm (the Project). This will involve up to 170 wind turbine generators and associated ancillary infrastructure. The Theodore Wind Farm is in the Banana Shire region of Queensland, approximately 22 kilometres (km) east of Theodore, 50 km west of Biloela and 150 km south-west of Gladstone.

The Project (EPBC 2024/09842) was determined a controlled action under the Environment Protection and Biodiversity Conservation Act 1999 (the Act), with assessment by Public Environment Report.

The controlling provisions are:

- Sections 18 and 18A: Listed threatened species and ecological communities
- Sections 20 and 20A: Listed migratory species
- Sections 12 and 15C: World Heritage values of a declared World Heritage property
- Sections 15B and 15C: National Heritage values of a National heritage place
- Sections 24B and 24C: The environment in the Great Barrier Reef Marine Park

Pursuant to Section 99(4) of the Act, the finalised Public Environment Report is available for public viewing at no cost online at www.theodorewindfarm.com.au, or in hard copy at the following locations:

Banana Shire Council Offices: 62 Valentine Plains Road,Biloela, QLD Australia 4715

Banana Shire Library & Information Services: 71 Grevillea St, Biloela QLD 4715

State Library of Queensland: Stanley Place, South Brisbane, QLD 4101

The finalised Public Environment Report may be obtained in hard copy or digital format at no cost from the Proponent upon request, using the contact details below.

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Persons with special needs (including those for whom English is a second language or those with a vision impairment) may contact the Proponent for assistance in accessing the documentation on 1800 879 435 or theodorewindfarm@rwe.com

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Theodore Wind Farm

Public Environment Report – Executive Summary

PREPARED FOR

Theodore Energy Development Pty Ltd

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Theodore Wind Farm

Public Environment Report – Executive Summary

0661076



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ACRONYMS AND ABBREVIATIONS

Acronym	Description
BESS	Battery Energy Storage System
BHT	Broad Habitat Types
CHMP	Cultural Heritage Management Plan
DCCEEW	Department of Climate Change, Energy, the Environment and Water
Disturbance Footprint	The area whereby the final layout and impacts have been considered and occupies an area of 1,537.4 ha.
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ERM	Environmental Resources Management Australia Pty Ltd
Met Mast	Meteorological Mast
MNES	Matters of National Environmental Significance
MW	Megawatts
PER	Public Environment Report
Proposed Action	Theodore Wind Farm
Proponent	Theodore Energy Development Pty Ltd
Project Area	The corridor of land on which the Disturbance Footprint will be located, including a 100 metre buffer for micro-siting.
SIG 1.1	*Significant Impact Guidelines 1.1 – Matters of National Environmental Significance*
Study Area	The 9 land parcels, across 3 properties, and road reserve areas, 46,830 ha, in which the Proposed Action will be located.
WTG	Wind Turbine Generator

EXECUTIVE SUMMARY

INTRODUCTION

Theodore Energy Development Pty Ltd (the Proponent) is proposing to develop the Theodore Wind Farm (Proposed Action) approximately 22 kilometres (km) east of the township of Theodore, 50 km west of Biloela and 150 km south-west of Gladstone, in the Banana Shire Council Local Government Area. Once operational, the Proposed Action will have the capacity to provide 1,054 megawatts (MW) of clean, renewable energy, supporting the progress toward time-critical, State and National decarbonisation objectives.

STATUS OF ASSESSMENT DOCUMENTATION

The Proposed Action was referred to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) with a valid referral published on 11 June 2024 (2024/09842). Following assessment of the referral, a controlled action decision was made on 09 July 2024. The assessment approach was confirmed to be by Public Environment Report (PER), and the PER Guidelines published on 09 August 2024.

Pursuant to Section 95A(3) of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) the Proponent invited the public to comment on the draft PER for a period of 20 business days between 8 April and 6 May 2026. During the public comment period one (1) submission was received. The Proponent has carefully considered the content of the submission with a response provided in Appendix N which includes details of the concerns raised and how the Proponent has addressed the matter through the documentation.

PURPOSE OF PER

The purpose of this PER is to provide adequate information to the Minister on the potential impacts of the Proposed Action in relation to Matters of National Environmental Significance (MNES) to meet Commonwealth legislative requirements. The relevant controlling provisions protected under Part 3 of the EPBC Act, associated with the Proposed Action include:

- Listed threatened species and ecological communities (s18 & s18A);
- Listed migratory species (s20 & s20A);
- Work Heritage values of a declared World Heritage property (s12 & s15C);
- National Heritage values of a National heritage place (s15 B & s15C); and
- The environment in the Great Barrier Reef Marine Park (s24B & s24C).

A full introduction, description of the action and assessment of feasible alternatives can be found in Section 1 – 3 of the Theodore Wind Farm PER.

DESCRIPTION OF PROPOSED ACTION

The Study Area is the land/properties, and road reserve areas, containing the Proposed Action and is located within the Rural Zone of the Banana Shire Council, with the predominant land use being cattle grazing (and associated homesteads). The Study Area consists of three working cattle enterprises, and as such, the landscape has been influenced by historical land clearing, with large areas of cleared land featuring no remnant vegetation or regrowth vegetation. In the north-east, the area is dominated by *Eucalyptus crebra* woodland and open woodland, with a modified ground layer due to grazing and presence of introduced flora

species. The surrounding landscape within the locality (10 km) has also been influenced by historical land clearing and cattle grazing. The Study Area is approximately 46,830 hectares (ha) in size.

The location and design of the Proposed Action within the Study Area have been designed and refined through consideration of technical, environmental, social, and commercial constraints. The Proposed Action is proposed to consist of up to 170 Wind Turbine Generators (WTGs) with the following associated infrastructure:

- WTG foundations and hardstand areas;
- Temporary infrastructure such as concrete batching plants, laydown areas, temporary construction offices and parking and on-site accommodation;
- Access tracks and electrical reticulation;
- Switching stations and substations;
- Battery Energy Storage Systems (BESS);
- Temporary and permanent meteorological masts; and
- Permanent operation and maintenance facilities, with a variety of associated facilities and storage laydowns.

The Project Area, which includes a 100 metre (m) buffer for micro-siting occupies an area of 6,737.4 ha. The Disturbance Footprint, area whereby the final layout and impacts have been considered, occupies 1,537.4 ha or 3.3% of the total Study Area. The Proponent is committed to extensive rehabilitation activities, and a significant portion of this disturbance will be rehabilitated or progressively restored. The permanent impact (Operations Footprint) will occupy an area of 537.3 ha, or 1.1% of the total Study Area.

The WTGs have an expected operating life of up to 35 years, at the end of which there are three main options for consideration:

- Continue the use of the Study Area as a wind farm using the existing WTGs (subject to condition of equipment);
- Replace the WTGs with technology current at that time and continue the use of the Study Area as a wind farm for a further term; or
- Decommission the Proposed Action and remove the WTGs and ancillary infrastructure in accordance with a Decommissioning Plan prepared for the Proposed Action.

Where decommissioning occurs, the Study Area will be returned, as far as practicable, to its condition prior to the commencement of construction.

Table E-1 details the phases of development associated with the Proposed Action.

TABLE E-1 PHASES OF DEVELOPMENT

Phase	Associated Activities	Duration
Design	The key activities associated with the design phase of the Proposed Action are: • Desktop review of key habitat and environmental areas on Study Area; • Disturbance Footprint mapping; • Ecological surveys to ground truth onsite vegetation and habitat; • Mapping of constraints applicable to the Study Area and Proposed Action;	Ongoing, commenced in 2021, to be finalised in 2026

Phase	Associated Activities	Duration
	• Technical engineering to determine appropriate locations for infrastructure while avoiding, minimising and mitigating impact to high value ecological areas; • Ongoing consultation with relevant stakeholders; and • Obtained consent from Landowners, Traditional Owners, government and transmission network services.	
Construction	The key activities likely to impact ecological resources during construction are: • Vegetation clearing for new access tracks, temporary construction compounds and laydown areas, borrow pits, water storages, concrete batching plants, turbine pads, trenches for power and instrumentation cables, electrical substation and overhead powerlines, and associated earthworks; • Excavating trenches; • Blasting for turbine foundations (if required); and • Construction traffic movement and plant operations (rock crushing and concrete batching plant).	~36-60 Months
Commissioning and Post-Construction Rehabilitation	Testing, in line with Australian Energy Market Operator Standards. The intention of post-construction rehabilitation is to progressively stabilise areas of disturbance, making them resilient to erosion and weed infestation, and to re-establish appropriate vegetation cover. Rehabilitation of on-ground vegetation will be managed through an adaptive management to ensure rehabilitation acceptance criteria are met.	~ 24 months
Operations	Operational phase activities are anticipated to be of an indirect nature, of lower frequency, and smaller intensity, but will last the lifetime of the Proposed Action. Potential impacts during the operational phase include: • WTG operation; and • Routine maintenance and servicing of WTGs, access tracks, electrical installations and infrastructure as required.	Up to 35 years
Decommissioning	If a decision was taken to decommission the Proposed Action, this would involve: • Dismantling and removal of WTGs; • Removal of electrical reticulation where not part of permanent network infrastructure; • Responsible disposal/recycling/reuse of infrastructure removed from the Study Area in according to the waste hierarchy; and • Rehabilitation of disturbed land in accordance with industry standard good practices at the time and where not required for ongoing grazing or agricultural uses. Underground cabling would be left in situ. Hardstand pads would be left in situ or deep ripped where rehabilitation is required. Turbine foundations may be left up to 500 mm below rehabilitated ground level as they do not present a risk to people or livestock. Excavations would be backfilled and rehabilitated. Access tracks could be retained on site for the continued benefit of the landholder, or they could be rehabilitated.	~5 years

DESCRIPTION OF THE ENVIRONMENT

The Study Area is the land/properties, and road reserve areas, containing the Proposed Action and is located within the Rural Zone of the Banana Shire Council, with the predominant land use being cattle grazing (and associated homesteads). The Study Area consists of three working cattle enterprises, and as such, the landscape has been influenced by historical land clearing, with large areas of cleared land featuring no remnant vegetation or regrowth vegetation. In the north-east, the area is dominated by *Eucalyptus crebra* woodland and open

woodland, with a modified ground layer due to grazing and presence of introduced flora species. The surrounding landscape within the locality (10 km) has also been influenced by historical land clearing and cattle grazing. The Study Area is approximately 46,830 hectares (ha) in size.

Ten field investigations have been undertaken across the Study Area between October 2022 and February 2026 (Table E-2) to identify the presence or potential presence of Matters of National Environmental Significance (MNES). The methods included a desktop review to identify ecological values that may be present, which informed the design of a comprehensive field survey and sampling program to collect field data and describe on-ground conditions and values. The field surveys design and implementation considered the requirements of State Code 23: Wind Farm Developments, the Department of Climate Change, Energy, the Environment and Water (DCCEEW) *Onshore wind farm guidance - best practice approaches when seeking approval under Australia's national environment law* as well as contemporary species specific survey guidelines, conservation and listing advices, and recovery plans where relevant. This data was used to describe on-ground conditions and to assess the known, likely, and potential occurrence of MNES, and their habitat, within the Study Area.

TABLE E-2 SUMMARY OF FIELD SURVEYS UNDERTAKEN IN THE STUDY AREA

Date	Summary	Techniques
17 – 22 October 2022	Four ecologists, six days	• Vegetation and habitat assessment • Targeted fauna surveys • Bird surveys • Bat surveys
13 – 17 February 2023	Two ecologists, five days	• Bird surveys • Bat surveys
27 – 31 March 2023	Four ecologists, five days	• Vegetation and habitat assessment • Targeted fauna surveys • Bird surveys
5 – 9 June 2023	Four ecologists, five days	• Vegetation and habitat assessment • Targeted fauna surveys • Bird surveys
25 September – 13 October 2023	Four ecologists, five days	• Habitat quality assessments • Bird surveys
4 – 8 December 2023	Two ecologists, five days	• Bird surveys
19 – 23 February 2024	Two ecologists, five days	• Bird surveys
10 – 14 June 2024	Four ecologists, four days	• Vegetation assessment • Habitat quality assessment • Bird surveys
23 – 28 September 2024	Four ecologists, six days	• Habitat quality assessments • Targeted flora transects • Habitat assessments • Targeted fauna surveys
17 – 21 February 2026	Four ecologists, five days	• Habitat quality assessments • Quaternary assessments • Targeted fauna surveys

The ecological condition of the Study Area is influenced by historical land clearing and cattle grazing, with large areas of cleared land featuring no remnant vegetation or regrowth vegetation.

No protected areas occur within the boundary of the Study Area, however, the following State Forests are located within the Locality (10 km):

- The Belmont State Forest is located adjacent to the northern boundary of the Study Area and has an area of approximately 8,550 ha;
- The Montour State Forest is located adjacent to the eastern boundary of the Study Area and has an area of approximately 4,222 ha;
- The Camboon State Forest is located adjacent to the southern boundary of the Study Area and has an area of approximately 11,874 ha; and
- The Trevethan State Forest is located approximately 3 km south of the Study Area and has an approximate area of 3,618 ha.

The Study Area is broadly connected to the surrounding landscape and vegetation by a state-mapped terrestrial corridor associated with the Banana Range running north to south from Mt Benn to Trevethan State Forest. The north and western parts of the Study Area are generally cleared, and dominated by open grassland (native and introduced) communities.

The Study Area has been classified into six broad habitat types (BHT), defined based on the vegetation community type and structure:

- Grasslands and cultivated agricultural land;
- Waterbodies and drainage features;
- Riparian woodland and open forest dominated by *E. populnea*, *E. tereticornis* often associated with stream channels;
- Vine Forest/Thickets and Dry Rainforest;
- Eucalypt woodland and open forest dominated by *E. crebra* with a grassy understorey; and
- Brigalow woodlands.

The habitats in the Study Area are generally in a low to moderate condition, with signs of degradation and fragmentation due to cattle grazing, dieback, erosion, and the presence of introduced flora species. Where there are areas of higher quality habitat in a remnant condition, these are in discrete patches and sections of the Study Area. The dominant BHT across the Study Area is grassland and cultivated agricultural land, accounting for almost half of the Study Area.

A full description of the environment can be found in Section 4 of the Theodore Wind Farm PER.

MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

As described above, following detailed desktop investigations, and a comprehensive field campaign across 9 separate survey events, the MNES relevant to the Study Area are summarised in Table E-3. The table summarises the MNES known, likely and with potential to occur in the Study Area. Although there are no recent records of those species with the potential to occur within the Study Area or Locality, and no observations were made during field surveys, their potential future presence cannot be ruled out due to an overlap of distribution and potential general habitat within the Study Area.

TABLE E-3 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE IN THE STUDY AREA

Matter	Relevance to the Study Area
World heritage properties	There are no world heritage properties within the Study Area.
National heritage properties	There are no national heritage properties within the Study Area.
Wetland of international importance	There are no wetlands of international importance associated with the Study Area.
Threatened species and ecological communities	The PMST identified five EPBC Act listed TECs with potential to occur within the Study Area. Based on in-situ ground-truthing via completion of quaternary vegetation assessments and BioCondition transects, as well as desktop assessment of aerial imagery, **two** TECs have been considered known to occur: • Poplar Box Grassy Woodland on Alluvial Plains (Poplar Box TEC); and • Brigalow (*Acacia harpophylla* dominant and co-dominant) (Brigalow TEC). Based on direct observations of species or species habitat during targeted field surveys, **four** EPBC Act listed threatened species have been concluded as known or likely to occur. • Squatter pigeon (southern) (*Geophaps scripta scripta*) - listed as Vulnerable under the EPBC Act (known); • Koala (*Phascolarctos cinereus*) - listed as Endangered under the EPBC Act (known); • Greater glider (southern and central) (*Petauroides volans*) - listed as Endangered under the EPBC Act (known); and • Large-eared pied bat (*Chalinolobus dwyeri*) – listed as Endangered under the EPBC Act (likely). **Five** additional EPBC Act listed fauna species are considered to have the potential to occur, due to the presence of general habitat for these species observed within the Study Area and recent records in the Locality, including: • Black-breasted buttonquail (*Turnix melanogaster*), listed as Vulnerable under the EPBC Act; • White-throated needletail (*Hirundapus caudacutus*), listed as Vulnerable under the EPBC Act; • Australian painted snipe (*Rostratula australis*), listed as Endangered under the EPBC Act; • Diamond firetail (*Stagonopleura guttata*) listed as Vulnerable under the EPBC Act; and • Yellow-bellied glider (south-eastern) (*Petaurus australis australis*) listed as Vulnerable under the EPBC Act. No listed flora species have been assessed as known or likely to occur within the Study Area. Based on survey effort and habitat suitability, **six** listed threatened flora species have been assessed as having the potential to occur: • Ooline (*Cadellia pentastylis*), listed as Vulnerable under the EPBC Act; • Cossinia (*Cossinia australiana*), listed as Endangered under the EPBC Act; • Austral Cornflower (*Rhaponticum australe*), listed as Vulnerable under the EPBC Act; • *Solanum dissectum*, listed as Endangered under the EPBC Act; • *Solanum johnsonianum*, listed as Endangered under the EPBC Act; and • *Xerothamnella herbacea*, listed as Endangered under the EPBC Act.
Migratory species	There are **two**[1] listed migratory species under the EPBC Act regarded as having the potential to occur within the Study Area: • Fork-tailed swift (*Apus pacificus*); and • White-throated needletail (*Hirundapus caudacutus*).

Matter	Relevance to the Study Area
Commonwealth marine area	There are no Commonwealth marine areas within the Study Area.
The Great Barrier Reef Marine Park	The Great Barrier Reef is not associated with the Study Area, however information relevant to assess the potential impacts of the Proposed Action on the Great Barrier Reef is provided in Section 5.
Nuclear actions	Not Applicable
Water resources	Not Applicable

[1]Satin flycatcher (*Myiagra cyanoleuca*) and rufous fantail (*Rhipidura rufifrons*) were originally included in the referral information and assessed for potential impacts of the Proposed Action. Following recent changes to the EPBC Act Migratory Species list, these de-listed species no longer require assessment under the EPBC Act as MNES and are therefore not assessed as part of this PER.

A full assessment of MNES within the Study Area can be found in Section 5.

IMPACT IDENTIFICATION, AVOIDANCE, MITIGATION AND MANAGEMENT

The Proposed Action has the potential to impact on ecological values in the Study Area during the construction, operation and decommissioning phases. The following direct and indirect impacts associated with the Proposed Action have been identified:

- Vegetation clearance, habitat loss and individual mortality;
- Habitat fragmentation and patch isolation;
- Prevalence of invasive plants;
- Vehicle impacts;
- Fire regimes and bushfire risk;
- Altered hydrology;
- Environmental pollution and hazardous materials;
- Individual mortality and injury from turbine collision and barotrauma;
- Site alienation;
- Cumulative impacts; and
- Climate change.

The Proponent is committed to avoiding, minimising, mitigating and managing potential impacts to MNES within the Disturbance Footprint and broader Study Area.

The EPBC Act mitigation hierarchy is a tool that is used to limit the amount of damage an action, such as a development, will have on the environment. The three tiers of the hierarchy, which must be followed preferentially from first to last and explored in full before moving on to the next, are:

1. Avoid
2. Mitigate
3. Offset

The Proponent has endeavoured to follow the mitigation hierarchy, and has proposed avoidance and mitigation measures relevant to each stage of the Proposed Action.

Since the conception of the Proposed Action, the design of the Disturbance Footprint has evolved with consideration of technical, environmental, social, and commercial constraints.

Initial reviews determined that the Study Area has the maximum capacity to host up to 260 WTGs. A Draft Disturbance Footprint was designed to host up to 260 WTGs and associated infrastructure. The design of the Disturbance Footprint was refined to be up to 170 WTGs to minimise impacts to sensitive ecological areas, minimise potential visual impacts to surrounding dwellings and maximise commercial output.

Specific Management Plans have been developed with the aim to manage and mitigate impacts to MNES. These management plans are attached to this PER and include:

- Bird and Bat Management Plan (Appendix D);
- Preliminary Vegetation and Fauna Management Plan (Appendix G); and
- Construction Environmental Management Plan (Appendix H).

More general management plans that will be developed for the Proposed Action and are likely to include relevant measures outlined in species-specific management plans and include:

- Construction Environmental Management Plan;
- Bushfire Management Plan; and
- Operational Environmental Management Plan.

A full description of the avoidance, mitigation and management measures can be found in Section 7 of the Theodore Wind Farm PER.

SIGNIFICANT IMPACT ASSESSMENTS

Potential impacts from the Proposed Action to MNES have been assessed against the *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* (SIG 1.1). These significant impact assessments (SIA) have been completed assuming the proposed avoidance, minimisation, mitigation and management measures will be implemented. The results of the SIAs are summarised below in Table E-4.

TABLE E-4 SUMMARY OF MNES SIGNIFICANT IMPACT ASSESSMENT

MNES	Likelihood of Occurrence	Significant Residual Impact
Threatened Ecological Communities		
Brigalow TEC	Known	**Unlikely**
Poplar Box TEC	Known	**Likely**
Listed Threatened Species		
Greater glider (southern and central)	Known	**Likely**
Yellow-bellied glider (south-eastern)	Potential	**Unlikely**
Koala	Known	**Likely**
Large-eared pied bat	Likely	**Unlikely**
Squatter Pigeon (southern)	Known	**Likely**
White-throated needletail	Potential	**Unlikely**
Black-breasted buttonquail	Potential	**Unlikely**
Australian painted snipe	Potential	**Unlikely**
Diamond firetail	Potential	**Potential**

MNES	Likelihood of Occurrence	Significant Residual Impact
Ooline	Potential	**Unlikely**
Cossinia	Potential	**Unlikely**
Austral cornflower	Potential	**Unlikely**
Solanum dissectum	Potential	**Unlikely**
Solanum johnsonianum	Potential	**Unlikely**
Xerothamnella herbacea	Potential	**Unlikely**
Migratory Species		
Fork-tailed swift	Potential	**Unlikely**

A full assessment of potential impacts associated with the Proposed Action can be found in Section 6.

REHABILITATION

Following the completion of construction as well as at the end-of life decommissioning phase, areas not required for ongoing operational disturbance will be rehabilitated and or regenerated in accordance with rehabilitation management practices established in Section 8 of the PER and where not required for ongoing grazing or agricultural practices.

In both cases, the intention is to progressively stabilise areas of disturbance, making them resilient to erosion and weed infestation, and to re-establish appropriate vegetation cover. Rehabilitation of on-ground vegetation will be managed through an adaptive management to ensure rehabilitation acceptance criteria are met.

A full description of rehabilitation can be found in Section 8 of the Theodore Wind Farm PER.

OFFSETS

As identified in Table 0-3, the Proposed Action is likely to have a Significant Residual Impact on the following MNES:

- Poplar Box TEC;
- Greater glider (southern and central);
- Koala; and
- Squatter Pigeon (southern).

Additionally, the Proposed Action has the potential to have a Significant Residual Impact on diamond firetail.

A Draft Offset Management Plan has been developed and provided as Appendix F. Offsets for bird and bat species at risk of turbine collision, where a threshold of mortality has been exceeded, is specifically addressed in the Bird and Bat Management Plan.

In order to achieve conservation outcomes for all species and meet policy requirements, a land-based offset is proposed to be delivered within the Study Area. Field surveys have been undertaken across the offset areas in order to ground truth the values for the above protected matters.

A full description and assessment of potential offsets can be found in Section 9 of the Theodore Wind Farm PER.

ECONOMIC AND SOCIAL MATTERS

The Proponent has engaged with stakeholders regarding the Proposed Action since 2021. The focus has been on building transparent and constructive relationships with landholders, neighbours, the community, Traditional Owners, and other interested parties.

Additionally, a Socio-Economic Impact Analysis has been undertaken to provide a high-level understanding of the socio-economic context of the surrounding local communities of relevance to the Proposed Action, including the potential social and economic impacts that may be experienced.

The Proponents commitment to working closely with the Wulli Wulli People, the Traditional Owners of the Study Area, has been demonstrated through regular meetings since 2023. The Proponent have signed an early works agreement, and various site visits have been undertaken by Wulli Wulli Elders, Wulli Wulli Nation Aboriginal Corporation board members and cultural heritage monitors. The Proponent have also agreed to undertake additional survey works in collaboration with the Wulli Wulli People and have agreed to a Cultural Heritage Management Plan under Part 7 of the *Aboriginal Cultural Heritage Act 2003* (Qld).

A full description of the economic and social matters can be found in Section 10 – 16 of the Theodore Wind Farm PER.

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Theodore Wind Farm

Public Environment Report – Introduction and Background (Section 1 – 3)

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Theodore Wind Farm

Public Environment Report – Introduction and Background (Section 1 – 3)

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ACRONYMS AND ABBREVIATIONS

Acronym	Description
BESS	Battery Energy Storage System
CHMP	Cultural Heritage Management Plan
DCCEEW	Department of Climate Change, Energy, the Environment and Water
Disturbance Footprint	The area whereby the final layout and impacts have been considered and occupies an area of 1,537.4 ha.
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ERM	Environmental Resources Management Australia Pty Ltd
Met Mast	Meteorological Mast
MNES	Matters of National Environmental Significance
PER	Public Environment Report
Proposed Action	Theodore Wind Farm
Project Area	The corridor of land on which the Disturbance Footprint will be located, including a 100 metre buffer for micro-siting.
Study Area	The 9 land parcels, across 3 properties, and road reserve areas, 46,830 ha, in which the Proposed Action will be located.
The Proponent	Theodore Energy Development Pty Ltd
WTG	Wind Turbine Generator

1. GENERAL INFORMATION

Theodore Energy Development Pty Ltd (the Proponent) is developing the Theodore Wind Farm (the Proposed Action) approximately 22 km east of the township of Theodore, 50 km west of Biloela and 150 km south-west of Gladstone, in the Banana Shire Council Local Government Area. The Proposed Action consists of up to 170 wind turbine generators (WTG), and ancillary infrastructure including, foundations and hardstands, temporary infrastructure such as concrete batching plants, laydown areas, construction offices, parking and on-site accommodation, access tracks and electrical reticulation, switching stations and substations, Battery Energy Storage Systems (BESS), meteorological masts (met masts), and operation and maintenance facilities. The Proposed Action is located over 9 land parcels, across three properties and road reserve areas across an area of 46,830 hectares (ha) (Study Area). The Study Area is shown on Figure 1-1.

For the purposes of this Public Environment Report (PER), the following definitions apply:

- **The Disturbance Footprint**: The area whereby the final layout and impacts have been considered occupies 1,537.4 ha or 3.3% of the total Study Area;
- **The Project Area**: The corridor of land on which the Disturbance Footprint will be located which includes a 100 metre (m) buffer for micro-siting occupies an area of 6,737.4ha.

Environmental Resources Management Australia Pty Ltd (ERM) has been commissioned by the Proponent to undertake detailed ecological studies to inform the layout and design of the Proposed Action as well as obtaining site based information to meet regulatory approval requirements, including assessment under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Detailed ecological field investigations were undertaken across 10 separate field surveys in 2022 (October), 2023 (February, March, June, September/October and December), 2024 (February, June and September) and 2026 (February).

The Proposed Action was referred to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) with a valid referral published on 11 June 2024 (2024/09842). Following assessment of the referral, a controlled action decision was made on 09 July 2024. The assessment approach was confirmed to be by Public Environment Report (PER), and the PER Guidelines published on 09 August 2024.

The purpose of this PER is to provide adequate information to the Minister on the potential impacts of the Proposed Action in relation to Matters of National Environmental Significance (MNES) to meet Commonwealth legislative requirements. The relevant controlling provisions protected under Part 3 of the EPBC Act, associated with the Proposed Action include:

- Listed threatened species and ecological communities (s18 & s18A);
- Listed migratory species (s20 & s20A);
- Work Heritage values of a declared World Heritage property (s12 & s15C);
- National Heritage values of a National heritage place (s15 B & s15C); and
- The environment in the Great Barrier Reef Marine Park (s24B & s24C).

The PER follows the specific structure outlined in the PER Guidelines and directly responds to information requested by DCCEEW (Appendix A).

1.1 DESIGNATED PROPONENT

The Proponent seeking approval under the EPBC Act is Theodore Energy Development Pty Ltd, a wholly owned subsidiary of RWE Renewables Europe & Australia (RWE). Background information relevant to RWE is provided below:

- RWE is one of the largest energy utilities in Europe and now operates in 18 countries around the world;
- RWE's core business model is to develop, own and operate renewable energy projects;
- Signed MoU with Stanwell to partner on 1.8 GW of wind projects in Queensland;
- Awarded LTESA LDS in 2023 by the New South Wales government to deliver and operate Australia's first eight-hour battery, Limondale BESS;
- Extensive history of developing strong relationships with landowners, host communities and stakeholders, ensuring a strong alignment of interest over the project lifetime;
- Australia is a key priority growth market for RWE;
- Entered Australian market in 2018 with the 249 MW Limondale Solar Farm in NSW;
- Developing around 3.0 GW of wind, solar, and storage projects across Queensland, New South Wales and Victoria.

The Proponents contact person in relation to the preparation and assessment of the PER is:

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1.2 OBJECTIVE

The objective of the Proposed Action is to construct a wind farm for the supply of renewable energy, this supports the progress toward time-critical, State and National decarbonisation objectives.

The Queensland Government is committed to achieving net zero emissions by 2050, and is committed to developing a net zero roadmap that will outline the overall vision and priorities (Queensland Goverment , 2025a).

In April 2025, the Queensland Government released a statement outlining their intent for a 5-year Energy Roadmap to deliver affordable, reliable and sustainable electricity. The 5-year Energy Roadmap is expected to be published by the end of 2025 (Queensland Goverment , 2025b).

Additionally in June 2025, the Queensland Government Budget was released which included the 5-year Energy Roadmap with more than $5 billion for Queensland's State-owned energy businesses to invest across the energy supply chain (Queensland Govermnet , 2025c).

It is noted, that while the 5-year Energy Roadmap and net zero plan are yet to be published, the Proposed Action is seen to be in line with the overall intent, receiving Queensland Government approval for a Development Permit in June 2025.

1.3 LOCATION

The Proposed Action involves the development, construction and operation of a large-scale wind farm approximately 22 km east of the township of Theodore and 50 km south of Biloela in the Banana Shire Council Local Government Area, Queensland. The closest major town is Gladstone, 150 km northeast of the Proposed Action, with Queensland's capital, Brisbane located 380 km southeast of the Proposed Action.

The Study Area is the land/properties containing the Proposed Action and is located within the Rural Zone of the Banana Shire Council, with the predominant land use being cattle grazing (and associated homesteads). The Study Area consists of three working cattle properties, and as such, the landscape has been majorly influenced by historical land clearing, with large patches of cleared land featuring no remnant vegetation. The surrounding landscape within the locality (10 km) have also been influenced by historical land clearing and cattle grazing.

The Study Area lies adjacent to and within the locality (10 km) of several State Forests:

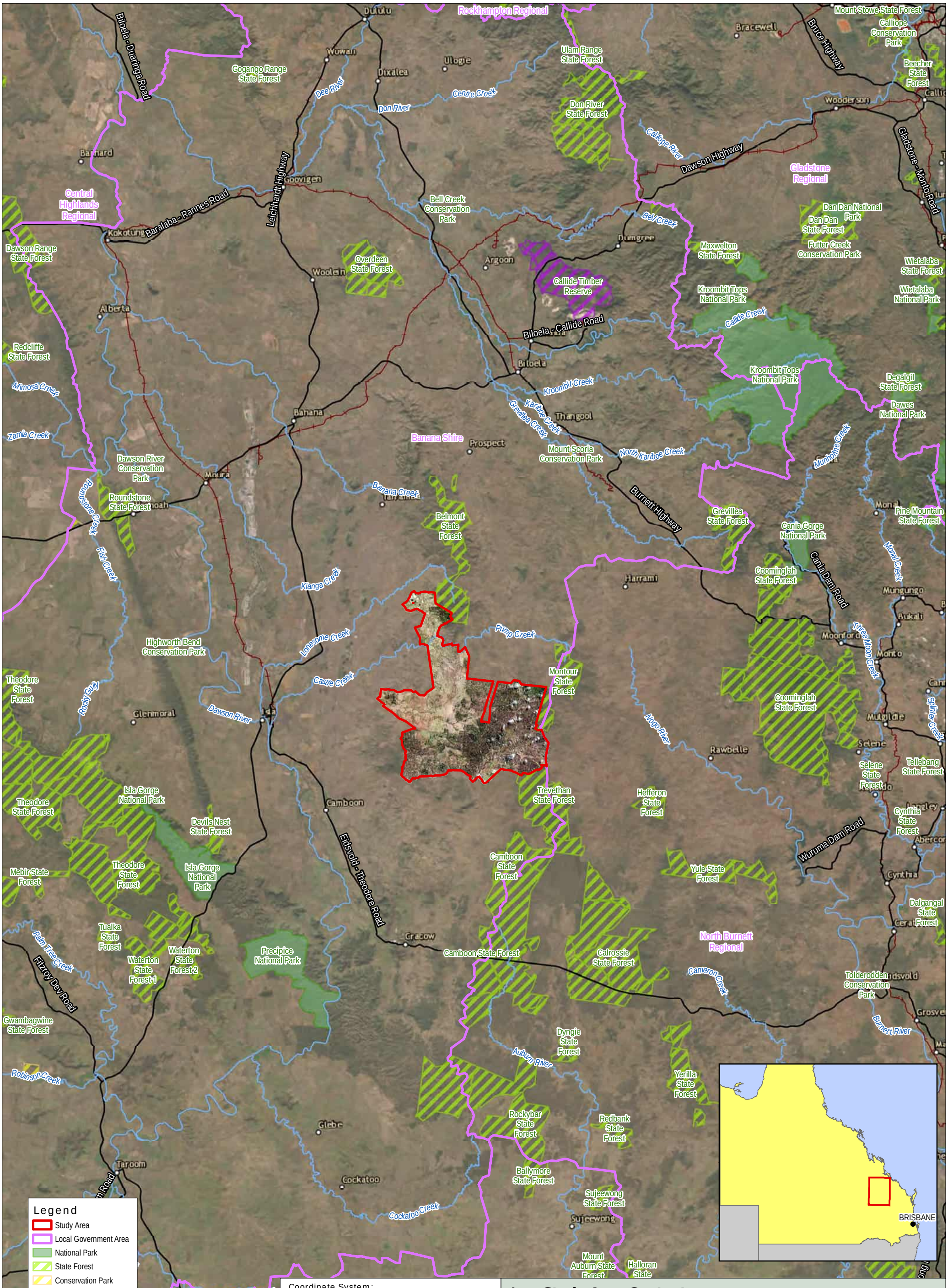
- The Belmont State Forest is located on the northern boundary of the Study Area and has an area of approximately 8,550 ha;
- The Montour State Forest is located to the eastern boundary of the Study Area and has an area of approximately 4,222 ha;
- The Camboon State Forest is located on the southern boundary of the Study Area and has an area of approximately 11,874 ha; and
- The Trevethan State Forest is located approximately 3 km south of the Study Area and has an approximate area of 3,618 ha.

The Study Area is approximately 46,830 ha in size (refer to Figure 1-1) and consists of nine lots on three properties. The property lots and sizes are described in Table 1-1.

A small land parcel, represented as a small dot on figures, Lot 28 on DW557, located in the north of the Study Area hosts Telstra infrastructure and as such is not included in the Study Area.

TABLE 1-1 STUDY AREA PROPERTY LIST

Property	Lot on Plan	Tenure
Landowner 1	Lot 4 on SP131475	Freehold
	Lot 2 on RP617749	Freehold
	Lot 1 on RP617748	Freehold
	Lot 8 on DW2	Freehold
Landowner 2	Lot 17 on DW49	Freehold
	Lot 18 on DW550	Freehold
Landowner 3	Lot 11 on DW446	Freehold
	Lot 19 on DW551	Freehold
	Lot 20 on SP100500	Freehold
Road Reserves	Part of Defence Road	Road Reserve
	Part of Crowsdale Camboon Road	Road Reserve
	Unnamed Road Reserves	Road Reserve



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1.4 BACKGROUND

The Proposed Action was conceived and explored by the Proponent in 2021. The Proponent reviewed high level wind data for the locality and proceeded to analyse this through the deployment of LiDARs and Meteorological Masts within the Study Area. Extensive engagement with landholders, primarily through face-to-face meetings allowed the Proponent to secure all relevant land agreements. The Proponent is continuing to maintain open and transparent communications with all landholders to ensure they are informed of the progress and outcomes of Proposed Action works. Key constraints such as port access and equipment procurement were taken into consideration given the location of the Study Area, however it was determined given the quality of the roads and limited required upgrades, the Study Area was viable from this perspective. The Proponent through internal engineering and construction capability, and engagement with engineering consultants, developed a preliminary Disturbance Footprint in order to complete a high-level analysis of potential WTG locations and project viability.

Following, the Proponent engaged ERM to undertake a Planning and Environment Due Diligence Assessment which reviewed key constraints and fatal flaws of the Study Area, including the presence of vegetation and fauna, land tenure, aviation impacts, electromagnetic inference impacts, traffic and transport routes and location of sensitive receptors.

The first ecological field survey was undertaken in October 2022 which focused on vegetation and fauna assessments, targeted fauna surveys and bird and bat surveys. The data collected from the field survey was used to map preliminary habitat for listed threatened species to inform the layout design. Subsequent ecological field surveys were conducted to confirm and update habitat mapping for listed threatened species and amend the layout design. In 2023, the Proponent developed a preliminary Disturbance Footprint. The preliminary Disturbance Footprint was used to undertake an Ecological Assessment Report, preliminary Aviation Impact Assessment and Electromagnetic Interference Assessment. The disturbance footprint (including location of wind turbine generators (WTGs), access tracks, batching plant, laydown areas, substations etc.) has been refined as part of an iterative process and informed by the presence of ecological values related to MNES and MSES.

Additionally, in 2023 the Proponent applied to the Banana Shire Council for a Building Permit for the erection of three meteorological masts to undertake wind and weather monitoring within the Study Area. Following approval of the Building Permit, the meteorological masts were erected, data collected was used to further inform the layout design to maximise productivity of the Proposed Action.

In 2024, the Disturbance Footprint was updated and additional technical studies undertaken to support the EPBC Act Referral and *Planning Act 2016* Development Application. The following technical studies have been undertaken for the Proposed Action:

- Aviation Impact Assessment – Aviation Projects;
- Ecological Assessment Report – ERM;
- Electromagnetic Impact Assessment – Middleton Group;
- Landscape and Visual Impact Assessment – Moir Studio;
- Natural Hazard Risk Assessment – Covey Associates;
- Noise Impact Assessment and Background Noise Monitoring – Echo Acoustic Consulting;

- Site Access and Route Assessment – Cambray Consulting;
- Socio-economic Impact Analysis and Accommodation Options Report – ERM;
- Stormwater and Erosion Risk Assessment – ERM;
- Traffic Impact Assessment – Cambray Consulting;
- Community Engagement Report – Attexo; and
- Workforce Accommodation and Infrastructure Report – Attexo.

In February 2024, the Proponent lodged a Relevant Purpose Determination under Section 22A of the *Vegetation Management Act 1999* to support the Operational Works Development Application for the Proposed Action for the clearing of native vegetation within the Study Area. On 05 July 2024, the Queensland Government Department of Resources confirmed that the proposed clearing of Regulated Vegetation is for Relevant Infrastructure Activities.

The Proposed Action was referred to DCCEEW with a valid referral published on 11 June 2024 (2024/09842). Following assessment of the referral, a controlled action decision was made on 09 July 2024. The assessment approach was confirmed to be by PER, and the PER Guidelines published on 09 August 2024.

On 27 September 2024, the Proponent lodged a Development Application to the Queensland State Assessment and Referral Agency for a Material Change of Use (Wind Farm) and Operational Works (Native Vegetation Clearing) for the Proposed Action. On 20 June 2025, the Queensland State Assessment and Referral Agency granted a Development Permit for Material Change of Use (Wind Farm) and Operational Works (Native Vegetation Clearing) for the Proposed Action.

1.5 OTHER ACTIONS IN THE LOCALITY

There is one project within the locality of the Proposed Action being the Banana Range Wind Farm, located approximately 20 km north of the Proposed Action.

The Proposed Action is proposed to be connected to the grid network via the Banana Range Wind Farm Connection project 275 kV transmission line approximately 50 km north of the Study Area. The transmission line, while under separate ownership and approvals processes, is considered a 'facilitated impact'.

1.6 STATUS

On 20 June 2025, the Queensland State Assessment and Referral Agency granted a Development Permit for Material Change of Use (Wind Farm) and Operational Works (Native Vegetation Clearing) for the Proposed Action.

The Proponent has engaged in further detailed design of the Disturbance Footprint and intends to undertaking geotechnical works in order to progress with the civil design and constructability of the Proposed Action.

1.7 CONSEQUENCES OF NOT PROCEEDING

There are two major consequences of not proceeding with the Proposed Action, being the loss of potential renewable energy generation, including the loss of potential alternate environmentally superior renewable energy sources, and the investment loss.

As discussed in Section 1.2, the Proposed Action has an estimated generation capacity of 1,152 MW, assisting to reach the Queensland net zero roadmap (Queensland Goverment , 2025a), and the Federal Governments 82% renewable energy generation target by 2030 (Australian Government, 2024). Additionally, the Proposed Action will contribute to the 12,200 MW of new wind generation capacity required to support these targets.

Additionally, the Proposed Action will result in significant direct and indirect local, state and national investment during construction and operation. The high-level potential economic impact of the Project on the Australian economy is depicted in Table 1-2 (Environmental Resources Management Australia Pty Ltd , 2024).

TABLE 1-2 IMPACT ON THE AUSTRALIAN ECONOMY

	Direct Economic Impact	Indirect Economic Impact[1]
Construction Phase		
Local	$0.5 billion	$0.835 billion
State	$0.425 billion	$0.71 billion
National	$0.29 billion	$0.485 billion
Operation Phase (nominal total over 35 years)[2]		
Local	$0.78 billion	$1.3 billion
State	$0.4 billion	$0.66 billion
National	$0.1 billion	$0.167 billion

1.8 CONSULTATION

The Proponent has engaged with stakeholders regarding the Theodore Wind Farm since 2021. The focus has been on building transparent and constructive relationships with landholders, near neighbours, the community, Traditional Owners, and other interested parties.

The Proponent has delivered a comprehensive stakeholder and community engagement program with an approach underpinned by the principles of honesty, respect, adaptability, consistency and consideration. The Proposed has:

- Worked closely with the Banana Shire Council from the outset of project development to inform project design, workforce accommodation plans, and to provide long-term housing benefits to the wider community, with Banana Shire Council a strong supporter of the Proposed Action, evidenced in a letter of support;
- Increased the duration of community drop-in sessions to all day events to provide people in the community with a greater opportunity to attend;

[1] Gross Regional Product values assume an economic output multiplier of 1.67 can be applied to direct spend values to estimate the indirect and induced economic impacts of the renewable energy project ("NSW Renewable Energy Zone: Economic Impact Assessment," – ARENA). The economic output multiplier of 1.67 means that for every $1 million invested in the project, the total economic output in the region is expected to increase by $1.67 million.
[2] Interest adjustments related to discounts have not been applied, i.e., these are nominal figures. It is assumed that all operational costs are indexed to inflation (CPI).

- Provided technical reports to the community, addressing queries and questions about potential impacts and management measures;
- Proactively engaged with directly impacted stakeholders on aerial mustering, workforce accommodation, noise, traffic and local procurement, to identify issues, opportunities and management measures;
- Engaged early with the Wulli Wulli people to guide project design and applied the avoidance principle to cultural heritage management. It is noted that the Cultural Heritage Management Plan for the Proposed Action has been completed;
- Received positive feedback from the community and a representative of the Federal Member of Parliament regarding their approach to community engagement;
- Provided $100,000 of social investment to grassroots community engagement, with an ongoing public commitment to $100,000 in community funds per year of development, and $500,000 per year during construction and lifetime operations.
- Established a complaints channel both via email and a toll-free number as a platform for the community to resolve issues. To date, no formal complaints have been received.

The community is largely supportive of the Proposed Action. Queries received from the community about the Proposed Action related to noise, visual amenity, local housing, biodiversity, cultural heritage, and traffic. These issues have been or will be addressed in relevant technical assessments and management plans. Several matters require ongoing stakeholder and community engagement including workforce accommodation, construction traffic, potential demands on council infrastructure, services and materials. Agreements are currently in development with key stakeholders regarding potential project impacts and benefits, including a memorandum of understanding (MOU) and infrastructure agreement with Banana Shire Council.

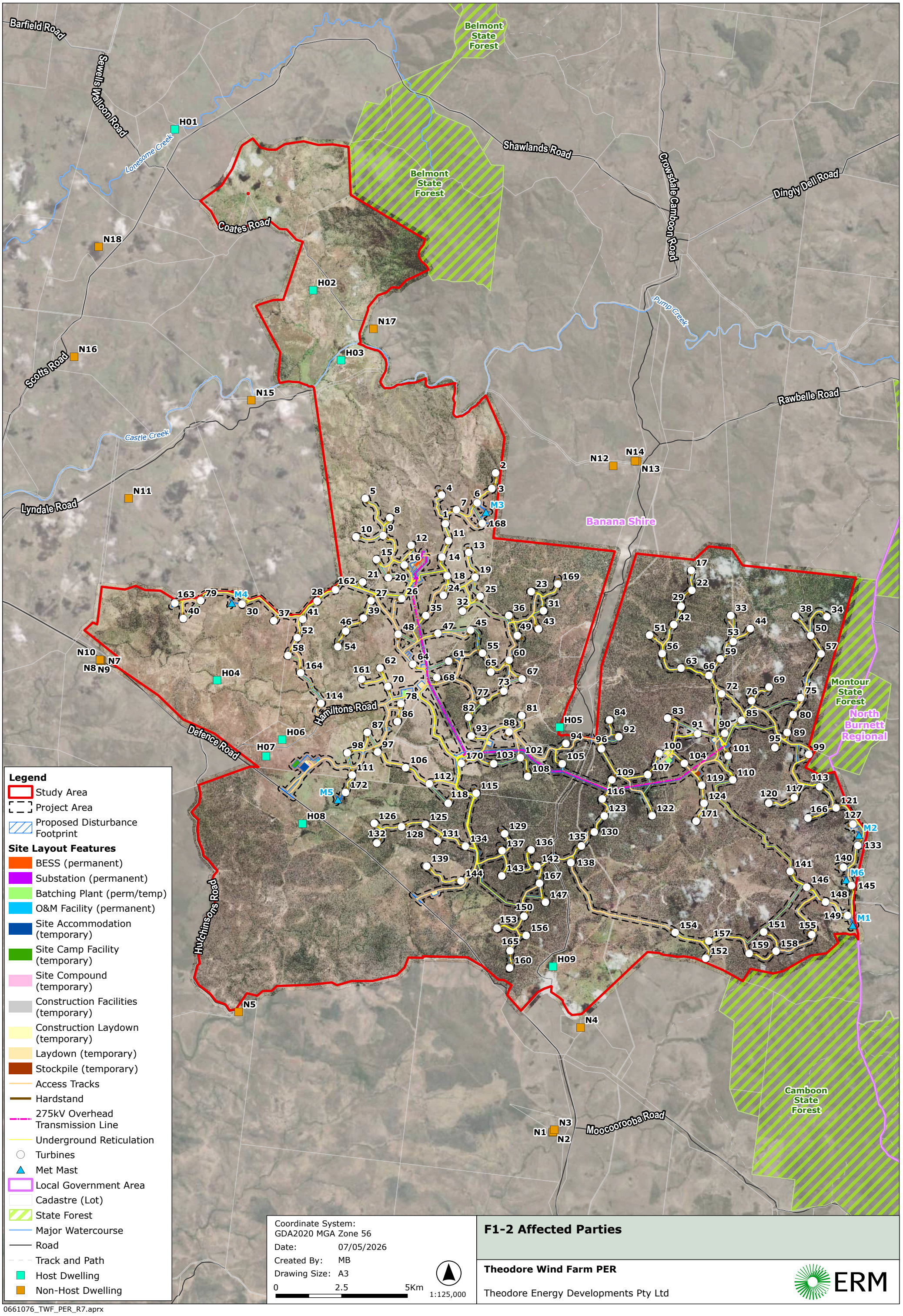
Further information on community engagement undertaken can be found in Appendix L.

1.9 AFFECTED PARTIES

The Study Area is made up of 9 lots owned by 3 landowners. Within the Study Area there are 9 host dwellings, as mapped on Figure 1-2.

There are 18 non-host dwellings located on lots adjacent to the Study Area, as mapped on Figure 1-2.

Details on consultation undertaken and outcomes of consultation are further described in Section 14.



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2. DESCRIPTION OF THE ACTION

2.1 PROPOSED ACTION

The Proposed Action is proposed to consist of up to 170 WTGs with the following associated infrastructure:

- WTG foundations and hardstand areas;
- Temporary infrastructure such as concrete batching plants, laydown areas, temporary construction offices and parking and on-site accommodation;
- Access tracks and electrical reticulation;
- Switching stations and substations;
- Battery Energy Storage System (BESS);
- Temporary and permanent meteorological masts; and
- Permanent operation and maintenance facilities, with a variety of associated facilities and storage laydowns.

The Project Area, which includes a 100 metre (m) buffer for micro-siting occupies an area of 6,737.4 ha. The Disturbance Footprint, area whereby the final layout and impacts have been considered, occupies 1,537.4 ha or 3.3% of the total Study Area.

The precise location of infrastructure within the Disturbance Footprint is described below in Table 2-1, WTG locations are on Table 2-2 and shown in Figure 2-1.

TABLE 2-1 PROPOSED ACTION COMPONENTS

Component	Description	Location
Wind Turbine Generators (WTG)	The Proposed Action will accommodate up to 170 WTGs with a blade tip reaching up to 270 m. The WTGs will be of the horizontal axis type, with a rotor consisting of 3 blades with a maximum rotor diameter of up to 175 m.	See Table 2-2 below.
Turbine Hardstand	The WTG hardstand area has been designed to minimie disturbance. Each WTG hardstand, will be approximately 2.67 ha in size. The hardstand areas also act as a bushfire setback for the ongoing operation of the WTG.	
Access and Infrastructure Corridors	Access corridors have been designed to utilise existing topography of the land, minimising the impact corridor to 40 m wide in most areas (including cleared areas for construction and infrastructure).	Mapped in Figure 2-1.
Temporary Infrastructure	The preliminary Disturbance Footprint includes 12 construction laydown areas, totalling 102 ha in size. The preliminary Disturbance Footprint includes 3 concrete batching plants, totalling 11.2 ha.	Mapped in Figure 2-1.
Electrical Connections and Substations	A 33kV underground reticulation will be installed to transfer the power from each WTG to a substation. Above-ground 275kV overhead transmission line supported by poles will transfer power from the substations to the BESS. There will be a total of 3 substations. The nominal size of the substations is approximately 1.5 ha each.	Mapped in Figure 2-1.

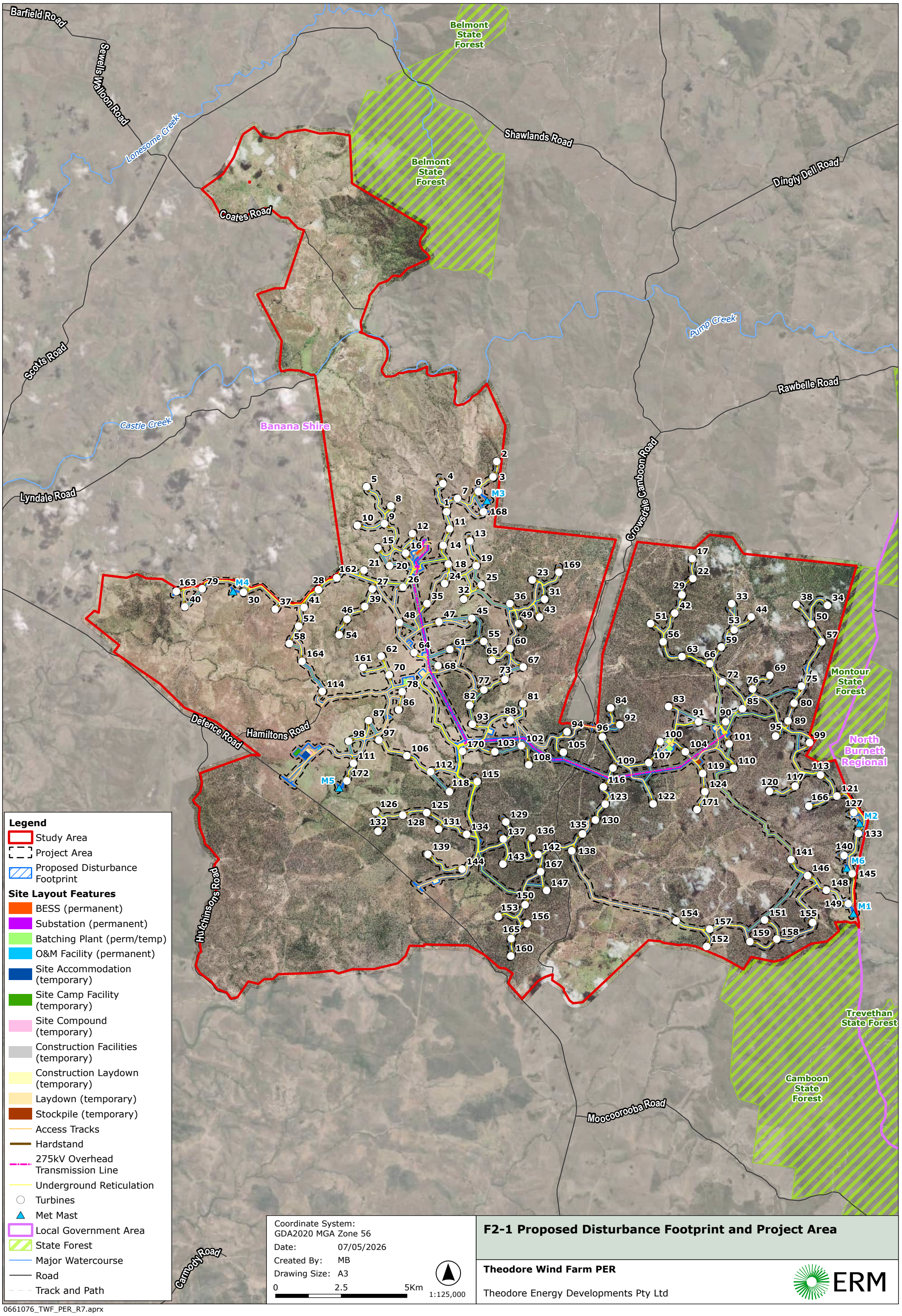
Component	Description	Location
Battery Energy Storage System	The BESS is located adjacent to a substation and laydown. The total area associated with the BESS is 3.2 ha in size with the adjacent laydown being 2.4 ha.	Mapped in Figure 2-1.
Meteorological Masts	Approximately 6 met masts are to be installed to monitor wind conditions for the operation of the Proposed Action. Proposed meteorological masts will be up to 200 m in height.	Mapped in Figure 2-1.
Central Operational and Maintenance Facility	The Proposed Action includes 2 operations and maintenance facilities, which are approximately 1.5 ha in total size.	Mapped in Figure 2-1.

TABLE 2-2 WTG LOCATIONS (GDA 94, MGA 56)

WTG ID	Easting	Northing	WTG ID	Easting	Northing
WTG 1	237000	7246091	**WTG 86**	239423	7238175
WTG 2	238910	7248019	**WTG 87**	249991	7238146
WTG 3	238766	7247426	**WTG 88**	247614	7238116
WTG 4	236860	7247174	**WTG 89**	246583	7238107
WTG 5	233957	7247054	**WTG 90**	243593	7237989
WTG 6	238207	7246878	**WTG 91**	237982	7238021
WTG 7	237418	7246613	**WTG 92**	241582	7237727
WTG 8	234884	7246325	**WTG 93**	249518	7237567
WTG 9	234632	7245646	**WTG 94**	242928	7237531
WTG 10	233604	7245590	**WTG 95**	234422	7237412
WTG 11	237120	7245448	**WTG 96**	233272	7237374
WTG 12	235697	7245268	**WTG 97**	250809	7237317
WTG 13	237888	7244991	**WTG 98**	245123	7237356
WTG 14	236872	7244824	**WTG 99**	247747	7237263
WTG 15	234378	7244726	**WTG 100**	239848	7237196
WTG 16	235444	7244523	**WTG 101**	238837	7236966
WTG 17	246345	7244317	**WTG 102**	246083	7236975
WTG 18	237065	7244113	**WTG 103**	241445	7236958
WTG 19	238129	7244052	**WTG 104**	235486	7236815
WTG 20	234830	7244043	**WTG 105**	244688	7236550
WTG 21	233857	7243876	**WTG 106**	240125	7236479
WTG 22	246368	7243560	**WTG 107**	243328	7236349

WTG ID	Easting	Northing	WTG ID	Easting	Northing
WTG 23	240261	7243510	**WTG 108**	247920	7236343
WTG 24	236926	7243370	**WTG 109**	233456	7236533
WTG 25	238324	7243323	**WTG 110**	236389	7236203
WTG 26	235345	7243239	**WTG 111**	251225	7236084
WTG 27	234176	7243161	**WTG 112**	232270	7239264
WTG 28	232125	7243141	**WTG 113**	238167	7235838
WTG 29	245953	7242944	**WTG 114**	242965	7235626
WTG 30	229273	7243037	**WTG 115**	250259	7235665
WTG 31	240728	7242777	**WTG 116**	237106	7235453
WTG 32	237649	7242770	**WTG 117**	246745	7236141
WTG 33	247844	7242604	**WTG 118**	249287	7235465
WTG 34	251496	7242544	**WTG 119**	251846	7235283
WTG 35	236255	7242605	**WTG 120**	244858	7234985
WTG 36	239410	7242604	**WTG 121**	243039	7234976
WTG 37	230479	7242398	**WTG 122**	246830	7235451
WTG 38	250305	7242578	**WTG 123**	236240	7234652
WTG 39	233889	7242498	**WTG 124**	234295	7234690
WTG 40	227041	7242484	**WTG 125**	252490	7234660
WTG 41	231579	7242459	**WTG 126**	235333	7234561
WTG 42	245681	7242247	**WTG 127**	239255	7234299
WTG 43	240539	7242093	**WTG 128**	242661	7234370
WTG 44	248589	7242105	**WTG 129**	236693	7234024
WTG 45	237963	7242047	**WTG 130**	234393	7233944
WTG 46	233213	7242008	**WTG 131**	252670	7233856
WTG 47	236713	7241918	**WTG 132**	237762	7233828
WTG 48	235205	7241884	**WTG 133**	242171	7233841
WTG 49	239734	7241844	**WTG 134**	240256	7233687
WTG 50	250883	7241836	**WTG 135**	239155	7233650
WTG 51	244761	7241849	**WTG 136**	241765	7233198
WTG 52	231369	7241752	**WTG 137**	236292	7233066
WTG 53	247939	7241608	**WTG 138**	252124	7233025
WTG 54	232915	7241413	**WTG 139**	250106	7232867
WTG 55	238411	7241167	**WTG 140**	240481	7233060

WTG ID	Easting	Northing	WTG ID	Easting	Northing
WTG 56	245239	7241153	**WTG 141**	239147	7232697
WTG 57	251276	7241148	**WTG 142**	237590	7232506
WTG 58	231016	7241081	**WTG 143**	252433	7232330
WTG 59	247447	7240951	**WTG 144**	250734	7232262
WTG 60	239419	7240903	**WTG 145**	240804	7231695
WTG 61	237122	7240864	**WTG 146**	251449	7231702
WTG 62	234514	7240601	**WTG 147**	252279	7231190
WTG 63	245957	7240595	**WTG 148**	239988	7231153
WTG 64	235762	7240745	**WTG 149**	249099	7230565
WTG 65	238729	7240452	**WTG 150**	246892	7229560
WTG 66	247013	7240318	**WTG 151**	238965	7230701
WTG 67	239916	7240189	**WTG 152**	245735	7230540
WTG 68	236673	7240242	**WTG 153**	250925	7230466
WTG 69	249299	7239881	**WTG 154**	240070	7230431
WTG 70	234816	7239898	**WTG 155**	247009	7230224
WTG 71	247497	7239626	**WTG 156**	249562	7229837
WTG 72	239220	7239723	**WTG 157**	248543	7229742
WTG 73	250502	7239469	**WTG 158**	239444	7229198
WTG 74	248641	7239358	**WTG 159**	233815	7240177
WTG 75	238421	7239326	**WTG 160**	232819	7243578
WTG 76	235312	7239249	**WTG 161**	226721	7243071
WTG 77	227701	7243168	**WTG 162**	231503	7240412
WTG 78	250220	7238825	**WTG 163**	239460	7229854
WTG 79	239904	7238799	**WTG 164**	250776	7234900
WTG 80	237877	7238735	**WTG 165**	240578	7232411
WTG 81	245442	7238693	**WTG 166**	238403	7246101
WTG 82	243242	7238636	**WTG 167**	241271	7243797
WTG 83	248254	7238609	**WTG 168**	237604	7236981
WTG 84	235172	7238566	**WTG 169**	246529	7234775
WTG 85	234031	7238155	**WTG 170**	233205	7235867



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2.1.1 WIND TURBINE GENERATORS (WTG)

The Proposed Action will accommodate WTGs with an upper blade tip of up to 270 m in height. The WTGs will be of the horizontal axis type, with a rotor consisting of 3 blades with a maximum rotor diameter of up to 175 m. The turbine specifications are summarised in Table 2-3.

TABLE 2-3 KEY GENERATION AND TURBINE SPECIFICATIONS

Feature	Statistic
Estimated generation capacity	1152 MW*
Turbine electrical output	Up to 8 MW
Number of WTG	Up to 170
Hub height**	Up to 169 m
Tip height**	Up to 250 m
Rotor radius**	Up to 81 m
Rotor Swept Area (RSA) height**	88 - 250 m
Number of blades	3
Chord width of blade	Up to 4.4 m
Average pitch angle of rotor	14.5°
Average rotation period of turbine	6.3 seconds

*The actual output of the wind farm will depend on the size and type of turbine chosen during the detailed design phase. Regardless of the size of the wind farm generation capacity, the Proposed Action will still need to comply with the Queensland Wind Farm State Code and supporting Planning Guidelines, particularly in relation to acoustic amenity and setback criteria.

**The specifications contained within the table are based on current, projected turbine size. Whilst they are an estimated maximum, changes in technology and constructability may result in larger turbines being installed

2.1.2 WTG FOUNDATIONS AND HARDSTAND FOUNDATIONS

Each WTG foundation will consist of a mass concrete footing or rock anchor foundation where suitable. WTG foundations may vary in size depending on the selected WTG, imposed loadings, ground conditions, construction methodology and the drainage design. The detailed design of the foundations will be undertaken prior to construction of the Proposed Action.

The final design will also consider the geotechnical conditions identified through detailed Study Area investigations. The ground surrounding the WTG will be finished, so it is tidy and usable for shared agricultural purposes. This may include mounding. At each WTG site, a hardstand area may be established for the laydown of key WTG equipment including the crane boom laydown and assembly area, nacelle, tower sections, blades, and other WTG components. The hardstand is the area used for the assembly, construction, and erection of the WTG. Each WTG foundation and hardstand area will be approximately 2.67 ha in size. Where suitable, just in time delivery and tower cranes may be utilised which may result in a smaller hardstand area. The smaller hardstand area is dependent on geotechnical studies and detailed engineering design including construction methodology review.

2.1.3 TEMPORARY INFRASTRUCTURE

The preliminary Disturbance Footprint includes 12 construction laydown areas, totally 102 ha in size. Temporary construction laydown areas are proposed for the storage of WTG components when initially delivered to the Study Area as well as other construction items, stockpiling of materials and temporary amenities. These temporary laydown areas are also intended to be used for concrete batching plants.

Additionally, a temporary construction camp is located in the south-west of the Study Area, adjacent to the site office and a laydown area, totalling 8.9 ha in size.

2.1.4 ACCESS AND UNDERGROUND CABLING AND OVERHEAD TRANSMISSION LINES

Up to 218 km of access roads will be required for the Proposed Action within the Study Area. Access tracks between the existing road network and the Proposed Action components will be established and or upgraded to allow access to the site for construction and operational traffic. Considerations in the establishment of these routes will include load requirements, turning radii, topography of the land, soils, watercourse crossings, vegetation clearing and potential colocation of wind farm infrastructure. The onsite access road layout will be designed to utilise existing tracks where appropriate and usage does not significantly impact on planned agricultural activities.

The proposed access/infrastructure corridors are at the minimum width achievable given the design maturity. This width is necessary to accommodate the access road, elements of the electrical collection system between the WTGs and where co-located, parts of the transmission system. Proposed access/infrastructure corridors will be further refined in the detailed design phase prior to construction.

The road formation will generally not exceed 12 m in width (table drain – table drain), with regular widening to accommodate passing bays. The area of the corridors outside the road formation may be cleared for the installation of reticulation/overhead lines. Access corridors will be their widest during the construction phase, and areas outside the final road formation will undergo progressive restoration of grass species post construction activities.

2.1.5 ELECTRICAL CONNECTIONS, SUBSTATIONS AND BATTERY ENERGY STORAGE SYSTEM

A 33kV underground reticulation will be installed to transfer the power from each WTG to the substations. Above-ground 275kV overhead transmission line supported by poles will transfer power to the BESS.

Currently 3 substations are proposed. The substations will include equipment necessary to collect the power flow from each WTG, increase the voltage and dispatch to the electricity grid. Hardware would include switches, breakers, transformers, meters, synchronous condensers (as needed), the earthing grid, and other electrical equipment. The nominal size of the substations is approximately 1.5 ha each. The voltage will be “stepped up” at the substations (up to 275kV).

A BESS for the storage of produced electricity will be installed at one location adjacent to a laydown and in proximity of a substation in the north-west of the Disturbance Footprint. The BESS has been designed to provide storage for export, system strength, and firming support. The area occupied by the BESS is 3.2 ha.

2.1.6 METEOROLOGICAL MASTS

Three met masts have been erected within the Study Area, for data collection purposes for Proposed Action feasibility. The installed meteorological masts are 160 m in height.

Approximately 6 met masts are to be installed to monitor wind conditions for the operation of the Proposed Action. Proposed meteorological masts will be up to 200 m in height. These met masts may be used to conduct power performance testing for the installed WTGs alongside the general monitoring of wind conditions.

2.1.7 CENTRAL OPERATIONAL AND MAINTENANCE FACILITIES

The Proposed Action includes 2 operations and maintenance facilities, which are approximately 1.5 ha in total size. The operational infrastructure for the Proposed Action will include management offices, workshops, storage, equipment laydown, and warehousing facilities.

2.2 PHASES OF DEVELOPMENT

A summary of the Proposed Action activities and associated durations are outlined in Table 2-4. Please note that this list is not exhaustive and other relevant activities will occur during these periods.

TABLE 2-4 PHASES OF DEVELOPMENT

Phase	Associated Activities	Duration
Design	The key activities associated with the design phase of the Project are: • Desktop review of key habitat and environmental areas on Study Area; • Disturbance Footprint mapping; • Ecological surveys to ground truth onsite vegetation and habitat; • Mapping of constraints applicable to the Study Area and Proposed Action; • Technical engineering to determine appropriate locations for infrastructure while avoiding, minimising and mitigating impact to high value ecological areas; • Ongoing consultation with relevant stakeholders; and • Obtained consent from land owners, Traditional Owners, government and transmission network services.	Ongoing, commenced in 2021, to be finalised in 2026
Construction	The key activities likely to impact ecological resources during construction are: • Vegetation clearing for new access tracks, temporary construction compounds and laydown areas, borrow pits, water storages, concrete batching plants, turbine pads, trenches for power and instrumentation cables, electrical substation and overhead powerlines, and associated earthworks; • Excavating trenches; • Blasting for turbine foundations (if required); and • Construction traffic movement and plant operations (rock crushing and concrete batching plant).	~36-60 months

Phase	Associated Activities	Duration
Commissioning and Post-construction rehabilitation	Testing, in line with Australian Energy Market Operator Standards. The intention of post-construction rehabilitation is to progressively stabilise areas of disturbance, making them resilient to erosion and weed infestation, and to re-establish appropriate vegetation cover. Rehabilitation of on-ground vegetation will be managed through an adaptive management to ensure rehabilitation acceptance criteria are met.	~24 months
Operations	Operational phase activities are anticipated to be of an indirect nature, of lower frequency, and smaller intensity, but will last the lifetime of the Proposed Action. Potential impacts during the operational phase include: • WTG operation; and • Routine maintenance and servicing of WTGs, access tracks, electrical installations and infrastructure as required.	Up to 35 years
Decommissioning	If a decision was taken to decommission the Proposed Action, this would involve: • Dismantling and removal of WTG; • Removal of electrical reticulation where not part of permanent network infrastructure; • Responsible disposal/recycling/reuse of infrastructure removed from the Study Area in according to the waste hierarchy; and • Rehabilitation of disturbed land in accordance with industry standard good practices at the time and where not required for ongoing grazing or agricultural uses. Underground cabling would be left in situ. Hardstand pads would be left in situ or deep ripped where rehabilitation is required. Turbine foundations may be left up to 500 mm below rehabilitated ground level as they do not present a risk to people or livestock. Excavations would be backfilled and rehabilitated. Access tracks could be retained on site for the continued benefit of the landholder, or they could be rehabilitated.	~5 years

2.2.1 DESIGN DETAILS

During the pre-approval design phase of the Proposed Action, key activities included undertaking technical assessments, and erecting meteorological masts to collect wind and weather data within the Study Area. The Proponent utilised the outcomes of the impact assessment and wind data to develop the Disturbance Footprint. Additionally, technical engineering and constructability assessments were undertaken to progress the Disturbance Footprint design.

As part of the development assessment process prior to receiving a Development Permit under the *Planning Act 2016*, further detailed design of the Disturbance Footprint was undertaken, with a focus on reducing areas of fragmentation. This resulted in removal of redundant infrastructure, and consolidation of impact areas with particular focus on the access tracks and electrical reticulation, specifically, the key changes included:

- Reduction from 4 substations to 3 substations;
- Consolidation of the Battery Energy Storage System (BESS) from being distributed amongst the site substations to a consolidated area within a largely cleared area.
- Reduction of electrical reticulation corridors:

  - Reduced total length of 275kV overhead line and associated corridors (achieved through the reduction in the number of substations);
  - Change of all identified 33kV overhead lines to underground designs;
  - 33kV corridors narrowed, where possible;
  - 33kV corridors co-located with track, where possible;
- Number and location of laydown areas have been further refined; and
- Earthworks and track detailed design have resulted in significant track alignment improvements.

Overall, these optimisations resulted in reducing the Disturbance Footprint by a further 344.4 ha.

Since the preparation of the draft PER, the Proponent has matured the Projects design from a 30% at the time of submission of the PER to 80% at the time of publishing the Final PER, an advanced level of design maturity for a project at this stage.

The optimisation of the layout has resulted in an overall reduction in the disturbance footprint of 54 ha, which includes a reduction in all MNES matters addressed in this PER.

To realise the impact minisation as part of this design package, there are some limited locations where the disturbance footprint is now outside the published micrositing corridor. Notably these are due to:

- An underground reticulation between WTG110 and WTG141, which allows for an ~8km reduction in the impacted area along eastern corridor.
- The movement of met masts which shifts the impact of this infrastructure to areas of lower impact.

These design optimisations are represented in Figure 2-2.

It is further acknowledged that during the post-approval design phase of the Proposed Action, the Proponent will undertake further design refinement and assessments in order to further solidify the Disturbance Footprint design which will occur within the micrositing corridor proposed as part of the Proposed Action.

2.2.2 CONSTRUCTION DETAILS

The detailed construction methodology will be delivered by the WTG supply and install contractors and the balance of plant contractors, in alliance with the Proponent. It is anticipated that the construction work (subject to geotechnical conditions) will include the following:

- Cut and fill earthworks (including excavating, hammering, ripping, crushing, material haulage, blasting, compacting, moisture conditioning, testing etc.);
- Erection of turbines (including component delivery, cranage, fitting of ancillary items);
- Cabling works (including trenching and laying of cables by various methods);
- Substation construction;
- Vegetation clearing (utilising appropriate methods);
- Construction of site compounds, camps and facilities; and
- Delivery of various Project components.

It is anticipated that an on-site borrow pit will be utilised to source much of the required construction material, where possible. The location of an on-site borrow pit will be located to avoid impacts to mapped MNES.

2.2.3 COMMISSIONING AND POST-CONSTRUCTION REHABILITATION DETAILS

Following the completion of construction, areas not required for ongoing operational disturbance will be rehabilitated and or regenerated in accordance with rehabilitation management practices established in Section 8 of the PER and where not required for ongoing grazing or agricultural practices. Post-construction will result in two types of rehabilitation:

- Type 1 – Natural regeneration measures restricted to low shrubbery and grass; and
- Type 2 – Revegetation reinstated of equivalent pre-construction vegetation without height restrictions.

Rehabilitation objectives have been developed with consideration for the existing condition, potential ongoing direct and indirect impacts, the need to maintain setbacks to reduce bushfire risk, and the need for disturbance for decommissioning. Where areas will need to be utilised for decommissioning and maintenance revegetation will be limited to low shrubbery and grass to avoid additional impacts due to habitat loss.

2.2.4 OPERATION DETAILS

The power output from an operational wind farm at any given time largely depends on the strength of the wind blowing across the site. During the operation of the Proposed Action, the WTGs will automatically start, stop and alter their output as determined by wind speed and other environmental, operational, maintenance, and electrical conditions.

It is anticipated that existing land management practices will be largely unaffected by the Proposed Action, with the participating properties continuing to be used for grazing and animal husbandry activities. To monitor and maintain the wind farm facility, a number of permanent operations and maintenance facilities will be established on site. This will include administrative areas, control buildings, workshops, warehousing, parts storage and ablution facilities, etc.

Over the course of the lifetime of the WTG, regular and unscheduled maintenance will occur. Occasionally this may include replacement/exchange of major components of the WTG including, gearboxes, generators, shafts, and blades. These works may require some form of crane to perform the maintenance.

2.2.5 END OF LIFE DECOMMISSIONING AND REHABILITATION

The WTGs have an expected operating life of up to 35 years, at the end of which there are three main options for consideration:

- Continue the use of the Study Area as a wind farm using the existing WTGs (subject to condition of equipment);
- Replace the WTGs with technology current at that time and continue the use of the Study Area as a wind farm for a further term; or
- Decommission the Proposed Action and remove the WTGs and ancillary infrastructure in accordance with a Decommissioning Plan prepared for the Proposed Action.

When decommissioning occurs:

- All above ground infrastructure not required for the ongoing agricultural use of the land, including the WTGs, substations, and operation and maintenance facilities will be removed and the land rehabilitated;
- Access tracks and hardstands not requested by the landowner to be retained will be removed and land rehabilitated and returned to agricultural use; and
- Below ground infrastructure, including cabling and the WTG foundations, will be left in situ to avoid further disturbance and minimise clearing of revegetated areas. Rehabilitated areas will be adequately graded to reflect the slope of the surrounding area and to mitigate the risk of soil erosion.

All materials removed from the Study Area will be sorted and packaged for reuse and/or recycled where possible in accordance with the waste hierarchy.

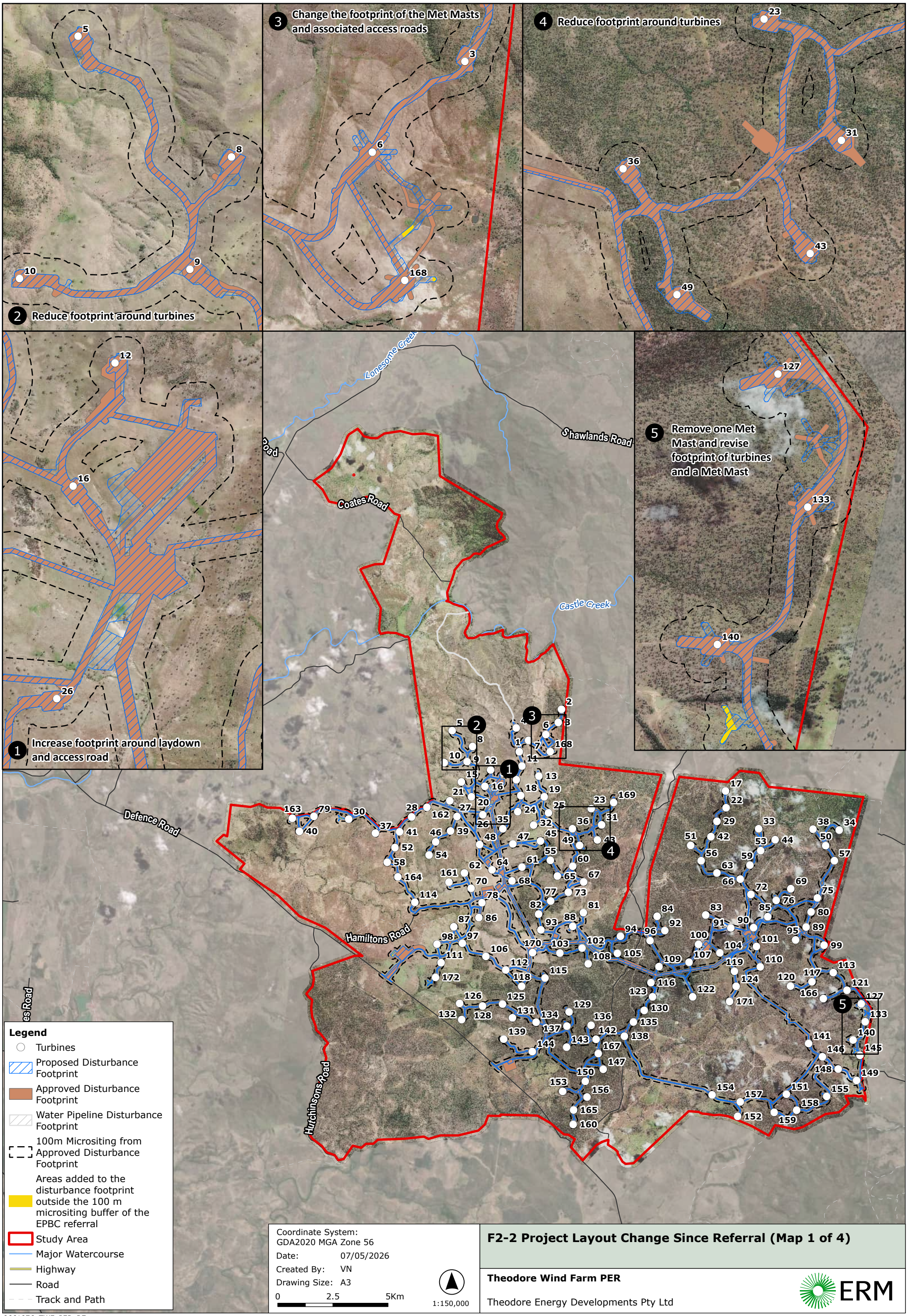
A Decommissioning and Rehabilitation Plan will be prepared for the Proposed Action no less than five years prior to decommissioning and / or in accordance with any Proposed Action approval requirements. It is anticipated that the decommissioning and rehabilitation phase may take up to five years to complete, with vegetation communities dominated by non-woody vegetation within the Study Area (identified in Section 8 of the PER) being returned to its pre-construction condition.

2.3 CHANGES SINCE REFERRAL

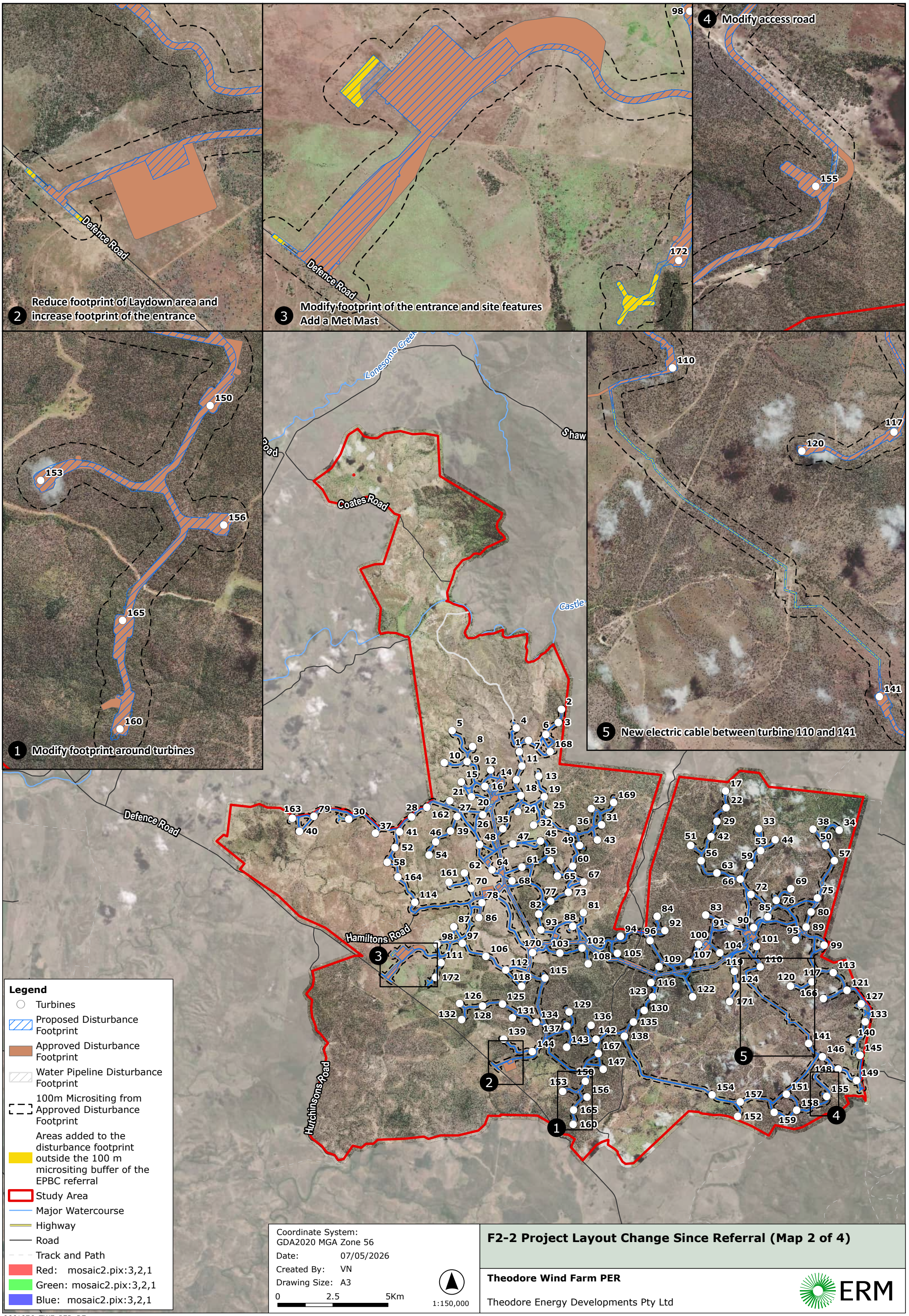
The Proponent is committed to refining the layout to reduce impacts to protected matters through the design phase, as such, since referral of the Proposed Action, changes to the Disturbance Footprint have been made. These changes represent the outcomes of further detailed design resulting in a reduction in the Disturbance Footprint by removing redundant infrastructure, and consolidating impact areas. Key changes include:

- Reduction from 4 substations to 3 substations;
- Consolidation of the BESS from being distributed amongst the substations to a consolidated areas within largely cleared area;
- Reduction of electrical reticulation corridors:
  - Reduced total length of 275 kV overhead line and associated corridors (achieved through the reduction in the number of substations);
  - Change of all identified 33kV overhead lines to underground lines;
  - 33kV corridors narrowed, where possible; and
  - 33kV corridors co-located with tracks, where possible;
- Number and location of layout areas have been further refined;
- Earthworks and track detailed design have resulted in significant track realignment improvements.
- The addition of an underground reticulation between WTG110 and WTG141, which allows for an ~8km reduction in the impacted area along eastern corridor and
- The movement of met masts which shifts the impact of this infrastructure to areas of lower impact.

Overall, the optimisations resulted in a reduction of the Disturbance Footprint of approximately 395.3 ha. The optimisation of the layout has resulted in a significant reduction in impacts to MNES values. These changes are represented in Figure 2-2.



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2 Reduce footprint of the infrastructure

3 Modify footprint of the infrastructure

4 Modify turbine and road crossing footprint

1 Modify access road

5 Modify access road and turbine footprint

Hamiltons Road

Crowsdale Camboon Road

Coates Road

Lonesome Creek

Defence Road

Hutchinsons Road

Legend

- Turbines
- Proposed Disturbance Footprint
- Approved Disturbance Footprint
- Water Pipeline Disturbance Footprint
- 100m Micrositing from Approved Disturbance Footprint
- Areas added to the disturbance footprint outside the 100 m micrositing buffer of the EPBC referral
- Study Area
- Major Watercourse
- Highway
- Road
- Track and Path
- Red: mosaic2.pix:3,2,1
- Green: mosaic2.pix:3,2,1
- Blue: mosaic2.pix:3,2,1

Coordinate System: GDA2020 MGA Zone 56
Date: 07/05/2026
Created By: VN
Drawing Size: A3
0 2.5 5Km
1:150,000

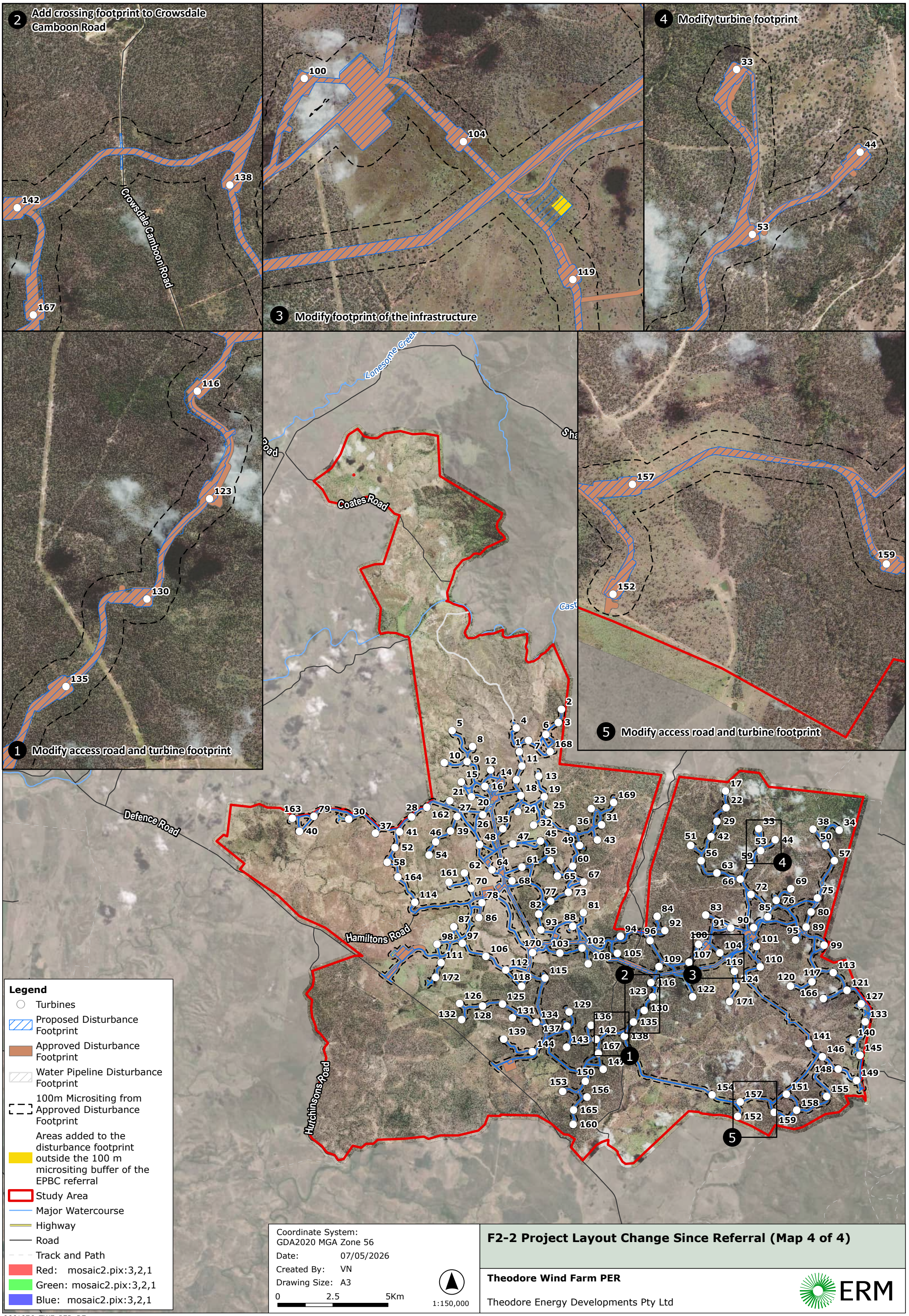
F2-2 Project Layout Change Since Referral (Map 3 of 4)

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3. FEASIBLE ALTERNATIVE

In addition to the Proposed Action assessed in detail in this PER, alternative Proposed Action concepts have been considered by the Proponent including:

- Draft Disturbance Footprint (up to 260 WTG and associated infrastructure);
- Final Disturbance Footprint (up to 170 WTG and associated infrastructure); and
- Take no action.

The following sections outline the design evolution of the Disturbance Footprint and consideration of impact minimisation in the final Disturbance Footprint. Additionally, the alternative of taking no action is explored.

3.1 DESIGN EVOLUTION AND IMPACT MINIMISATION

Since the conception of the Proposed Action, the design of the Disturbance Footprint has evolved with consideration of technical, environmental, social, and commercial constraints. This has included consideration of the outcomes of engagement with host landowners, non-host landowners, the community and local government.

Initial reviews determined that the Study Area has the maximum capacity to host up to 260 WTGs. A Draft Disturbance Footprint was designed to host up to 260 WTGs and associated infrastructure.

The design of the Disturbance Footprint was refined to be up to 170 WTGs to be compliant with export constraints and avoid sensitive ecological areas. Table 3-1 describes the extent of impact avoided by implementing the proposed Disturbance Footprint compared to the Draft Disturbance Footprint.

3.2 TAKING NO ACTION

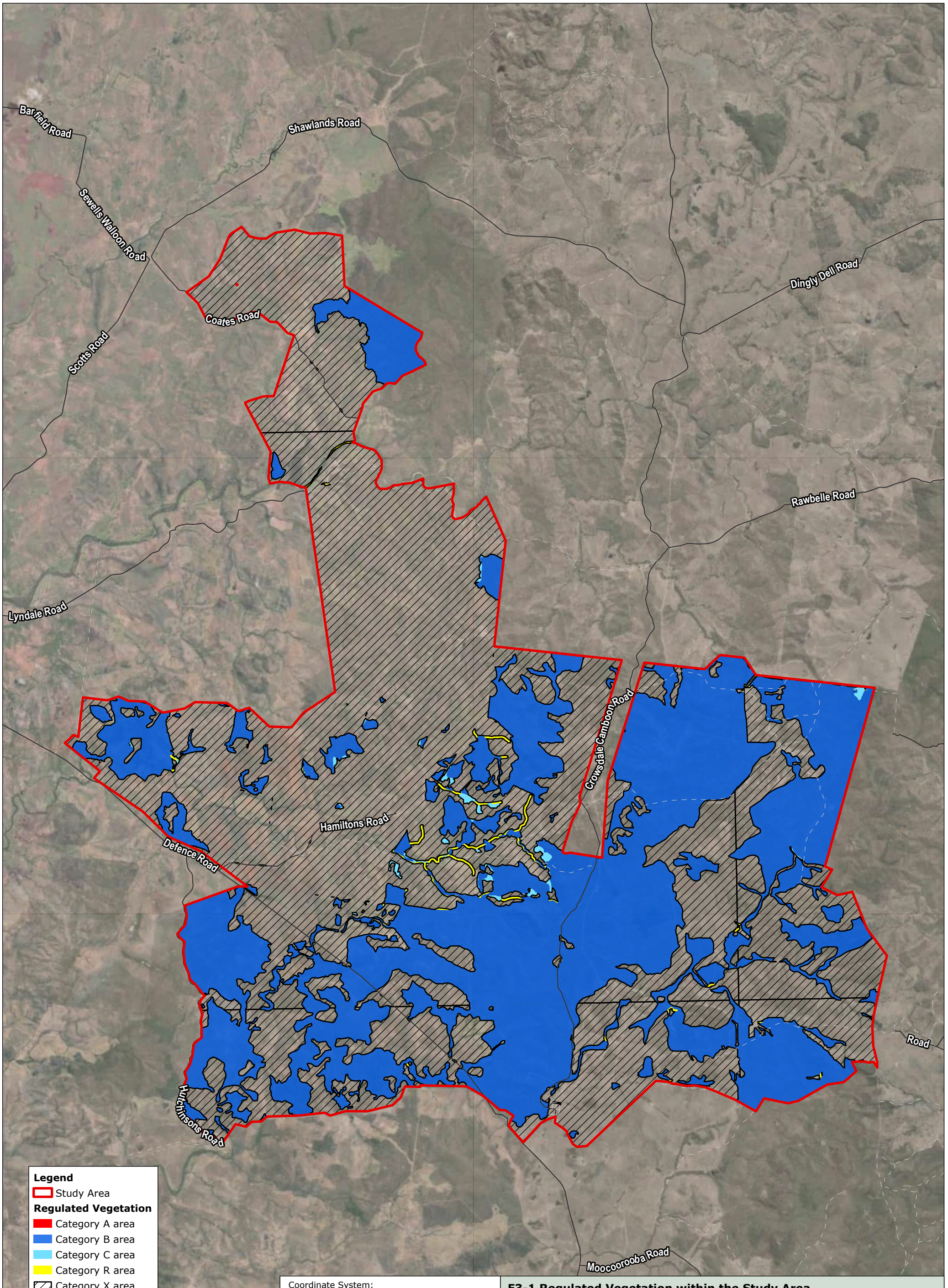
In the Proponents view, not proceeding with the Proposed Action is not a feasible alternative. This is in the context of the evidence showing that climate change is accelerating and its impacts are projected to become more severe and devastating across Australia. The energy sector is the largest contributor to emissions in Australia. Most of the emissions are from aging coal power generators, which are reaching end of their design life. In order to meet the Australian Governments targets and decarbonise the electricity sector the renewable sector will need to grow rapidly (Australian Government Department of Climate Change, Energy, the Environment and Water , 2023). The Proposed Action will support reaching renewable energy targets and decarbonisation efforts identified by both State and Federal Government.

Additionally, as discussed in Section 1.2, the Proposed Action has an estimated generation capacity of 1,152 MW, assisting Queensland Governments target of 70% renewable energy generation by 2032 and reducing the CO2 emissions from electricity generation sources. Additionally, the Proposed Action will increase the reliability of electricity generation by inclusion of storage infrastructure and a strong generation profile complementing solar generation.

Furthermore, if no action was taken, landholders have the right to clear areas mapped as Category X under Queensland State based Regulated Vegetation Mapping. As such, Table 3-1 provides a calculation of the area of Category X vegetation within mapped threatened species habitat. Figure 3-1 depicts State Mapped Regulated Vegetation within the Study Area.

TABLE 3-1 COMPARISON OF ALTERNATIVES

Threatened or migratory species		Draft Disturbance Footprint (up to 260 WTGs) (ha)	Referral Disturbance Footprint (up to 170 WTGs) (ha)	Draft PER Disturbance Footprint (up to 170 WTGs) (ha)	Final PER Disturbance Footprint (up to 170 WTGs) (ha)	Taking No Action (ha)
Poplar Box Threatened Ecological Community		7.7	6.4	1.2	1.0	4.4
Greater glider (southern and central)	Likely/Current Denning Habitat	46.1	27.7	19	19.8	231.2
	Potential Denning Habitat	7.6	3.1	0.8	1.1	135.7
	Foraging and Dispersal Habitat	785.7	810.3	623.9	607.3	5292.8
Koala	Preferred Foraging and Breeding Habitat	29.9	16.5	6.2	8.1	507.3
	General Foraging and Breeding Habitat	831.7	851.7	657.3	640.2	5563.9
	Dispersal Habitat	212.1	322.3	237.9	247.2	6204.5
Squatter Pigeon (southern)	Breeding Habitat	261.8	433.8	128.3	123.0	3,900.7
	Foraging and Dispersal Habitat	84	439.7	57.6	54.2	562.4



F3-1 Regulated Vegetation within the Study Area

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0661076_Rehab_R1\0661076_Rehab_3-1_R1

Base Data: QSpatial, 2024

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Theodore Wind Farm

Public Environment Report – Existing Environment (Section 4)

PREPARED FOR

Theodore Energy Development Pty Ltd

DATE
12 May 2026

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SIGNATURE PAGE

Theodore Wind Farm

Public Environment Report – Existing Environment (Section 4)

0661076



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ACRONYMS AND ABBREVIATIONS

Acronym	Description
ALA	Atlas of Living Australia
BACI	Before-After-Control-Impact
BUS	Bird Utilisation Survey
CRM	Collision Risk Model
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DESI	Department of Environment, Science and Innovation
DEWHA	Department of Environment, Water, Heritage and the Arts
Disturbance Footprint	The area whereby the final layout and impacts have been considered and occupies an area of 1,537.4 ha.
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
MHQA	Modified Habitat Quality Assessment
MNES	Matters of National Environmental Significance
NC Act	Queensland Nature Conservation Act 1992
PMST	Protected Matters Search Tool
Project Area	The corridor of land on which the Disturbance Footprint will be located, including a 100 metre buffer for micro-siting.
Proposed Action	Theodore Wind Farm
SATs	Spot Assessment Technique
SIG 1.1	Significant Impact Guidelines 1.1 - Matters of National Environmental Significance
State Code 23	Queensland State Code 23 - Wind farm developments
Study Area	The 9 land parcels, across 3 properties, and road reserve areas, 46,830 ha, in which the Proposed Action will be located.
TECs	Threatened Ecological Community
The Proponent	Theodore Energy Development Pty Ltd
WTG	Wind Turbine Generator

4. DESCRIPTION OF THE ENVIRONMENT

The Study Area is located within the Rural Zone of the Banana Shire Council Local Government Area. It has been historically used for agricultural purposes, predominantly cattle grazing (and associated homesteads) which remains the primary use. The Study Area consists of three working cattle properties which have influenced the land management practices, including historical land clearing with large patches of cleared land featuring no remnant vegetation. The surrounding landscapes within the locality (10 km) have similarly been influenced by historical land clearing and cattle grazing.

The Study Area lies within the Brigalow Belt bioregion as defined by the Interim Biogeographic Regionalization for Australia framework, within the Banana – Auburn Ranges subregion. The Brigalow Belt bioregion covers 365,281 km^2, approximately 21% of Queensland, from Townsville to the border of New South Wales. The general landform of the bioregion is dominated by ranges that fringe or divide three major catchments – Burdekin and Fitzroy in the north and Condamine – Warrego in the south (DES, 2018).

4.1 CLIMATE

Climatically, the bioregion lies in the 500 – 700 mm annual rainfall belt and encompasses a gradient from eastern mesic and western xeric environments. In the west, there is a general increase in rainfall variability, annual evaporation and the incidence of drought, and decrease in total rainfall (DES, 2018), evidenced through weather data from the closest Bureau of Meteorology weather station to the Study Area, being the Thangool weather station (039089), located approximately 50 km north-east of the Study Area. A summary of climate statistics for this station is provided in Table 4-1.

TABLE 4-1 CLIMATE SUMMARY FOR THANGOOL WEATHER STATION (BUREAU OF METEROLOGY , 2024)

Statistic	Average (between 1992 and 2024)
Annual maximum temperature (°C)	29.2
Annual minimum temperature (°C)	13.3
Annual rainfall (mm)	655.2

4.2 SOILS

A review of the Atlas of Australia Soils identified eight soil types within the Study Area:

- Firm shallow siliceous loams (Fz10) – uniform medium, below A1 horizon coherent and non calc of value/chroma=2/3;
- Black self-mulching cracking clays (Kb20, Kb17) – uniform fine cracking, smooth faced peds, dark clay horizon underlain by weathered rock before 1.5 m;
- Hard pedal mottled-yellow duplex soils (Ub70) – duplex yellow-grey, hard setting A horizon, A2 horizon conspic bleached, neut pedal mottled B horizon;
- Hard pedal red duplex soils (Qa7) – duplex red, hard setting A horizon, no A2 horizon, neut pedal whole col B horizon;

- Siliceous sands (Bz6) – uniform coarse, non calc weakly coherent below A1 horizon of value/chrome = 2/3;
- Black smooth-ped earths (Mm11) – gradational black, no A2 horizon, alk smooth-ped whole col B horizon;
- Bleached sands (Cd11) – uniform coarse, non calc, A2 horizon conspic bleached with non calc pan below A2 horizon; and
- Hilly to mountainous terrain (LK13).

4.3 TOPOGRAPHY

The Study Area is topographically characterised by rolling hills and flat plains. Across the Study Area the landscape features vary in geology, from torsdale volcanic mixed with camboon volcanics, to rocky outcrops of large boulders, open flat areas on tops of ridges, and sedimentary stratigraphy on the western extent of the Study Area.

4.4 WATERWAYS

The Study Area is located in the Fitzroy catchment, with the most notable of the waterways within the proposed Study Area being Castle Creek, classified as Stream Order 5 under the Strahler system of stream order. Castle Creek intersects the Study Area in the north. Other notable waterways include Oxtrack Creek, a Stream Order 4 waterway in the south of the Project, and several Stream Order 3 waterways situated throughout the Study Area (Boam Creek, South Creek, Keen Creek, and Six Mile Creek). Several other ephemeral Stream Order 1 and 2 tributaries of Castle Creek (and other surrounding waterways) flow through the Study Area. Based on the topography and the Strahler system of stream order, Castle Creek flows east to west where it joins the nearby Dawson River approximately 30 km west of the Study Area just south of the township of Theodore.

4.5 PROTECTED AREAS

No protected areas occur within the boundary of the Study Area, however, the following State Forests are located within the locality (10 km):

- The Belmont State Forest is located on the northern boundary of the Study Area and has an area of approximately 8,550 ha;
- The Montour State Forest is located to the eastern boundary of the Study Area and has an area of approximately 4,222 ha;
- The Camboon State Forest is located on the southern boundary of the Study Area and has an area of approximately 11,874 ha; and
- The Trevethan State Forest is located approximately 3 km south of the Study Area and has an approximate area of 3,618 ha.

4.6 ECOLOGICAL CONDITION

The ecological condition of the Study Area is majorly influenced by historical land clearing and cattle grazing, with large patches of cleared land featuring no remnant vegetation occurring throughout. This is the most prominent in the centre and north of the Study Area, though some large swathes of cleared land also occur in the southeast of the Study Area. These areas have current grazing leases.

The Study Area is broadly connected to the surrounding landscapes and vegetation by a regional terrestrial corridor, which is situated in a north to south alignment throughout the Study Area.

Terrestrial corridors are mapped by the Queensland Government where there are large areas of remnant vegetation and maintain ecological and evolutionary processes at a landscape scale. The combined area of Belmont State Forest and Camboon State Forest provides an important terrestrial corridor within the regional landscape. The Biodiversity Planning Assessment undertaken for the Brigalow Belt Bioregion (Version 2.1 released on 6 March 2018) identifies terrestrial and riparian corridors in more detail. It identifies the function of a regional terrestrial corridor is to maintain long term evolutionary/genetic processes that allow change in distributions and connectivity, maintain landscape/ecosystem processes to allow for responses to climate change, maintain migration and movement of fauna, and maximise connectivity between large tracts/patches of remnant vegetation. The corridor mapped over the Study Area is associated with the Banana Range running north to south from Mt Benn to Trevethan State Forest (DES, 2018).

Riparian corridors are vegetated areas along major watercourses and maintain and encourage connectivity of riparian and associated ecosystems. Four regional riparian corridors intersect the Study Area associated with Oxtrack Creek, Keen Creek, Castle Creek and Boam Creek. Regional riparian corridors in the Brigalow Belt bioregion were identified by the Biodiversity Planning Assessment as areas associated with Stream Order 3 and 4 watercourses. Riparian corridors function is to provide migratory and dispersal pathways and contain important habitat resources as well as refugia during periods of drought (DES, 2018).

4.7 BROAD HABITAT TYPES WITHIN THE STUDY AREA

The Study Area has been classified into six broad habitat types (BHT), defined based on vegetation community type and structure. These habitat types have been considered as respective foraging, breeding, roosting, denning, dispersal and movement functions for listed threatened and/or migratory species that are known, likely or have the potential to occur within the Study Area. Ground-truthed habitat mapping, based on the findings of the 10 field investigations between October 2022 and February 2026, has been informed by these six habitat types, and subsequently used to identify areas of habitat for listed threatened species.

The habitats in the Study Area are generally in a moderate to low condition, with signs of degradation and fragmentation due to cattle grazing, dieback, erosion, and the presence of introduced flora species. Where there are areas of higher quality habitat in a remnant condition, these are in discrete patches and sections of the Study Area. The dominant BHT across the Study Area is grassland and cultivated agricultural land, accounting for almost half of the Study Area. A summary of these habitat types, along with their vegetation community classifications and attributes, are provided in Table 4-2 and presented in Figure 4-1.

TABLE 4-2 BROAD HABITAT TYPES

Habitat Type and Occurrence in Study Area[1]	Structure	Habitat Features / Condition	Photographic Example
Grasslands and cultivated agricultural land including cultivated alluvial plains, and grassland with occasional presence of *Eucalyptus sp.*, often in the form of small regrowth patches or small clusters of mature paddock trees. Indicative habitat available: 22,684.9 ha*	**Tree layer:** Sparse eucalyptus paddock trees, dead stags sporadic throughout. Minimal habitat values. **Shrub layer:** Sparse to absent. Mainly *Acacia* sp. **Ground microhabitat layer:** Native and exotic grasses. Suitable cover and habitat for ground foraging species such as squatter pigeon.	This BHT is often found linking denser eucalypt woodlands to riparian habitats. There is limited habitat value present due to the lack of dense vegetation. Longer native and non-native grass species can be used for sheltering and dispersal by smaller mammal species. Very limited to low necessary microhabitat features for reptiles.	

Habitat Type and Occurrence in Study Area[1]	Structure	Habitat Features / Condition	Photographic Example
Waterbodies and drainage features located throughout Study Area. These were mainly farm dams which were found in conjunction with cleared agricultural land and creeks. Indicative habitat available: 56 ha*	**Tree layer:** *Eucalyptus* sp. and or *Melaleuca* sp. **Shrub layer:** sparse often weedy. Presence of Acacia spp. **Ground microhabitat layer:** Native and exotic grassland	The farm dams are generally in a poor condition due to being eroded from heavy cattle use. These farm dams provide a refuge for a range of bird species, including birds of prey. Drainage features in the Study Area including rivers, creeks, and adjacent remnant vegetation provide value for a range of species of birds, mammals and reptiles.	
Riparian woodland and open forest dominated by Eucalyptus populnea, E. tereticornis often associated with stream channels. Associated commonly with C. tessellaris +/- E. camaldulensis. Indicative habitat available: 1,726 ha*	**Tree layer:** Eucalyptus tereticornis, E. camaldulensis, and Melaleuca bracteata **Shrub layer:** *Melaleuca* and *Acacia sp.* usually sparse. **Ground microhabitat layer:** Native and exotic grasses and sedge tufts, minimal habitat value. Woody debris often present along active parts of creek beds such as depositions/ meanders which provide habitat for smaller mammals and reptiles.	This habitat was generally of moderate to poor condition due to presence of weedy species of grasses and shrubs such as L*antana camara* and erosion caused by cattle, high grazing pressures.	

Habitat Type and Occurrence in Study Area[1]	Structure	Habitat Features / Condition	Photographic Example
Vine Forest/Thickets and Dry Rainforest Including *Brachychiton sp. +/-Flindersia sp.* Indicative habitat available: 277.4 ha*	**Tree layer:** Brachychiton sp. +/-Flindersia sp. **Shrub layer:** Commonly vine thicket species such as Wilga (*Geijera parviflora*) and *Eremophila* sp. **Ground microhabitat layer:** Native and exotic grasses. Suitable cover and habitat for ground foraging species such as squatter pigeon.	Trees present may provide habitat for birds and mammals. However, these areas are quite isolated and degraded. Woody debris generally absent. The ground layer largely consists of natives such as *Aristida* sp. (wire grass), *Heteropogon* sp. grass), and *Bothriochloa decipiens.*	
Eucalypt woodland and open forest dominated by E. crebra with a grassy understorey +/- Eucalyptus populnea +/- C. tessellaris +/- E. tereticornis +/- C. erythrophloia +/- E. melanophloia +/- C. citriodora. Indicative habitat available: 21,768.5 ha*	**Tree layer:** dominated by E. crebra, E. populnea +/- C. tessellaris +/- E. tereticornis +/- C. erythrophloia +/- E. melanophloia +/- C. citriodora. **Shrub layer:** sparse often weedy. Presence of Acacia spp. **Ground microhabitat layer:** Native and exotic grasses. Suitable cover and habitat for ground foraging species such as squatter pigeon.	The trees present may provide habitat for birds and mammals. However, habitat for arboreal mammals is likely to be sparse due to the limited amount of hollow bearing and mature trees observed within the Study Area. The ground layer largely consists of natives such as *Aristida* sp. (wire grass), *Heteropogon* sp. grass), and *Bothriochloa decipiens.*	

Habitat Type and Occurrence in Study Area[1]	Structure	Habitat Features / Condition	Photographic Example
Brigalow woodlands- dominated by Acacia harpophylla +/- Casuarina sp. Indicative habitat available: 277.4 ha*	**Tree layer:** *Acacia harpophylla* dominant. **Shrub layer:** Sparse cover which can include species such as Wilga (*Geijera parviflora*) and *Acacia* sp. **Ground microhabitat layer:** Sparse grasses, saltbush and woody debris. Occasionally cracking clay soils creating gilgai.	Habitat is suitable for some threatened species such as *Denisonia maculata*, where cracking clay depressions are readily available and there is a moderate presence of woody debris. Also potential habitat for *Solanum* sp., as well as *Xerothamnella* sp. where water pools. Often observed as heavily grazed in pure stands on alluvial soils. Condition varies depending on grazing pressure and access to cattle as well as presence of weedy vegetation.	

*Due to the projection of spatial data, the areas (ha) listed as indicative habitat available for each Broad Habitat Type do not equate to the same total area indicated for the Study Area (46,830 ha).

Camboon State Forest

Legend

- Study Area
- Project Area
- Proposed Disturbance Footprint

Broad Habitat Type

- Brigalow woodlands- dominated by Acacia harpophylla +/- Casuarina spp.
- Eucalypt woodland and open forest dominated by Eucalyptus crebra with a grassy understorey +/- E. populnea +/- C. tessellaris +/- E. tereticornis +/- C. erythrophloia +/- E. melanophloia +/- C. citriodora.
- Grasslands and Cleared Areas
- Riparian woodland and open forest dominated by Eucalyptus tereticornis often associated with stream channels
- Semi-evergreen vine thicket forests
- Waterbodies and drainage features located throughout Study Area

Coordinate System: GDA2020 MGA Zone 56
Date: 07/05/2026
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F4-1 Broad Habitat Types

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4.8 ECOLOGICAL INVESTIGATIONS

4.8.1 OVERVIEW

This section outlines the methods implemented to identify Matters of National Ecological Significance (MNES) in the Study Area. The methods include a desktop review to identify ecological values that may be present, which informed the design of field surveys and the sampling program to collect field data. Ten field investigations were undertaken across the Study Area between October 2022 and February 2026. Field data was used to describe on-ground conditions and to assess the known, likely, and potential occurrence of MNES, and their habitat, within the Study Area.

4.8.2 EXPERT CONSULTATION

Supervision, guidance, and technical review has been undertaken by Dr David Dique, a lead partner at ERM with 30 years of ecology experience, for each field survey investigation. David has led the design of all field surveys. Over the last 20 years, David has become recognised as a specialist in koala ecology research, conservation, and mapping planning. David completed his PhD on koalas in South-east Queensland in 2004, and since has played key roles on expert panels for State and Federal Governments in koala management policy development. This includes developing the Queensland koala habitat mapping, participating as an invited expert on a panel for the review of the status of the koala in Australia and contributing as an invited expert for the development of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) koala referral guidelines.

Oversight, guidance, and technical review has been undertaken by ERM Principal Ecologist Matt Davis, a 20 year experienced ecologist who has experience in both flora and fauna assessments.

Threatened fauna surveys were led by Adam Pavitt, a senior ERM ecologist with 10 years' experience. Vegetation assessments, including ground truthing and mapping of Threatened Ecological Communities (TECs), were led by Timothy Callaghan, also a senior ERM ecologist, with 10 years' experience specialising in botany and vegetation. The extended field team supporting these senior ecologists included a range of suitably qualified ecologists and botanists who were able to gather and analyse the results of the field surveys.

The bat surveys were undertaken with the use of ultrasonic detectors (i.e. Anabats) and as such, an expert with the ability to understand the frequency of bat calls was consulted to analyse these results. This was done by expert Kelly Mathews, who is the Director of Green Tape Solutions and is a Certified Environmental Practitioner. Kelly has over 16 years' experience in ecology including the reporting and interpretation of bat detector results.

A peer review of the approach performed for the Collision Risk Model (CRM) for the Proposed Action has been undertaken by Peter Wright, Principal Ecologist in ERM Scotland. Given his extensive experience with CRM for onshore wind farm projects in the northern hemisphere no further consultation with experts/field specialists was required.

4.8.3 DESKTOP REVIEW

Databases and other desktop sources reviewed included State, Commonwealth and other publicly available information sources (Table 4-3). A search encompassing the Study Area and a 10 km buffer (the Locality) was utilised for database searches.

Queensland Department of Environment, Science and Innovation (DESI) WildNet searches were produced using a central point with a buffer used to ensure searches captured WildNet database records with 10km of the Study Area at a minimum. As a result, some records captured in the search may be further than 10 km from the Study Area boundary, in particular to the east and west.

Department of Climate Change, Energy, the Environment and Water (DCCEEW) Protected Matters Search Tool (PMST) and WildNet search results were cross-referenced with Atlas of Living Australia (ALA) to further interrogate records of MNES for recency and distribution within the Locality. Search results for PMST and WildNet are presented in Appendix B.

Results of the desktop review were used to produce a preliminary likelihood of occurrence analysis for significant species, as detailed in Section 4.8.4 of this Report. Preliminary likelihood of occurrence analysis informed the methods and survey locations for targeted listed threatened species surveys. This preliminary likelihood of occurrence was then refined to produce a final likelihood of occurrence (Appendix C) informed by field survey data, based on ground-truthed habitat characteristics in the Study Area.

TABLE 4-3 DATABASES REVIEWED FOR DESKTOP ANALYSIS

Information Source	Name	Data Description
Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Protected Matters Search Tool (PMST) The PMST report for this PER was generated on 26 August 2024	The search tool provides predictive results of matters of national environmental significance based on mapping of known and potential species distribution, habitat, ecological communities and wetlands. The outputs are based on modelling results and do not necessarily reflect known records of species or communities. The features highlighted by the search are considered further through a likelihood of occurrence assessment (Appendix C). The PMST is available as Appendix B. Search area: Study Area Boundary .shp file (with a 10 km buffer, referred to as the Locality, around this area drawn in the PMST interactive search map).
Department of Resources (DoR)	Regional Ecosystem Version 13 mapping	This product maps remnant and regrowth vegetation communities across Queensland and identifies communities listed as Endangered, Of Concern or Least Concern status as defined by the QLD Vegetation Management Act 1999.
DoR	Property Maps of Assessable Vegetation mapping (published 4 May 2017)	This product provides certified property scale maps indicating where landholders can clear regrowth in 'Category X' areas without further approval.
Queensland Government	MSES version 4.1 mapping	This product maps areas of MSES as defined under the QLD State Planning Policy.
DoR	Queensland Globe	A Queensland Government based product that allows viewing of spatial data and imagery covering Queensland.

Information Source	Name	Data Description
Department of Environment, Science and Innovation (DESI)	WildNet records – Through Environmental Reports Online The WildNet report for this PER was generated on 26 August 2024	A database that contains records of wildlife sightings including threatened flora and fauna species (protected under the NC Act) that have been provided to the agency by Government departments and external organizations. Search area: all Lots within the Study Area
Atlas of Living Australia website at http://www.ala.org.au.	Atlas of Living Australia (ALA) Atlas of Living Australia occurrence download. Accessed 26 August 2024	Australia national biodiversity database (supported by the National Collaborative Research Infrastructure Strategy, CSIRO). Database contains records accessed through an interactive spatial portal. Threatened species are searched to identify known records in proximity to the Study Area.
DCCEEW	Species Profile and Threats Database (SPRAT)	The SPRAT profiles and associated conservation advice documents were consulted as they provide detailed information for the likelihood of occurrence assessment on: • Species distribution; and • Species habitat preferred and general. • • The conservation advice documents are particularly important for assessing TECs found in field surveys, against the listed TEC guidelines.

4.8.4 LIKELIHOOD OF OCCURRENCE

As outlined above, a preliminary likelihood of occurrence assessment was refined using site-specific and species-specific habitat information obtained from field surveys and observations from senior field ecologists to produce a final likelihood of occurrence (Appendix C).

The assessment ranks the likelihood of the species occurring within the Study Area through analysis of species distribution information and the presence of specific habitat attributes as identified through the desktop analysis and field survey. The criteria are outlined in Table 4-4.

The *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* (SIG 1.1) (DoE, 2013) provides overarching guidance on determining whether an action is likely to have a significant impact on MNES, and refers to 'habitat critical to the survival of a species' and 'important habitat' (see Section 4.8.6.1). This approach has been adopted for the likelihood of occurrence, with consideration of the *Queensland Method for Mapping Matters of state environmental significance* (DES, 2020) which defines habitat for threatened species as preferred and general habitat.

Preferred habitat is defined as areas or locations which have the potential to provide necessary resources needed for the maintenance of a population. This includes the presence of desired habitat features for a species whereby activities such as breeding, nesting, and foraging contribute to the maintenance of the population. Preferred habitat can also include habitat critical to the survival of the species, whether denoted by the relevant species guidelines (such as conservation advice, recovery plans or scientific literature), or by the definition provided by SIG 1.1, and may support elements such as species dispersal requirements.

General habitat is defined as areas or locations which have the potential to host a species for a limited amount of time or to support an ecological function (such as dispersal) that is not restricted to that area. General habitat may be considered suitable for a species, but not preferred, where there are some desired features present but not all. Areas within general habitat may not maintain a population, may have poor connectivity to known preferred habitat, or may be known to be disturbed.

Habitat and distribution information for MNES is sourced from Species Profile and Threats Database profiles and/or Conservation Advice where available, supplemented by other primary sources (e.g. published literature). In regard to species records, these were sourced from WildNet and/or ALA. Where species presence cannot be discounted, they are categorized as potentially occurring.

All records of species identified within the Study Area or Locality were noted in the likelihood of occurrence assessment. For defining recent records of threatened species within the Locality, only those that have been recorded in databases searches within the previous 20 years have been considered.

TABLE 4-4 LIKELIHOOD OF OCCURRENCE CRITERIA

	Preferred habitat exists	**General habitat exists[1]**	**Habitat does not exist[2]**
Records within the Study Area (based field investigations)	Known	Known	Known
Recent[3] records in the Locality[4]	Likely	Potential	Unlikely
No records in the Locality, but the Study Area is within the known distribution	Potential	Potential	Unlikely
No records in the Locality, and the Study Area is outside of the known distribution	Unlikely	Unlikely	Unlikely

1. *Habitat may be considered general, but not preferred because: some desired habitat features may be present, but not all; habitat may have poor connectivity; or habitat may be known to be disturbed.*
2. *Based on sources reviewed and/or field survey results.*
3. *'Recent' means records within the previous 20 years.*
4. *'Locality' refers to a 10 km radius centred on the Study Area.*

4.8.5 ECOLOGICAL SURVEYS

This section summarises the survey guidelines and methodology utilised during field investigations for the Proposed Action.

4.8.5.1 SURVEY GUIDELINES

Table 4-5 provides an overview of relevant State and Commonwealth adopted survey guideline documents that were consulted to inform the field survey program.

TABLE 4-5 SURVEY GUIDELINES RELEVANT TO FIELD INVESTIGATION

Guideline Level and Source	Guideline and Reference
Commonwealth Guidelines	
Department of Climate Change, Energy, the Environment and Water (DCCEEW), May 2024	• Onshore Wind Farm Guidance - Best practice approaches when seeking approval under Australia's national environment law (draft for consultation)
Department of Sustainability, Environment, Water, Population and Communities (DSEWPC), 2011	• Survey guidelines for Australia's threatened mammals
Department of Environment, Water, Heritage and the Arts (DEWHA), 2017	• Survey guidelines for Australia's threatened birds
Department of the Environment (DoE), 2015	• Draft referral guidelines for 14 birds listed as migratory species under the EPBC Act
DSEWPC, 2011	• Survey guidelines for Australia's threatened reptiles
DSEWPC, 2011	• Draft referral guidelines for nationally listed Brigalow Belt reptiles
DEWHA, 2010	• Survey guidelines for Australia's threatened bats
DEWHA, 2017	Survey Guidelines for Australia's Threatened Birds: Guidelines for detecting birds listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999
Department of Environment and Energy (DoEE), 2017	• Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species
DoE, 2014	• EPBC Act Referral Guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)
Youngentob et.al., 2021	• A review of koala habitat assessment criteria and methods (Commonwealth Information Sheet)
State Guidelines	
DES, 2018	• Terrestrial Vertebrate Fauna Survey Guidelines for Queensland
DES, 2020	• Flora Survey Guidelines - Protected Plants under the NC Act
Eyre et al., 2022	• Guide to greater glider habitat in Queensland - report prepared for the Department of Agriculture, Water and the Environment, Canberra

4.8.5.2 SURVEY SUMMARY AND TECHNIQUES

Ten field investigations have been undertaken across the Study Area between October 2022 and February 2026. Field survey timing, techniques and survey effort are summarized in Table 4-6. The locations of survey effort undertaken during these events are presented in Figure 4-2. Field investigation techniques undertaken across the Study Area were based on an assessment of target species considered to potentially occur in the Study Area from the preliminary likelihood of occurrence. Field survey plans were developed to meet required effort and seasonality requirements as defined in relevant State and Commonwealth guidelines (see Section 4.8.5.1).

A summary of the survey effort is provided in Figure 4-2 and a description of survey techniques is detailed in the Sections below.

Legend

- Study Area
- Project Area
- Proposed Disturbance Footprint
- Road
- Track and Path
- BioCondition Transects
- Flora Transect Point
- Habitat Quality Assessment
- Quaternary Assessment

Broad Habitat Type

- Brigalow woodlands- dominated by Acacia harpophylla +/- Casuarina spp.
- Eucalypt woodland and open forest dominated by Eucalyptus crebra with a grassy understorey +/- E. populnea +/- C. tessellaris +/- E. tereticornis +/- C. erythrophloia +/- E. melanophloia +/- C. citriodora.
- Grasslands and Cleared Areas
- Riparian woodland and open forest dominated by Eucalyptus tereticornis often associated with stream channels
- Semi-evergreen vine thicket forests
- Waterbodies and drainage features located throughout Study Area

Coordinate System: GDA2020 MGA Zone 56
Date: 07/05/2026
Created By: MB
Drawing Size: A3

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F4-2a Survey Effort and Locations in the Study Area - Vegetation and Habitat Quality Assessments and Targeted Flora Surveys

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Legend

- Study Area
- Project Area
- Proposed Disturbance Footprint
- Call Playback (Yellow-bellied Glider and Koala)
- Call Playback (Diamond Firetail)
- Koala SAT
- Camera Traps
- Anabat Songmeter
- Fauna Transect Point
- Spotlighting Tracks
- Road
- Track and Path

Coordinate System:
GDA2020 MGA Zone 56

Date: 07/05/2026

Created By: MB

Drawing Size: A3

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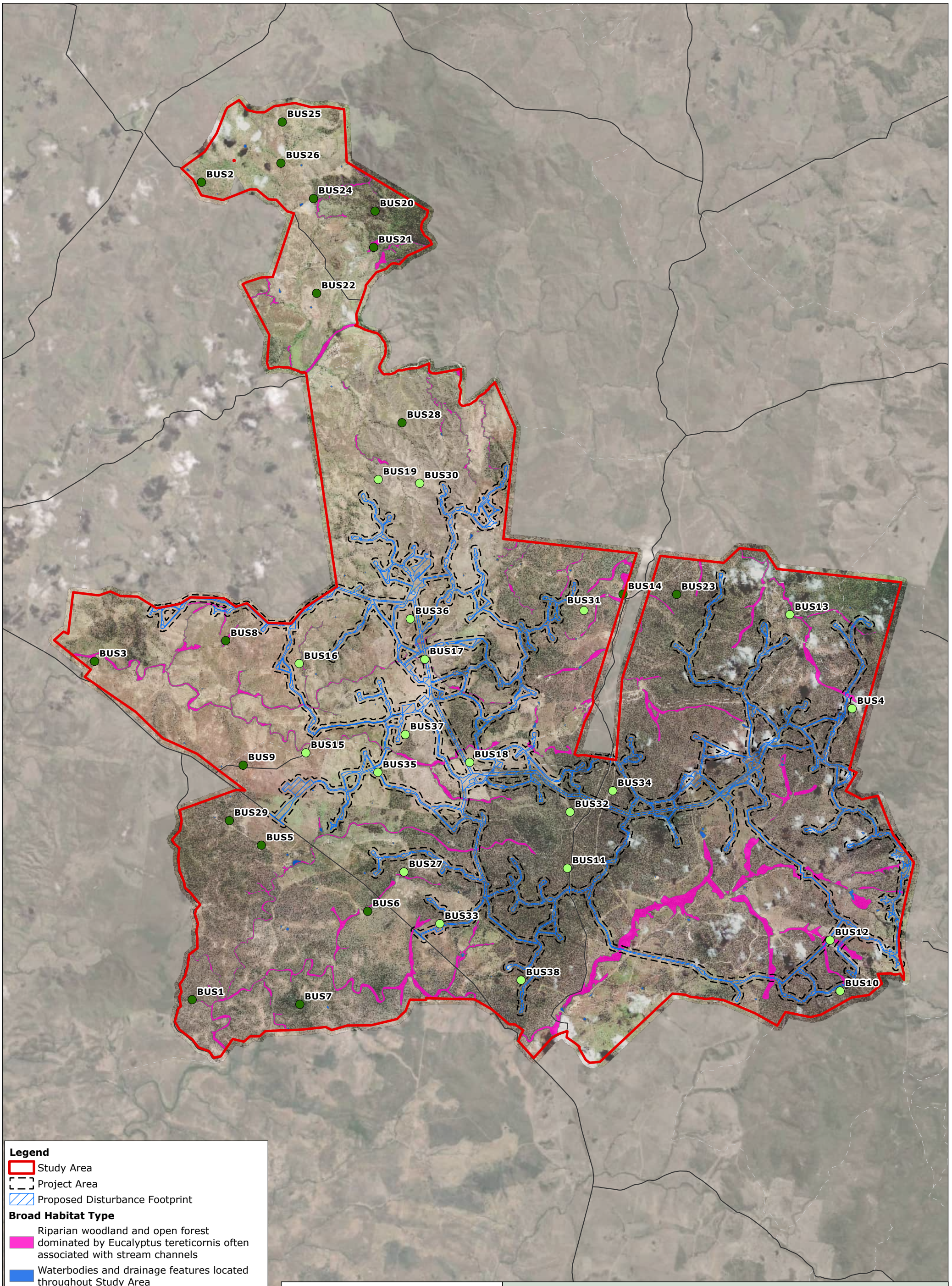
F4-2b Survey Effort and Locations in the Study Area - Targeted Surveys for Listed Fauna Species

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TABLE 4-6 SUMMARY OF FIELD SURVEYS UNDERTAKEN WITHIN THE STUDY AREA

Dates	Summary	Target	Techniques	Survey Effort
17-22 October 2022	Four ecologists undertook a six-day ecological survey within the Study Area, for a total of 240 person hours.	Vegetation and habitat assessment (including targeted threatened species surveys)	• Assessment of habitat features present relating to relative cover and abundance of nesting/shelter/basking sites, presence of aquatic habitats, presence of foraging resources, dominant canopy species, connectivity and disturbances. • Representative sampling for regional ecosystem verification using quaternary vegetation sampling (Neldner, et al., 2022). • Targeted surveys for threatened species identified with potential to occur, as described in the likelihood of occurrence analysis (Appendix C) including surveys for signs (e.g. scats) with techniques outlined in the Sections below.	• 36 individual survey locations where habitat assessments, vegetation assessments and targeted surveys were completed.
		Targeted fauna surveys	• Deployment of baited camera traps to target terrestrial mammals. • Targeted spotlighting transects.	• 4 camera traps deployed for 4 consecutive nights, totalling 16 trap nights. • 2 nights spotlighting transects along Defence Road.
		Bird surveys	• Bird utilization surveys (BUS)	• 23 BUS
		Bat surveys	• Bat detection via the use of ultrasonic devices (Anabats).	• 2 Anabat locations recording for 4 consecutive nights, totalling 8 trap nights.
		Bird surveys	• BUS	• 32 BUS

Dates	Summary	Target	Techniques	Survey Effort
13-17 February 2023	Two ecologists undertook a five-day bird and bat survey within the Study Area, for a total of 100 person hours.	Bat surveys	• Bat detection via the use of ultrasonic devices (Anabats).	• 4 Anabat locations recording for 4 consecutive nights, totalling 16 trap nights.
27-31 March 2023	Four ecologists undertook a five-day ecological survey within the Study Area, for a total of 200 person hours.	Vegetation and habitat assessment (including targeted threatened species surveys)	• Assessment of habitat features present relating to relative cover and abundance of nesting/shelter/basking sites, presence of aquatic habitats, presence of foraging resources, dominant canopy species, connectivity and disturbances. • Representative sampling for RE verification using quaternary vegetation sampling (Neldner, et al., 2022). • Targeted surveys for threatened species identified with potential to occur, as described in the likelihood of occurrence analysis (Appendix C) including surveys for signs (e.g. scats) with techniques outlined in the Sections below.	• 60 individual survey locations where habitat assessments, vegetation assessments and targeted surveys were completed.
		Bird surveys	• BUS	• 27 BUS
		Bat surveys	• Bat detection via the use of ultrasonic devices (Anabats).	• 4 Anabat locations recording for 4 consecutive nights, totalling 16 trap nights.

Dates	Summary	Target	Techniques	Survey Effort
5-9 June 2023	Four ecologists undertook a five-day ecological survey within the Study Area, for a total of 200 person hours.	Vegetation and habitat assessment (including targeted threatened species surveys)	• Assessment of habitat features present relating to relative cover and abundance of nesting/shelter/basking sites, presence of aquatic habitats, presence of foraging resources, dominant canopy species, connectivity and disturbances. • Representative sampling for RE verification using quaternary vegetation sampling (Neldner, et al., 2022). • Targeted surveys for threatened species identified with potential to occur, as described in the likelihood of occurrence analysis (Appendix C) including surveys for signs (e.g. scats) with techniques outlined in the Sections below.	• 48 individual survey locations where habitat assessments, vegetation assessments and targeted surveys were completed.
		Additional targeted fauna surveys	• Targeted spotlighting transects. • Koala Spot Assessment Technique (SATs).	• 4 spotlighting nights totalling 12 hours survey effort. • 7 koala SATs
		Bird surveys	• BUS	• 24 BUS
25 September -13 October 2023	Two ecologists undertook a five-day ecological survey within the Study Area from 25th of September to the 29th of September 2023, then another five-day ecology survey from the 9th of October to the 13th of October 2023, for a total of 200 person hours.	Habitat quality assessments	• Modified Habitat Quality Assessment (MHQA) and BioCondition Assessments.	• 17 transects
		Bird surveys	• BUS	• 26 BUS
4-8 December 2023	Two ecologists undertook a five-day ecology survey within the Study Area, for a total of 100 people.	Bird surveys	• BUS	• 40 BUS

Dates	Summary	Target	Techniques	Survey Effort
19 – 23 February 2024	Two ecologists undertook a five-day ecology survey within the Study Area, for a total of 100 person hours.	Bird surveys	• BUS	• 27 BUS
10 – 14 June 2024	Four ecologists undertook a four-day ecology survey within the Study Area, for a total of 160 person hours.	Vegetation assessments	• Representative sampling for RE verification using quaternary vegetation sampling (Neldner, et al., 2022).	• 31 individual survey locations where habitat assessments, vegetation assessments and targeted surveys were completed.
		Habitat quality assessments	• MHQA and BioCondition Assessments.	• 8 transects
		Bird surveys	• BUS	• 18 BUS
23 – 28 September 2024	Four ecologists undertook a six-day ecology survey within the Study Area, for a total of 240 person hours.	Habitat quality assessments	• MHQA and BioCondition Assessments.	• 13 transects
		Targeted Flora Transects	• Targeted flora transects within impact areas for potentially occurring threatened flora: Ooline (*Cadellia pentatylis*), Cossinia (*Cossinia australiana*), Austral cornflower (*Rhaponticum australe*), *Solanum dissectum*, *Solanum johnsonianum* and *Xerothamnella herbacea*.	• 17 transects in impact areas ranging from 30 minutes to an hour.

Dates	Summary	Target	Techniques	Survey Effort
		Habitat assessment (including targeted threatened species surveys)	• Assessment of habitat features present relating to relative cover and abundance of roosting/shelter/basking sites, presence of aquatic habitats, presence of foraging resources, dominant canopy species, connectivity and disturbances. • Targeted surveys for threatened species identified with potential to occur, as described in the likelihood of occurrence analysis (Appendix C). Surveys focused on the presence of suitable habitat for threatened reptiles and white-throated needletail roosting/foraging habitat.	• 4 assessments in impact areas for reptiles. • 6 assessments atop ridgelines for white-throated needletail.
		Additional targeted fauna surveys	• Targeted spotlighting transects. • Call playback.	• 2 spotlighting nights totalling 8 hours survey effort. • 8 call playback sessions for yellow-bellied glider and koala. • 6 call playback sessions for diamond firetail.
17 – 21 February 2026	Four ecologists undertook a five-day ecological survey within the Study Area, for a total of 120 person hours.	Habitat quality and quaternary assessments (targeted for yellow-bellied glider)	• Habitat quality and quaternary assessments to verify the extent of habitat for yellow-bellied glider within the Study Area. • This included refinement based on expert guidance advice, focusing on species identification, floristic diversity and composition, and identification of areas to be excluded from habitat mapping including poplar box communities, areas of sparse vegetation (including regrowth) and disconnected vegetation patches.	• 22 additional quaternary surveys.
		Habitat quality assessments	• MHQA and BioCondition Assessments.	• 19 BioCondition assessments.

Vegetation and Habitat Quality Assessments

Vegetation assessments and habitat quality assessments were undertaken to describe the type and condition of the vegetation communities within the Study Area. The outcomes of these assessments were used to inform a final likelihood of occurrence (Appendix C) of listed threatened species and TECs. The assessments undertaken include:

- Representative sampling of REs. This included quaternary assessments in accordance with (Neldner, et al., 2022);
- Assessment of water features (such as dams) and habitat values;
- Recording of topographical features; and
- Defining barriers of both disturbed and undisturbed areas.

Parameters measured during assessments critical to identifying potential habitat include:

- Context with regard to landscape features (connectivity, proximity to water);
- Condition (weeds, evidence of disturbance, invasive species);
- Breeding and roosting habitat features (e.g. hollows, nests, caves);
- Foraging sources (flowering tree species, termite mounds);
- Microhabitat presence (woody debris, leaf litter specifically important for small mammals and reptiles);
- Wetland presence (presence of aquatic vegetation, water depth); and
- Signs of threatened species (such as scats, scratches and tracks).

Vegetation communities identified as potentially meeting the key diagnostic criteria and condition thresholds of EPBC Act listed TECs were sampled with a greater scrutiny to verify the status of these communities.

Targeted surveys for listed flora and fauna identified with potential to occur in the Study Area (refer to Appendix C) were undertaken at the same location as habitat assessments. The survey locations are shown in Figure 4-2.

Targeted Surveys for Listed Flora Species

Ten flora species recognized as MNES were identified through desktop assessment. Targeted surveys were undertaken during field survey events in October 2022, March, June and September/October 2023, and September 2024 for listed flora species assessed as potentially occurring within the Study Area. Following field surveys, this was refined down to six potentially occurring species:

- Ooline (*Cadelia pentastylis*);
- Cossinia (*Cossinia australiana*);
- Austral cornflower (*Rhaponticum australe*);
- *Solanum dissectum*;
- *Solanum johnsonianum*; and
- *Xerothamnella herbacea*.

Targeted flora surveys for these species were undertaken concurrently with vegetation and habitat assessments throughout the Study Area. Listed flora species targeted during the field surveys, their survey guideline requirements, as well as whether the survey effort has met guideline requirements, are discussed further in Section 5 of the Theodore Wind Farm PER.

Targeted Surveys for Listed Fauna Species

Targeted surveys were undertaken during all field survey events for listed fauna species with potential habitat identified from desktop analysis and the preliminary likelihood of occurrence assessment (see Appendix C):

- Greater glider (southern and central) (*Petauroides Volans*);
- Yellow-bellied glider (south-eastern) (*Petaurus australis australis*);
- Koala (*Phascolarctos cinereus*);
- Large-eared pied-bat (*Chalinolobus dwyeri*);
- South-eastern long-eared bat (*Nyctophilus corbeni*); and
- Ornamental snake (*Denisonia maculata*).

Details on all the EPBC Act listed fauna species targeted during the field surveys, their survey guideline requirements, as well as whether the survey effort has met guideline requirements are discussed further in Section 5 of the Theodore Wind Farm PER.

The following Sections summarise the main techniques used when targeting listed threatened mammals, birds and reptiles within the Study Area.

Terrestrial and Arboreal Mammals

Koala, greater glider (southern and central) and yellow-bellied glider (south-eastern) have been considered to potentially occur in the Study Area (Appendix C) and have been targeted during field surveys.

A targeted survey approach was implemented to assess the presence of these species in line with *Survey guidelines for Australia's threatened mammals* (DSEWPC, 2011), *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland* (DES, 2022), *A review of koala habitat assessment criteria and methods* (Youngentob, Marsh, & Skewes, 2021) and *Guide to greater glider habitat in Queensland* (Eyre, et al., 2022). Surveys techniques adopted were as follows:

- Koala:
  - Nocturnal spotlighting for smaller sites to determine presence and density;
  - SAT which involves looking at the base of koala food trees for presence of koala scats and the trunks of smooth bark gums for koala scratches; and
  - Call playback playing a downloaded koala call through a speaker for 3 minutes followed by listening for a response prior to spotlighting.
- Greater glider (southern and central):
  - Two (2) people, 30-minute spotlight searches of 100 x 100 m survey sites; and
  - Scat and sign search can coincide with the systematic diurnal active searches, within 50 x 50 m quadrats of the survey site.

- Yellow-bellied glider (south-eastern):
  - Two (2) people, 30-minute spotlight searches of 100 x 100 m survey sites; and
  - Daytime searches for signs of activity (feeding marks on trees).
  - Call playback playing a downloaded yellow-bellied glider call through a speaker for 3 minutes followed by listening for a response during spotlighting.

Reptiles

Targeted searches were undertaken for all for listed reptiles with potential habitat identified within the Study Area, though were primarily focused on identification of the ornamental snake, as per the likelihood of occurrence assessment (Appendix C). These searches were undertaken in accordance with the following guidelines:

- Survey guidelines for Australia's threatened reptiles (DSEWPC, 2011):
  - Searches of suitable gilgai habitat (small depressions and mounds in clay soils) while preferred prey species (frogs) are active;
  - Diurnal searches under sheltering sites such as rocks, logs or other large objects on the ground.
- EPBC Act - Draft Referral guidelines for the nationally listed Brigalow Belt reptiles (DCCEEW, 2023):
  - Spotlighting transects targeting water-inundated gilgais, wetlands, riparian habitats and surrounding environments and large logs between dusk and early morning hours, ideally on warm and humid evenings;
  - Opportunistic road surveys while driving along roadways in the identified study area, especially following large rainfall events and on warm evenings; and
  - Microhabitat searches during the coolest parts of the day, including carefully turning woody debris, rocks and artificial debris, raking the soil surface or leaf litter beneath trees.

Birds

Surveys for birds within the Study Area focused on identification of species listed as threatened or migratory, particularly those considered known, likely or potentially occurring within the Study Area as per the likelihood of occurrence assessment (Appendix C):

- Squatter pigeon (southern) (*Geophaps scripta scripta*);
- White-throated needletail (*Hirundapus caudacutus*);
- Australian painted snipe (*Rostratula australis*);
- Diamond firetail (*Stagonopleura guttata*);
- Black-breasted button-quail (*Turnix melanogaster*); and
- Fork-tailed swift (*Apus pacificus*).

Surveys for diurnal birds were conducted in line with *Survey Guidelines for Australia's threatened birds* (DEWHA, 2017) and *Draft referral guidelines for 14 birds listed as migratory species under the EPBC Act* (DoE, 2015). Various surveys targeting birds within the Study Area were completed following the methods described below. All bird survey locations are shown in Figure 4-2.

Bird Utilisation Surveys

BUS involve 20-minute fixed point surveys to provide data based on the species present and their height, speed and direction of flight as required to complete collision risk modelling using the Band Model (SNH, 2016; Band, 2000). The current *Onshore wind farm guidance - best practice approaches when seeking approval under Australia's national environment law* (Onshore Wind Farm Guidance) (DCCEEW, 2024) outlines the need to improve the understanding of the Study Area (and surrounds) utilisation through survey work for each relevant species. It is reiterated that species-specific survey methodologies and requirements were also consulted and implemented in the field survey program, as detailed in the following Sections.

Each fixed-point BUS site was located to provide a search radius of at least 100 m for small birds and up to 800 m for large birds with range finders used to determine distances. This fulfills the non-specific DEWHA (2017) requirements for diurnal bird surveys. As well as targeting threatened species, BUS focused on birds most likely to be affected by the development, such as raptors (birds of prey) and large flocks of birds. This technical requirement for BUS is outlined in AusWind's Report, *Wind Farms and Birds: Interim Standards for Risk Assessment* (AusWEA, 2006), Onshore Wind Farm Guidance (DCCEEW, 2024) and Queensland *State Code 23 – Wind farm developments* (State Code 23) (DSDILGP, 2022).

As surveys commenced in October 2022, the BUS survey design was implemented with reference to the *Onshore Wind Farms – interim guidance on bird and bat management* (DAWE, 2021), which required BUSs to be completed over each relevant season over a minimum of 24 months prior to commissioning of a wind farm. This survey effort is also consistent with the requirements of the updated Onshore Wind Farm Guidance (DCCEEW, 2024), which requires site utilisation surveys to be undertaken for each relevant season over at least two years (up to 8 survey events).

There are two distinct seasons in Queensland, wet season and dry season. The Study Area experiences a higher mean rainfall and higher mean temperatures between November and February (often extending into March). This also coincides with the season for migratory birds, including wetland birds.

To meet survey timing requirements and inform species use across the Study Area as part of the risk assessment for threatened birds with the potential to be impacted by Wind Turbine Generator (WTG) strike, eight BUS survey trips have been conducted to date across these two seasons (four surveys in the wet season and four surveys in the dry season), consecutively over a 2-year period. BUS points were dispersed across the Study Area during the first two sampling events in October 2022 and February 2023, with the same sites subject to repeat visits in both the morning and afternoon period during all subsequent sampling events. A summary of the BUS survey effort is described in Table 4-7.

TABLE 4-7 SUMMARY OF BUS EFFORT

BUS Survey Event	BUS survey effort
October 2022 Dry season	23 surveys, 12 morning and 11 afternoon
February 2023 Wet season	32 surveys, repeat visits to BUS points including 16 morning and 16 afternoon surveys
March 2023 Wet season	28 surveys, repeat visits to BUS points including 14 morning and 14 afternoon surveys
June 2023 Dry season	24 surveys repeat visits to BUS points including 12 morning and 12 afternoon surveys
September/October 2023 Dry season	26 surveys, repeat visits to BUS points including 12 morning and 14 afternoon surveys
December 2023 Wet season	40 surveys, repeat visits to BUS points including 20 morning and 20 afternoon surveys
February 2024 Wet season	27 surveys, repeat visits to BUS points including 13 morning and 14 afternoon surveys
June 2024 Dry season	18 surveys, repeat visits to BUS points including 9 morning and 9 afternoon surveys

DEHWA (2017) outlines steps that aid in determining survey effort and timing, noting a particular focus on optimal timing for surveys of 'target' taxa. With the timing of surveys critical to species detection, it is important that surveys be timed to maximise potential detection across the year. As such, eight BUS events have been completed over the two distinct seasons observed within Central Queensland (wet and dry).

State Code 23 details the requirement for BUS for wind farm developments. Such surveys identify avian species, numbers present, height flown and site utilisation. The eight field investigations undertook BUS at waterbodies and in open areas for birds of prey. Thus, the survey effort was performed in accordance with State Code 23 requirements.

The updated DCCEEW draft guidelines on the management of bird and bat species in onshore wind farms details the need to undertake a risk assessment for birds and bats following bird utilisation surveys for the Study Area (DCCEEW, 2024). A risk assessment has been completed, and takes into account the likelihood and consequences of events including collision with wind turbines and the impact of construction and operation on the Proposed Action causing changes in site utilisation by bird and bat species.

DCCEEW (2024) and State Code 23 also recommend Before-After-Control-Impact (BACI) design principle for surveys where the Study Area is determined to support significant bird species. The aim of the BACI design is to compare environmental variables before and after a human activity and between the areas affected by the development (impact site) and areas unaffected by the Proposed Action (control sites). In this instance, this would compare control and impact BUS sites, before and after the construction of the Proposed Action, to determine if there are any avian impacts as a result of the Proposed Action. For the Proposed Action, impact sites are generally located within 1 km of the proposed turbine locations. Control sites

are defined as sites that are placed at a sufficient distance from the proposed turbine locations to obtain data outside the zone of influence of the turbines, as defined in State Code 23 (DSDILGP, 2022).

Twenty potential impact sites and 18 potential control sites were visited over the eight survey events between October 2022 and June 2024 (see Figure 4-2). These areas will be revisited and resurveyed during construction and after construction (operation phase) of the Proposed Action development, in accordance with the Proposed Action's Bird and Bat Management Plan (BBMP).

Draft guidance from DCCEEW on the management of birds and bats for onshore wind farms details how CRM must be undertaken for listed threatened species (MNES) where risks from the Proposed Action, particularly collision risks, have been identified (DCCEEW, 2024). State Code 23 also requires CRM and Population Viability Analysis be conducted when a collision risk assessment identifies a risk to significant species, such as threatened birds, raptors and wetland birds. To satisfy these requirements, CRM has been undertaken in accordance with the Band CRM Method (Band, W., Madders, M., & Whitfield, D.P, 2007) for listed threatened and/or migratory species, and non-threatened raptor species, recorded in the Study Area and assessed as having a potential collision risk. CRM results are discussed in Section 6 and presented in full within the BBMP, Appendix D.

Point Surveys

Point surveys were conducted to target diurnal woodland and riparian bird species. Four ecologists during the October 2022 surveys, two ecologists during the February 2023 surveys, four ecologists during the March 2023 surveys and four ecologists during the June 2023 surveys traversed suitable woodland and riparian habitats and conducted 20-minute timed surveys for all birds in the area. This survey effort was targeted for listed threatened birds and is additional to the BUS effort.

Transect Surveys

Transect surveys were conducted in order to diurnal woodland and riparian bird species. Two ecologists during the February 2023 surveys, four ecologists during the March 2023 surveys and four ecologists during the June 2023 surveys traversed suitable riparian habitats and conducted transect walks for all birds in the area. This survey effort was targeted for listed threatened birds and is additional to the BUS effort.

Waterbody Surveys

Waterbody surveys were conducted in order to target aquatic species and woodland species utilising the waterbody. Observations were made from a stationary position, and birds were identified by call detection and visual observations. The Study Area contained several artificial waterbodies, likely to act as important water sources in the landscape, particularly during dry conditions. This survey effort was targeted for listed threatened birds and is additional to the BUS effort.

Call Playback

Call playback surveys were conducted in suitable habitat for diamond firetail (*Stagonopleura guttata*) during the September 2024 surveys. Six call playback sessions using downloaded diamond firetail calls broadcast through a speaker were conducted in *Eucalyptus* open forest with a grassy understory.

Squatter Pigeon Surveys

Squatter pigeon (southern) was identified via the likelihood of occurrence assessment as known to occur within the Study Area (Appendix C). This species' survey guidelines are different to most avifauna due to being a mostly ground-dwelling species. Searches were undertaken in accordance with the following guidelines:

- *Survey guidelines for Australia's threatened birds* (DEWHA, 2017):
  - Recommended methods include 15 hours of flushing surveys over a 3-day survey period; and
  - 10 hours of area searches or transect surveys over a 3-day survey period in suitable habitat (short, grassy understory of eucalypt woodland, nearly always near permanent water).

Bat Surveys

Microbat surveys were conducted to determine the presence/absence of bats within and surrounding the Study Area, with four ultrasonic bat detectors (Anabats) placed throughout the relevant properties in the Study Area. The four Anabat devices were placed in 10 total locations throughout the Study Area over the October 2022, February and March 2023 field surveys. Anabats were not deployed during the June 2023 winter surveys. These devices were used to detect ultrasonic signals from bat species in the Study Area, for either two or four consecutive survey nights.

The bat detectors were placed across representative remnant vegetation/habitat types. This included riparian woodlands and eucalypt or acacia open forest or woodlands. The detectors were specifically placed in areas that were in close proximity to potential flight paths/water sources (farm dams) and in relative proximity to proposed turbine locations. The survey locations were selected on the basis that they provided the greatest likelihood of detecting an abundance and diversity of bat species.

The detectors were secured onto trees at approximately 1.8 m above the ground. They were collected and the information recorded on the Anabats was then analysed by a specialist to determine the species recorded.

The BACI design has also been implemented for bat surveys (explained in Bird Utilisation Surveys), in order to identify any impacts on bats as a result of the Proposed Action, with control sites determined based on the current Preliminary Design and locations of WTGs.

The survey requirements and recommended survey effort and methods for bats is as follows:

- *Survey guidelines for Australia's threatened bats* (DEWHA, 2010):
  - Trapping methods such as harp traps are recommended. Such effort is not precisely stated, but studies have found that the use of 20 or more traps a night a good for detection (Schulz, 1999). Harp trapping was not utilised as the target species, ghost bat (*Macroderma gigas*), can be detected via various other methods including however not limited to acoustic monitoring and spotlighting;
  - Echolocation call detection to be carried out for a recommended 30-60 minutes per night for four to five survey nights. Detectors were deployed to exceed these minimum requirements and set to record from dusk through to dawn during each sampling event;
  - Recommended that a variety of trapping and call detection methods are used together, where possible.

The full echolocation analyses for the Anabats deployed during October 2022, February and March 2023 field investigations are presented in Appendix E. The bat survey locations are shown in Figure 4-2.

4.8.5.3 CLIMATIC CONDITIONS

During all field investigation periods, the weather typically remained dry (with the exception of the October 2022 and September 2024 survey periods). Moderate wind conditions and temperatures were typical for the periods that each survey took place. A summary of the daily weather observations for each survey period is presented in Table 4-8 to Table 4-18.

It should be noted that creek flooding occurred within the Study Area during the October 2022 survey period, which impacted access between survey sites.

Weather observations were sourced from the Thangool weather station (station number 039089), located approximately 50 km north-east of the Study Area.

TABLE 4-8 DAILY WEATHER OBSERVATIONS OCTOBER 2022 - THANGOOL QUEENSLAND

	Daily Temp		**Rain**	**9:00AM**				**3:00 PM**			
	Min	Max	mm	Temp	RH	Dir	Spd	Temp	RH	Dir	Spd
	°C	°C		°C	%		km/hr	°C	%		km/hr
17/10/22	16.6	29.3	7	22.5	79	NW	7	24.5	71	SE	13
18/10/22	14.8	28.9	0	25.5	65	NNE	20	26.8	53	N	20
19/10/22	19	23.9	1.4	21.5	89	NE	7	23.1	78	NNE	9
20/10/22	19.3	25.5	24.2	21.2	93	WNW	6	24.2	73	NE	15
21/10/22	17.1	29.5	14.6	25.4	72	NNE	11	28.3	52	NNE	22
22/10/22	17.6	27.2	23.2	18.2	99	ESE	13	25.2	59	ESE	13

Dir = wind direction; Spd = wind speed; RH = relative humidity
Blue denotes the lowest daily temperature; Red denotes the highest daily temperature.
Source: Australian Government Bureau of Meteorology, www.bom.gov.au

TABLE 4-9 DAILY WEATHER OBSERVATIONS FEBRUARY 2023 - THANGOOL QUEENSLAND

	Daily Temp		Rain	9:00 AM				3:00 PM			
	Min	Max	mm	Temp	RH	Dir	Spd	Temp	RH	Dir	Spd
	°C	°C		°C	%		km/hr	°C	%		km/hr
13/02/23	19.4	37.9	0	29.4	58	NW	11	37.5	31	NNW	9
14/02/23	19	38.1	0	30.8	57	N	19	37.3	28	NNW	22
15/02/23	20.4	32.4	9.6	28.1	66	E	13	31	49	NNE	11
16/02/23	19	33.3	0.2	25.9	58	E	17	32	36	SE	11
17/02/23	15	32.2	0	25.9	53	E	6	31.2	38	SSE	13

Dir = wind direction; Spd = wind speed; RH = relative humidity
Blue denotes the lowest daily temperature; Red denotes the highest daily temperature.
Source: Australian Government Bureau of Meteorology, www.bom.gov.au

TABLE 4-10 DAILY WEATHER OBSERVATIONS MARCH 2023 - THANGOOL QUEENSLAND

	Daily Temp		Rain	9:00 AM				3:00 PM			
	Min	Max	mm	Temp	RH	Dir	Spd	Temp	RH	Dir	Spd
	°C	°C		°C	%		km/hr	°C	%		km/hr
27/03/23	17	33.7	0	26	63	NE	4	33.4	38	WNW	13
28/03/23	16.6	34.6	0	26.6	70	ENE	2	33	37	NE	7
29/03/23	18.6	32	0	25.7	71	N	11	30.8	48	W	6
30/03/23	21.1	33.3	0	25.8	73	NW	13	31.7	44	SW	13
31/03/23	15.4	32.4	2.2	25	46	ESE	9	31.4	23	W	9

Dir = wind direction; Spd = wind speed; RH = relative humidity
Blue denotes the lowest daily temperature; Red denotes the highest daily temperature.
Source: Australian Government Bureau of Meteorology, www.bom.gov.au

TABLE 4-11 DAILY WEATHER OBSERVATIONS JUNE 2023 - THANGOOL QUEENSLAND

	Daily Temp		Rain	9:00 AM				3:00 PM			
	Min	Max	mm	Temp	RH	Dir	Spd	Temp	RH	Dir	Spd
	°C	°C		°C	%		km/hr	°C	%		km/hr
05/06/23	14	26.8	0	21.1	66	ESE	22	25.5	41	ENE	22
06/06/23	12.1	24.9	0	18.8	74	ESE	17	22.5	54	ESE	17
07/06/23	9.4	26.4	0	19.2	68	ESE	15	25.6	38	ESE	9
08/06/23	4.7	26.4	0	16	82	SE	6	25.3	34	NNW	9
09/06/23	7.9	27.7	0	17.6	69	E	7	24.9	40	SSW	13

Dir = wind direction; Spd = wind speed; RH = relative humidity
Blue denotes the lowest daily temperature; Red denotes the highest daily temperature.
Source: Australian Government Bureau of Meteorology, www.bom.gov.au

TABLE 4-12 DAILY WEATHER OBSERVATIONS SEPTEMBER 2023 – THANGOOL QUEENSLAND

	Temp		Rain	9:00 AM				3:00 PM			
	Min	Max	mm	Temp	RH	Dir	Spd	Temp	RH	Dir	Spd
	°C	°C		°C	%		km/hr	°C	%		km/hr
25/09/2023	8.1	27.9	0	20.9	51	ESE	17	26	30	ESE	7
26/09/2023	6.9	29.8	0	21.0	53	SSE	7	29.2	19	SW	6
27/09/2023	8.2	31.4	0	21.6	58	NNW	9	29.3	22	NNE	15
28/09/2023	9.3	32.9	0	21.7	58	NNW	7	31.9	18	ESE	9
29/09/2023	13.5	31.9	0	23.3	54	NNE	9	29.5	28	ESE	11

Dir = wind direction; Spd = wind speed; RH = relative humidity
Blue denotes the lowest daily temperature; Red denotes the highest daily temperature.
Source: Australian Government Bureau of Meteorology, www.bom.gov.au

TABLE 4-13 DAILY WEATHER OBSERVATIONS OCTOBER 2023 - THANGOOL QUEENSLAND

	Temp		Rain	9:00 AM				3:00 PM			
	Min	Max	mm	Temp	RH	Dir	Spd	Temp	RH	Dir	Spd
	°C	°C		°C	%		km/hr	°C	%		km/hr
09/10/2023	8.3	28.9	0	23.1	35	E	13	26.6	26	SE	11
10/10/2023	8.1	30.0	0	22	54	S	7	27	31	ENE	7
11/10/2023	9.5	31.9	0	23.2	48	ENE	9	31.3	21	E	11
12/10/2023	11	32.2	0	23.7	52	WSW	9	30.6	25	NNW	9
13/10/2023	10.5	33.2	0	23.8	53	NNW	15	32.5	21	SSW	9

Dir = wind direction; Spd = wind speed; RH = relative humidity
Blue denotes the lowest daily temperature; Red denotes the highest daily temperature.
Source: Australian Government Bureau of Meteorology, www.bom.gov.au

TABLE 4-14 DAILY WEATHER OBSERVATIONS DECEMBER 2023 - THANGOOL QUEENSLAND

	Temp		Rain	9:00 AM				3:00 PM			
	Min	Max	mm	Temp	RH	Dir	Spd	Temp	RH	Dir	Spd
	°C	°C		°C	%		km/hr	°C	%		km/hr
04/12/2023	20.7	38.7	0	31.1	53	NE	7	36.6	27	SW	6
05/12/2023	19.4	35.8	0	28.9	55	N	13	34.1	33	WNW	17
06/12/2023	17.5	38.4	0	29.3	47	WSW	6	36.5	18	ESE	17
07/12/2023	14.9	38.6	0	26.8	49	SE	7	37.1	16	NE	31
08/12/2023	15.1	37.7	0	28.5	45	SE	15	36.3	22	E	20

Dir = wind direction; Spd = wind speed; RH = relative humidity
Blue denotes the lowest daily temperature; Red denotes the highest daily temperature.
Source: Australian Government Bureau of Meteorology, www.bom.gov.au

TABLE 4-15 DAILY WEATHER OBSERVATIONS FEBRUARY 2024 - THANGOOL QUEENSLAND

	Temp		Rain	9:00 AM				3:00 PM			
	Min	Max	mm	Temp	RH	Dir	Spd	Temp	RH	Dir	Spd
	°C	°C		°C	%		km/hr	°C	%		km/hr
19/02/2024	17.6	34.5	0	27	63	ESE	20	34.4	34	SE	11
20/02/2024	19.8	34.4	0	27.4	58	SE	9	32.4	37	S	7
21/02/2024	20.2	34.2	0	27.5	62	W	4	31.4	46	NE	20
22/02/2024	19.1	34.3	0	27.7	63	W	4	32.1	43	NNW	11
23/02/2024	19.4	35.6	0	28.1	66	N	4	34.5	35	SE	9

Dir = wind direction; Spd = wind speed; RH = relative humidity
Blue denotes the lowest daily temperature; Red denotes the highest daily temperature.
Source: Australian Government Bureau of Meteorology, www.bom.gov.au

TABLE 4-16 DAILY WEATHER OBSERVATIONS JUNE 2024 – THANGOOL QUEENSLAND

	Temp		Rain	9:00 AM				3:00 PM			
	Min	Max	mm	Temp	RH	Dir	Spd	Temp	RH	Dir	Spd
	°C	°C		°C	%		km/hr	°C	%		km/hr
11/06/2024	2.6	26.1	0	14.8	57	SE	11	25.9	19	NW	6
12/06/2024	2.3	26.2	0	13.6	60	SSE	2	25.5	19	SSW	17
13/06/2024	0.9	24.0	0	14.7	51	SE	13	22.7	19	SSE	9
14/06/2024	1.6	24.0	0	12.6	47	E	7	23.3	17	N	11

Dir = wind direction; Spd = wind speed; RH = relative humidity
Blue denotes the lowest daily temperature; Red denotes the highest daily temperature.
Source: Australian Government Bureau of Meteorology, www.bom.gov.au

TABLE 4-17 DAILY WEATHER OBSERVATIONS SEPTEMBER 2024 – THANGOOL QUEENSLAND

	Temp		Rain	9:00 AM				3:00 PM			
	Min	Max	mm	Temp	RH	Dir	Spd	Temp	RH	Dir	Spd
	°C	°C		°C	%		km/hr	°C	%		km/hr
23/09/2024	5	29.9	0	22.3	57	SE	11	28.6	26	NE	13
24/09/2024	8	30	0	22.4	49	SSE	6	28.8	24	NE	19
25/09/2024	7.1	29.5	0	22.8	49	NNE	13	28.1	29	N	17
26/09/2024	9.3	30.6	0	23.1	51	NNW	13	29.7	36	NNW	15
27/09/2024	17.7	27.2	12.2	20.3	81	S	9	26.6	30	SW	15
28/09/2024	9	26.7	0	20.7	50	SE	9	25.9	27	SW	17

Dir = wind direction; Spd = wind speed; RH = relative humidity
Blue denotes the lowest daily temperature; Red denotes the highest daily temperature.
Source: Australian Government Bureau of Meteorology, www.bom.gov.au

TABLE 4-18 DAILY WEATHER OBSERVATIONS FEBRUARY 2026 – THANGOOL QUEENSLAND

	Temp		Rain	9:00 AM				3:00 PM			
	Min	Max	mm	Temp	RH	Dir	Spd	Temp	RH	Dir	Spd
	°C	°C		°C	%		km/hr	°C	%		km/hr
17/02/2026	21.1	30.3	0	25.3	65	ESE	17	29.5	52	E	13
18/02/2026	18.8	32.6	0	26.5	63	S	7	31	48	NE	9
19/02/2026	20.9	34.2	0	28.3	64	SE	4	32.7	39	E	15
20/02/2026	16.6	31.8	0	25.2	65	ESE	17	31.2	37	E	19
21/02/2026	17.8	32.5	0	26.9	62	ESE	17	31.2	43	E	11

Dir = wind direction; Spd = wind speed; RH = relative humidity
Blue denotes the lowest daily temperature; Red denotes the highest daily temperature.
Source: Australian Government Bureau of Meteorology, www.bom.gov.au

4.8.5.4 SURVEY ADEQUACY

A survey adequacy review has been undertaken for the survey effort applied across the Study Area, with a full list of the targeted MNES flora and fauna assessed as known, likely or potentially occurring. Survey guideline requirements and survey adequacy is outlined in Table 4-19 and Table 4-20.

TABLE 4-19 SURVEY ADEQUACY FOR LISTED THREATENED FLORA WITH THE POTENTIAL TO OCCUR

Target Species	Listing Status		Survey Guidelines and Requirements	Sampling Technique / Effort	Comment on Survey Adequacy
	NC Act[1]	EPBC Act[2]			
Ooline (Cadellia pentastylsis)	VU	V	Flora Survey Guidelines – Protected Plants, Nature Conservation Act 1992 (DES, 2020) Random, non-selective traverses of all habitat types throughout the Study Area, whether identified as suitable or un-suitable habitat for threatened flora.	245 vegetation and habitat assessments were completed across 10 survey periods. Meander searches were undertaken at the same time as vegetation and habitat assessments within flora trigger areas of the Study Area. 17 targeted flora transects conducted during the September 2024 survey period in impact areas ranging from 30 minutes to an hour.	• Survey effort considered adequate • This species has not been observed during field surveys, despite suitable habitat being identified.
Cossinia (Cossinia australiana)	EN	E	Flora Survey Guidelines – Protected Plants, Nature Conservation Act 1992 (DES, 2020) Random, non-selective traverses of all habitat types throughout the Study Area, whether identified as suitable or un-suitable habitat for threatened flora.	245 vegetation and habitat assessments were completed across 10 survey periods. Meander searches were undertaken at the same time as vegetation and habitat assessments within flora trigger areas of the Study Area. 17 targeted flora transects conducted during the September 2024 survey period in impact areas ranging from 30 minutes to an hour.	• Survey effort considered adequate • • This species has not been observed during field surveys, despite suitable habitat being identified.

Target Species	Listing Status		Survey Guidelines and Requirements	Sampling Technique / Effort	Comment on Survey Adequacy
	NC Act[1]	EPBC Act[2]			
Austral cornflower (Rhaponticum australe)	VU	V	Flora Survey Guidelines – Protected Plants, Nature Conservation Act 1992 (DES, 2020) Random, non-selective traverses of all habitat types throughout the Study Area, whether identified as suitable or un-suitable habitat for threatened flora.	245 vegetation and habitat assessments were completed across 10 survey periods. Meander searches were undertaken at the same time as vegetation and habitat assessments within flora trigger areas of the Study Area. 17 targeted flora transects conducted during the September 2024 survey period in impact areas ranging from 30 minutes to an hour.	• Survey effort considered adequate • This species has not been observed during field surveys, despite suitable habitat being identified.
Solanum dissectum	EN	E	Flora Survey Guidelines – Protected Plants, Nature Conservation Act 1992 (DES, 2020) Random, non-selective traverses of all habitat types throughout the Study Area, whether identified as suitable or un-suitable habitat for threatened flora.	245 vegetation and habitat assessments were completed across 10 survey periods. Meander searches were undertaken at the same time as vegetation and habitat assessments within flora trigger areas of the Study Area. 17 targeted flora transects conducted during the September 2024 survey period in impact areas ranging from 30 minutes to an hour.	• Survey effort considered adequate • This species has not been observed during field surveys, despite suitable habitat being identified.

Target Species	Listing Status		Survey Guidelines and Requirements	Sampling Technique / Effort	Comment on Survey Adequacy
	NC Act[1]	EPBC Act[2]			
Solanum johnsonianum	EN	E	Flora Survey Guidelines – Protected Plants, Nature Conservation Act 1992 (DES, 2020) Random, non-selective traverses of all habitat types throughout the Study Area, whether identified as suitable or un-suitable habitat for threatened flora.	245 vegetation and habitat assessments were completed across 10 survey periods. Meander searches were undertaken at the same time as vegetation and habitat assessments within flora trigger areas of the Study Area. 17 targeted flora transects conducted during the September 2024 survey period in impact areas ranging from 30 minutes to an hour.	• Survey effort considered adequate • This species has not been observed during field surveys, despite suitable habitat being identified.
Xerothamnella herbacea	EN	E	Flora Survey Guidelines – Protected Plants, Nature Conservation Act 1992 (DES, 2020) Random, non-selective traverses of all habitat types throughout the Study Area, whether identified as suitable or un-suitable habitat for threatened flora.	245 vegetation and habitat assessments were completed across 10 survey periods. Meander searches were undertaken at the same time as vegetation and habitat assessments within flora trigger areas of the Study Area. 17 targeted flora transects conducted during the September 2024 survey period in impact areas ranging from 30 minutes to an hour.	• Survey effort considered adequate • This species has not been observed during field surveys, despite suitable habitat being identified.

- [1] NC Act status: EN = endangered; VU = vulnerable
- [2] EPBC Act status: E = endangered; V = vulnerable

TABLE 4-20 SURVEY ADEQUACY FOR LISTED THREATENED OR MIGRATORY FAUNA KNOWN, LIKELY OR POTENTIAL TO OCCUR

Target Species	Listing Status		Survey Guidelines and Requirements	Sampling Technique / Effort	Comment on Survey Adequacy
	NC Act[1]	EPBC Act[2]			
Birds[3]					
Squatter pigeon (southern) (*Geophaps scripta scripta*)	VU	V	Survey guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the EPBC Act (DEWHA, 2017) Area searches or transect surveys in suitable habitat. Flushing surveys also likely to be useful. Area searches or transect surveys for 15 hours over 3 days. Flushing surveys for 10 hours over 3 days.	171 dawn and dusk timed surveys (20 minutes), bird utilisation surveys across 38 locations in the Study Area. 3 area/transect searches were also conducted during bird utilisation surveys in appropriate habitat. These area/transect searches were completed by 2 ecologists for 1.5 hours each (9 total hours).	Survey effort considered adequate The southern squatter has been observed on one occasion during the October 2022 survey at a farm dam located in the northern section of the Study Area, on one occasion during the September/October 2023 survey in the north-western section of the Study Area, and on one occasion during December 2023 survey. • Surveys were conducted throughout the Study Area, in suitable patches of open eucalypt woodlands and areas close to permanent bodies like farm dams and waterways.
Black-breasted buttonquail (*Turnix melanogaster)*	VU	V	Survey guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the EPBC Act (DEWHA, 2017) Area searches of suitable habitat with detection of flushing birds or hearing of foraging scratching for 15 hours over 3 days.	171 dawn and dusk timed surveys (20 minutes), bird utilisation surveys across 38 locations in the Study Area. 245 vegetation and habitat assessments were completed across 10 survey periods determining the presence of any suitable habitat features for the species.	Survey effort considered adequate Suitable habitat for the species was detected within the Study Area, with flushing surveys being conducted within this habitat during habitat assessments. The species was not observed in any surveys.
White-throated needletail (*Hirundapus caudacutus)*	VU	V, Mi	Draft referral guidelines for 14 birds listed as migratory species under the EPBC Act (DoE, 2015) No survey guidelines specific to white-throated needletail, however, recommended to focus survey efforts from high vantage points. Observations should be made as late as possible in the evening of birds coming in to roost. This species is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground and have been recorded over most types of habitat.	171 dawn and dusk timed surveys (20 minutes), bird utilisation surveys across 38 locations in the Study Area. 6 targeted assessments atop ridgelines for potential white-throated needletail roosting habitat during the September 2024 surveys.	Survey effort considered adequate Surveys were conducted from vantage points in the Study Area within the appropriate time frame to detect the species. The species was not detected in any of the surveys. The habitat in the Study Area was not deemed suitable for the species to roost in.
Australian painted snipe (*Rostratula australis)*	EN	E	Survey guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the EPBC Act (DEWHA, 2017) Area searches or transects through suitable wetlands; detection by sighting and flushing. Conducted for 10 hours over 3 days. Targeted stationary observations at dawn and dusk of suitable foraging locations within wetlands; detection by sighting. Conducted for 10 hours over 5 days. Also a brief spotlight search shortly after dusk may detect birds.	171 dawn and dusk timed surveys (20 minutes), bird utilisation surveys across 38 locations in the Study Area. 245 vegetation and habitat assessments were completed across 10 survey periods determining the presence of any suitable habitat features for the species. 6 hours of spotlighting over two nights in October 2022. (Impacted by inclement weather). 12 hours of spotlighting over four nights in June 2023. 8 hours of spotlighting over two nights in September 2024.	Survey effort considered adequate Waterbodies were surveyed across the Study Area, with flushing being conducted habitat assessments and timed stationary surveys being conducted at dawn and dusk. Spotlighting was also conducted. The species was not observed in any surveys.

Target Species	Listing Status		Survey Guidelines and Requirements	Sampling Technique / Effort	Comment on Survey Adequacy
	NC Act[1]	EPBC Act[2]			
Diamond firetail (Stagonopleura guttata)	V	V	Survey guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the EPBC Act (DEWHA, 2017) There are no targeted survey guidelines for this species. Active searches or transects whilst recording any sightings and calls within suitable habitat is recommended. Suitable habitats include; grassy eucalypt, acacia, or casuarina woodlands, other suitable habitat include open forests, mallees or natural temperate grasslands. Active searches for microhabitat features include; globular structured nests within the shrubby understorey of woodland areas.	171 dawn and dusk timed surveys (20 minutes), bird utilisation surveys across 38 locations in the Study Area. 6 call playback sessions in suitable habitat. 245 vegetation and habitat assessments were completed across 10 survey periods determining the presence of any suitable habitat features for the species.	Survey effort considered adequate Survey effort was conducted in a range of habitats throughout the Study Area by suitably qualified ecologists, including suitable habitat of grassy eucalyptus woodlands and grasslands. No observation of the species occurred during field surveys however suitable habitat for breeding, foraging and dispersal was detected within the Study Area.
Fork-tailed swift (*Apus pacificus)*	-	Mi	Draft referral guidelines for 14 birds listed as migratory species under the EPBC Act (DoE, 2015) No survey guidelines specific to the fork-tailed swift – however, recommended to focus survey efforts from high vantage points. This species is found across a range of habitats (non-breeding habitats only), from inland plains to wooded areas. It is exclusively aerial.	171 dawn and dusk timed surveys (20 minutes), bird utilisation surveys across 38 locations in the Study Area.	Survey effort considered adequate Surveys were conducted from vantage points in the Study Area and done at the appropriate timing to detect the species. The species was not detected in any of the survey. The habitat in the Study Area, was not deemed suitable for the species to forage and roost in.
Listed Threatened Mammals					
Greater glider (southern & central) (*Petauroides volans)*	EN	E	Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (DES, 2018) Requires two-person 30-minute spotlight searches of 100 x 100 m survey site across multiple nights. This can include spotlighting up one side of the 100 x 100 m area and then spotlighting back the other side of the 100 x 100 m area. Scat and sign search can coincide with the systematic diurnal active searches, within 50 x 50 m quadrates of the survey site. Survey Guidelines for Australia's Threatened Mammals (DSEWPC, 2011) Bright moonlight aids in detecting greater gliders. Spotlighting should be at least two 200 m transects per 5 ha sites. It is also recommended there be 100 m between survey transects.	245 vegetation and habitat assessments were completed across 10 survey periods determining the presence of any suitable habitat features for the species, including any hollow-bearing trees within mature forests. 6 hours of spotlighting over two nights in October 2022. (Impacted by inclement weather). 12 hours of spotlighting over four nights in June 2023. 8 hours of spotlighting over two nights in September 2024. 5 x camera traps for 4 trap nights in suitable habitats.	Survey effort considered adequate • This species was observed on 14 occasions during June 2023 surveys, and on 10 occasions during the September 2024 surveys. • Diurnal searches were undertaken in areas of potential habitat for this species with the aim of identifying suitable microhabitat features, namely mature hollow-bearing trees with >20cm diameter hollows in areas of eucalypt forest. • Spotlighting surveys were undertaken by foot and slow vehicle within suitable habitats and vegetation communities, totalling 26 hours and 8 nights of survey effort.

Target Species	Listing Status		Survey Guidelines and Requirements	Sampling Technique / Effort	Comment on Survey Adequacy
	NC Act[1]	EPBC Act[2]			
Koala (Phascolarctos cinereus)	EN	E	Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (DES, 2018) Requires two- person 30-minute spotlight searches of 100 x 100 m survey site across multiple nights. This can include spotlighting up one side of the 100 x 100 m area and then spotlighting back the other side of the 100 x 100m area. Scat and sign search can coincide with the systematic diurnal active searches, within 50 x 50 m quadrates of the survey site. EPBC Act referral guidelines for the vulnerable koala (DoE, 2014) Strip transects which involve diurnal distance sampling and density searches. Nocturnal spotlighting for smaller sites to determine presence and density. Scats – Spot Assessment Technique (SAT) which involves looking at food trees for presence of koala scats.	245 vegetation and habitat assessments were completed across 10 survey periods determining the presence of any suitable habitat features for the species, including any eucalypt forest and riparian vegetation. 5 x camera traps for 4 trap nights in suitable habitats. 6 hours of spotlighting over two nights in October 2022. (Impacted by inclement weather). 12 hours of spotlighting over four nights in June 2023. 8 hours of spotlighting over two nights in September 2024, which included 8 call playback sessions for koala. 12 koala SATs conducted in suitable habitat to detect the species (diurnal searches).	Survey effort considered adequate • This species was not directly observed, a single faecal pellet was recorded during field surveys. One koala was also heard bellowing within the Survey Area at dusk during the September 2024 survey period prior to any call playback. • Diurnal searches during habitat assessments were conducted to indicate presence. • Spotlighting surveys were undertaken by foot and slow vehicle within suitable habitats and vegetation communities, totaling 26 hours and 8 nights of survey effort.
Large-eared pied-bat (*Chalinolobus dwyeri*)	VU	V	Survey guidelines for Australia's threatened bats (DEWHA, 2010) A combination of survey efforts is recommended for this species. This includes unattended bat detectors for 16 detector nights for a minimum of four nights and attended bat detectors for six detector hours for a minimum of three nights. It is also including harp traps and/or mist nets for 16 trap or net nights for a minimum of four nights. Surveys are best undertaken from October through to March.	10 Anabats have been deployed in 10 locations within the Study Area (all for 4 nights), for a total of 40 Anabat trapping nights. 245 vegetation and habitat assessments were completed across 10 survey periods determining the presence of any suitable habitat features for the species, including any camps or roosting sites. Assessment of potential roosting sites was extended to areas adjacent the Study Area.	Survey effort considered adequate to detect large-eared pied bat. • This species' call was recorded as 'probable' on Anabat devices deployed across five locations in the October 2022, February and March 2023 surveys. • urveys were conducted in suitable habitat of well-vegetated areas such as eucalypt forest and in the appropriate seasons of October to March.
Yellow-bellied glider (south-eastern) (*Petaurus australis australis)*	VU	V	Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (Eyre et al. 2022) Feeding mark searches on trees are an effective way to identify this species. This is because these gliders use their teeth to incise tree bark for feeding. A list of tree species the yellow-bellied glider prefers is found in the guidelines. Call playback is another method that can detect this species. This method involves conducting playback on two occasions over different nights in a survey area. This is then followed by a 5-minute listening period for un-elicited calls. These surveys must be done on numerous occasions however, given the species large home range and mobility. Recommended four spotlight/call playback surveys to a site (two in each survey event).	245 vegetation and habitat assessments were completed across 10 survey periods determining the presence of any suitable habitat features for the species, including any hollow-bearing trees within mature forests. 6 hours of spotlighting over two nights in October 2022. (Impacted by inclement weather). 12 hours of spotlighting over four nights in June 2023. 8 hours of spotlighting over two nights in September 2024, which included 8 call playback sessions for yellow-bellied glider. 5 x camera traps for 4 trap nights in suitable habitats.	Survey effort considered adequate No yellow-bellied gliders were observed from diurnal surveys, nocturnal surveys, or by the presence of feeding marks located within the Study Area. Suitable foraging habitat was observed, therefore the species is considered as potentially occurring.

Target Species	Listing Status		Survey Guidelines and Requirements	Sampling Technique / Effort	Comment on Survey Adequacy
	NC Act[1]	EPBC Act[2]			
South-eastern long-eared bat (*Nyctophilus corbeni*)	VU	V	Survey guidelines for Australia's threatened bats (DEWHA, 2010) A combination of survey efforts is recommended for this species. This includes unattended bat detectors for 16 detector nights for a minimum of four nights and attended bat detectors for six detector hours for a minimum of three nights. It also includes harp traps and/or mist nets for 16 trap or net nights for a minimum of four nights. Surveys are best undertaken from October through to March.	10 Anabats have been deployed in 10 locations within the Study Area (all for 4 nights), for a total of 40 Anabat trapping nights across the October 2022, February and March 2023 survey periods. 245 vegetation and habitat assessments were completed across 10 survey periods determining the presence of any suitable habitat features for the species, including any camps or roosting sites. Assessment of potential roosting sites was extended to areas adjacent the Study Area.	Survey effort considered adequate to detect south-eastern long-eared bat Diurnal habitat assessments were conducted, which identified potential foraging and roosting habitat of ironbark woodland present within the Study Area. Anabats were deployed in suitable habitat of well-vegetated areas such as eucalypt forest and in the appropriate seasons of October to March. A *Nyctophilus sp*. call was recorded as 'possible' at detectors deployed across seven locations in the October 2022, February 2023 and March 2023 surveys.
Ornamental snake (*Denisonia maculata*)	VU	V	Survey guidelines for Australia's threatened reptiles (DSEWPC, 2011) Searches of suitable gilgai habitat (small depressions and mounds in clay soils) while preferred prey species (frogs) are active. Diurnal searches under sheltering sites such as rocks, logs or other large objects on the ground. EPBC Act - Draft Referral guidelines for the nationally listed Brigalow Belt reptiles (DCCEEW, 2023) Spotlighting transects targeting water-inundated gilgais, wetlands, riparian habitats and surrounding environments and large logs between dusk and early morning hours, ideally on warm and humid evenings. Opportunistic road surveys while driving along roadways in the identified study area, especially following large rainfall events and on warm evenings. Microhabitat searches during the coolest parts of the day, including carefully turning woody debris, rocks and artificial debris, raking the soil surface or leaf litter beneath trees.	245 vegetation and habitat assessments were completed across 10 survey periods determining the presence of any suitable habitat features for the species, including any *Acacia*-dominated vegetation communities, areas with cracking clay soils or gilgais. Searches for reptiles involved turning over potential sheltering sites such as rocks, logs and debris. Assessments were undertaken across six surveys events in both the wet and dry seasons (October 2022, March, June and September/October 2023, June and September 2024). 6 hours of spotlighting over two nights in October 2022 (impacted by inclement weather). 12 hours of spotlighting over four nights in June 2023. 8 hours of spotlighting over two nights in September 2024.	Survey effort considered adequate No ornamental snakes were observed from diurnal searches. No suitable habitat was identified during field surveys due to the absence of microhabitat features and the abundance of cane toads observed.

- [1] NC Act status: EN = endangered; VU = vulnerable

[2] EPBC Act status: E = endangered; V = vulnerable; Mi = Migratory

[3] Satin flycatcher and rufous fantail were originally included in the referral information and assessed for potential impacts of the Proposed Action. Following recent changes to the EPBC Act Migratory Species list, these species no longer require assessment under the EPBC Act as MNES and are therefore not assessed as part of this PER.

4.8.6 HABITAT ASSESSMENT FOR MNES

In order to map habitat for listed threatened and/or migratory species and threatened communities known, likely or potentially occurring, the Study Area was divided into BHT. BHTs were identified based on vegetation community type and structure and ground-truthed during field surveys. These BHTs were used to map habitat for listed threatened and/or migratory species and threatened communities, based on the specific habitat requirements and preferences of the species/communities. For some species (e.g. yellow-bellied glider), regional ecosystem mapping was also used in conjunction with BHTs to delineate the extent of habitat. BHTs within the Study Area are outlined in Section 4.7.

4.8.6.1 MNES HABITAT MAPPING

The mapped habitat for threatened and/or migratory species and threatened communities listed under the EPBC Act has been categorised with consideration of the SIG 1.1 (DoE, 2013). Habitat definitions within the SIG 1.1 relevant to this assessment are:

- Habitat critical to the survival of a species (relevant to vulnerable, endangered and critically endangered flora, fauna and ecological communities); and
- Important Habitat (relevant to migratory species).

Individual species/ecological communities approved conservation advice or recovery plans were used to provide species-specific description of habitat critical to the survival of the species and important habitat where appropriate.

Each relevant MNES known, likely or potential to occur within the Study Area is assessed against the SIG 1.1 to determine if the Proposed Action will result in a significant impact to that MNES.

Habitat critical to the survival of a species

For all EPBC Act listed species and ecological communities, 'habitat critical to survival of the species' is referenced within the relevant Significant Impact Assessment (SIA) criteria. As defined in the SIG 1.1 (DoE, 2013), habitat critical to the survival of a species or ecological communities are areas that are necessary:

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

Such habitat maybe, but is not limited to: habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the minister under the EPBC Act.

Important Habitat

For migratory species, 'important habitat' is referenced within the relevant SIA criteria. As defined in the SIG 1.1 (DoE, 2013), important habitat is:

- Habitat utilised by a migratory species occasionally or periodically within a *region that supports an ecologically significant proportion of the population of the species; and/or*
- *Habitat that is of critical importance to the species at particular life-cycle stages; and/or*
- *Habitat utilised by a migratory species which is at the limit of the species range; and/or*
- *Habitat within an area where the species is declining.*

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Theodore Wind Farm

Public Environment Report – Matters of National Environmental Significance (Section 5)

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ACRONYMS AND ABBREVIATIONS

Acronym	Description
ALA	Atlas of Living Australia
BACI	Before-After-Control-Impact
BHT	Broad Habitat Types
BUS	Bird Utilisation Survey
CRM	Collision Risk Model
DBH	Diameter at Breast Height
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DESI	Department of Environment, Science and Innovation
DEWHA	Department of Environment, Water, Heritage and the Arts
Disturbance Footprint	The area whereby the final layout and impacts have been considered and occupies an area of 1,590.1 ha.
E	Endangered
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
GBRMP	Great Barrier Reef Marine Park
MHQA	Modified Habitat Quality Assessment
Mi	Migratory
MNES	Matters of National Environmental Significance
NSW	New South Wales
PMST	Protected Matters Search Tool
Project Area	The corridor of land on which the Disturbance Footprint will be located, including a 100 metre buffer for micro-siting.
QLD	Queensland
REs	Regional Ecosystems
SATs	Spot Assessment Technique
SIG 1.1	Significant Impact Guidelines 1.1 – Matters of National Environmental Significance
SPRAT	Species Profile and Threats Database
State Code 23	Queensland State Code 23 – Wind farm developments
Study Area	The 9 land parcels, across 3 properties, and road reserve areas, 46,830 ha, in which the Proposed Action will be located.
TECs	Threatened Ecological Community
The Proponent	Theodore Energy Development Pty Ltd
V	Vulnerable
VCA	Vegetation Classification and Assessment
WTG	Wind Turbine Generator

5. MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

5.1 SUMMARY OF MNES OCCURRENCE

The Matters of National Environmental Significance (MNES) relevant to the Study Area are summarized in Table 5-1, with detailed descriptions provided in the Sections following.

Four *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed threatened fauna species were considered likely or known to occur in the Study Area. Two Threatened Ecological Communities (TEC) were determined known to occur.

Five listed threatened fauna species, six listed threatened flora species and two migratory species were determined to potentially occur within the Study Area. Although no recent records of these species occur within the Study Area or Locality, and no observations were made during field surveys, the potential future presence of these species cannot be ruled out due to an overlap of distribution and potential general habitat within the Study Area. The final likelihood of occurrence for known, likely and potential species is attached in Appendix C.

TABLE 5-1 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE IN THE STUDY AREA

Matter	Relevance to the Study Area
World heritage properties	There are no world heritage properties within the Study Area.
National heritage properties	There are no national heritage properties within the Study Area.
Wetland of international importance	There are no wetlands of international importance associated with the Study Area.
Threatened species and ecological communities	The PMST identified five EPBC Act listed TECs with potential to occur within the Study Area. Based on in-situ ground-truthing via completion of quaternary vegetation assessments and BioCondition transects, as well as desktop assessment of aerial imagery, **two** TECs have been considered known to occur: • Poplar Box Grassy Woodland on Alluvial Plains; and • Brigalow (*Acacia harpophylla* dominant and co-dominant). Based on direct observations of species or species habitat during targeted field surveys, **four** EPBC Act listed threatened species have been concluded as known or likely to occur. • Squatter pigeon (southern) (*Geophaps scripta scripta*) - listed as Vulnerable under the EPBC Act (known); • Koala (*Phascolarctos cinereus*) - listed as Endangered under the EPBC Act (known); • Greater glider (southern and central) (*Petauroides volans*) - listed as Endangered under the EPBC Act (known); and • Large-eared pied bat (*Chalinolobus dwyeri*) – listed as Endangered under the EPBC Act (likely). **Five** additional EPBC Act listed fauna species are considered to have the potential to occur, due to the presence of general habitat for these species observed within the Study Area and recent records in the Locality, including: • Black-breasted buttonquail (*Turnix melanogaster*), listed as Vulnerable under the EPBC Act; • White-throated needletail (*Hirundapus caudacutus*), listed as Vulnerable under the EPBC Act;

Matter	Relevance to the Study Area
	• Australian painted snipe (*Rostratula australis*), listed as Endangered under the EPBC Act; • Diamond firetail (*Stagonopleura guttata*) listed as Vulnerable under the EPBC Act; and • Yellow-bellied glider (south-eastern) (*Petaurus australis australis*) listed as Vulnerable under the EPBC Act. No listed flora species have been assessed as known or likely to occur within the Study Area. Based on survey effort and habitat suitability, **six** listed threatened flora species have been assessed as having the potential to occur: • Ooline (*Cadellia pentastylis*), listed as Vulnerable under the EPBC Act; • Cossinia (*Cossinia australiana*), listed as Endangered under the EPBC Act; • Austral Cornflower (*Rhaponticum australe*), listed as Vulnerable under the EPBC Act; • *Solanum dissectum*, listed as Endangered under the EPBC Act; • *Solanum johnsonianum*, listed as Endangered under the EPBC Act; and • *Xerothamnella herbacea*, listed as Endangered under the EPBC Act.
Migratory species	There are **two**[1] listed migratory species under the EPBC Act regarded as having the potential to occur within the Study Area: • Fork-tailed swift (*Apus pacificus*); and • White-throated needletail (*Hirundapus caudacutus*).
Commonwealth marine area	There are no Commonwealth marine areas within the Study Area.
The Great Barrier Reef Marine Park	The Great Barrier Reef is not associated with the Study Area, however information relevant to assess the potential impacts of the Proposed Action on the Great Barrier Reef is provided in Section 5.5.
Nuclear actions	Not Applicable
Water resources	Not Applicable

[1]Satin flycatcher (*Myiagra cyanoleuca*) and rufous fantail (*Rhipidura rufifrons*) were originally included in the referral information and assessed for potential impacts of the Proposed Action. Following recent changes to the EPBC Act Migratory Species list, these de-listed species no longer require assessment under the EPBC Act as MNES and are therefore not assessed as part of this PER.

5.2 LISTED THREATENED ECOLOGICAL COMMUNITIES

The Protected Matters Seach Tool (PMST) results (Appendix B) indicated the possible occurrence of five EPBC Act listed TECs within the Study Area. Based on field surveys and a likelihood of occurrence assessment (Appendix C), two EPBC Act listed TECs were considered known to occur within the Study Area (Table 5-2). These TECs are further discussed in the following Sections.

A summary of the desktop review and field survey effort is discussed in Section 4.2 Ecological Investigations of the Theodore Wind Farm Public Environment Report (PER).

TABLE 5-2 LIKELIHOOD OF OCCURRENCE RESULTS (TECS)

Scientific Name	Common Name	EPBC Act Status	Likelihood of Occurrence
TEC			
Brigalow (*Acacia harpophylla* dominant and co-dominant)		E	Known
Poplar Box Grassy Woodland on Alluvial Plains		E	Known

EPBC Act listing status: E = Endangered.

5.2.1 BRIGALOW (*ACACIA HARPOPHYLLA* DOMINANT AND CO-DOMINANT)

Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC (Brigalow TEC) is listed as Endangered under the EPBC Act and is considered known to occur within the Study Area.

5.2.1.1 TEC DESCRIPTION

Brigalow TEC coincides with 16 Regional Ecosystems (REs) in Queensland (QLD) (listed in the *Approved Conservation Advice or the Brigalow (Acacia harpophylla dominant and co-dominant) ecological community* (DoE, 2013), as well as any regrowth patch of a sufficient size dominated or co-dominated by Brigalow (*Acacia harpophylla)* which has not been comprehensively cleared in 15 years.

Key Diagnostic Characteristics and Condition Thresholds

Brigalow TEC is limited to patches that meet the following key diagnostic characteristics and condition thresholds (DoE, 2013).

Key Diagnostic Characteristics

A patch must include the following key diagnostic characteristics to be considered the Brigalow ecological community (DoE, 2013):

3. The presence of *Acacia harpophylla* as one of the most abundant tree species in the patch. *A. harpophylla* is either dominant in the tree layer, or co-dominant with other species (notably *Casuarina cristata*, other species of *Acacia*, or species of *Eucalyptus*). **AND**
4. Either:

a. In QLD - the patch is in one of the following QLD bioregions (including outliers) and it meets the description of one of 16 QLD REs determined at the time of the national listing of the Brigalow ecological community under the EPBC Act. The 16 REs are, as described by the Queensland Herbarium (2013):

i. In the Qld Brigalow Belt Bioregion – REs 11.3.1, 11.4.3, 11.4.7, 11.4.8, 11.4.9, 11.4.10, 11.5.16, 11.9.1, 11.9.5, 11.9.6, 11.11.14 and 11.12.21;

ii. In the Qld Southeast Queensland Bioregion – REs 12.8.23, 12.9-10.6 and 12.12.26; or,

iii. In the QLD Mulga Lands Bioregion – RE 6.4.2. OR 2b). **OR**

b. In New South Wales (NSW) - the patch meets one of the following NSW Vegetation Classification and Assessment (VCA) community descriptions. The NSW VCA communities are: VCA IDs 29, 31 and 35; as described in Benson et al. (2006). **AND/OR**

c. The vegetation in the patch is brigalow regrowth with species composition and structural elements broadly typical of one of the identified QLD REs or NSW vegetation communities (although species density may be reduced). This can be assumed to be the case where it has been at least 15 years since it was last comprehensively cleared (not just thinned); unless direct evidence proves otherwise.

Condition Threshold

A patch must meet the following condition thresholds to be considered the Brigalow ecological community (DoE, 2013):

3. The patch is 0.5 ha or more in size; **AND**
4. Exotic perennial plants comprise less than 50% of the total vegetation cover of the patch, as assessed over a minimum sample area of 0.5 ha (100 m by 50 m), that is representative of the patch.

Additional Considerations

Additional considerations when applying key diagnostics and condition thresholds of Brigalow TEC are described in *Approved Conservation Advice or the Brigalow (Acacia harpophylla dominant and co-dominant) ecological community* (DoE, 2013). These additional considerations, including land use history, patch, buffer zone, revegetated areas and timing of surveys, have been reviewed and taken into consideration when assessing the presence of Brigalow TEC.

Areas critical to the survival of the ecological community

The areas considered critical to the survival of the Brigalow TEC includes (DoE, 2013):

> *All patches that meet the key diagnostic characteristics and condition thresholds for the ecological community; plus the buffer zones, particularly where these include native vegetation. Note that additional areas that do not meet the minimum condition thresholds may be critical to the survival of the ecological community depending on factors such as their size and shape, landscape linkages to other patches and landscape position; this is because they could retain some biodiversity, wildlife corridor, or habitat values.*

5.2.1.2 FIELD SURVEYS

Survey Methodology and Effort

One RE mapped as present within the Study Area (RE 11.12.21) coincides with Brigalow TEC. Survey effort for this TEC included 16 quaternary assessments in mapped vegetation patches of brigalow woodland (RE 11.12.21) as well as regrowth patches that were identified to have the required floristic composition. These surveys were completed across the October 2022, March 2023 and June 2023 survey periods.

Following these quaternary assessments, three BioCondition assessment transects have been completed to assess if the brigalow woodland patches (potential Brigalow TEC patches) identified from the initial quaternary assessments meet the key diagnostic criteria and conditions thresholds of the TEC (focusing particularly on the patches located within or near the Disturbance Footprint). These surveys were conducted across the September 2023, June 2024 and September 2024 survey periods.

For further detail on the ecological investigations completed within the Study Area, including desktop searches, survey timing and survey methodology, refer to Section 4.8.

Survey Results

More than 36 disjunct patches of potential Brigalow TEC have been mapped, with quaternary and/or BioCondition transects completed in 17 patches, mostly within or near the Disturbance Footprint, as shown in Figure 5-1. As a result of the initial vegetation assessments, a total of 8 patches of brigalow woodland (potential Brigalow TEC patches) were identified within the Disturbance Footprint. Of these patches, assessment concluded that:

- 3 patches met the key diagnostic criteria and condition thresholds and are considered ground-truthed Brigalow TEC patches; and
- 5 patches did not meet key diagnostic criteria or condition thresholds and are not considered Brigalow TEC.

Table 5-3 details how the key diagnostic criteria for the Brigalow TEC have been met based on data collected from field surveys and Table 5-4 details this assessment for each patch of potential Brigalow TEC within or near the Disturbance Footprint.

TABLE 5-3 KEY DIAGNOSTIC CRITERIA FOR BRIGALOW TEC AND RELEVANCE TO THE STUDY AREA

Key Diagnostic Criteria and Condition Threshold for TEC		Comment on Requirement met in Study Area
1	Presence of *Acacia harpophylla* as one of the most abundant tree species in the patch	A total of 10 potential Brigalow TEC patches were confirmed to have *Acacia harpophylla* as one of the most abundant tree species in the patch via quaternary or BioCondition transect. Patches that did not meet this diagnostic criterion were excluded from consideration.

Key Diagnostic Criteria and Condition Threshold for TEC		Comment on Requirement met in Study Area
2	Patch meets the description of one of 16 QLD REs that coincide with Brigalow TEC	A total of 23 patches of RE 11.12.21 were identified within the Study Area during the desk-top assessment. Ground-truthing via quaternary assessment or BioCondition transect occurred during field surveys which confirmed the presence of 11 patches of RE 11.12.21 within the Study Area. Potential Brigalow TEC patches that did not meet this diagnostic criteria were excluded from consideration.
3	The patch is ≥ 0.5 ha	A total of 16 potential Brigalow TEC patches are greater than 0.5 ha in size across the Study Area. Where patches smaller than this size occur, they have been excluded from consideration.
4	Exotic perennial plants comprise less than 50% of total vegetation cover of the patch.	All 17 patches of potential Brigalow TEC assessed within the Study were comprised of less than 50% exotic perennial plant cover.

TABLE 5-4 TEC ASSESSMENT OF POTENTIAL BRIGALOW TEC PATCHES WITHIN OR NEAR THE DISTURBANCE FOOTPRINT

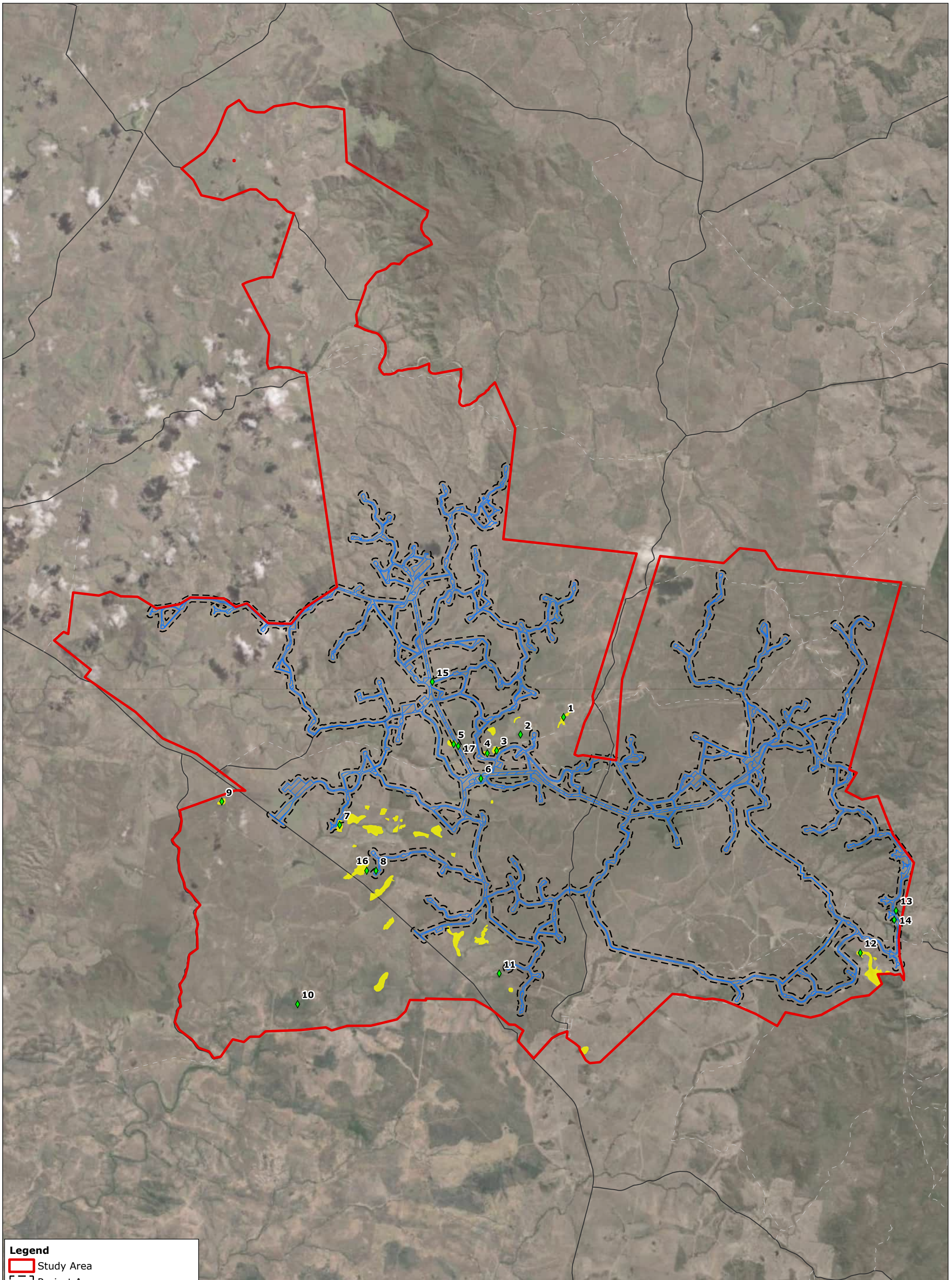
Potential Brigalow TEC Patch within or near the Disturbance Footprint	Key Diagnostic Criteria		Condition Threshold		Conclusion
	1 Presence of *Acacia harpophylla* as one of the most abundant tree species in the patch	2 Patch meets the description of one of 16 QLD REs that coincide with Brigalow TEC	3 The patch is ≥ 0.5 ha	4 Exotic perennial plants comprise less than 50% of total vegetation cover of the patch.	
1	✓	✓	✓	✓	Ground-truthed Brigalow TEC
2	×	×	✓	✓	Brigalow TEC not present
3	✓	✓	✓	✓	Ground-truthed Brigalow TEC
4	✓	✓	✓	✓	Ground-truthed Brigalow TEC
5	✓	✓	✓	✓	Ground-truthed Brigalow TEC
6	×	×	✓	✓	Brigalow TEC not present
7	✓	✓	✓	✓	Ground-truthed Brigalow TEC
8	✓	✓	✓	✓	Ground-truthed Brigalow TEC
9	✓	✓	✓	✓	Ground-truthed Brigalow TEC
10	×	×	✓	✓	Brigalow TEC not present
11	×	×	✓	✓	Brigalow TEC not present
12	✓	✓	✓	✓	Ground-truthed Brigalow TEC
13	×	×	✓	✓	Brigalow TEC not present
14	×	×	✓	✓	Brigalow TEC not present
15	✓	✓	✓	✓	Ground-truthed Brigalow TEC
16	✓	✓	✓	✓	Ground-truthed Brigalow TEC
17	✓	✓	×	✓	Brigalow TEC not present

✓ Key diagnostic criteria or condition threshold met
× Key diagnostic criteria or condition threshold not met - BioCondition not completed within patch

5.2.1.3 HABITAT ASSESSMENT AND MAPPING

Brigalow TEC mapping was conducted through the onsite verification of vegetation mapped as brigalow woodland (RE 11.12.21) as well as regrowth patches that were identified to have the required floristic composition. Particular focus was on patches of potential TEC located within or near the Disturbance Footprint, in an effort to accurately map the TEC that would potentially be impacted by the Proposed Action. As a result, all of the potential Brigalow TEC within the Disturbance Footprint has been delineated as ground-truthed Brigalow TEC, or discounted as not meeting the requirements to constitute Brigalow TEC.

Where field verification has not been completed, desktop imagery analyses and assessment of representative sampling points has been undertaken to assist with mapping of Brigalow TEC where possible. Where access difficulties and time constraints have limited survey effort, patches have conservatively been considered potential Brigalow TEC. All the mapped potential Brigalow TEC occurs outside of the Disturbance Footprint. For the purpose of this report, including the Impact Assessment (Section 6), the combined total of all ground-truthed and potential Brigalow TEC within the Study Area (225.5 ha) is considered Brigalow TEC, as presented in Figure 5-1. It should be noted that any TEC that occurs within the Disturbance Footprint and is considered in the Impact Assessment is ground-truthed Brigalow TEC.



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5.2.2 POPLAR BOX GRASSY WOODLANDS ON ALLUVIAL PLAINS TEC

Poplar Box Grassy Woodlands on Alluvial Plains TEC (Poplar Box TEC) is listed as Endangered under the EPBC Act and is considered known to occur within the Study Area.

5.2.2.1 TEC DESCRIPTION

Poplar Box Grassy Woodlands on Alluvial Plains TEC (Poplar Box TEC) is typically a grassy woodland with a canopy dominated by *Eucalyptus populnea* and understorey mostly of grasses and other herbs. It occurs in Queensland RE Land Zone 3 (quaternary alluvium deposited from stream flow) and Land Zone 4 (quaternary clay plains originating in ancient alluvium deposits) (DoEE, 2019). The TEC is best represented by five REs in QLD, though can occur outside of these mapped REs, including as regrowth vegetation (DoEE, 2019).

Key Diagnostic Characteristics and Condition Thresholds

For EPBC Act referral, assessment and compliance purposes, the nominated ecological community is limited to patches that meet the following diagnostic characteristics and condition thresholds. The additional factors noted in Section 3.2.3 and critical areas noted in Section 3.3 of the *Conservation Advice (including listing advice) for the Poplar Box Grassy Woodland on Alluvial Plains* (DoEE, 2019) should also be taken into consideration.

Key Diagnostic Characteristics

The Poplar Box TEC that is protected under national environment law consists of areas of vegetation (and associated biota) that meet the following key diagnostic characteristics:

Location and physical environment:

3. Occurs in the Brigalow Belt North, Brigalow Belt South, Southeast QLD, Cobar Peneplains, Darling Riverine Plains, NSW South Western Slopes, Riverina and Murray Darling Depression IBRA bioregions.
4. Associated with ancient and recent depositional alluvial plains with clay, clay-loam, loam and sandy loam, typically duplex soils or sodosols. This includes areas that may not be part of currently defined floodplains.

Structure:

1. A grassy woodland to grassy open woodland with a tree crown cover of 10% or more at patch scale.
2. A tree canopy must be present that shows these features:

- Canopy tree species are capable of reaching 10 m or more in height;
- *Eucalyptus populnea* (poplar box) must be present in the canopy and is the dominant tree species;
- Where hybrids of poplar box with other *Eucalyptus* sp. are present, they should be counted as part of the *Eucalyptus populnea* component of the tree canopy when assessing the previous criterion.

3. Mid layer (1-10 m) crown cover of shrubs to small trees is low, about 30% or less.
4. A ground layer (<1 m) mostly dominated across a patch by native grasses, other herbs and occasionally chenopods (during extended dry periods), ranging from sparse to thick (in response to canopy development, soil moisture, disturbance and/or management history).

5. A list of diagnostic native plant species and some of the key native fauna that make up the ecological community is given at Appendix A of the *Conservation Advice (including listing advice) for the Poplar Box Grassy Woodland on Alluvial Plains* (DoEE, 2019), although particular species may be abundant or rare, or not necessarily present, at every location.

Condition Threshold

6. The Poplar Box TEC that is protected under national environment law comprises patches that meet the key diagnostic characteristics (above) and at least the minimum condition thresholds (Moderate and High condition categories A, B, or C) set out in Table 5-5.

TABLE 5-5 POPLAR BOX TEC CONDITION THRESHOLD

Category and rationale	Native cover and diversity thresholds	Minimum patch size thresholds*
Class A Highest Quality		
Category A1 Little to no perennial weeds and diverse native understorey	The crown cover of canopy trees in the patch is ≥10% AND ≥ 90% of perennial vegetation cover in the ground layer is native AND ≥ 30 native plant species per patch in the ground layer	≥ 1 ha
Category A2 A large patch with low perennial weeds and diverse native understorey	The crown cover of canopy trees in the patch is ≥10% AND ≥70% of perennial vegetation cover in the ground layer is native AND ≥ 30 native plant species per patch in the ground layer	≥ 5 ha
Class B Good Quality		
Category B A large patch with good quality native understorey or with mature trees	The crown cover of canopy trees in the patch is ≥10% AND ≥ 50% of perennial vegetation cover in ground layer is native AND EITHER ≥ 20 perennial native plant species per patch in the ground layer OR ≥ 10 mature trees+ per ha with ≥ 30cm Diameter at Breast Height (DBH) (and/or hollows)	≥ 5 ha
Class C Moderate Quality		
Category C A large patch with low native cover but retains good native understorey diversity and habitat features of mature trees	The crown cover of canopy trees in the patch is ≥10% **AND** If < 50% of perennial vegetation cover in ground layer is native, then the patch must have: ≥ 20 native plant spp. per patch in the ground layer AND ≥ 10 mature trees per ha with ≥ 30cm DBH (and/or hollows) AND smaller trees, saplings or seedlings suggestive of periodic recruitment	≥ 5 ha

5.2.2.2 FIELD SURVEYS

Survey Methodology and Effort

Survey effort for this TEC included 18 quaternary assessments in accordance with Neldner et al, (2022) and five BioCondition transects in accordance with Eyre et al., (2015) in state-mapped vegetation patches of poplar box alluvial woodland. Surveys focused on the patches located within or near the Disturbance Footprint.

For further detail on the ecological investigations completed within the Study Area, including desktop searches, survey timing and survey methodology, refer to Section 4.8.

Survey Results

Three BioCondition transects and quaternary assessments confirmed the presence of the TEC due to meeting 'Class B Good Quality' key diagnostic condition criteria. Additionally, 10 quaternary assessments ground-truthed areas with suitable dominance in the canopy of *Eucalyptus populnea* (poplar box). The remaining quaternary assessments ruled out the TEC occurring due to inconsistent floristics. In total, assessments found:

- 5 patches of ground-truthed Class B Poplar Box TEC within the Study Area; and
- 13 patches of potential Poplar Box TEC within the Study Area.

Table 5-6 and Table 5-7 details how the Category B key diagnostic criteria and condition thresholds for the Poplar Box TEC were met based on data collected from field surveys.

TABLE 5-6 KEY DIAGNOSTIC CRITERIA FOR POPLAR BOX TEC AND RELEVANCE TO THE STUDY AREA

Key Diagnostic Criteria and Condition Threshold for TEC		Comment on Requirement met in Study Area
Key Diagnostics		
Location and Physical Environment		
1	Occurs in defined IBRA Bioregion	The entire Study Area is within the Brigalow Belt South IBRA Bioregion which meets key diagnostic criteria 1.
2	Associated with ancient and recent depositional alluvial plains with clay, clay-loam, loam and sandy loam, typically duplex soils or sodosols	All potential patches of Poplar Box TEC occur on QLD RE Land Zone 3 (quaternary alluvium deposited from stream flow).
Structure		
3	A grassy woodland to grassy open woodland with a tree crown cover of 10% or more at patch scale.	All potential patches of Poplar Box TEC within the Study Area were identified as having >10% crown cover, with *Eucalyptus populnea* accounting for dominant species in all canopies.
4	A tree canopy with defined features present.	

TABLE 5-7 KEY DIAGNOSTIC CRITERIA AND CONDITION THRESHOLD FOR POPLAR BOX TEC PATCHES WITHIN THE STUDY AREA

Potential Poplar Box TEC Patch within THE Study Area	Key Diagnostic Criteria			Condition Threshold (Class B Good Quality, Category B)			Minimum patch size thresholds	Conclusion
	5 Mid layer (1-10 m) crown cover low, ~ 30% or less	6 Ground layer (<1 m) mostly dominated by natives	7 Diagnostic native species present	The crown cover of canopy trees in the patch is ≥10% AND	Exotic perennial plants comprise less than 50% of total vegetation cover of the patch AND EITHER	≥ 20 perennial native species in ground layer OR ≥ 10 mature trees+ per ha with ≥ 30cm DBH	CLASS B ≥ 5 ha	
1	-	✓	✓	✓	-	-	✓	Potential Poplar Box TEC
2	✓	✓	✓	✓	✓	✓	✓	Ground-truthed Class B TEC
3	-	-	-	✓	-	-	✓	Potential Poplar Box TEC
4	-	✓	✓	✓	-	-	✓	Potential Poplar Box TEC
5	✓	✓	✓	✓	✓	✓	✓	Ground-truthed Class B TEC
6	-	✓	✓	✓	-	-	✓	Potential Poplar Box TEC
7	-	-	-	✓	-	-	✓	Potential Poplar Box TEC
8	-	-	-	✓	-	-	✓ [1]	Potential Poplar Box TEC
9	-	-	-	✓	-	-	✓	Potential Poplar Box TEC
10	-	-	-	✓	-	-	✓	Potential Poplar Box TEC
11	-	-	-	✓	-	-	✓	Potential Poplar Box TEC
12	-	✓	✓	✓	-	-	✓	Potential Poplar Box TEC
13	-	-	-	✓	-	-	✓ [1]	Potential Poplar Box TEC

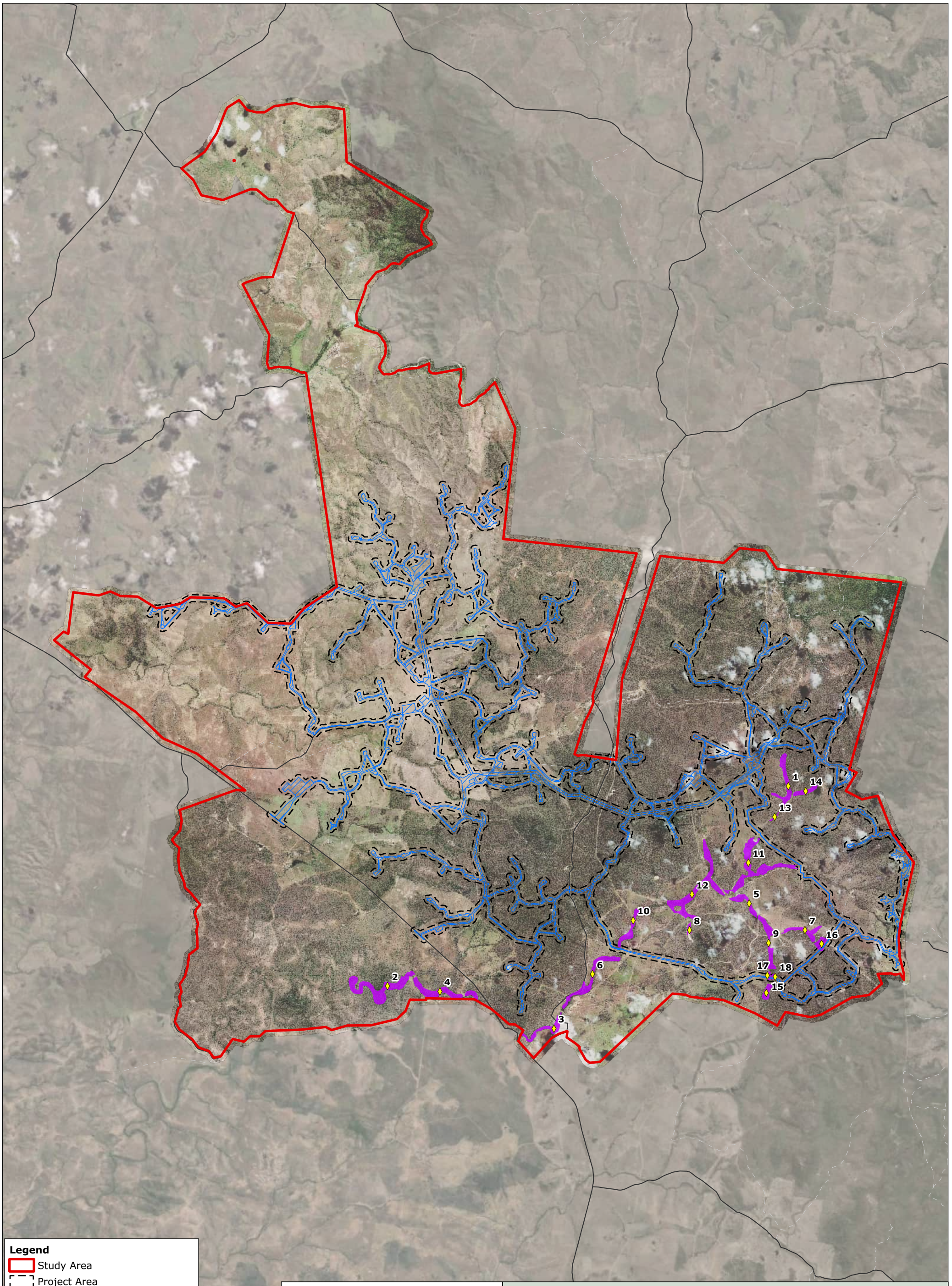
Potential Poplar Box TEC Patch within THE Study Area	Key Diagnostic Criteria			Condition Threshold (Class B Good Quality, Category B)			Minimum patch size thresholds	Conclusion
	5 Mid layer (1-10 m) crown cover low, ~ 30% or less	6 Ground layer (<1 m) mostly dominated by natives	7 Diagnostic native species present	The crown cover of canopy trees in the patch is ≥10% AND	Exotic perennial plants comprise less than 50% of total vegetation cover of the patch AND EITHER	≥ 20 perennial native species in ground layer OR ≥ 10 mature trees+ per ha with ≥ 30cm DBH	CLASS B ≥ 5 ha	
14	-	-	-	✓	-	-	✓	Potential Poplar Box TEC
15	-	-	-	✓	-	-	✓	Potential Poplar Box TEC
16	✓	✓	✓	✓	✓	✓	✓	Ground-truthed Class B TEC
17	✓	✓	✓	✓	✓	✓	✓ [2]	Ground-truthed Class B TEC
18	✓	✓	✓	✓	✓	✓	✓ [2]	Ground-truthed Class B TEC

✓ Key diagnostic criteria or condition threshold met
× Key diagnostic criteria or condition threshold not met
- BioCondition not completed within patch
1 Patches 8 and 13 are each below 5 ha (3.3 ha and 1.3 ha respectively) however were not able to be adequately surveyed to rule out meeting criteria for Class A Highest Quality, Category A1 Poplar Box TEC (minimum patch size thresholds ≥ 1 ha), and have therefore been included as potential Poplar Box TEC.
2 Patches 17 and 18 are below 5 ha individually (3.2 ha and 2.2 ha respectively) however are separated by non-TEC native vegetation and are close enough to ecologically function as a single patch, and have therefore been included as ground-truthed Class B Poplar Box TEC.

5.2.2.3 HABITAT ASSESSMENT AND MAPPING

Poplar Box TEC has been mapped to occur within the southeast of the Study Area in 18 relatively well-connected patches associated with RE 11.3.2 along Oxtrack Creek, as shown in Figure 5-2. Poplar Box TEC mapping was conducted through the onsite verification of state-mapped vegetation patches of poplar box alluvial woodland. Particular focus was on patches of potential TEC located within or near the Disturbance Footprint, in an effort to accurately map the TEC that would potentially be impacted by the Proposed Action. As a result, all of the mapped potential Poplar Box TEC within the Disturbance Footprint has been delineated as ground-truthed Poplar Box TEC, or discounted as not meeting the requirements to constitute Poplar Box TEC.

In patches of Poplar Box TEC where in-situ assessment has not been completed, satellite imagery analyses and assessment of representative sampling points has been undertaken to assist mapping of the TEC. Where access difficulties and time constraints have limited survey effort, patches have conservatively been considered potential Poplar Box TEC. All the mapped potential Poplar Box TEC occurs outside of the Disturbance Footprint. For the purpose of this report, including the Impact Assessment (Section 6), the combined total of all ground-truthed and potential Poplar Box TEC within the Study Area (478.4 ha) is considered Poplar Box TEC, as presented in Figure 5-2. It should be noted that any TEC that occurs within the Disturbance Footprint and is considered in the Impact Assessment is ground-truthed Poplar Box TEC.



F5-2 Poplar Box Woodland TEC Mapping in the Study Area

Theodore Wind Farm PER

Theodore Energy Developments Pty Ltd

ERM

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5.3 LISTED THREATENED SPECIES

The following Sections summarise the occurrence of and habitat for EPBC Act listed threatened species determined known, likely or potential to occur within the Study Area based on desktop assessments and field surveys. Species identified in the Theodore Wind Farm (EPBC 2024/09842) PER guidelines provided by Department of Climate Change, Energy, the Environment and Water (DCCEEW) and determined unlikely to occur are also discussed. The PMST results (Appendix B) indicated the possible occurrence of 38 EPBC Act listed threatened species within the Study Area. Based on field surveys and a likelihood of occurrence assessment (Appendix C), four EPBC Act listed threatened species were considered known or likely to occur within the Study Area (Table 5-8).

An additional 11 EPBC Act listed species have been assessed as having the potential to occur within the Study Area (Table 5-8). These species' distribution overlaps with the Study Area, with suitable habitat also occurring, which is supported by field assessments of habitat suitability and targeted species surveys conducted over 10 separate events. No observations of these species within the Study Area or Locality have been made to date, however their presence cannot be ruled out.

EPBC Act listed threatened species, determined known, likely or potential to occur within the Study Area are further discussed in the following Sections. A summary of the desktop review and field survey effort is discussed in Section 4.2 Ecological Investigations of the Theodore Wind Farm PER. Habitat assessment methodology, including the use of broad habitat types (BHTs) to delineate threatened species habitat within the Study Area, is discussed in Section 4.2.6 of the Theodore Wind Farm PER.

TABLE 5-8 LIKELIHOOD OF OCCURRENCE RESULTS (THREATENED SPECIES)

Scientific Name	Common Name	EPBC Act Status	Likelihood of Occurrence
Mammals			
Petauroides volans	Greater glider (southern and central)	E	Known
Petaurus australis australis	Yellow-bellied glider (south-eastern)	V	Potential
Phascolarctos cinereus	Koala	E	Known
Chalinolobus dwyeri	Large-eared pied-bat	E	Likely
Nyctophilus corbeni	South-eastern long-eared bat	V	Unlikely
Birds			
Geophaps scripta scripta	Squatter pigeon (southern)	V	Known
Hirundapus caudacutus	White-throated needletail	V and Mi	Potential
Turnix melanogaster	Black-breasted buttonquail	V	Potential
Rostratula australis	Australian painted snipe	E	Potential

Scientific Name	Common Name	EPBC Act Status	Likelihood of Occurrence
Stagonopleura guttata	Diamond firetail	V	Potential
Reptiles			
Denisonia maculata	Ornamental snake	V	Unlikely
Flora			
Cadellia pentastylis	Ooline	V	Potential
Rhaponticum australe	Austral cornflower	V	Potential
Cossinia australiana	Cossinia	E	Potential
Xerothamnella herbacea		E	Potential
Solanum johnsonianum		E	Potential
Solanum dissectum		E	Potential

EPBC Act listing status: E = Endangered, V = Vulnerable, Mi = Migratory

5.3.1 GREATER GLIDER (SOUTHERN AND CENTRAL)

The greater glider (southern and central) (*Petauroides volans)* (greater glider) was upgraded from a listing of Vulnerable to Endangered under the EPBC Act, on the 5th of July 2022. It is noted in the Conservation Advice that two separate taxa of subspecies likely co-exist in this area. However, until such ambiguity is resolved, the listed entity will be referred to as *Petauroides volans* (DCCEEW, 2022a). This species was concluded as known to occur within the Study Area as per the likelihood of occurrence assessment (Appendix C).

5.3.1.1 SPECIES DISTRIBUTION AND HISTORICAL RECORDS

The greater glider occurs in eastern Australia, where it has a broad distribution from around Proserpine in QLD, south through NSW and the ACT, to Wombat State Forest in central VIC, preferring an elevational range of 0−1200 m above sea level (DCCEEW, 2022a). The Study Area is within the 'species or species habitat likely to occur' modelled distribution of the species (DCCEEW, 2024a) (Figure 5-3). There is a total of four historical records of greater glider, one recent (within the past 20 years) Atlas of Living Australia (ALA) record (2020) (ALA, 2024), and three outdated (recorded more than 20 years ago) Wildnet records (2002), within the Locality.



FIGURE 5-3 GREATER GLIDER MODELLED DISTRIBUTION (DCCEEW, 2024A) AND RECORDS (ALA, 2024)

5.3.1.2 HABITAT REQUIREMENTS

Greater glider habitat consists of tall, eucalypt forests with mature hollow-bearing trees (Eyre T. , 2004). The species has an affinity for habitats dominated or co-dominated by *Corymbia citriodora, E. moluccana, E. tereticornis, E. crebra, C. intermedia* and *E. portuensis* (Eyre, et al., 2022). Eyre (2002) notes, within southern Queensland, greater glider requires a density of at least 2-4 live den trees per ha of suitable forest habitat. The species also demonstrates a 'preference for large hollows (diameter >10cm) in large, old trees' (DCCEEW, 2022a), though it is noted that the species will utilise both living and dead trees. Most studies of the species have demonstrated that they generally have small home ranges (<3 ha) (Eyre, et al., 2022).

The *Guide to greater glider habitat in Queensland* (Eyre, et al., 2022) includes the following definitions of habitat for the species:

> *Habitat*
>
> - *Regional ecosystems with confirmed greater glider records.*
> - *Contains habitat attributes (but not necessarily all attributes), such as live and dead hollow-bearing trees for denning, feed trees, large trees, habitat connectivity across the landscape.*
>
> *Potential habitat*
>
> - *Regional ecosystems that do not have confirmed greater glider records but are identified by experts as potential greater glider habitat.*
> - *Contains habitat attributes (but not necessarily all attributes), such as live and dead hollow-bearing trees for denning, feed trees, large trees, habitat connectivity across the landscape.*
>
> *Not habitat*
>
> - *Regional ecosystems with no confirmed records of greater gliders, and identified by experts as non-habitat.*
> - *Does not contain habitat attributes such as live and dead hollow-bearing trees for denning, feed trees, large trees, habitat connectivity across the landscape.*

Specifically, in Central Queensland, greater glider preferred habitat includes the following characteristics:

- Remnant connected eucalypt woodlands and forests containing more than 2 hollow bearing trees per 2 ha, with hollow entrance diameters greater than 10 cm;
- Preferred foraging tree species:
  - Trees >30 cm in DBH;
  - Species including:
    - Red ironbark (*E. fibrosa*);
    - Gum-topped box (*E. moluccana*); and
    - Lemon-scented spotted gum (*C. citriodora*).
- Preferred denning trees include:
  - Trees >50 cm DBH, as trees greater than 50 cm DBH are more likely to contain suitable hollows for the species (Eyre, et al., 2022);
  - Species including:
    - Forest red gum (*E. tereticornis*);
    - Lemon-scented spotted gum (*C. citriodora*);
    - River red gum (*E. camaldulensis*).

Other suitable foraging and/or denning trees for the greater glider in Central Queensland include coolibah (*E. coolabah*), narrow-leaved ironbark (*E. crebra*), silver-top stringybark (*E. laevopinea*), mountain coolibah (*E. orgadophila*), poplar box (*E. populnea*), silver-leaved ironbark (*E. melanophloia*) and Moreton Bay ash (*C. tessellaris*).

Habitat Critical to the Survival of the Species

Habitat critical to survival for the greater glider has been defined in *Conservation Advice for Petauroides volans (Greater Glider (southern and central))* (DCCEEW, 2022a) as:

- *Large contiguous areas of eucalypt forest, which contain mature hollow-bearing trees and a diverse range of the species' preferred food species in a particular region; and*
- *Smaller or fragmented habitat patches connected to larger patches of habitat, that can facilitate dispersal of the species and/or that enable recolonization; and*
- *Cool microclimate forest/woodland areas (e.g., protected gullies, sheltered high elevation areas, coastal lowland areas, southern slopes); and*
- *Areas identified as refuges under future climate changes scenarios; and*
- *Short-term or long-term post-fire refuges (i.e., unburnt habitat within or adjacent to recently burnt landscapes) that allow the species to persist, recover and recolonise burnt areas.*

5.3.1.3 FIELD SURVEYS

Survey Methodology and Effort

In lieu of species-specific guidelines, a targeted survey approach was implemented to assess the presence of greater glider, and potential habitat, in line with *Survey guidelines for Australia's threatened mammals* (DSEWPC, 2011a), *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland* (DES, 2022), and *Guide to greater glider habitat in Queensland* (Eyre, et al., 2022).

A total of 26 hours of two-person targeted spotlighting searches were conducted throughout the Study Area across three survey periods:

- October 2022 – six hours of spotlighting transects over two nights;
- June 2023 – 12 hours of spotlighting transects over four nights; and
- September 2024 – eight hours of spotlighting transects over two nights.

Additionally, 245 vegetation and habitat assessments were completed across the Study Area during the 10 survey periods.

For further detail on the ecological investigations completed within the Study Area, including desktop searches, survey timing and survey methodology, refer to Section 4.8.

Survey Results

Greater glider was recorded within the Study Area during targeted spotlighting surveys in the June 2023 survey period, with 14 individuals observed in the south-east and central north of the Study Area. An additional 10 individuals were also observed during the September 2024 survey period. Field survey observations and historical records are included in Figure 5-4.

Survey Adequacy

Considering relevant guidelines and recommendations, the field survey methodology and effort has been considered adequate for this species. Survey guideline advice for the greater glider and field survey effort and adequacy are outlined in Table 5-9.

TABLE 5-9 GREATER GLIDER FIELD SURVEY EFFORT

Survey Guidelines and Recommendations	Survey Effort Utilised and Timing	Comment on Field Survey Adequacy
Arboreal mammal survey methods adopted from the *Survey Guidelines for Australia's Threatened Mammals* (DSEWPC, 2011): • Diurnal searches for the presence of potentially suitable habitat resources for nest or den sites as well as signs of the species' presence, such as scratches on tree trunks and scats beneath trees. • Stag watching. • Spotlight surveys in suitable vegetation types. Bright moonlight aids in detecting greater gliders. Spotlighting should be at least two 200 m transects per 5 ha sites. It is also recommended there be 100 m between survey transects. As per the Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (DES, 2018): • Spotlighting transects are the most effective method. • Where possible, survey effort should target habitat known to be suitable for listed species Spotlighting requires two-person 30-minute searches of 100 x 100 m survey site across multiple nights. This can include spotlighting up one side of the 100 x 100 m area and then spotlighting back the other side of the 100 x 100 m area. The *Guide to greater glider habitat in Queensland* (Eyre, et al., 2022) includes the following advice (further outlined above in Section 4: • Preferred foraging tree species include trees >30 cm DBH; and • Preferred denning trees include trees >50 cm DBH.	245 diurnal vegetation and habitat assessments determining the presence of suitable habitat features for the species, including any hollow-bearing trees within mature eucalypt forests. Assessments undertaken across surveys events in both the wet and dry seasons (October 2022, March, June and September/October 2023, June and September 2024). 6 hours of spotlighting over two nights in October 2022 (impacted by inclement weather). 12 hours of spotlighting over four nights in June 2023. 8 hours of spotlighting over two nights in September 2024. 4 x camera traps deployed for 4 trap nights in October 2022 within suitable habitat, totalling 16 trap nights.	Survey effort considered adequate. Diurnal searches were undertaken in areas of potential habitat for this species with the aim of identifying suitable microhabitat features, namely mature hollow-bearing trees with >20cm diameter hollows in areas of eucalypt forest. DBH measurements were taken within suitable eucalypt forests to delineate potential foraging and denning habitat. Suitable denning and foraging habitat were located. Spotlighting surveys were undertaken on foot and in slow moving vehicles within suitable habitats and vegetation communities, totalling 26 hours across 8 nights of survey effort. This species was observed on 14 occasions during June 2023 surveys, and on 10 occasions during the September 2024 surveys.

5.3.1.4 HABITAT ASSESSMENT AND MAPPING

Greater glider habitat within the Study Area can be considered to include large contiguous areas of eucalypt forest containing mature hollow-bearing trees and a diverse range of preferred food species, as well as smaller or fragmented habitat patches connected to larger patches of habitat. Suitable greater glider foraging and denning habitat has been identified within the Study Area based on ground-truthing of habitat attributes and confirmed records of the species during survey effort.

BHT mapping has been used to identify habitat suitable for denning and foraging for greater glider within the Study Area, as well as generally unsuitable habitat for the species.

In accordance with habitat guidance provided by Eyre, et al. (2022)), and the Theodore Wind Farm (EPBC 2024/09842) PER guidelines provided by DCCEEW, mapping was refined to areas with eucalypt forest or woodland containing the following parameters:

Likely/Current Denning Habitat

- Habitat contains a suitable density of appropriate mature, hollow-bearing canopy trees greater than the relevant RE threshold for large trees stated in the *Guide to greater glider habitat in Queensland* (Eyre, et al., 2022);
- Habitat contains a diverse range of the species' preferred food trees;
- Likely/Current Denning Habitat predominantly includes remnant vegetation.

Potential Denning Habitat

- Habitat contains some appropriate hollow-bearing canopy trees, less than a suitable density of relevant RE large trees though typically trees >30 cm DBH are present;
- Habitat contains a diverse range of the species' preferred food trees;
- Potential Denning Habitat predominantly includes remnant or advanced regrowth vegetation that has been subject to historical disturbance.

Foraging and Dispersal Habitat

- Any eucalypt forest or woodland containing appropriate tree species for greater glider;
- Habitat lacks appropriate hollow-bearing canopy trees;
- Trees and canopy dense enough to allow the species to glide from tree to tree, and to disperse between other patches of habitat;
- Foraging and Dispersal Habitat includes remnant and regrowth vegetation connected to denning habitat.

Ground-truthed surveys have identified 1,662.1 ha of greater glider Likely/Current Denning Habitat, 381.4 ha of Potential Denning Habitat, and 20,070.2 ha of Foraging and Dispersal Habitat within the Study Area, which meets the definition of habitat critical to the survival of the species. There is also 24,658.9 ha of generally unsuitable habitat within the Study Area. It should be noted that greater glider habitat has been identified based on the habitat requirements discussed within Section 5.3.1.2, and includes both remnant and non-remnant vegetation. In total, 233.8 ha of Likely/Current Denning Habitat and 147.2 ha of Potential Denning Habitat lies within non-remnant vegetation.

Greater glider habitat mapping is presented in Figure 5-4, with a summary of mapped habitat in the Study Area presented below in Table 5-10.

TABLE 5-10 GREATER GLIDER HABITAT SUMMARY IN THE STUDY AREA

	Likely/Current Denning Habitat	**Potential Denning Habitat**	**Foraging and Dispersal Habitat**	**Generally Unsuitable Habitat**
Description	Any eucalypt forest or woodland containing appropriate tree species and mature, hollow-bearing canopy trees greater than relevant RE large tree thresholds, plus a diverse range of the species' preferred food trees. This predominantly includes remnant vegetation.	Any eucalypt forest or woodland containing appropriate tree species and some mature, hollow-bearing canopy trees >30 cm DBH, plus a diverse range of the species' preferred food trees. This predominantly includes regrowth vegetation.	Any eucalypt forest or woodland containing a range of the species' preferred food trees and canopy dense enough to allow the species to glide from tree to tree. This includes remnant and regrowth vegetation.	Unsuitable habitat includes vegetation communities which do not provide sufficient foraging function (absence of eucalypt species) or which do not provide suitable denning function (absence of mature hollows).
Mapped habitat within the Study Area (by BHT)	Suitably large and connected communities of: • Riparian woodland and open forests dominated by *E. tereticornis* often associated with stream channels; • In areas with predominantly remnant vegetation; and • Contains a suitable density of appropriate mature, hollow-bearing canopy trees greater than the relevant RE threshold for large trees.	• Suitably large and connected communities of: • Riparian woodland and open forests dominated by *E. tereticornis* often associated with stream channels; • In areas with predominantly remnant or advanced regrowth vegetation that has been subject to historical disturbance; and • Contains some appropriate hollow-bearing canopy trees, less than a suitable density of relevant RE large trees though typically trees >30 cm DBH are present.	Suitably large and connected communities of: • Eucalypt woodland and open forest dominated by *E. crebra* with a grassy understorey.	• Vine forests/thickets and dry rainforest; • Waterbodies and drainage features (predominately farm dams); • Brigalow woodlands; and • Grasslands and cultivated agricultural land.
Total in the Study Area (ha)	1,662.1	381.4	20,070.2	24,659.8
Total in the Project Area (ha)	104.7	8.4	2,899.4	3,724.9

Legend

- Study Area
- Project Area
- Proposed Disturbance Footprint

Greater Glider Habitat

- Likely/current denning habitat
- Foraging/dispersal habitat
- Potential/future denning habitat
- Road
- Track and Path
- Greater Glider – Field Observations
- Greater Glider Historical Record (Wildnet, 2002)

Coordinate System: GDA2020 MGA Zone 56
Date: 07/05/2026
Created By: MB
Drawing Size: A3

0 2 4Km

1:120,000

F5-4 Greater Glider (Southern and Central) Habitat and Occurrence in the Study Area

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5.3.2 YELLOW-BELLIED GLIDER (SOUTH-EASTERN)

The yellow-bellied glider (south-eastern) (*Petaurus australis australis*) (yellow-bellied glider) is listed as Vulnerable under the EPBC Act, effective from 2 March 2022. It is noted in the Conservation Advice that two subspecies are recognised and accepted, which includes an isolated northern subspecies in the Wet Tropics, but have not yet been formally described (DAWE, 2022a). In this assessment, the listed entity referred to is *Petaurus australis australis*. This species is considered to have the potential to occur within the Study Area as per the likelihood of occurrence assessment (Appendix C).

5.3.2.1 SPECIES DISTRIBUTION AND HISTORICAL RECORDS

The yellow-bellied glider is found at altitudes ranging from sea level to 1400 m above sea level and has a widespread but patchy distribution from south-eastern QLD to far south-eastern SA, near the SA-VIC border. Most of the QLD distribution is coastal, extending southward from north of Mackay to the NSW-QLD border (DAWE, 2022a). The Study Area is within the 'species or species habitat may occur' modelled distribution of the species (DCCEEW, 2024a) (Figure 5-5). There are three historical records of yellow-bellied glider listed in the Wildnet search results and several in the Locality from 1998 (ALA, 2024), though these do not meet recency criteria (within 20 years) for the likelihood of occurrence assessment (outdated historical records). The majority of these records are from within the Camboon State Forest, which is located directly south-east of the Study Area and is connected through remnant vegetation.



FIGURE 5-5 YELLOW-BELLIED GLIDER MODELLED DISTRIBUTION (DCCEEW, 2024A) AND RECORDS (ALA, 2024)

5.3.2.2 HABITAT REQUIREMENTS

Habitat for yellow-bellied glider broadly includes wet and dry eucalypt-dominated sclerophyll woodlands and forests. Forest age is a reliable determinant of abundance of the south-eastern sub-species, as they require mature old growth for foraging and shelter. Additionally, they show a preference for woodlands and forests that have a high proportion and diversity of winter-flowering and smooth-barked eucalypts, which help provide a variety of food sources year-round. The south-eastern sub-species also typically have a large home-range (50-65 ha) to further provide this food resource diversity. The diet of the yellow-bellied glider includes

insects sheltering in shed bark, manna, eucalypt nectar and pollen. Various *Eucalyptus* species are used for sap-feeding, a process whereby sap is drawn from the tree via V-shaped incisions and vertical furrows created by the species' large, lower incisor teeth. Sap feed trees are considered a critical habitat feature for the species (DAWE, 2022a).

Another critical microhabitat feature are hollows found in old, mature trees usually greater than one metre in diameter, which provide dens for shelter during the day. Hollow-bearing trees for this species are typically living, smooth-barked eucalypts (DAWE, 2022a).

Based on subject matter expert input, yellow-bellied gliders do not occur in poplar box (*Eucalyptus populnea*) habitat and due to their large home ranges and reliance on mature forest habitat, they are highly unlikely to inhabit non-remnant or fragmented habitats (Eyre, pers comm 2025).

Habitat Critical to the Survival of the Species

Under the *Conservation Advice for Petaurus australis australis (yellow-bellied glider (south-eastern))* (DAWE, 2022), habitat critical to the survival of the species is habitat that contains any one of the following attributes:

- *Large contiguous areas of floristically diverse eucalypt forest, which are dominated by winter-flowering and smooth-barked eucalypts, including mature living hollow-bearing trees and sap trees;*
- *Areas identified as refuges under future climate change scenarios;*
- *Short or long-term post-fire refuges that allow the species to persist, recover and recolonise burnt areas;*
- *Habitat corridors required to facilitate dispersal of the subspecies between fragmented habitat patches and/or that enable recolonization or movement away from threats. Yellow-bellied gliders (south-eastern) have a glide ratio (horizontal distance/height dropped) of around 2.0, and corridors spanning gaps larger than the distance gliders are likely to be able to travel should be considered critical to the survival. There is not enough evidence to define the canopy and width characteristics of appropriate corridors. In the absence of such information, a precautionary approach should be taken to maximise dispersal by considering all habitat corridors in the species' range to be habitat critical to the survival; and*
- *Areas in which some trees have evidence of use for sap extraction by yellow-bellied glider.*

5.3.2.3 FIELD SURVEYS

Survey Methodology and Effort

In lieu of species-specific guidelines, a targeted survey approach was implemented to assess the presence of yellow-bellied glider, and potential habitat, in line with *Survey guidelines for Australia's threatened mammals* (DSEWPC, 2011a) and *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland* (DES, 2022).

A total of 26 hours of two-person targeted spotlighting searches were conducted throughout the Study Area across three survey periods:

- October 2022 – six hours of spotlighting transects over two nights;
- June 2023 – 12 hours of spotlighting transects over four nights; and
- September 2024 – eight hours of spotlighting transects over two nights, which included eight call playback sessions for yellow-bellied glider.

As shown in Figure 4-2b (Survey Effort and Locations in the Study Area – Targeted Surveys for Listed Fauna Species) and Figure 5-6 below, spotlighting surveys have been conducted in both yellow-bellied glider Potential Denning Habitat and Potential Foraging Habitat that has been mapped within the south-east section of the Study Area. Camera trapping was also conducted within mapped Potential Foraging Habitat. Additionally, 245 vegetation and habitat assessments were completed across the Study Area during the 10 survey periods, which includes multiple assessments within both mapped habitat types for yellow-bellied glider.

Targeted surveys were also conducted from 19 and 20 February 2026 by two ecologists, to undertake detailed potential habitat mapping. The targeted surveys focused on determining the presence of key attributes that define yellow-bellied glider habitat, as provided by Dr Teresa Eyre (see Section 5.3.2.4).

For further detail on the ecological investigations completed within the Study Area, including desktop searches, survey timing and survey methodology, refer to Section 4.8.

Survey Results

No yellow-bellied gliders, or signs of the species, were observed during field surveys. However, potential suitable denning and foraging habitat has been identified.

Survey Adequacy

Considering relevant guidelines and recommendations, the field survey methodology and effort has been considered adequate for this species. Survey guideline advice for yellow-bellied glider and field survey effort and adequacy are outlined in Table 5-11.

TABLE 5-11 YELLOW-BELLIED GLIDER FIELD SURVEY EFFORT

Survey Guidelines and Recommendations	Survey Effort Utilised and Timing	Comment on Field Survey Adequacy
Arboreal mammal survey methods adopted from the *Survey Guidelines for Australia's Threatened Mammals* (DSEWPC, 2011): • Diurnal searches for the presence of potentially suitable habitat resources for nest or den sites as well as signs of the species' presence, such as scratches or feeding marks on tree trunks. • Stag watching. • Spotlight surveys in suitable vegetation types.	245 diurnal vegetation and habitat assessments determining the presence of suitable habitat features for the species, including any hollow-bearing trees within mature eucalypt forests. Assessments undertaken across surveys events in both the wet and dry seasons (October 2022, March, June and September/October 2023, June and	Survey effort considered adequate, although spotlighting in potential habitat was limited. Diurnal searches were undertaken in areas of potential habitat for this species with the aim of identifying suitable microhabitat features, namely living, smooth-barked eucalypts with large hollows in areas of sclerophyll forest. DBH measurements were taken within suitable sclerophyll forest to delineate

Survey Guidelines and Recommendations	Survey Effort Utilised and Timing	Comment on Field Survey Adequacy
• Call detection surveys or call playback surveys are also suitable for the yellow-bellied glider. As per the Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (Eyre et al. 2022). Feeding mark searches on trees are an effective way to identify this species. This is because these gliders use their teeth to incise tree bark for feeding. A list of tree species the yellow-bellied glider prefers is found in the guidelines. Call playback is another method that can detect this species. This method involves conducting playback on two occasions over different nights in a survey area. This is then followed by a 5-minute listening period for un-elicited calls. These surveys should be done on numerous occasions given the species large home range and mobility. Recommended four spotlight/call playback surveys to a site (two in each survey event).	September 2024, and February 2026). 6 hours of spotlighting over two nights in October 2022 (impacted by inclement weather). 12 hours of spotlighting over four nights in June 2023. 8 hours of spotlighting over two nights in September 2024, which included 8 call playback sessions for yellow-bellied glider. 4 x camera traps deployed for 4 trap nights in October 2022 within suitable habitat, totaling 16 trap nights.	potential foraging and denning habitat. Suitable denning and foraging habitat was located, therefore the species is considered as potentially occurring. Spotlighting surveys were undertaken on foot and in slow moving vehicles within suitable habitats and vegetation communities, totaling 26 hours across 8 nights of survey effort. Nine call playback surveys were conducted in September 2024. No yellow-bellied gliders were observed from diurnal surveys, spotlighting surveys, or the presence of feeding marks located within the Study Area.

5.3.2.4 HABITAT ASSESSMENT AND MAPPING

There is potential denning and foraging habitat for the yellow-bellied glider in the form of old growth eucalypt forests present within the Study Area, where a suitable tree canopy species composition contains known foraging resources. Smooth-barked eucalypts are important due to the range of foraging substrates (and therefore food resources) they provide, as loose bark hanging in strips from these trees provides shelter for insect prey (DAWE, 2022a). Yellow-bellied glider, or signs of the species, were not observed in the Study Area during any of the field surveys. Wildnet records of yellow-bellied glider in the Locality include several from 1998 within the Camboon State Forest, located directly south-east of the Study Area. Yellow-bellied glider abundance is highly dependent on habitat suitability, which is determined by species composition and maturity of trees. The south-eastern subspecies also has very poor dispersal capabilities over open spaces greater than its gliding distance. with a glide ratio of around 2.0 (DAWE, 2022a). Yellow-bellied glider habitat requirements are based on the description in Section 5.3.2.2. It is noted that additional advice from subject matter expert, T. Eyre, concludes yellow-bellied gliders do not occur in poplar box (*Eucalyptus populnea*) habitat and due to their large home ranges and reliance on mature forest habitat, they are highly unlikely to inhabit non-remnant or fragmented habitats (Eyre, pers comm 2025). This advice has informed a more granular, accurate and refined habitat map for this species within the Study Area.

On the boundary between the Camboon State Forest and the south-eastern portion of the Project Area, is RE 11.12.17. This RE is a heterogeneous polygon, that contains poplar box, and likely to form a barrier to movement of the species from the Camboon State Forest to the Project Area. Despite this, the mapping of potential habitat for the species has considered that connectivity may be maintained in a drainage feature that contains taller (approx. 25m) smooth bark trees such as *C. citriodora* that connects the Project Area and the Camboon State Forest in the most south-eastern portion of the Project Area . Therefore, the potential habitat mapped is conservative and has considered the precautionary principle.

When analysing data collected from the targeted field surveys associated with this drainage feature, *E. crebra* dominated open woodlands to the east and west of the riparian vegetation, were not considered potential habitat for the species due to the presence of poplar box and/or were being sparsely vegetated due to previous disturbance as well as being disconnected from other vegetated parts of the Project Area.

Overall, the areas that have been mapped in this south-eastern part of the Project Area containing potential habitat for yellow-bellied glider, are as follows:

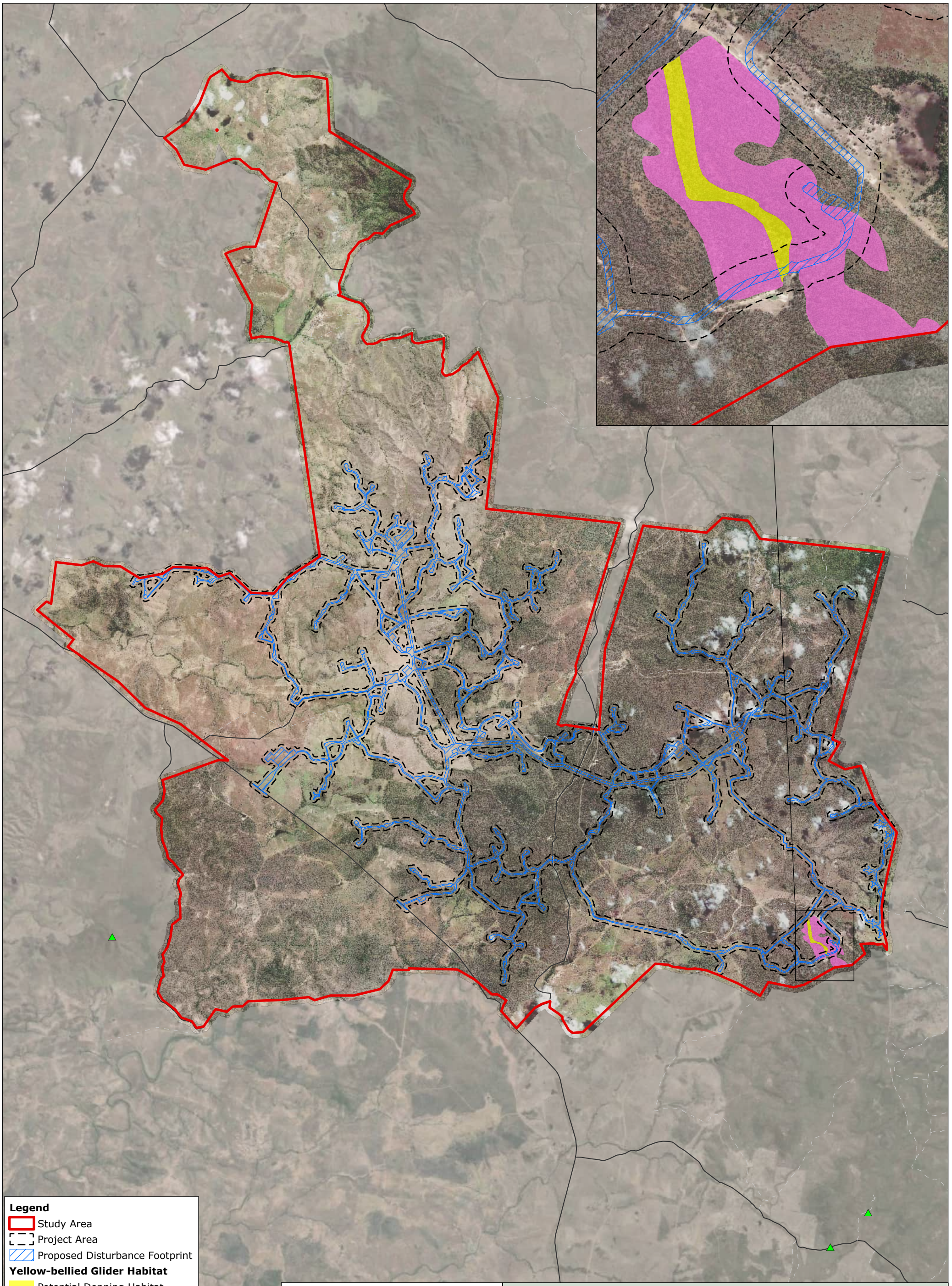
- Potential Denning Habitat: mapped as the vegetation associated with the riparian area at the centre of the patch, that is connected to the Camboon State Forest. Some suitable tree species were identified as present for the species along the riparian area, but overall were present at low densities with smooth-bark largely absent. A total of 16.0 ha of Potential Denning Habitat has been mapped within the Study Area.
- Potential Foraging Habitat: mapped as vegetation adjacent to this Potential Denning Habitat that did not contain poplar box, and did not show evidence of recent disturbance or was sparsely distributed. A total of 110.2 ha of Potential Foraging Habitat has been mapped within the Study Area.

Yellow-bellied glider habitat mapping is presented in Figure 5-6, with a summary of mapped habitat in the Study Area presented below in Table 5-12.

It is noted that there is also a single (1997) record of a yellow-bellied glider within remnant vegetation to the west of the Study Area (approximately 2 km from the boundary), though this patch is limited in size and appears to be isolated from potential habitat within the Study Area by similarly unsuitable vegetation and fragmented landscapes. Vegetation and habitat assessments conducted in this south-western section determined this area unsuitable for yellow-bellied glider due to the sparse, open nature of the ironbark communities present, presence of poplar box communities creating barriers to movement due to their lack of suitability and the minimal occurrence of smooth-barked species. Riparian corridors closer to the historical record also lack suitably large denning eucalypts and are in a generally fragmented state.

TABLE 5-12 YELLOW-BELLIED GLIDER HABITAT SUMMARY IN THE STUDY AREA

	Potential Denning Habitat	**Potential Foraging Habitat**	**Generally Unsuitable Habitat**
Description	Sufficiently large and connected patches of sclerophyll forest in the south-eastern section of the Study Area containing mature, hollow-bearing canopy trees and supporting a diversity of smooth or half-bark eucalypts. This includes only remnant vegetation.	Sufficiently large and connected patches of sclerophyll forest in the south-eastern section of the Study Area, located on a range of soils where species diversity and presence of smooth or half-bark eucalypts is limited. This includes only remnant vegetation that has not been disturbed and/or is not sparsely distributed.	Unsuitable habitat includes vegetation communities which: • Do not provide sufficient foraging function (absence of suitable eucalypt species); • Which do not provide suitable denning function (absence of mature hollows); or • Contain poplar box and do not form large, connected patches.
Mapped habitat within the Study Area (by BHT)	Suitably large and connected communities of the following BHT (excluding areas co-dominated by *E. populnea)*: • Riparian woodland and open forests dominated by *E. tereticornis* often associated with stream channels.	Suitably large and connected communities of the following BHT with high floristic diversity of winter-flowering and smooth-barked eucalypts (excluding areas co-dominated by *E. populnea*): • Eucalypt woodland and open forest dominated by *E. crebra* with a grassy understorey adjacent to riparian vegetation. Generally, this *E. crebra* woodland does not contain a diversity of trees, or smooth-barked species, and where field data confirms areas undisturbed or sparsely distributed, has been conservatively mapped as potential foraging habitat for the species.	• Vine forests/thickets and dry rainforest; • Waterbodies and drainage features (predominately farm dams); • Brigalow woodlands; • Grasslands and cultivated agricultural land; and • All remaining areas of suitable BHTs which do not have suitable foraging function, suitable denning function, or suitable extent or connectivity.
Total in the Study Area (ha)	16.0	110.2	46,703.7
Total in the Project Area (ha)	1.2	28.4	6,707.7



F5-6 Potential Yellow-bellied Glider (South-eastern) Habitat in the Study Area

Theodore Wind Farm PER

Theodore Energy Developments Pty Ltd

ERM

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5.3.3 KOALA

The koala (*Phascolarctos cinereus*) is listed as Endangered under the EPBC Act (as of the 12th of February 2022) and is considered known to occur within the Study Area.

5.3.3.1 SPECIES DISTRIBUTION AND HISTORICAL RECORDS

The koala typically occurs in eastern Australian forests and woodlands of predominantly *Eucalyptus* species. The koala's distribution is not continuous across this range, occurring in several subpopulations that are separated by cleared land or unsuitable habitat. Within Queensland, koalas occur as far north as the Einasleigh Uplands and Wet Tropics bioregions with records to the south and west in the Desert Uplands, Central Mackay Coast, Mitchell Grass Downs, Mulga Lands, Brigalow Belt North, Brigalow Belt South, and South Eastern Queensland (DAWE, 2022b). The Study Area is within the 'species or species habitat likely to occur' modelled distribution of the species (DCCEEW, 2024a) (Figure 5-7). No historical records occur within the Study Area however there is one undated ALA record (ALA, 2024) and Wildnet record within the Locality.



FIGURE 5-7 KOALA MODELLED DISTRIBUTION (DCCEEW, 2024A) AND RECORDS (ALA, 2024)

5.3.3.2 HABITAT REQUIREMENTS

Under the revised Conservation Advice for *Phascolarctos cinereus* (Koala) combined populations of Queensland, New South Wales and the Australian Capital Territory (DAWE, 2022b), released on 12 February 2022, habitat for the koala is described as follows:

> *Koala habitat includes both coastal and inland areas that are typically characterised by Eucalyptus forests and woodlands. Biophysical habitat attributes for the Koala include places that contain the resources necessary for individual foraging, survival (including predator avoidance), growth, reproduction and movement.*

In Central Queensland, koala habitat is described as preferred habitat and general habitat, with preferred habitat including:

- Contiguous remnant *Eucalyptus* open forest and woodlands on alluvial soils or with connection to seasonal aquifers where palatable food tree species occur frequently and are typically dominant. Preferred koala habitat is typically centralised around riparian forests and woodlands where forest red gum (*E. tereticornis*) and river red gum (*E. camaldulensis*) are the dominant or sub-dominant species; and
- Habitat trees greater than 10 cm in DBH (Youngentob, Marsh, & Skewes, 2021).

Preferred foraging and breeding trees within Central Queensland include: Brown's box (*Eucalyptus brownii*), river red gum (*E. camaldulensis*), coolibah (*Eucalyptus coolabah*), narrow-leaved ironbark (*E. crebra*), Queensland grey ironbark (*E. drepanophylla*), Queensland peppermint (*E. exserta*), broad-leaved ironbark (*E. fibrosa*), silver-top stringybark (*E. laevopinea*), black box (*E. largiflorens*), silver-leaved ironbark (*E. melanophloia*), coastal grey box (*E. moluccana*), mountain coolibah (*E. orgadophila*), poplar box (*E. populnea*), and forest red gum (*E. tereticornis*) (Youngentob, Marsh, & Skewes, 2021).

General habitat for the koala in Central Queensland includes all other remnant and regrowth *Eucalyptus* open forest and woodland on alluvial areas or with connection to seasonal aquifers and all other fragmented and sparsely distributed woodlands (including open woodlands), shrublands and forests where some food tree species occur, which are connected to areas of preferred habitat.

Koala ancillary habitat trees that are classified as species general habitat in Central Queensland include: brigalow (*Acacia harpophylla*), cooba (*A. salicina*), boree (*A. tephrina*), lemon-scented spotted gum (*Corymbia citriodora*), Dallachy's ghost gum (*C. dallachiana*), red bloodwood (*C. erythrophloia*), pink bloodwood (*C. intermedia*), Moreton Bay ash (*C. tessellaris*), white mahogany (*E. acmenoides*), Dawson River blackbutt (*E. cambageana*), white gum (*E. platyphylla*), Thozet's box (*E. thozetiana*) and black tea-tree (*Melaleuca bracteata*) (Youngentob, Marsh, & Skewes, 2021).

Habitat Critical to the Survival of the Species

Habitat critical to the survival of the species is defined as those that the species relies on to avoid or halt decline and promote the recovery of the species. Under the EPBC Act, the following factors are considered when identifying habitat that is critical to the survival of the species:

> *(a) Whether the habitat is used during periods of stress (examples: flood, drought or fire);*
>
> *(b) Whether the habitat is used to meet essential life cycle requirements (examples: foraging, breeding, nesting, roosting, social behaviour patterns or seed dispersal processes);*
>
> *(c) The extent to which the habitat is used by important populations;*
>
> *(d) Whether the habitat is necessary to maintain genetic diversity and long-term evolutionary development;*

(e) Whether the habitat is necessary for use as corridors to allow the species to move freely between sites used to meet essential life cycle requirements;

(f) Whether the habitat is necessary to ensure the long-term future of the species or ecological community through reintroduction or re-colonisation; and

(g) Any other way in which habitat may be critical to the survival of a listed threatened species or a listed threatened ecological community.

5.3.3.3 FIELD SURVEYS

Survey Methodology and Effort

No specific methodology or effort standards are prescribed for koala surveys. However, where there is a need to critically evaluate the potential impacts of major projects, multiple techniques should be used. A targeted survey approach was implemented to assess the presence of koala, and potential habitat, in line with *Survey guidelines for Australia's threatened mammals* (DSEWPC, 2011a), *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland* (DES, 2022), and the *EPBC Act referral guidelines for the vulnerable koala* (DoE, 2014).

A total of 12 koala Spot Assessment Technique surveys (SATs) were conducted in suitable habitat within the Study Area to detect the species (diurnal searches). A total of 26 hours of two-person targeted spotlighting searches were conducted throughout the Study Area across three survey periods (nocturnal searches):

- October 2022 – six hours of spotlighting transects over two nights;
- June 2023 – 12 hours of spotlighting transects over four nights; and
- September 2024 – eight hours of spotlighting transects over two nights, which included eight call playback sessions for koala.

Additionally, 245 vegetation and habitat assessments were completed across the Study Area during the 10 survey periods and scat searches occurred at each site.

For further detail on the ecological investigations completed within the Study Area, including desktop searches, survey timing and survey methodology, refer to Section 4.8.

Survey Results

The presence of koala has been assessed as known due to positive identifications of faecal pellets (scats) for the species, recorded in the south-east corner and adjacent the western boundary of the Study Area during the September 2023, June and September 2024 field surveys. A koala was also heard bellowing within the Study Area at dusk during the September 2024 survey period prior to any call playback. Field survey observations and historical records are included in Figure 5-8. Given the number of field surveys undertaken across multiple years and seasons and the general paucity of evidence of the species, it is considered that the species occurs in a patchy distribution and at very low densities across the Study Area.

Survey Adequacy

Considering relevant guidelines and recommendations, the field survey methodology and effort has been considered adequate for this species. Survey guideline advice for the koala and field survey effort and adequacy are outlined in Table 5-13.

TABLE 5-13 KOALA FIELD SURVEY EFFORT

Survey Guidelines and Recommendations	Survey Effort Utilised and Timing	Comment on Field Survey Adequacy
Arboreal mammal survey methods adopted from the *Survey Guidelines for Australia's Threatened Mammals* (DSEWPC, 2011): • Diurnal searches for the presence of potentially suitable habitat resources for nest or den sites as well as signs of the species' presence, such as scratches on tree trunks and scats beneath trees. • Spotlight surveys in suitable vegetation types. As per the Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (DES, 2018) Spotlighting requires two-person 30-minute searches of 100 x 100 m survey site across multiple nights. This can include spotlighting up one side of the 100 x 100 m area and then spotlighting back the other side of the 100 x 100 m area. Scat and sign search can coincide with the systematic diurnal active searches, within 50 x 50 m quadrates of the survey site. EPBC Act referral guidelines for the vulnerable koala (DoE, 2014) Strip transects which involve diurnal distance sampling and density searches. Nocturnal spotlighting for smaller sites to determine presence and density. Spot Assessment Technique (SAT) which involves looking at food trees for presence of koala scats.	245 diurnal vegetation and habitat assessments determining the presence of any suitable habitat features for the species, including any eucalypt forest and riparian vegetation. Assessments undertaken across six surveys events in both the wet and dry seasons (October 2022, March, June and September/October 2023, June and September 2024). 6 hours of spotlighting over two nights in October 2022 (impacted by inclement weather). 12 hours of spotlighting over four nights in June 2023. 8 hours of spotlighting over two nights in September 2024, which included 8 call playback sessions for koala. 4 x camera traps deployed for 4 trap nights in October 2022 within 12 koala SATs conducted in suitable habitat to detect the species (diurnal searches).	Survey effort considered adequate. Diurnal searches during habitat assessments were conducted to indicate presence. Spotlighting surveys were undertaken by foot and slow vehicle within suitable habitats and vegetation communities, totalling 18 hours and 6 nights of survey effort. This species was not directly observed, a single faecal pellet was recorded during field surveys. One koala was also heard bellowing within the Survey Area at dusk during the September 2024 survey period prior to any call playback.

5.3.3.4 HABITAT ASSESSMENT AND MAPPING

The majority of the Study Area contains general foraging and breeding habitat and dispersal habitat for koala associated with eucalypt dominated communities. It should be noted that in the centre and north of the Study Area, dieback of eucalypt species was widely observed, to the extent it was determined most vegetation patches in that region of the Study Area do not constitute koala habitat.

Survey results indicate that the species occurs in a patchy distribution and at very low densities across the Study Area (see Section 5.3.3.3). As outlined in Section 5.3.3.2, preferred koala habitat in Central Queensland includes contiguous remnant *Eucalyptus* open forest and woodlands in riparian areas where favoured food tree species occur in abundance (Youngentob, Marsh, & Skewes, 2021). General habitat includes all other remnant and regrowth *Eucalyptus* open forest which is connected to preferred habitat, occurring within alluvial areas or with seasonal access to water, fragmented and more open woodlands, and shrublands and forests where some food tree species are available (Youngentob, Marsh, & Skewes, 2021).

Preferred Foraging and Breeding Habitat has therefore been mapped within riparian zones and adjoining alluvial areas where preferred foraging trees occur, and higher moisture content of leaves provides increased nutritional value. General Foraging and Breeding Habitat has been mapped within forest and woodland (including remnant and regrowth vegetation) connected to Preferred Foraging and Breeding Habitat, containing species that are known koala food trees, or shrubland with emergent food trees.

Open grassy areas and cleared agricultural land with occasional standalone koala food trees are also present within the Study Area, mostly in the centre and north. Due to the lack of connectivity and observed effects of dieback and drought within these areas, this habitat type in those areas is also deemed generally unsuitable for koala. Koala dispersal habitat has been identified where cleared areas contain occasional eucalypt paddock trees that are directly adjacent to eucalypt woodlands.

The BHTs that comprise each koala habitat are presented in Table 5-14. Ground-truthed surveys have identified 1,613.4 ha of Preferred Foraging and Breeding Habitat, 21,216.6 ha of General Foraging and Breeding Habitat and 6,950.5 ha of Dispersal Habitat within the Study Area, which meets the definition of habitat critical to the survival of the species. There is also 16,992.9 ha of generally unsuitable habitat for koala. These habitats are presented in Figure 5-8.

TABLE 5-14 KOALA HABITAT SUMMARY IN THE STUDY AREA

	Preferred Foraging and Breeding Habitat	**General Foraging and Breeding Habitat**	**Dispersal Habitat**	**Generally Unsuitable Habitat**
Description	Contiguous remnant Eucalyptus open forest and woodlands on alluvial soils or with connection to seasonal aquifers where palatable food tree species occur frequently and are typically dominant.	Any forest or woodland containing species that are known koala food trees, or shrubland with emergent food trees. This includes remnant and regrowth vegetation.	Part of the broader landscape that includes cleared areas. Contains isolated or scattered foraging or shelter trees. Contains vegetation generally not used frequently for foraging and breeding purposes by the species.	Not suitable habitat includes barriers (natural or artificial) that prevent the movement of koalas, such as mountain ranges, water bodies or treeless areas that are greater than 500 m wide.

	Preferred Foraging and Breeding Habitat	General Foraging and Breeding Habitat	Dispersal Habitat	Generally Unsuitable Habitat
Mapped habitat within the Study Area (by BHT)	• Riparian woodland and open forests dominated by *E. tereticornis* often associated with stream channels.	• Eucalypt woodland and open forest dominated by *E. crebra* with a grassy understorey.	• Brigalow woodlands; and • Cleared grasslands that contain occasional paddock trees.	• Vine forests/thickets and dry rainforest; • Grasslands and cultivated agricultural land; and • Waterbodies and drainage features (predominately farm dams).
Total in the Study Area (ha)	1,613.4	21,216.6	6,950.5	16,992.9
Total in the Project Area (ha)	51.1	3,039.4	1,025.4	2,621.5

Legend

- Study Area
- Project Area
- Proposed Disturbance Footprint

Koala Habitat

- Preferred foraging and breeding habitat
- General foraging and breeding habitat
- Dispersal habitat
- Road
- Track and Path
- Koala Historical Record (ALA, not-dated)
- Koala Call Heard
- Koala Scat Observed

Coordinate System: GDA2020 MGA Zone 56
Date: 07/05/2026
Created By: MB
Drawing Size: A3

0 2 4Km

1:120,000

F5-8 Koala Habitat and Occurrence in the Study Area

Theodore Wind Farm PER

Theodore Energy Developments Pty Ltd

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5.3.4 LARGE-EARED PIED BAT

The large-eared pied bat (*Chalinolobus dwyeri*) is listed as Endangered under the EPBC Act, as of 15th November 2023, and has been concluded as likely to occur within the Study Area.

5.3.4.1 SPECIES DISTRIBUTION AND HISTORICAL RECORDS

The large-eared pied bat is a medium-sized bat that is found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland down to Bungonia in the NSW Southern Highlands (DERM, 2011)). The Study Area sits outside the species modelled distribution, however Camboon State Forest (that borders the Study Area in the south) sits within the 'species or species habitat may occur' distribution of the species (DCCEEW, 2024a) (Figure 5-9). No historical records of the species occur within the Study Area or the Locality, with the closest record occurring within Presho State Forest, over 100 km to the west of the Study Area (ALA, 2024).



FIGURE 5-9 LARGE-EARED PIED BAT MODELLED DISTRIBUTION (DCCEEW, 2024A) AND RECORDS (ALA, 2024)

5.3.4.2 HABITAT REQUIREMENTS

Large-eared pied bat prefers a specific intersection of habitat traits which makes habitat for the species both uncommon and susceptible to clearing-related impacts. Per the Conservation Advice for the species (DCCEEW, 2023a)):

> *Large-eared pied-bat has close association with the presence of sandstone escarpment (for roosts) and fertile valleys (for foraging), particularly where the valleys support box gum woodland. This is a relatively restricted combination of habitat factors, and the extent of woodlands on fertile soils within its range has been greatly diminished by clearing (Pennay, 2008*).

The large-eared pied bat is dependent on the presence of diurnal roosts for shelter (DERM, 2011)). Escarpments provide roosting habitat for this species, with the availability of diurnal roost options an important indicator of habitat suitability. Large-eared pied bat prefers rhyolite cliffs and caves for roosting purposes, although geology is secondary to presence of suitably deep and high caves and overhangs which provide shelter from natural disturbances (DCCEEW, 2023a)).

Fertile valleys and vegetated areas provide foraging habitat for large-eared pied-bat, with riverine and riparian corridors being identified as favourable for the insectivorous species. The species has been recorded foraging in canopied vegetation communities of various descriptions including dry and wet sclerophyll forest, grassy woodland, *Callitris* dominated forest, tall open eucalypt forest with a rainforest sub-canopy, subtropical rainforest and small clearings adjacent to rainforest (DCCEEW, 2023a)). Wing morphology suggests that it is a relatively slow-flying manoeuvrable species. Studies on flight behaviour suggest the species may prefer open habitats in the mid to upper canopy and is less inclined to enter dense vegetation (Williams & Thomson, 2018). Almost all records are within several kilometres of cliff lines or rocky terrain. It is likely that critical foraging resources are also located in these areas (DERM, 2011)).

Habitat Critical to the Survival of the Species

Under the species approved Conservation Advice, any known roost site, or caves that could be roost sites, are considered habitat critical to the survival of the species. Further, the presence of foraging habitat within close proximity to roosting sites should be considered habitat critical to the survival of the large-eared pied bat (DCCEEW, 2023a).

Additionally, all populations are considered important due to their likely role in maintaining genetic diversity necessary for the ecological survival of the species (DCCEEW, 2023a). As the species is considered likely to occur within the Study Area, it is considered likely that the identified habitat within the Study Area constitutes habitat critical to the survival of the species.

5.3.4.3 FIELD SURVEYS

Survey Methodology and Effort

A targeted survey approach was implemented to assess the presence of large-eared pied bat, and potential habitat, in line with *Survey guidelines for Australia's threatened bats* (DEWHA, Survey guidelines for Australia's threatened bats, 2010a).

Acoustic bat detectors (Anabats) were deployed over three of the 10 surveys for a total of 40 trapping nights. This includes:

- Four devices deployed for four nights in October 2022 (16 trapping nights);
- Two devices deployed for four nights in February 2023 (8 trapping nights); and
- Four devices deployed for four nights in March 2023 (16 trapping nights).

Calls recorded on the Anabats were analysed by specialist analysts Green Tape Solutions.

Additionally, 245 vegetation and habitat assessments were completed across the Study Area during the 10 survey periods.

For further detail on the ecological investigations completed within the Study Area, including desktop searches, survey timing and survey methodology, refer to Section 4.8.

Survey Results

Calls were recorded on five occasions that were determined to be 'probable' large-eared pied bat calls by specialist analysts Green Tape Solutions. The full echolocation analyses for the Anabats deployed during the October 2022, February and March 2023 field investigations are presented in Appendix E. Additionally, the Study Area sits just outside the species modelled distribution ('species or species habitat may occur') (DCCEEW, 2024a) and contains habitat suitable for large-eared pied bat survival (as evidenced by species presence). The location of Anabat devices that yielded 'probable' large-eared pied bat records are included in Figure 5-10.

There were no deep caves or overhangs observed within the Study Area during field surveys. One location within the north of the Study Area has been identified to potentially contain suitable roosting habitat for the species. Other than a few small, isolated hills within the south of the Study Area, the larger area in the north that extends to the east of the Study Area is the area that shows the highest slope gradient and seems to be the most prominent steep slope, high elevation feature within the landscape (as presented in Figure 5-16).

Survey Adequacy

In May 2024, the *Draft Onshore Wind Farm Guidance - best practice approaches when seeking approval under Australia's national environment law* was published and opened for consultation (DCCEEW, 2024d), which considers best practice to undertake at least 24 months of site utilisation surveys (for birds and bats) before assessment of a proposed wind farm can be completed and an approval decision made. Consultation was completed in July 2024, and the department advises it is currently reviewing all feedback received.

Considering the guidelines and recommendations available at the commencement of the Proposed Action's survey program, the field survey methodology and effort in potential habitat for the species is considered adequate to detect the presence of this species, and subsequently map the species habitat and conduct an accurate impact assessment. Survey guideline advice for the large-eared pied bat and field survey effort and adequacy are outlined in Table 5-15.

TABLE 5-15 LARGE-EARED PIED BAT FIELD SURVEY EFFORT

Survey Guidelines and Recommendations	Survey Effort Utilised and Timing	Comment on Field Survey Adequacy
As per the *Survey guidelines for Australia's threatened bats* (DEWHA, 2010a): A combination of survey efforts is recommended for this species. This includes unattended bat detectors for 16 detector nights for a minimum of four nights and attended bat detectors for six detector hours for a minimum of three nights. It also includes harp traps and/or mist nets for 16 trap or net nights for a minimum of four nights. Surveys are best undertaken from October through to March.	Anabats have been deployed across 10 locations within the Study Area (for up to four nights per survey event), for a total of 40 Anabat trapping nights across the October 2022, February and March 2023 survey periods (across two seasons in wormer months). 245 vegetation and habitat assessments were completed determining the presence of any suitable habitat features for the species, including any camps or roosting sites. Assessment of potential roosting sites was extended to areas adjacent the Study Area. Assessments undertaken across surveys events in both the wet and dry seasons (October 2022, March, June and September/October 2023, June and September 2024).	Survey effort targeted in potential is considered adequate to detect large-eared pied bat. Diurnal habitat assessments were conducted, which identified potentially suitable large-eared pied bat foraging habitat within the Study Area. Anabats were deployed in suitable habitat of well-vegetated areas such as eucalypt forest and in the appropriate seasons from October to March across two years. This species' call was recorded as 'probable' on Anabat devices deployed in the October 2022, February and March 2023 surveys.

5.3.4.4 HABITAT ASSESSMENT AND MAPPING

Roosting and breeding habitat was not directly observed during field surveys and sandstone is generally absent from the Study Area. As a result, only foraging habitat has been mapped for the species.

The National Recovery plan for the large-eared pied bat states that:

> *Almost all records are within several kilometres of cliff lines or rocky terrain and it is likely that critical foraging resources are also located in these areas* (DERM, 2011).

As specific roosting habitat has not been directly observed within or surrounding the Study Area despite surveys, determining a specific distance from roosting habitat to define potential foraging habitat cannot be undertaken. To be conservative, the preferred riverine and riparian corridor habitat of the species has been mapped across the entire Study Area as potential foraging habitat.

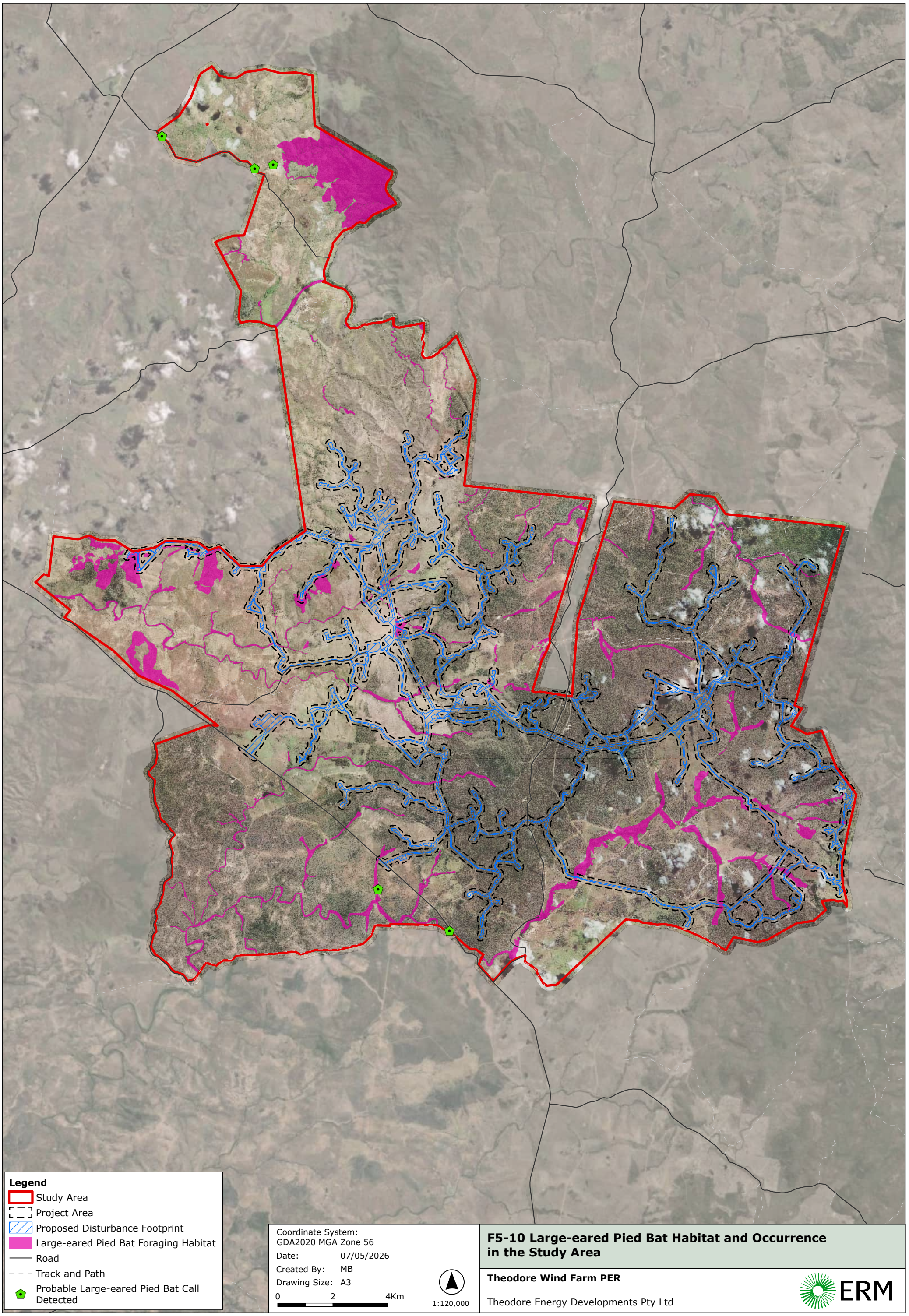
Additionally, as stated above in Section 5.3.4.3, one location within the north of the Study Area has been identified to potentially contain suitable roosting habitat for the species due to the potential for cliff lines and rocky terrain (as shown in Figure 5-16). It should be noted that although no suitable roosting habitat features were observed within the Study Area during field surveys, this identified higher slope area extends to the east and north of the Study Area where surveys did not occur and therefore the utilisation of this area as potential roosting habitat cannot be discounted. As such, the open eucalypt forest habitat within this identified area in the north that may contain potential roosting habitat has also been included within the species habitat mapping.

BHT mapping has been used to identify suitable foraging habitat for large-eared pied bat within the Study Area, as well as generally unsuitable habitat for the species. There is a total 2,856.1 ha of Foraging Habitat which meets the definition of habitat critical to the survival of the species. No roosting habitat for this species was identified within the Study Area, however there is potential for such habitat to occur in the north of the Study Area and in the Locality. Mapped foraging habitat for the large-eared pied bat is shown on Figure 5-10, with habitat types summarised below in Table 5-16.

TABLE 5-16 LARGE-EARED PIED BAT HABITAT SUMMARY IN THE STUDY AREA

	Foraging Habitat	**Generally Unsuitable Habitat**
Description	Fertile valleys and vegetated areas, riverine and riparian corridors, dry and wet sclerophyll forest and grassy woodland. Open, less densely vegetated habitats better suited to foraging.	Cleared areas are likely to constitute unsuitable habitat, with *Acacia* woodland also not suitable within the Study Area. Though the species has been recorded foraging in subtropical and dry rainforest, vegetation communities within the Study Area are of generally low quality and do not form suitable habitat.

	Foraging Habitat	Generally Unsuitable Habitat
Mapped habitat within the Study Area (by BHT)	• Riparian woodland and open forest dominated by *E. tereticornis* often associated with stream channels; and • Eucalypt woodland and open forest dominated by *E. crebra* with a grassy understorey on steep slope gradients within the north of the Study Area.	• Vine forest/ thickets and dry rainforest; • Waterbodies and drainage features; • Grasslands and cultivated agricultural land; • Brigalow woodlands dominated by *Acacia harpophylla*; • All other areas of Eucalypt woodland and open forest dominated by *E. crebra* with a grassy understorey.
Total in the Study Area (ha)	2,856.1	43,917.3
Total in the Project Area (ha)	54.5	6,682.9



F5-10 Large-eared Pied Bat Habitat and Occurrence in the Study Area

Theodore Wind Farm PER

Theodore Energy Developments Pty Ltd

ERM

0661076_TWF_PER_R7.aprx

5.3.5 ORNAMENTAL SNAKE

The ornamental snake (*Denisonia maculata*) is listed as Vulnerable under the EPBC Act and is considered unlikely to occur within the Study Area.

5.3.5.1 SPECIES DISTRIBUTION AND HISTORICAL RECORDS

The ornamental snake is known only from within the drainage system of the Fitzroy and Dawson Rivers in Queensland (DoE, 2014). The Study Area is located at the southern extent of the species known range, within the 'species or species habitat may occur' modelled distribution (DCCEEW, 2024a) (Figure 5-11). No historical records are present within the Study Area, however one ALA record of a "preserved specimen", with an unknown date and unknown spatial accuracy, exists within the Locality (ALA, 2024).



FIGURE 5-11 ORNAMENTAL SNAKE MODELLED DISTRIBUTION (DCCEEW, 2024A) AND RECORDS (ALA, 2024)

5.3.5.2 HABITAT REQUIREMENTS

Preferred ornamental snake habitat is within, or close to, habitat that is favoured by frogs, which make up most of the species' diet. Ornamental snake prefers woodlands and open forests in moist areas, particularly gilgai (melon-hole) mounds and undulations in Queensland RE Land Zone 4, but also around lakes and wetlands (DCCEEW, 2024c). Ornamental snake habitat is associated with brigalow (*Acacia harpophylla*), gidgee (*Acacia cambagei*), blackwood (*Acacia argyrodendron*) and coolibah (*Eucalyptus coolabah*)-dominated vegetation communities, or grasslands where gilgais are present (DCCEEW, 2024c). There is no delineation between breeding, dispersal and foraging habitat for this species.

According to the species' SPRAT profile (DCCEEW, 2024c), microhabitat features common within areas where ornamental snakes have been recorded in abundance include:

- Sites located within the lowest part of the catchment;
- A diversity of gilgai size and depth;
- Soils of high clay content and deep-cracking characteristics;
- Ground timber is usually relatively common (especially piles adjacent to or close by to gilgais);

- Where burrowing frogs (*Cyclorana species*) are abundant; and
- Habitat patches are typically greater than 10 ha in area and are within, or connected, to larger areas of remnant vegetation.

Ornamental snakes are vulnerable to lethal poisoning caused by predating upon cane toads (*Bufo marinus*), which are common within their range. The two species are often recorded at the same sites, however cane toads are never found where the ornamental snake is in high numbers. In contrast, a number of studies in seemingly optimal ornamental snake habitat have yielded no observations of the species where cane toads were in abundance (DCCEEW, 2024c).

Habitat Critical to the Survival of the Species

Habitat critical for survival has not been specifically described for the ornamental snake (DoE, 2014). Therefore, habitat critical to the survival of the species has been considered according to the following description (as provided in the *SIG 1.1* (DEWHA, 2013)).

> *Habitat critical to the survival of a species or ecological communities are areas that are necessary:*
>
> - *"For activities such as foraging, breeding, roosting, or dispersal;*
> - *For the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators);*
> - *To maintain genetic diversity and long-term evolutionary development; and/or*
> - *For the reintroduction of populations or recovery of the species or ecological community.*

5.3.5.3 FIELD SURVEYS

Survey Methodology and Effort

Targeted searches were undertaken for all for listed reptiles with potential habitat identified within the Study Area, though were primarily focused on identification of the ornamental snake. These searches were undertaken in accordance with the *Survey guidelines for Australia's threatened reptiles* (DSEWPC, 2011b) and the *EPBC Act - Draft Referral guidelines for the nationally listed Brigalow Belt reptiles* (DCCEEW, 2023b).

A total of 26 hours of two-person targeted spotlighting searches were conducted throughout the Study Area across three survey periods:

- October 2022 – six hours of spotlighting transects over two nights;
- June 2023 – 12 hours of spotlighting transects over four nights; and
- September 2024 – eight hours of spotlighting transects over two nights.

A total of 245 vegetation and habitat assessments were completed across the Study Area during the 10 survey periods. Searches for reptiles involved turning over potential sheltering sites such as rocks, logs and debris.

For further detail on the ecological investigations completed within the Study Area, including desktop searches, survey timing and survey methodology, refer to Section 4.8.

Survey Results

The species was not observed during any of the field surveys. The Study Area is located at the southern extent of the species known range, within the 'species or species habitat may occur' modelled distribution (DCCEEW, 2024a) and the closest confirmed record (from 2007) of a non-preserved specimen is located 50 km west of the Study (ALA, 2024). Brigalow vegetation communities (known to be associated with ornamental snake habitat) were identified within the Study Area, however lacked key microhabitat features (see Plate 5-1 below).

Brigalow communities within the Study Area distinctly lacked gilgais and the appropriate soil composition known to be associated with presence of ornamental snake. Most of the surveyed areas targeting ornamental snake also lacked coarse woody debris, leaf litter and other suitable sheltering resources. Soils encountered tended to be loamy, as opposed to the deep-cracking clay soils favoured by the species (DCCEEW, 2024c).

Additionally, Brigalow communities within the Study Area had suffered soil degradation resultant of historical land clearing and grazing pressure, reducing potential habitat quality for ornamental snake. Further, a notable abundance of cane toads was observed, particularly after rain during the September 2024 survey event, which is known to be associated with a lower likelihood of ornamental snake presence (DCCEEW, 2024c).

As a result, no suitable habitat for the ornamental snake was identified within the Study Area during field surveys. This species has been concluded as unlikely to occur within the Study Area as per the likelihood of occurrence (Appendix C).



PLATE 5-1: EXAMPLES OF BRIGALOW WOODLAND WITHIN THE STUDY AREA. NO CRACKING CLAYS PRESENT (LOAMY SOILS ONLY). SOME MINOR DEPRESSIONS PRESENT BUT DISTINCT ABSENCE OF GILGAIS. ONLY SPARSE LEAF-LITTER AND LARGER WOODY DEBRIS.

Survey Adequacy

Considering relevant guidelines and recommendations, the field survey methodology and effort has been considered adequate for this species. Survey guideline advice for the ornamental snake and field survey effort and adequacy are outlined in Table 5-17.

TABLE 5-17 ORNAMENTAL SNAKE FIELD SURVEY EFFORT

Survey Guidelines and Recommendations	Survey Effort Utilised and Timing	Comment on Field Survey Adequacy
As per the Survey guidelines for Australia's threatened reptiles (DSEWPC, 2011): • Searches of suitable gilgai habitat (small depressions and mounds in clay soils) while preferred prey species (frogs) are active. • Diurnal searches under sheltering sites such as rocks, logs or other large objects on the ground. As per the EPBC Act - Draft Referral guidelines for the nationally listed Brigalow Belt reptiles (DCCEEW, 2023): • Spotlighting transects targeting water-inundated gilgais, wetlands, riparian habitats and surrounding environments and large logs between dusk and early morning hours, ideally on warm and humid evenings. • Opportunistic road surveys while driving along roadways in the identified study area, especially following large rainfall events and on warm evenings. • Microhabitat searches during the coolest parts of the day, including carefully turning woody debris, rocks and artificial debris, raking the soil surface or leaf litter beneath trees.	245 diurnal vegetation and habitat assessments determining the presence of any suitable habitat features for the species, including any *Acacia*-dominated vegetation communities, areas with cracking clay soils or gilgais. Searches for reptiles involved turning over potential sheltering sites such as rocks, logs and debris. Assessments were undertaken across surveys events in both the wet and dry seasons (October 2022, March, June and September/October 2023, June and September 2024). 6 hours of spotlighting over two nights in October 2022 (impacted by inclement weather). 12 hours of spotlighting over four nights in June 2023. 8 hours of spotlighting over two nights in September 2024.	Survey effort considered adequate. No ornamental snakes were observed from diurnal searches. No suitable habitat was identified during field surveys due to the absence of microhabitat features and the abundance of cane toads observed.

5.3.5.4 HABITAT ASSESSMENT AND MAPPING

No suitable habitat for the ornamental snake was identified within the Study Area due to an absence of microhabitat features required for the species and the abundance of cane toads observed during field surveys. This species has therefore been concluded as unlikely to occur within the Study Area as per the likelihood of occurrence (Appendix C).

As a result, no habitat has been mapped within the Study Area and no significant impact assessment has been completed for the species.

5.3.6 SOUTH-EASTERN LONG-EARED BAT

The south-eastern long-eared bat (*Nyctophilus corbeni*) is listed as Vulnerable under the EPBC Act and is considered unlikely to occur within the Study Area.

5.3.6.1 SPECIES DISTRIBUTION AND HISTORICAL RECORDS

The south-eastern long-eared bat is found in southern central Queensland, central western New South Wales, north-western Victoria and eastern South Australia, with majority of its range within the Murray Darling Basin and most records recorded inland of the Great Dividing Range (TSSC, 2015b). The Study Area is within the 'species or species habitat may occur' modelled distribution of the species (DCCEEW, 2024a) (Figure 5-12). No historical records for the species exist within the Study Area or the Locality. The closest record is approx. 40 km south-west of the Study Area from 2000 (ALA, 2024) with the closest recent record 140 km from the Study Area.



FIGURE 5-12 SOUTH-EASTERN LONG-EARED BAT MODELLED DISTRIBUTION (DCCEEW, 2024A) AND RECORDS (ALA, 2024)

5.3.6.2 HABITAT REQUIREMENTS

The south-eastern long-eared bat is found in a wide range of inland woodland vegetation types, including box / ironbark / cypress pine woodlands, Buloke woodlands, Brigalow woodland, Belah woodland, smooth-barked apple woodland, river red gum forest, black box woodland, and various types of tree mallee. In QLD, it is distinctly more common in box / ironbark / cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of southern QLD (TSSC, 2015b).

Studies have found that the south-eastern long-eared bat roosts solitarily, mainly in dead trees or dead spouts of live trees. A study in VIC found most bats roosting in mallee eucalypts, with some under bark or in fissures of dead Buloke (*Allocasuarina leuhmannii*) or Belah (*Casuarina cristata*) trees (Lumsden , Nelson, & Lindeman, 2008).

The species is more abundant in extensive stands of vegetation in comparison to smaller woodland patches, suggesting its home range is probably large, and has also been found to be more abundant in habitats that have a distinct tree canopy and a dense, cluttered understorey layer (TSSC, 2015b).

Habitat Critical to the Survival of the Species

Habitat critical to the survival has not been specifically defined for this species (TSSC, 2015b). Therefore, habitat critical to the survival of the species has been considered according to the following description (as provided in the *SIG 1.1* (DEWHA, 2013)).

> *Habitat critical to the survival of a species or ecological communities are areas that are necessary:*
>
> - *"For activities such as foraging, breeding, roosting, or dispersal;*
> - *For the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators);*
> - *To maintain genetic diversity and long-term evolutionary development; and/or*
> - *For the reintroduction of populations or recovery of the species or ecological community.*

5.3.6.3 FIELD SURVEYS

Survey Methodology and Effort

A targeted survey approach was implemented to assess the presence of south-eastern long-eared bat and potential habitat for the species, in line with *Survey guidelines for Australia's threatened bats* (DEWHA, 2010a).

Acoustic bat detectors (Anabats) were deployed over three of the 10 surveys for a total of 40 trapping nights. This includes:

- Four devices deployed for four nights in October 2022 (16 trapping nights);
- Two devices deployed for four nights in February 2023 (8 trapping nights); and
- Four devices deployed for four nights in March 2023 (16 trapping nights).

Calls recorded on the Anabats were analysed by specialist analysts Green Tape Solutions.

Additionally, 245 vegetation and habitat assessments were completed across the Study Area during the 10 survey periods.

For further detail on the ecological investigations completed within the Study Area, including desktop searches, survey timing and survey methodology, refer to Section 4.8.

Survey Results

A 'Possible' *Nyctophilus* sp. call was recorded on seven Anabats devices deployed within the Study Area during field surveys, however this call was unable to be distinguished between the three *Nyctophilus* species that possibly occur within the Study Area. It has also been noted that the call is often confused with *Mytosis macropus*. The full echolocation analyses for the Anabats deployed during October 2022, February and March 2023 field investigations are presented in Appendix E.

Considering these results, a review of species distribution indicates that the Study Area location is more consistent with the distribution of two unlisted species of *Nyctophilus* (*N. geoffroyi* or *N. gouldii*), rather than the south-eastern long-eared bat. Although the Study Area overlaps with the 'may occur' modelled distribution of the species (Figure 5-12), the presence of recent records and the modelled 'likely to occur' distribution indicates that important habitat for the species begins just north of Roma (approximately 150 km south of the Study Area) and continues south throughout NSW and northern Victoria. The closest record of the species is located 40 km south-east of the Study Area (from 2000 and therefore out-dated), with the closest recent record of the species located approximately 140 km from the Study Area.

Additionally, the closest record of the species, occurring around Precipice National Park, is located in an area where Belah (*Cassuarina cristata*) open forest to woodland is mapped in relative abundance. This community type is recognised as providing habitat value for the south-eastern long-eared bat, particularly due to the roosting function that Belah provides. In contrast, although the Study Area contains ironbark and box woodlands, these communities lack the identified roosting tree species (as identified within Section 5.3.6.2), such as Belah and Buloke. As a result, it has been concluded that suitable habitat for the south-eastern long-eared bat is generally absent from the Study Area.

Considering the absence of suitable habitat and the conclusion that the 'Possible' call is most likely a different *Nyctophilus* sp., this species has been concluded as unlikely to occur within the Study Area.

Survey Adequacy

In May 2024, the Draft Onshore Wind Farm Guidance - best practice approaches when seeking approval under Australia's national environment law was published and opened for consultation (DCCEEW, 2024d), which considers best practice to undertake at least 24 months of site utilisation surveys (for birds and bats) before assessment of a proposed wind farm can be completed and an approval decision made. Consultation was completed in July 2024, and the department advises it is currently reviewing all feedback received.

Considering the guidelines and recommendations available at the commencement of the Proposed Action's survey program, the field survey methodology and effort has been considered adequate to assess the presence of this genus for this group of species, and is supported by data from the Anabat analysis. Harp trapping is typically required to positively identify south-eastern long-eared bat, however this was not performed as suitable habitat was generally absent as explained above, and that the species' northern distribution limit ('species or species habitat likely to occur') is approximately 150 km south of the Study Area, with the closest recent record is 140 km away. Survey guideline advice for the south-eastern long-eared bat and field survey effort and adequacy are outlined in Table 5-18.

TABLE 5-18 SOUTH-EASTERN LONG-EARED BAT FIELD SURVEY EFFORT

Survey Guidelines and Recommendations	Survey Effort Utilised and Timing	Comment on Field Survey Adequacy
As per the Survey guidelines for Australia's threatened bats (DEWHA, 2010): A combination of survey efforts is recommended for this species. This includes unattended bat detectors for 16 detector nights for a minimum of four nights and attended bat detectors for six detector hours for a minimum of three nights. It also includes harp traps and/or mist nets for 16 trap or net nights for a minimum of four nights. Surveys are best undertaken from October through to March.	Anabats have been deployed in 10 locations within the Study Area (all for 4 nights), for a total of 40 Anabat trapping nights across the October 2022, February and March 2023 survey periods. 245 vegetation and habitat assessments were completed determining the presence of any suitable habitat features for the species, including any camps or roosting sites. Assessment of potential roosting sites was extended to areas adjacent the Study Area. Assessments undertaken across surveys events in both the wet and dry seasons (October 2022, March, June and September/October 2023, June and September 2024).	Survey effort considered adequate to detect *Nyctophilus* sp. (that includes south-eastern long-eared bat). Diurnal habitat assessments were conducted, which identified the lack of suitable roosting habitat within the Study Area. Anabats were deployed in potential habitat of well-vegetated areas such as eucalypt forest and in the appropriate seasons of October to March. A *Nyctophilus* sp. call was recorded as 'possible' deployed across seven locations in the October 2022, February 2023 and March 2023 surveys, but likely to be the one or both of the unlisted species.

5.3.6.4 HABITAT ASSESSMENT AND MAPPING

Considering that suitable habitat for south-eastern long-eared bat is generally absent from the Study Area and the conclusion that the 'Possible' call is most likely a different *Nyctophilus* sp.*,* the species has been concluded as unlikely to occur within the Study Area.

As a result, no habitat has been mapped within the Study Area and no significant impact assessment has been completed for the species.

5.3.7 SQUATTER PIGEON (SOUTHERN)

The squatter pigeon (southern) (*Geophaps scripta scripta*) (squatter pigeon) is listed as Vulnerable, under the EPBC Act, as of 16th July 2000. This species is considered known to occur within the Study Area.

Squatter pigeon (southern) is a ground-dwelling pigeon and can be differentiated from the northern subspecies by its larger body, and the skin around the eyes being predominantly blue-grey compared with yellowy-orange to orange-red in the northern subspecies (DCCEEW, 2024b).

5.3.7.1 SPECIES DISTRIBUTION AND HISTORICAL RECORDS

The squatter pigeon occurs on the inland slopes of the Great Dividing Range. Its current distribution extends from the Burdekin-Lynd Divide in central Queensland, west to Longreach and Charleville, east to the coast between Port Curtis and Proserpine, and south to New South Wales (DCCEEW, 2024b). The Study Area occurs within the 'species or species habitat may occur' modelled distribution of the species (DCCEEW, 2024a) (Figure 5-13). No historical records occur within the Study Area or the Locality, with the closest recent historical record located 70 km to the south-east of the Study Area at Eidsvoid (ALA, 2024).



FIGURE 5-13 SQUATTER PIGEON MODELLED DISTRIBUTION (DCCEEW, 2024A) AND RECORDS (ALA, 2024)

5.3.7.2 HABITAT REQUIREMENTS

The squatter pigeon inhabits open forests to sparse, open woodlands and scrub mostly dominated in the overstorey by *Eucalyptus, Corymbia, Acacia* or *Callitris* species, on sandy or gravelly soils, within approximately 3 km of a suitable, permanent or seasonal waterbody. Retention of these woodland canopy species, which provide shelter from predatory birds, is an important habitat factor for the squatter pigeon and is a notable distinction between the habitat value of open woodland compared to cleared land (which does not constitute important or critical habitat for the species). Density of ground layer vegetation in foraging and breeding habitat is considerably patchy and rarely exceeds 33% (DCCEEW, 2024b).

Additional to presence of woodland canopy species, squatter pigeon conservation guidelines identify proximity to water as the most important determinant of habitat suitability, with open ground cover that permits ease of movement also crucial:

> *It is nearly always found near permanent water such as rivers, creeks and waterholes. Sandy areas dissected by gravel ridges, which have open and short grass cover allowing easier movement, are preferred* (TSSC, 2015a).

Specifically in Queensland, foraging and breeding habitat is known to occur on well-draining, sandy or loamy soils on low, gently sloping, flat to undulating plains and foothills, and lateritic (duplex) soils on low 'jump-ups' and escarpments within 1 km of watercourses. The squatter pigeon nests on the ground where it forages for seeds among ground layers where there is sparse and low-density grass cover. It roosts in low trees at night.

Habitat Critical to the Survival of the Species

Habitat critical to the survival has not been specifically defined for the squatter pigeon (DCCEEW, 2024b). Therefore, habitat critical to the survival of the species has been considered according to the following description (as provided in the *SIG 1.1* (DEWHA, 2013)).

Habitat critical to the survival of a species or ecological communities are areas that are necessary:

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

5.3.7.3 FIELD SURVEYS

Survey Methodology and Effort

A targeted survey approach was implemented to assess the presence of squatter pigeon, and potential habitat, in line with *Survey guidelines for Australia's threatened birds* (DEWHA, 2010b). A total of 171 20-minute BUS were completed across 38 locations within the Study Area during eight filed survey periods (four across each season):

Dry season

- October 2022 - 23 surveys, 12 morning and 11 afternoon;
- June 2023 - 24 surveys repeat visits to BUS points including 12 morning and 12 afternoon surveys;
- September/October 2023 - 26 surveys, repeat visits to BUS points including 12 morning and 14 afternoon surveys; and
- June 2024 -18 surveys, repeat visits to BUS points including 9 morning and 9 afternoon surveys.

Wet Season

- February 2023 - 32 surveys, repeat visits to BUS points including 16 morning and 16 afternoon surveys;
- March 2023-2 8 surveys, repeat visits to BUS points including 14 morning and 14 afternoon surveys;
- December 2023 - 40 surveys, repeat visits to BUS points including 20 morning and 20 afternoon surveys; and
- February 2024-27 surveys, repeat visits to BUS points including 13 morning and 14 afternoon surveys.

Additionally, 245 vegetation and habitat assessments were completed across the Study Area during the 10 survey periods.

For further detail on the ecological investigations completed within the Study Area, including desktop searches, survey timing and survey methodology, refer to Section 4.8.

Survey Results

This species was identified on three occasions during field surveys in October 2022, September/October 2023 and December 2023. All observations were made in the north to north-west section of the Study Area outside the Disturbance Footprint. Field survey observations are presented in Figure 5-14.

Survey Adequacy

Considering relevant guidelines and recommendations, the field survey methodology and effort has been considered adequate for this species. Survey guideline advice for squatter pigeon and field survey effort and adequacy are outlined in Table 5-19.

TABLE 5-19 SQUATTER PIGEON FIELD SURVEY EFFORT

Survey Guidelines and Recommendations	Survey Effort Utilised and Timing	Comment on Field Survey Adequacy
As per the Survey guidelines for Australia's threatened birds (DEWHA, 2010): Area searches or transect surveys should be conducted in suitable habitat. Flushing surveys also likely to be useful. Recommended methods include 15 hours of flushing surveys over a 3-day survey period. 10 hours of area searches or transect surveys over a 3-day survey period in suitable habitat (short, grassy understory of eucalypt woodland, nearly always near permanent water).	171 dawn and dusk timed surveys (20 minutes), bird utilisation surveys across 38 locations in the Study Area. Bird surveys were conducted during eight of the 10 survey periods (October 2022, February, March, June, September/October and December 2023, February and June 2024). 3 area/transect searches were also conducted in appropriate habitat. These area/transect searches were completed by 2 ecologists for 1.5 hours each (9 total hours).	Survey effort considered adequate. 171 timed bird surveys across 38 locations. Surveys were conducted throughout the Study Area, in suitable patches of open eucalypt woodlands and areas close to permanent bodies like farm dams and waterways. Squatter pigeon was observed on one occasion during the October 2022 survey at a farm dam located in the northern section of the Study Area, on one occasion during the September/October 2023 survey in the north-western section of the Study Area, and on one occasion during December 2023 survey.

5.3.7.4 HABITAT ASSESSMENT AND MAPPING

BHT mapping has been used to identify suitable squatter pigeon breeding, foraging and dispersal habitat within the Study Area, as well as generally unsuitable habitat for the species. The BHTs considered suitable for squatter pigeon habitat include:

- Eucalypt woodland and open forest dominated by *E. crebra* with a grassy understorey;
- Brigalow woodlands; and
- Riparian woodland and open forests dominated by *E. tereticornis* often associated with stream channels.

The suitable squatter pigeon habitat within these BHTs has been narrowed down to areas within 1 km of permanent dams, watercourses and waterbodies as breeding habitat and areas within 3 km of permanent dams, watercourses and waterbodies as foraging and dispersal habitat.

Given that foraging and breeding habitat for the species is known to occur gently sloping, flat to undulating plains and foothills (DCCEEW, 2024b), squatter pigeon habitat has been further refined to only include grassy, open forest in areas with lower elevation and gradual slopes. This refinement has discounted much of the open forest habitats in the central and eastern sections of the Study Area, which tends to exhibit steep, hilly terrain (see Figure 5-16). These central and eastern areas also contain more dense grassy eucalypt woodlands, with ground layer vegetation cover in excess of 33% and likely unsuitable for squatter pigeon. This is further evidenced by the fact that, despite 10 survey events across the survey period, no individuals were detected in the central, eastern and southern parts of the Study Area.

Based on the presence of woodland canopy species and the proximity to water, mapped squatter pigeon habitat within the Study Area (which is assumed to provide breeding and foraging function for the known species), is considered habitat critical to the survival of the species. It should be noted that suitable low grass cover for foraging will vary across the year in the Study Area, with cover reducing during dry the dry season.

There is a total of 9,575.4 ha Breeding Habitat and 2,333.5 ha of Foraging and Dispersal Habitat mapped in the Study Area. There is also 34,864.6 ha of generally unsuitable habitat within the Study Area. The habitat for the squatter pigeon is presented in Figure 5-14, with habitat types summarised below in Table 5-20.

TABLE 5-20 SQUATTER PIGEON (SOUTHERN) HABITAT SUMMARY IN THE STUDY AREA

	Breeding Habitat	**Foraging and Dispersal Habitat**	**Generally Unsuitable Habitat**
Description	Low, open eucalypt woodland on well-draining, gravelly, sandy or loamy soils and escarpments within 1 km of permanent dams, watercourses and waterbodies.	Low, open eucalypt woodland on well-draining, gravelly, sandy or loamy soils and escarpments within 3 km of dam, watercourses and waterbodies.	Not suitable habitat includes areas either bereft of suitable roosting and shelter sites, areas that are too dense for movement and areas which tend to exhibit steep, hilly terrain.
Mapped habitat within the Study Area (by BHT)	Grassy, open forest in areas with lower elevation and gradual slopes within 1 km of permanent waterbodies, including: • Eucalypt woodland and open forest dominated by *E. crebra* with a grassy understorey; • Brigalow woodlands; and • Riparian woodland and open forests dominated by *E. tereticornis* often associated with stream channels.	Grassy, open forest in areas with lower elevation and gradual slopes within 3 km of permanent and seasonal waterbodies, including: • Eucalypt woodland and open forest dominated by *E. crebra* with a grassy understorey; • Brigalow woodlands; and • Riparian woodland and open forests dominated by *E. tereticornis* often associated with stream channels.	• Vine forest/thickets and dry rainforest; • Waterbodies and drainage features; and • Grasslands and cultivated agricultural land.
Total in the Study Area (ha)	9,575.4	2,333.5	34,864.6
Total in the Project Area (ha)	657.0	247.7	5,832.7

Legend

- Study Area
- Project Area
- Proposed Disturbance Footprint

Squatter Pigeon (Southern) Habitat

- Breeding Habitat
- Foraging and Dispersal Habitat
- Road
- Track and Path
- Squatter Pigeon (Southern) Observation

Coordinate System:
GDA2020 MGA Zone 56

Date: 07/05/2026

Created By: MB

Drawing Size: A3

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F5-14 Squatter Pigeon (Southern) Habitat and Occurrence in the Study Area

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5.3.8 WHITE-THROATED NEEDLETAIL

White-throated needletail (*Hirundapus caudacutus*) is listed as Vulnerable under the EPBC Act as of 19th July 2019 and is considered as potentially occurring within the Study Area.

5.3.8.1 SPECIES DISTRIBUTION AND HISTORICAL RECORDS

The white-throated needletail is widespread in eastern and south-eastern Australia, with the species being recorded in all coastal regions of Queensland, extending inland to the western slopes of the Great Dividing Range and occasionally onto the adjacent inland plains (TSSC, 2019). The Study Area occurs within the 'species or species habitat may occur' modelled distribution of the species (DCCEEW, 2024a) (Figure 5-15). No recent historical record of the species occurs within the Study Area or the Locality, however one outdated historical record from 2002 occurs within the Locality (ALA, 2024). It should be noted that during surveys for the Kariboe Wind Farm (EPBC 2022/09428), approximately 45 km east of the Study Area, a flock of 100+ white-throated needletails were recorded overflying the Kariboe Wind Farm project area in October 2022, as reported in the *Kariboe Wind Farm Project MNES Assessment Report* (Attexo, 2022).

White-throated needletail breeds in the Northern Hemisphere and migrates to Australia during the species' non-breeding season, roughly October to April (TSSC, 2019).

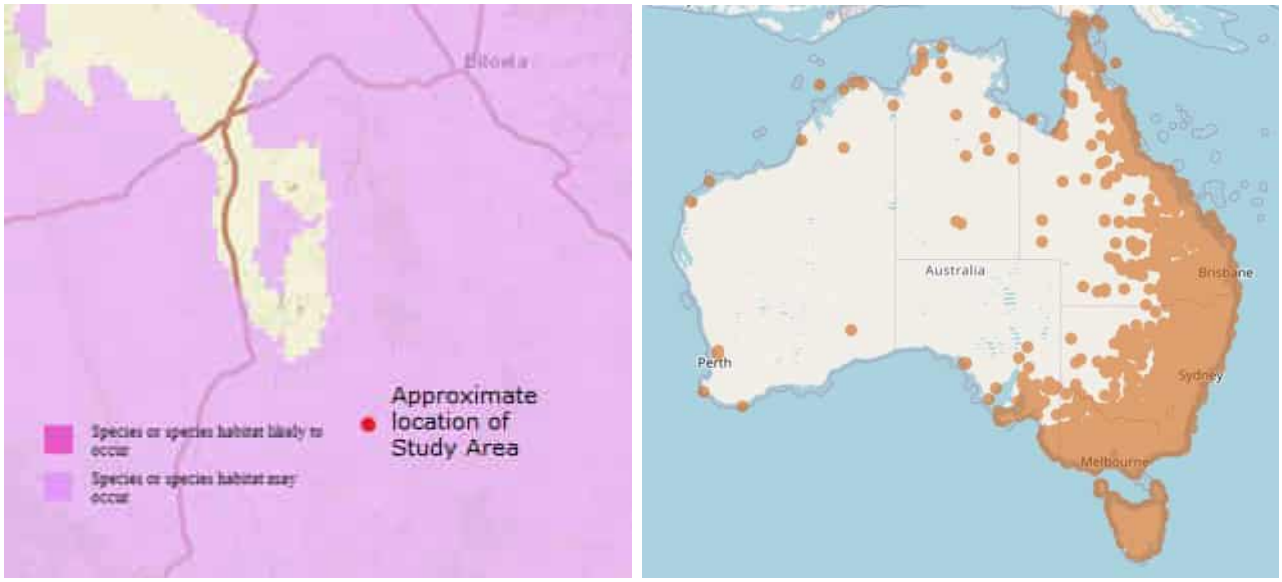


FIGURE 5-15 WHITE-THROATED NEEDLETAIL MODELLED DISTRIBUTION (DCCEEW, 2024A) AND RECORDS (ALA, 2024)

5.3.8.2 HABITAT REQUIREMENTS

During the time the white-throated needletail is within Australia, the species mostly remains aerial, foraging above a variety of habitats as it moves along the eastern coast of Australia, before returning to preferred breeding locations across Asia in autumn. They are more commonly recorded foraging above open wooded areas, though may also forage beneath the canopy between trees. Around farmland, white-throated needletail are often recorded above partly cleared fields or remnant vegetation at the edge of paddocks (TSSC, 2019)).

Conservation Advice for white-throated needletail (TSSC, 2019)) identifies this broad range of suitable foraging habitat as the following:

> *White-throated Needletail forages at heights up to 'cloud level', above a wide variety of habitats ranging from heavily treed forests to open habitats, such as farmland, heathland, mudflats […] or coastal saltworks. Large tracts of native vegetation, particularly forest, may be a key habitat requirement for species.*
>
> *Areas of updraughts, such as ridges, cliffs or sand-dunes […] or along the edges of low-pressure systems, which both lift their food sources and assist with their flight, are preferred for foraging purposes as well, with the species potentially following these systems across Australia.*
>
> *The species roosts in trees amongst dense foliage in the canopy or in hollows.*

The species has been observed to roost in trees amongst dense foliage in the canopy or in hollows (TSSC, 2019), although the degree to which the species roosts in trees is potentially over-emphasised and not well known. Roosting has been recorded rarely in Australia, for example Tarburton (2021) identified 10 published roosting records ranging from 1902 to 2001 and 20 in journals, newsletters and direct reports citing visual evidence of them landing in Australia. Twenty-four of these observations were of birds roosting/landing after sunset. A recent roosting observation of white-throated needletail was made in the Pilliga Forest in NSW (Vanderduys, Macdonald, & Pavey, 2024)), though this observation may be associated with a failed attempt at predation by a brown falcon (*Falco berigora*). Evidence suggests roosting is extremely rare in Australia and specific roosting habitat is not known.

Habitat Critical to the Survival of the Species

Habitat critical to the survival has not been specifically defined for the white-throated needletail in Australia (TSSC, 2019) and would be limited to foraging only. That is, prominent landscape features that have the potential to create updraughts and foraging opportunities may be important for the species. In this context, habitat critical to the survival of the species has been considered according to the following description (as provided in the *SIG 1.1* (DEWHA, 2013)).

> *Habitat critical to the survival of a species or ecological communities are areas that are necessary:*
>
> - *For activities such as foraging, breeding, roosting, or dispersal;*
> - *For the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators);*
> - *To maintain genetic diversity and long-term evolutionary development; and/or*
> - *For the reintroduction of populations or recovery of the species or ecological community.*

5.3.8.3 FIELD SURVEYS

Survey Methodology and Effort

A targeted survey approach was implemented to assess the presence of white-throated needletail, and potential habitat, in line with *Survey guidelines for Australia's threatened birds* (DEWHA, 2010b). A total of 171 20-minute BUS were completed across 38 locations within the Study Area during eight field survey periods (four across each season):

Dry season

- October 2022 - 23 surveys, 12 morning and 11 afternoon;
- June 2023 - 24 surveys repeat visits to BUS points including 12 morning and 12 afternoon surveys;
- September/October 2023 - 26 surveys, repeat visits to BUS points including 12 morning and 14 afternoon surveys; and
- June 2024 -18 surveys, repeat visits to BUS points including 9 morning and 9 afternoon surveys.

Wet Season

- February 2023 - 32 surveys, repeat visits to BUS points including 16 morning and 16 afternoon surveys;
- March 2023-2 8 surveys, repeat visits to BUS points including 14 morning and 14 afternoon surveys;
- December 2023 - 40 surveys, repeat visits to BUS points including 20 morning and 20 afternoon surveys; and
- February 2024-27 surveys, repeat visits to BUS points including 13 morning and 14 afternoon surveys.

In addition to the 171 BUS, six targeted white-throated needletail surveys were also carried out during the September 2024 survey period in elevated sections of the Study Area in order to identify potential areas of roosting habitat (see Figure 5-16). Topographic data was reviewed prior to the September 2024 survey event and targeted survey points identified, which were visited by the field teams in order to confirm the presence of roosting and foraging habitat features, such as tall woodland and areas with prominent updraughts.

It is important to note that the white-throated needletail is a migratory species, and that the species is more likely to be observed utilising the Study Area in the warmer months (from October to April).

For further detail on the ecological investigations completed within the Study Area, including desktop searches, survey timing and survey methodology, refer to Section 4.8.

Survey Results

White-throated needletail was not observed during any of the field surveys. Suitable foraging habitat occurs above the Study Area, as the species forages almost exclusively aerially.

The Study Area contains eucalypt woodland atop elevations, however, these do not comprise the dense, tall forest typically associated with preferred habitat for the species. Most of the vegetation observed during targeted white-throated needletail surveys in elevated areas consisted of open, immature *Eucalyptus crebra* woodland (see Plate 5-2 – Plate 5-5 below) which lacked the dense foliage and hollows the species is reported to utilise for roosting.

Further, the elevated areas within the Study Area tend to consist of gentle, undulating hills (see Plate 5-2 – Plate 5-5 below) rather than steep ridges or cliffs that result in more pronounced updraughts. Due to the lack of elevated areas with dense canopy foliage and tall hollow-bearing trees and the general undulating nature of the landscape, with limited large and distinct areas of elevational change, the habitat in the Study Area is not deemed suitable for the species for roosting.



PLATE 5-2: GENTLE, ROLLING HILLS IN THE CENTRAL SECTION OF THE STUDY AREA. PLATE 1.5 SHOWS THE VEGETATION ON THE NORTHERN FACE OF THIS ELEVATION. NO STEEP CLIFFS, RIDGES OR PROMINENT UPDRAUGHTS WERE OBSERVED.



PLATE 5-3: OPEN, IMMATURE E. CREBRA WOODLAND WITH AN ESTIMATED HEIGHT OF 8M IN THE CENTRE OF THE STUDY AREA, NOT LIKELY WHITE-THROATED NEEDLETAIL ROOSTING HABITAT.



PLATE 5-4: GENTLE, SLOPING HILLS WITH OPEN EUCALYPT WOODLAND CONSISTING OF TREES <20M TALL IN THE NORTH-WEST OF THE STUDY AREA.



PLATE 5-5: ELEVATED AREA IN THE NORTH-EAST OF THE STUDY AREA WITH OPEN WOODLAND RATHER THAN TALL FOREST. NEARBY FOREST OUTSIDE OF THE STUDY AREA APPEARS MORE SUITABLE FOR POTENTIAL ROOSTING HABITAT.

Survey Adequacy

Considering relevant guidelines and recommendations, the field survey methodology and effort has been considered adequate for this species. Survey guideline advice for white-throated needletail and field survey effort and adequacy are outlined in Table 5-21.

TABLE 5-21 WHITE-THROATED NEEDLETAIL FIELD SURVEY EFFORT

Survey Guidelines and Recommendations	Survey Effort Utilised and Timing	Comment on Field Survey Adequacy
As per the Draft referral guidelines for 14 birds listed as migratory species under the EPBC Act (DoE, 2015): No survey guidelines specific to white-throated needletail, however, recommended to focus survey efforts from high vantage points. Observations should be made as late as possible in the evening of birds coming in to roost. This species is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground and have been recorded over most types of habitat.	171 dawn and dusk timed surveys (20 minutes), bird utilisation surveys across 38 locations in the Study Area. Bird surveys were conducted during eight of the 10 survey periods (October 2022, February, March, June, September/October and December 2023, February and June 2024). 6 targeted assessments atop ridgelines for potential white-throated needletail roosting habitat during the September 2024 surveys.	Survey effort considered adequate. Surveys were conducted from vantage points in the Study Area within the appropriate time frame to detect the species. The species was not detected in any of the surveys. The habitat in the Study Area was not deemed suitable for the species to roost in.

5.3.8.4 HABITAT ASSESSMENT AND MAPPING

Figure 5-16 demonstrates the topography of the Study Area and the surrounding landscape. As stated in Section 5.3.8.3, the gentle, undulating nature of the Study Area suggests that this area is generally unsuitable for roosting. This is further supported by the lack of observations of the species, despite surveys of 171 locations across multiple survey events conducted over a two-year period. This confirms the Study Area is unlikely to provide important roosting habitat for the species. As such, no habitat mapping has been completed for the white-throated needletail within the Study Area. An assessment of collision risk and management measures to minimise impacts is considered in the Bird and Bat Management Plan (BBMP), Appendix D.

The species is therefore considered to only utilise the aerial space across the Study Area for foraging if it were to occur. As demonstrated in Figure 5-16, landscape features within the north of the Study Area (extending to the north and east outside of the Study Area) contain higher slope gradients that may present a terrain that promotes the occurrence of suitable updraughts that might support foraging. The use of this landscape feature for potential foraging by the species cannot be ruled out, and as a result this area within the Study Area is considered to have the highest potential value for foraging for the species.

Legend

- Study Area
- Project Area
- Proposed Disturbance Footprint
- Road
- Track and Path
- White-throated Needletail Targeted Survey Points
- BUS Locations

Slope Percent

0% 48%

Coordinate System:
GDA2020 MGA Zone 56

Date: 07/05/2026

Created By: MB

Drawing Size: A3

0 2 4Km

1:120,000

F5-16 Topographic Map of the Study Area with Targeted Survey Locations for the White-Throated Needletail and BUS Locations

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5.3.9 BLACK-BREASTED BUTTONQUAIL

The black-breasted buttonquail (*Turnix melanogaster*) is listed as Vulnerable under the EPBC Act as of 16th July 2000 and is considered to have the potential to occur within the Study Area.

5.3.9.1 SPECIES DISTRIBUTION AND HISTORICAL RECORDS

Black-breasted buttonquail is a cryptic, mostly ground-dwelling bird endemic to coastal and near-coastal south-east Queensland and north-east New South Wales (TSSC, 2015c). The Study Area within the 'species or species habitat may occur' modelled distribution of the species, however the species distribution is patchy within this area (DCCEEW, 2024a) (Figure 5-17). Species movement is poorly understood. Though patches of suitable habitat within the distribution are often widely separated, due to naturally open landscapes or through clearing in agricultural areas, enough records of vagrants exist to suggest that dispersibility is maintained in a fragmented landscape and that a single population persists (Garnett & Baker, 2021).

Although there are no recent historical records of black-breasted buttonquail in the Locality, there is a record from 2021 located approximately 20 km to the east of the Study Area in Coominglah State Forest (ALA, 2024).



FIGURE 5-17 BLACK-BREASTED BUTTONQUAIL MODELLED DISTRIBUTION (DCCEEW, 2024A) AND RECORDS (ALA, 2024)

5.3.9.2 HABITAT REQUIREMENTS

The species inhabits rainforest and closed forest ecosystems, with a preference for low, dry rainforest communities such as semi-evergreen vine thickets and araucarian microphyll to notophyll vine forests (Smyth, Noble, & Wiley, 2001). These vegetation communities often have a dense understorey high in complex shrubs and coarse woody debris, which provide important shelter and breeding value for the species (Smyth, Noble, & Wiley, 2001). They may also be found in low, dense acacia thickets and, in littoral areas, in vegetation behind sand dunes. Nesting often occurs in areas where understorey plants including bracken (*Pteridium esculentum*), rasp fern (*Doodia aspera*) and lantana (*Lantana camara*) are common (TSSC, 2015c).

Black-breasted buttonquail forages along forest floors, preying on invertebrates sheltered amongst leaf litter. Presence of leaf litter is a crucial habitat determinant for black-breasted buttonquail, with a given community requiring extensive deposits of litter to provide suitable habitat (TSSC, 2015c). To this extent, habitat for the species is considered to occur on highly fertile soils which facilitate rapid foliage growth and provide a constant layer of fallen leaves (TSSC, 2015c).

Habitat Critical to the Survival of the Species

Habitat critical to the survival of the black-breasted buttonquail has been defined within the *National Recovery Plan for Black-breasted Button-quail* (*Turnix melanogaster*) (DCCEEW, 2022b) as:

- *Foraging and breeding habitat;*
- *Habitat for the long-term maintenance of the species;*
- *Areas with potential habitat; and*
- *Areas supporting recovery.*

5.3.9.3 FIELD SURVEYS

Survey Methodology and Effort

A targeted survey approach was implemented to assess the presence of black-breasted buttonquail, and potential habitat, in line with *Survey guidelines for Australia's threatened birds* (DEWHA, 2010b). A total of 171 20-minute BUS were completed across 38 locations within the Study Area during eight filed survey periods (four across each season):

Dry season

- October 2022 - 23 surveys, 12 morning and 11 afternoon;
- June 2023 - 24 surveys repeat visits to BUS points including 12 morning and 12 afternoon surveys;
- September/October 2023 - 26 surveys, repeat visits to BUS points including 12 morning and 14 afternoon surveys; and
- June 2024 -18 surveys, repeat visits to BUS points including 9 morning and 9 afternoon surveys.

Wet Season

- February 2023 - 32 surveys, repeat visits to BUS points including 16 morning and 16 afternoon surveys;
- March 2023-2 8 surveys, repeat visits to BUS points including 14 morning and 14 afternoon surveys;
- December 2023 - 40 surveys, repeat visits to BUS points including 20 morning and 20 afternoon surveys; and
- February 2024-27 surveys, repeat visits to BUS points including 13 morning and 14 afternoon surveys.

Additionally, 245 vegetation and habitat assessments were completed across the Study Area during the 10 survey periods.

For further detail on the ecological investigations completed within the Study Area, including desktop searches, survey timing and survey methodology, refer to Section 4.8.

Survey Results

No individuals of the species were observed within the Study Area during field surveys. No platelets or other indicators of the presence of black-breasted buttonquail were observed during field surveys. Suitable habitat for the species was identified in the Study Area within the Vine forest/thicket and dry rainforest BHT, however this habitat is considered fragmented and limited. Observed habitat lacks key requirements for the species, such as a dense, heterogeneously distributed shrub layer for shelter and nesting, and a deep leaf litter layer for foraging.

Survey Adequacy

Considering relevant guidelines and recommendations, the field survey methodology and effort has been considered adequate for this species. Survey guideline advice for black-breasted buttonquail and field survey effort and adequacy are outlined in Table 5-22.

TABLE 5-22 BLACK-BREASTED BUTTONQUAIL FIELD SURVEY EFFORT

Survey Guidelines and Recommendations	Survey Effort Utilised and Timing	Comment on Field Survey Adequacy
Survey guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the EPBC Act (DEWHA, 2010b) Area searches of suitable habitat with detection of flushing birds or hearing of foraging scratching for 15 hours over 3 days.	171 dawn and dusk timed surveys (20 minutes), bird utilisation surveys across 38 locations in the Study Area. 245 vegetation and habitat assessments were completed across six survey periods determining the presence of any suitable habitat features for the species.	Survey effort considered adequate. Suitable habitat for the species was detected within the Study Area, with flushing surveys being conducted within this habitat during habitat assessments. The species was not observed in any surveys.

5.3.9.4 HABITAT ASSESSMENT AND MAPPING

BHT mapping has been used to identify suitable habitat within the Study Area where black-breasted buttonquail has the potential to occur. Though potentially suitable habitat within the Study Area is considered fragmented and limited in key requirements, a conservative approach to mapping this species' habitat has been implemented. Potential Foraging and Roosting Habitat for the black-breasted buttonquail within the Study Area includes the following BHT:

- Vine forest/thicket and dry rainforest.

As this habitat is considered potential habitat, it constitutes habitat critical to the survival of the species (defined in Section 5.3.9.2).

There is a total of 277.2 ha of Potential Foraging and Roosting Habitat for the species in the Study Area. Mapped habitat for the black-breasted buttonquail is shown on Figure 5-18, with habitat types summarised below in Table 5-23.

TABLE 5-23 BLACK-BREASTED BUTTONQUAIL HABITAT SUMMARY IN THE STUDY AREA

	Potential Foraging and Roosting Habitat	**Generally Unsuitable Habitat**
Description	Rainforest and closed forest ecosystems with presence of leaf litter.	Unsuitable habitat includes vegetation communities that are not considered rainforest or closed forest systems.
Mapped habitat within the Study Area (by BHT)	• Vine forest/ thickets and dry rainforest.	• Waterbodies and drainage features; • Grasslands and cultivated agricultural land; • Brigalow woodlands dominated by *Acacia harpophylla*; • Eucalypt woodland and open forest dominated by *E. crebra* with a grassy understorey; and • Riparian woodland and open forest dominated by *E. tereticornis* often associated with stream channels.
Total in the Study Area (ha)	277.2	46,552.8
Total in the Project Area (ha)	26.2	6,711.2

Legend

- Study Area
- Project Area
- Proposed Disturbance Footprint
- Black-breasted Buttonquail Potential Foraging and Roosting Habitat
- Road
- Track and Path

Coordinate System:
GDA2020 MGA Zone 56

Date: 07/05/2026

Created By: MB

Drawing Size: A3

0 2 4Km

1:120,000

F5-18 Potential Black-breasted Buttonquail Habitat in the Study Area

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5.3.10 AUSTRALIAN PAINTED SNIPE

The Australian painted snipe (*Rostratula australis*) is listed as Endangered under the EPBC Act, effective 15 May 2013, and was assessed as having the potential to occur in the Study Area.

5.3.10.1 SPECIES DISTRIBUTION AND HISTORICAL RECORDS

The Australian painted snipe occurs throughout Australia, being recorded at wetlands in all Australian states and territories, however, is the most localised in eastern Australia (DSEWPC, 2013). They are a highly mobile species, known to travel long distances between wetland habitats based on seasonal availability (Garnett & Baker, 2021). The Study Area within the 'species or species habitat likely to occur' modelled distribution of the species, however the species distribution is patchy within this area (DCCEEW, 2024a) (Figure 5-19). No historical records of the species exist within the Study Area or the Locality, with the closest record (outdated – 2000) approximately 17 km to the south-west of the Study Area (ALA, 2024).

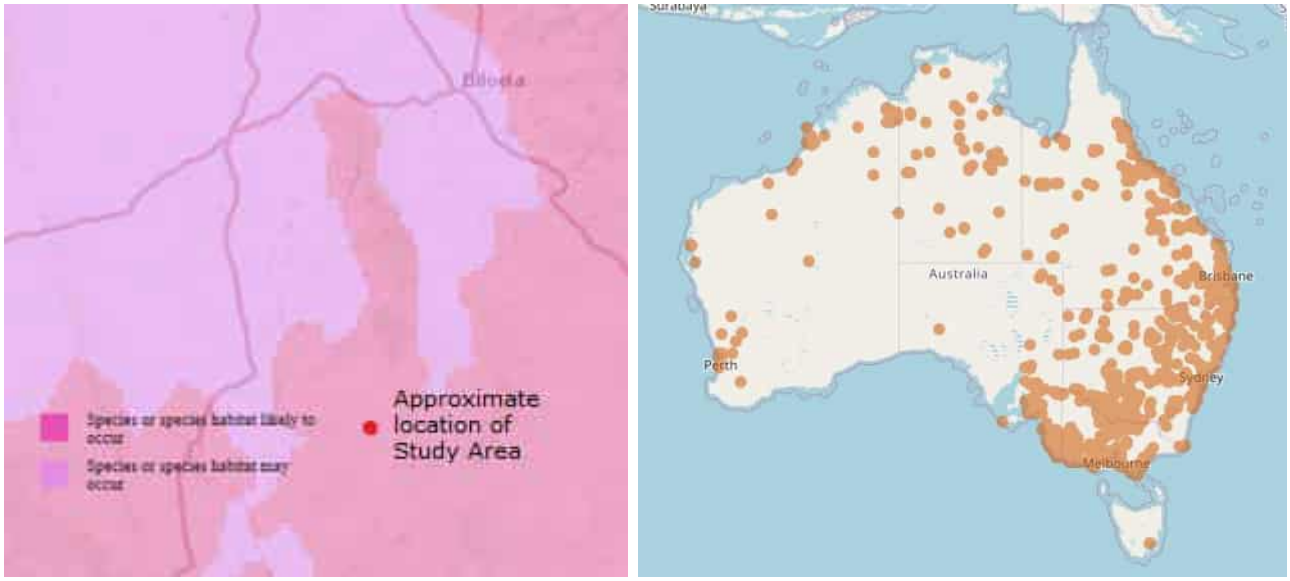


FIGURE 5-19 AUSTRALIAN PAINTED SNIPE MODELLED DISTRIBUTION (DCCEEW, 2024A) AND RECORDS (ALA, 2024)

5.3.10.2 HABITAT REQUIREMENTS

The Australian painted snipe occurs throughout Australia, being recorded at wetlands in all Australian states and territories, however, is the most localised in eastern Australia. The species inhabits shallow terrestrial freshwater wetlands, and occasionally brackish. Common habitats for the species include temporary and/or permanent lakes, swamps and claypans, inundated or waterlogged grassland, saltmarsh, farm dams and sewage farms, and bore drains (DSEWPC, 2013). In drought conditions, the Australian painted snipe requires suitable wetland conditions and may move to other suitable habitats if required (Marchant & Higgins, 1993), however migratory patterns are poorly known for the species (Pringle, 1987).

Breeding habitat for the species is known to be more specific, where the species requires shallow wetlands with areas of bare wet mud and upper and canopy cover within the immediate vicinity. All recorded nests have been located in or near small islands in freshwater wetlands (DCCEEW, 2024a).

Habitat Critical to the Survival of the Species

No habitat critical to the survival has been specifically described for this species (DSEWPC, 2013). Therefore, habitat critical to the survival of the species has been considered according to the following description (as provided in the *SIG 1.1* (DEWHA, 2013)).

> *Habitat critical to the survival of a species or ecological communities are areas that are necessary:*
>
> - *"For activities such as foraging, breeding, roosting, or dispersal;*
> - *For the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators);*
> - *To maintain genetic diversity and long-term evolutionary development; and/or*
> - *For the reintroduction of populations or recovery of the species or ecological community.*

5.3.10.3 FIELD SURVEYS

Survey Methodology and Effort

A targeted survey approach was implemented to assess the presence of squatter pigeon, and potential habitat, in line with *Survey guidelines for Australia's threatened birds* (DEWHA, 2010b). A total of 171 20-minute BUS were completed across 38 locations within the Study Area during eight filed survey periods (four across each season):

Dry season

- October 2022 - 23 surveys, 12 morning and 11 afternoon;
- June 2023 - 24 surveys repeat visits to BUS points including 12 morning and 12 afternoon surveys;
- September/October 2023 - 26 surveys, repeat visits to BUS points including 12 morning and 14 afternoon surveys; and
- June 2024 -18 surveys, repeat visits to BUS points including 9 morning and 9 afternoon surveys.

Wet Season

- February 2023 - 32 surveys, repeat visits to BUS points including 16 morning and 16 afternoon surveys;
- March 2023-2 8 surveys, repeat visits to BUS points including 14 morning and 14 afternoon surveys;
- December 2023 - 40 surveys, repeat visits to BUS points including 20 morning and 20 afternoon surveys; and
- February 2024-27 surveys, repeat visits to BUS points including 13 morning and 14 afternoon surveys.

Additionally, 245 vegetation and habitat assessments were completed across the Study Area during the 10 survey periods.

For further detail on the ecological investigations completed within the Study Area, including desktop searches, survey timing and survey methodology, refer to Section 4.8.

Survey Results

Australian painted snipe was not observed during any of the field surveys, however suitable foraging habitat was identified within the Study Area. Based on the likelihood of occurrence criteria, this species is considered potential to occur within the Study Area (Appendix C).

Survey Adequacy

Considering relevant guidelines and recommendations, the field survey methodology and effort has been considered adequate for this species. Survey guideline advice for Australian painted snipe and field survey effort and adequacy are outlined in Table 5-24.

TABLE 5-24 AUSTRALIAN PAINTED SNIPE FIELD SURVEY EFFORT

Survey Guidelines and Recommendations	Survey Effort Utilised and Timing	Comment on Field Survey Adequacy
Survey guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the EPBC Act (DEWHA, 2010b) Area searches or transects through suitable wetlands; detection by sighting and flushing. Conducted for 10 hours over 3 days. Targeted stationary observations at dawn and dusk of suitable foraging locations within wetlands; detection by sighting. Conducted for 10 hours over 5 days. Also a brief spotlight search shortly after dusk may detect birds.	171 dawn and dusk timed surveys (20 minutes), bird utilisation surveys across 38 locations in the Study Area. 245 vegetation and habitat assessments were completed across 10 survey periods determining the presence of any suitable habitat features for the species. 6 hours of spotlighting over two nights in October 2022 (Impacted by inclement weather). 12 hours of spotlighting over four nights in June 2023. 8 hours of spotlighting over two nights in September 2024.	Survey effort considered adequate. Waterbodies were surveyed across the Study Area, with flushing being conducted. Habitat assessments and timed stationary surveys being conducted at dawn and dusk. Spotlighting was also conducted. The species was not observed in any surveys.

5.3.10.4 HABITAT ASSESSMENT AND MAPPING

Potential foraging habitat for this species in the Study Area includes the following BHT:

- Waterbodies and drainage features.

This habitat is considered potential foraging habitat only, with no breeding habitat identified within the Study Area.

As no individuals of the species have been observed utilising this habitat and the habitat is considered to be in poor condition due to the historical cattle grazing within the Study Area, this habitat has not been considered habitat critical to the survival of the species.

There is a total of 56.0 ha of Potential Foraging Habitat for the species in the Study Area. Mapped habitat for the Australian painted snipe is shown on Figure 5-20, with habitat types summarised below in Table 5-25.

TABLE 5-25 AUSTRALIAN PAINTED SNIPE HABITAT SUMMARY IN THE STUDY AREA

	Potential Foraging Habitat	**Generally Unsuitable Habitat**
Description	Shallow terrestrial freshwater wetlands.	Unsuitable habitat includes all habitat types that do not provide foraging value.
Mapped habitat within the Study Area (by BHT)	• Waterbodies and drainage features.	• Vine forest/ thickets and dry rainforest; • Grasslands and cultivated agricultural land; • Brigalow woodlands dominated by *Acacia harpophylla;* • Eucalypt woodland and open forest dominated by *E. crebra* with a grassy understorey; and • Riparian woodland and open forest dominated by *E. tereticornis* often associated with stream channels.
Total in the Study Area (ha)	56.0	46,717.4
Total in the Project Area (ha)	3.3	6,734.2

Legend

- Study Area
- Project Area
- Proposed Disturbance Footprint
- Australian Painted Snipe Potential Foraging Habitat
- Road
- Track and Path

Coordinate System:
GDA2020 MGA Zone 56

Date: 07/05/2026

Created By: MB

Drawing Size: A3

0 2 4Km

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F5-20 Potential Australian Painted Snipe Habitat within the Study Area

Theodore Wind Farm PER

Theodore Energy Developments Pty Ltd

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5.3.11 DIAMOND FIRETAIL

The diamond firetail (*Stagonopleura guttata*) is listed as Vulnerable under the EPBC Act and considered potential to occur within the Study Area.

5.3.11.1 SPECIES DISTRIBUTION AND HISTORICAL RECORDS

Diamond firetails occur on the south-east mainland of Australia from south-east Queensland to Eyre Peninsula, South Australia, and about 300 km inland from the sea (Higgins, Peter, & Cowling, 2007). The Study Area occurs within the 'species or species habitat may occur' modelled distribution of the species (DCCEEW, 2024a) (Figure 5-21). No historical record of the species exists within the Study Area or the Locality. The closest (undated) record is located approximately 30 km to the west of the Study Area (ALA, 2024).

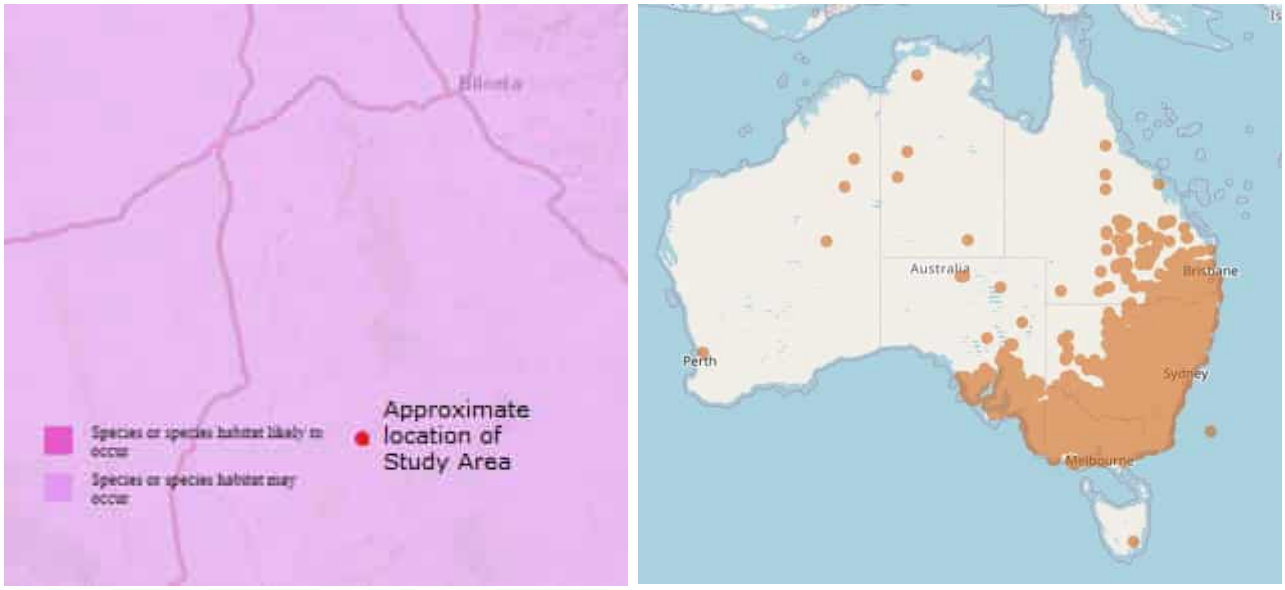


FIGURE 5-21 DIAMOND FIRETAIL MODELLED DISTRIBUTION (DCCEEW, 2024A) AND RECORDS (ALA, 2024)

5.3.11.2 HABITAT REQUIREMENTS

Diamond firetails occur in eucalypt, acacia or casuarina woodlands, open forests and other lightly timbered habitats, including farmland and grassland with scattered trees (Higgins, Peter, & Cowling, 2007). They prefer areas with relatively low tree density, few large logs, and little litter cover but high grass cover and roost in dense shrubs or in smaller nests built especially for roosting (DCCEEW, 2023b). Their flight is described as low and direct in long lines with slight undulations.

The diamond firetails build their nests in areas where the eggs are somewhat safeguarded including in the base of raptor bird nests or in foliage of prickly shrubs (DCCEEW, 2023b).

Habitat Critical to the Survival of the Species

Habitat critical to the survival of the diamond firetail has been described within the species Conservation Advice (DCCEEW, 2023b) and includes areas of:

- *Eucalypt, acacia or casuarina woodlands, open forests and other lightly timbered habitats;*

- *Low tree density, few large logs, and little litter cover but high grass cover for foraging, roosting and breeding;*
- *Drooping she-oak (Allocasuarina verticillata) within the Mt Lofty Ranges.*

Any known or likely habitat within the modelled distribution of the diamond firetail (Species of National Environmental Significance database) should be considered as habitat critical to the survival of the species (DCCEEW, 2023b). Additionally, areas that are not currently occupied by the species due to recent disturbance (e.g. fire, grazing or human activity), but should became suitable again in the future, should also be considered habitat critical to the survival of the species (DCCEEW, 2023b).

5.3.11.3 FIELD SURVEYS

Survey Methodology and Effort

A targeted survey approach was implemented to assess the presence of diamond firetail, and potential habitat, in line with *Survey guidelines for Australia's threatened birds* (DEWHA, 2010b). A total of 171 20-minute BUS were completed across 38 locations within the Study Area during eight filed survey periods (four across each season):

Dry season

- October 2022 - 23 surveys, 12 morning and 11 afternoon;
- June 2023 - 24 surveys repeat visits to BUS points including 12 morning and 12 afternoon surveys;
- September/October 2023 - 26 surveys, repeat visits to BUS points including 12 morning and 14 afternoon surveys;
- June 2024 -18 surveys, repeat visits to BUS points including 9 morning and 9 afternoon surveys; and
- September 2024 – 3 call playback sessions in suitable habitat.

Wet Season

- February 2023 - 32 surveys, repeat visits to BUS points including 16 morning and 16 afternoon surveys;
- March 2023-2 8 surveys, repeat visits to BUS points including 14 morning and 14 afternoon surveys;
- December 2023 - 40 surveys, repeat visits to BUS points including 20 morning and 20 afternoon surveys; and
- February 2024-27 surveys, repeat visits to BUS points including 13 morning and 14 afternoon surveys.

Call playback surveys were conducted in suitable habitat for diamond firetail during the September 2024 surveys. Six call playback sessions using downloaded diamond firetail calls broadcast through a speaker were conducted in open eucalypt forest with a grassy understory.

Additionally, 245 vegetation and habitat assessments were completed across the Study Area during the 10 survey periods.

For further detail on the ecological investigations completed within the Study Area, including desktop searches, survey timing and survey methodology, refer to Section 4.8.

Survey Results

Diamond firetail was not observed during any of the field surveys, however potential foraging and breeding habitat has been identified throughout the Study Area. Based on the likelihood of occurrence criteria, this species is considered potential to occur within the Study Area (Appendix C).

Survey Adequacy

Considering relevant guidelines and recommendations, the field survey methodology and effort has been considered adequate for this species. Survey guideline advice for diamond firetail and field survey effort and adequacy are outlined in Table 5-26.

TABLE 5-26 DIAMOND FIRETAIL FIELD SURVEY EFFORT

Survey Guidelines and Recommendations	Survey Effort Utilised and Timing	Comment on Field Survey Adequacy
Survey guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the EPBC Act (DEWHA, 2010) There are no targeted survey guidelines for this species. Active searches or transects whilst recording any sightings and calls within suitable habitat is recommended. Suitable habitats include; grassy eucalypt, acacia, or casuarina woodlands, other suitable habitat include open forests, mallees or natural temperate grasslands. Active searches for microhabitat features include; globular structured nests within the shrubby understorey of woodland areas.	171 dawn and dusk timed surveys (20 minutes), bird utilisation surveys across 38 locations in the Study Area. 245 vegetation and habitat assessments were completed across 10 survey periods determining the presence of any suitable habitat features for the species. Six 5-minute call playback sessions, using a portable speaker to broadcast diamond firetail calls in suitable habitat.	Survey effort considered adequate. Survey effort was conducted in a range of habitats throughout the Study Area by suitably qualified ecologists, including suitable habitat of grassy eucalypt woodlands and grasslands. No observation of the species occurred during field surveys however suitable habitat for breeding, foraging and dispersal was detected within the Study Area.

5.3.11.4 HABITAT ASSESSMENT AND MAPPING

Considering the above discussion of the species habitat, the BHT in the Study Area which can be considered Potential Breeding and Foraging Habitat for the diamond firetail include:

- Eucalypt woodland and open forest dominated by *E. crebra* with a grassy understorey.

It should be noted that the Study Area is in the northern extent of the species distribution with no sighting of the species during field surveys despite surveys of 171 targeted sites over a two-year period. Because of this, it has been concluded that the potential for the species to occur within the Study Area is low. As such, only areas of this BHT with the most preferred habitat features of low tree density and high grass cover have been mapped as potential habitat for the species. Areas containing these habitat features within the Study Area seem to be concentrated to north facing hillsides in eucalypt woodland. In line with the description provided within the species Conservation Advice (DCCEEW, 2023b), this mapped potential habitat has been conservatively considered potential habitat critical to the survival of the species due to the presence of preferred lightly timbres eucalyptus habitat with low tree density that may provide habitat for foraging, breeding, roosting and dispersal in the future if the species was to occur.

While acacia woodlands are typically considered suitable habitat for diamond firetail, the Brigalow woodland observed within the Study Area contained a distinct lack of grassy understory, and was considered unlikely to be utilised by the species which prefers high grass cover. The BHT Brigalow woodlands dominated by *Acacia harpophylla* has therefore not been mapped as diamond firetail habitat.

The BHTs not listed above have been excluded as habitat for the diamond firetail for the following reasons:

- Grasslands and cultivated agricultural – absence of trees;
- Riparian woodland and open forest – vegetation considered too dense for the species;
- Vine forest/ thickets and dry rainforest – preferred canopy species and microhabitat (few large logs, and little litter cover but high grass cover) not present;
- Permanent waterbodies – while the diamond firetail may drink from farm dams, they are not considered a foraging resource.

There is a total of 7,899.3 ha Potential Breeding and Foraging Habitat for the species in the Study Area. Mapped habitat for the diamond firetail is shown on Figure 5-22, with habitat types summarised below in Table 5-27.

TABLE 5-27 DIAMOND FIRETAIL HABITAT SUMMARY IN THE STUDY AREA

	Potential Breeding and Foraging Habitat	**Generally Unsuitable Habitat**
Description	Eucalypt, acacia or casuarina woodlands, open forests and other lightly timbered habitats.	Other habitat types, particularly those with high tree density, abundance of large logs, thick litter cover and/or low grass cover.
Mapped habitat within the Study Area (by BHT)	• Eucalypt woodland and open forest dominated by *E. crebra* with a grassy understorey – with low tree density and high grass cover (north facing areas).	• Eucalypt woodland and open forest dominated by *E. crebra* with a grassy understorey – with high tree density and low grass cover; • Grasslands and cultivated agricultural land; • Riparian woodland and open forest dominated by *E. tereticornis* often associated with stream channels; • Vine forest/ thickets and dry rainforest; • Brigalow woodlands dominated by *Acacia harpophylla;* and • Waterbodies and drainage features.
Total in the Study Area (ha)	7,899.3	38,874.1
Total in the Project Area (ha)	1,154.5	5,582.9

Legend

- Study Area
- Project Area
- Proposed Disturbance Footprint
- Diamond Firetail Potential Foraging Habitat
- Road
- Track and Path

Coordinate System:
GDA2020 MGA Zone 56

Date: 07/05/2026

Created By: MB

Drawing Size: A3

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F5-22 Potential Diamond Firetail Habitat within the Study Area

Theodore Wind Farm PER

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5.3.12 OOLINE

Ooline (*Cadellia pentastylis*) is listed as Vulnerable under the EPBC Act as of 16th July 2000, and is assessed as having the potential to occur within the Study Area.

5.3.12.1 SPECIES DISTRIBUTION AND HISTORICAL RECORDS

Ooline occurs in north-west New South Wales and southern and central Queensland (DEWHA, 2008a). The majority of the Study Area occurs within the 'species or species habitat may occur' modelled distribution of the species, with small portions of the Study Area within the 'species or species habitat likely to occur' modelled distribution (DCCEEW, 2024a) (Figure 5-23). No historical record of the species occurs within the Study Area or the Locality, however an out-dated record of the species occurs 50 km east of the Study Area near Coominglah State Forest (dated 2003) (ALA, 2024).

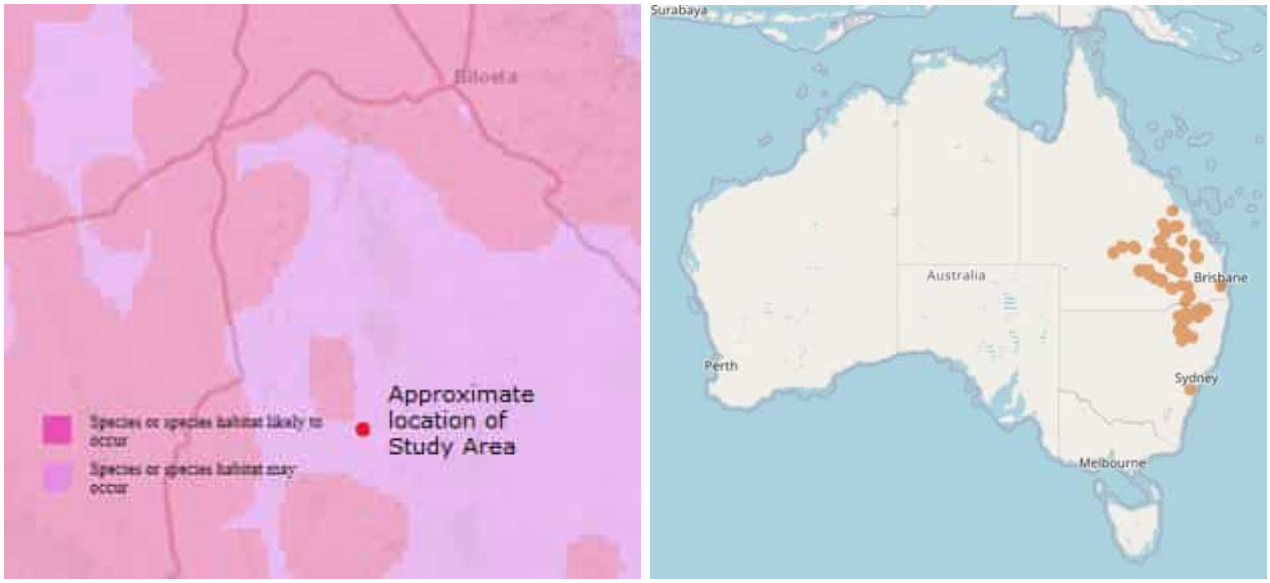


FIGURE 5-23 OOLINE MODELLED DISTRIBUTION (DCCEEW, 2024A) AND RECORDS (ALA, 2024)

5.3.12.2 HABITAT REQUIREMENTS

This species inhabits dry rainforest, vine thickets and some mixed sclerophyllous communities on mid-to-upper slopes of hills and ridges (300m to 600m above sea level) comprised of a varied clay and sandstone geology (DEWHA, 2008a). Ooline is a dominant or co-dominant canopy species often found in conjunction with white box and white cypress pine, with an open understorey and dense leaf litter. Understorey species commonly observed include native olive (*Notelaea microcarpa*), pinkwood (*Beyeria viscosa*), bitterbark (*Alstonia constricta*), wilga (*Geijera parviflora*), berry saltbush (*Einadia hastate*), *Stipa* and *Aristida* species (DCCEEW, 2024a).

Habitat Critical to the Survival of the Species

Habitat critical to the survival of the species has not been specifically described for ooline (DEWHA, 2008a). Therefore, habitat critical to the survival of the species has been considered according to the following description (as provided in the *SIG 1.1* (DEWHA, 2013)).

Habitat critical to the survival of a species or ecological communities are areas that are necessary:

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

5.3.12.3 FIELD SURVEYS

Survey Methodology and effort

A total of 245 vegetation and habitat assessments were completed across the Study Area during the 10 field surveys, including random meanders completed concurrently with these surveys in suitable habitat for the species across the Study Area.

This total includes 42 BioCondition assessments, including 35 conducted in eucalypt open woodland/riparian communities, three in patches of brigalow woodland, two in vine thicket/dry rainforest communities, and two in open grasslands/cleared environments.

A total of 17 targeted flora transects were also conducted during the September 2024 survey period.

For further detail on the ecological investigations completed within the Study Area, including desktop searches, survey timing and survey methodology, refer to Section 4.8.

Survey Results

This species was not observed during field surveys, despite suitable habitat being identified.

Survey Adequacy

Considering relevant guidelines and recommendations, the field survey methodology and effort has been considered adequate for this species. Survey guideline advice for ooline, field survey effort and adequacy is outlined in Table 5-28.

TABLE 5-28 OOLINE FIELD SURVEY EFFORT

Survey Guidelines and Recommendations	Survey Effort Utilised and Timing	Comment on Field Survey Adequacy
Flora Survey Guidelines – Protected Plants, Nature Conservation Act 1992 (DES, 2020) Random, non-selective traverses of all habitat types throughout the Study Area, whether identified as suitable or un-suitable habitat for threatened flora.	245 vegetation and habitat assessments were completed across 10 survey periods, including 42 BioCondition assessments. Meander searches were undertaken at the same time as vegetation and habitat assessments within the Study Area. 17 targeted flora transects conducted during the September 2024 survey period in impact areas ranging from 30 minutes to an hour.	Survey effort considered adequate. This species has not been observed during field surveys, despite suitable habitat being identified.

5.3.12.4 HABITAT ASSESSMENT AND MAPPING

Potential ooline habitat occurs within the Study Area in association with the following BHT:

- Vine forest / thickets and dry rainforest.

The BHT of Brigalow woodlands dominated by *Acacia harpophylla* was considered to potentially provide habitat for ooline. However considering the survey effort within Brigalow TEC, particularly within the Disturbance Footprint (see Section 5.2.1.2), and as ooline is such a distinctive and conspicuous species, it has been concluded that if ooline was present within this habitat, it would have been identified during field surveys. Therefore, Brigalow woodlands dominated by *Acacia harpophylla* was not mapped as potential habitat for the species.

In the absence of an official definition, potential species habitat defined above and mapped to occur within the Study Area has conservatively been considered habitat critical to the survival of ooline, though the Study area does not support an important population of the species.

This habitat has been mapped with a total of 277.2 ha occurring in the Study Area. Mapped habitat for ooline is shown on Figure 5-24, with habitat types summarised below in Table 5-27.

TABLE 5-29 OOLINE HABITAT SUMMARY IN THE STUDY AREA

	Potential Habitat	**Generally Unsuitable Habitat**
Description	Dry rainforest, vine thickets and some mixed sclerophyllous communities on mid-to-upper slopes of hills and ridges (300m to 600m above sea level) comprised of a varied clay and sandstone geology.	Habitats at lower altitudes and/or on soils not comprising of clay and sandstone and/or communities not containing components of dry rainforests or vine thickets.
Mapped habitat within the Study Area (by BHT)	• Vine forest/ thickets and dry rainforest.	• Grasslands and cultivated agricultural land; • Brigalow woodlands dominated by *Acacia harpophylla;* • Waterbodies and drainage features. • Eucalypt woodland and open forest dominated by *E. crebra* with a grassy understorey; and • Riparian woodland and open forest dominated by *E. tereticornis* often associated with stream channels.
Total in the Study Area (ha)	277.2	46,552.8
Total in the Project Area (ha)	26.2	6,711.2

Legend

- Study Area
- Project Area
- Proposed Disturbance Footprint
- Ooline Potential Habitat
- Road
- Track and Path

Coordinate System:
GDA2020 MGA Zone 56

Date: 07/05/2026

Created By: MB

Drawing Size: A3

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F5-24 Potential Ooline Habitat within the Study Area

Theodore Wind Farm PER

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5.3.13 COSSINIA

Cossinia (*Cossinia australiana*) is listed as Endangered under the EPBC Act as of 16th July 2000, and is assessed as having the potential to occur within the Study Area.

5.3.13.1 SPECIES DISTRIBUTION AND HISTORICAL RECORDS

Cossinia is endemic to central and southern Queensland where it occurs from 20 m to 520 m above sea level (DEWHA, 2008b). The majority of the Study Area occurs within the 'species or species habitat may occur' modelled distribution of the species, with small portions of the Study Area within the 'species or species habitat likely to occur' modelled distribution (DCCEEW, 2024a) (Figure 5-25). No recent historical record of the species occurs within the Study Area or the Locality, however one out-dated (2002) record of the species occurs 1 km east of the Study Area in Montour State Forest (ALA, 2024).

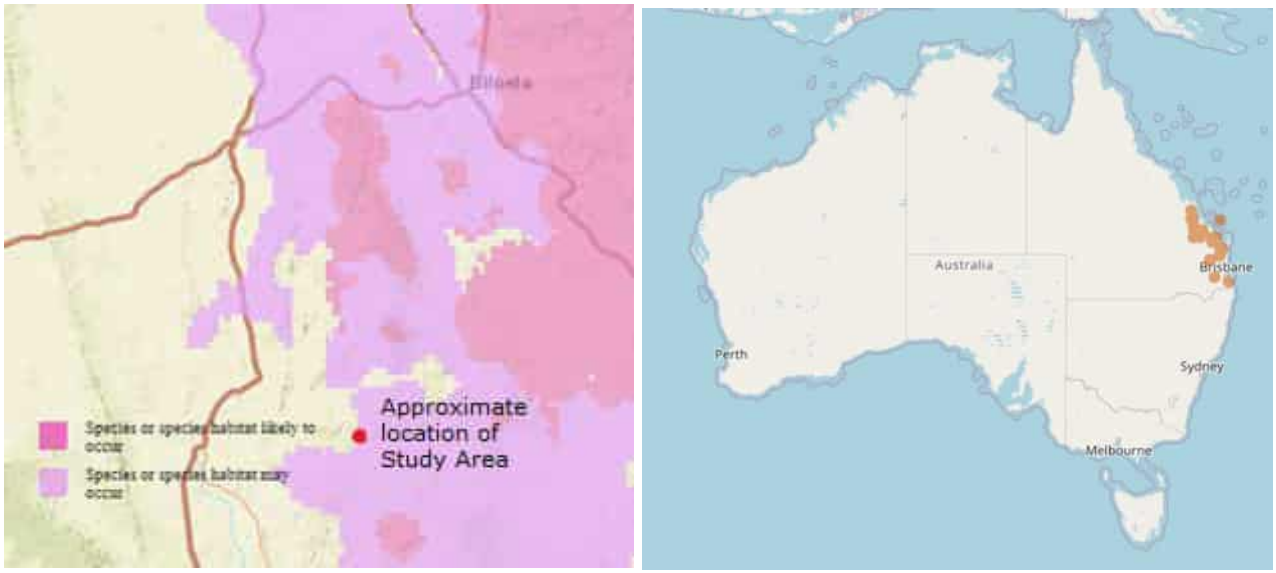


FIGURE 5-25 COSSINIA MODELLED DISTRIBUTION (DCCEEW, 2024A) AND RECORDS (ALA, 2024)

5.3.13.2 HABITAT REQUIREMENTS

Cossinia occurs in *Araucaria* vine forests and semi-evergreen thickets on varied geology of red volcanic soils and black clay loams. In addition to occurrences as a scattered or uncommon individual among closed forests, cossinia also inhabits ecotones between dry rainforest and sclerophyllous communities (DEWHA, 2008b).

Habitat Critical to the Survival of the Species

Habitat critical to the survival of the species has not been specifically described for cossinia (DEWHA, 2008b). Therefore, habitat critical to the survival of the species has been considered according to the following description (as provided in the *SIG 1.1* (DEWHA, 2013)).

> *Habitat critical to the survival of a species or ecological communities are areas that are necessary:*
>
> - *"For activities such as foraging, breeding, roosting, or dispersal;*

- *For the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators);*
- *To maintain genetic diversity and long-term evolutionary development; and/or*
- *For the reintroduction of populations or recovery of the species or ecological community.*

5.3.13.3 FIELD SURVEYS

Survey Methodology and effort

A total of 245 vegetation and habitat assessments were completed across the Study Area during the 10 field surveys, including random meanders completed concurrently with these surveys in suitable habitat for the species across the Study Area.

This total includes 42 BioCondition assessments, including 35 conducted in eucalypt open woodland/riparian communities, three in patches of brigalow woodland, two in vine thicket/dry rainforest communities, and two in open grasslands/cleared environments.

A total of 17 targeted flora transects were also conducted during the September 2024 survey period.

For further detail on the ecological investigations completed within the Study Area, including desktop searches, survey timing and survey methodology, refer to Section 4.8.

Survey Results

This species was not observed during field surveys, despite suitable habitat being identified.

Survey Adequacy

Considering relevant guidelines and recommendations, the field survey methodology and effort has been considered adequate for this species. Survey guideline advice for cossinia, field survey effort and adequacy is outlined in Table 5-30.

TABLE 5-30 COSSINIA FIELD SURVEY EFFORT

Survey Guidelines and Recommendations	Survey Effort Utilised and Timing	Comment on Field Survey Adequacy
Flora Survey Guidelines – Protected Plants, Nature Conservation Act 1992 (DES, 2020) Random, non-selective traverses of all habitat types throughout the Study Area, whether identified as suitable or un-suitable habitat for threatened flora.	245 vegetation and habitat assessments were completed across 10 survey periods, including 42 BioCondition assessments. Meander searches were undertaken at the same time as vegetation and habitat assessments within the Study Area. 17 targeted flora transects conducted during the September 2024 survey period in impact areas ranging from 30 minutes to an hour.	Survey effort considered adequate. This species has not been observed during field surveys, despite suitable habitat being identified.

5.3.13.4 HABITAT ASSESSMENT AND MAPPING

Potential cossinia habitat occurs within the Study Area in association with the following BHT:

- Vine forest / thickets and dry rainforest.

In the absence of an official definition, potential species habitat defined above and mapped to occur within the Study Area has been considered habitat critical to the survival of cossinia. This is largely due to the 2002 record 1 km east of the Study Area.

This habitat has been mapped with a total of 277.2 ha occurring in the Study Area. Mapped habitat for the cossinia is shown on Figure 5-26, with habitat types summarised below in Table 5-31.

TABLE 5-31 COSSINIA HABITAT SUMMARY IN THE STUDY AREA

	Potential Habitat	**Generally Unsuitable Habitat**
Description	Vine forests and semi-evergreen thickets and/or ecotones between dry rainforest and sclerophyllous communities.	Non dry-rainforest habitats.
Mapped habitat within the Study Area (by BHT)	• Vine forest / thickets and dry rainforest.	• Grasslands and cultivated agricultural land; • Brigalow woodlands dominated by *Acacia harpophylla;* • Waterbodies and drainage features. • Eucalypt woodland and open forest dominated by *E. crebra* with a grassy understorey; and • Riparian woodland and open forest dominated by *E. tereticornis* often associated with stream channels.
Total in the Study Area (ha)	277.2	46,552.8
Total in the Project Area (ha)	26.2	6,711.2

Legend

- Study Area
- Project Area
- Proposed Disturbance Footprint
- Cossinia Potential Habitat
- Road
- Track and Path

Coordinate System:
GDA2020 MGA Zone 56

Date: 07/05/2026

Created By: MB

Drawing Size: A3

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F5-26 Potential Cossinia Habitat within the Study Area

Theodore Wind Farm PER

Theodore Energy Developments Pty Ltd

ERM

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5.3.14 AUSTRAL CORNFLOWER

Austral cornflower (*Leuzea australis*) is listed as Vulnerable under the EPBC Act, effective 16 July 2000, and was assessed as having the potential to occur in the Study Area.

5.3.14.1 SPECIES DISTRIBUTION AND HISTORICAL RECORDS

Austral cornflower's distribution occurs across 600 km, from Mt Moffat to Gatton. It is thought to be extinct in NSW and Victoria, but it historically occurred in these two states (DEWHA, 2008c). The majority of the Study Area occurs within the 'species or species habitat may occur' modelled distribution of the species (DCCEEW, 2024a) (Figure 5-27). No historical record of the species occurs within the Study Area or the Locality, however three out-dated records of the species occur 20 km east of the Study Area (ALA, 2024).

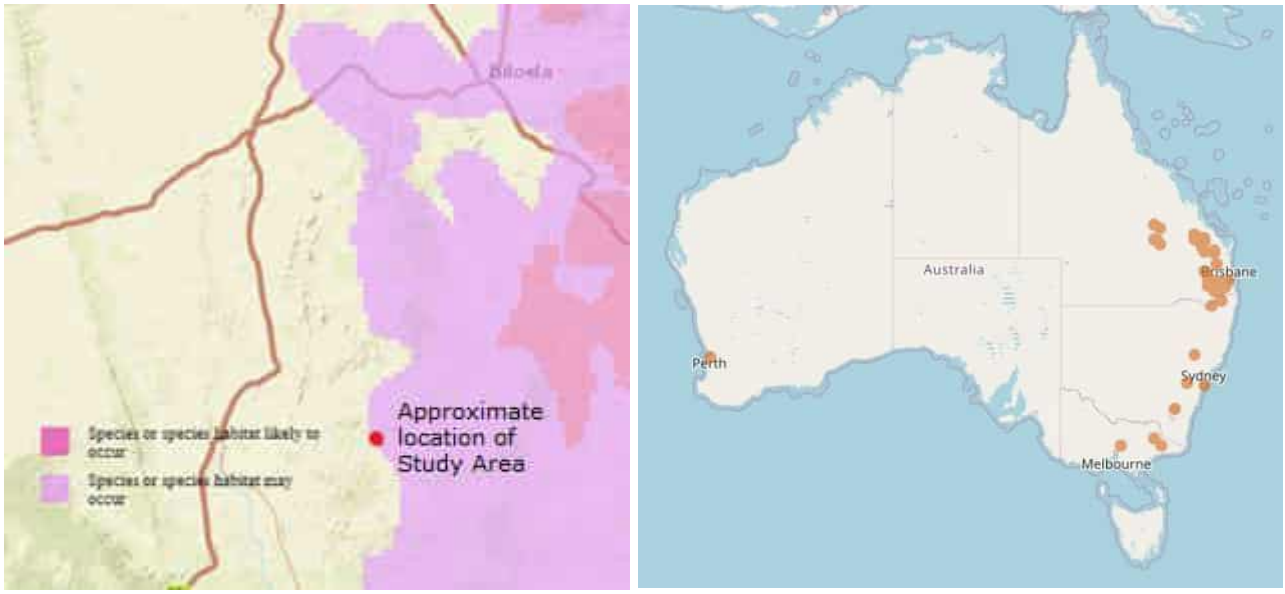


FIGURE 5-27 AUSTRAL CORNFLOWER MODELLED DISTRIBUTION (DCCEEW, 2024A) AND RECORDS (ALA, 2024)

5.3.14.2 HABITAT REQUIREMENTS

The species occurs in eucalypt open forests with a grassy understorey on heavy clay soils or clay loams derived from basalt. Typical associated canopy species include *Eucalyptus crebra, E. populnea, E. tereticornis,* and *E. melanophloia*. This species is noted to be a poor competitor and tends to favour habitat where grass competition has been reduced by fire or other forms of disturbance (DCCEEW, 2024a).

Habitat Critical to the Survival of the Species

Habitat critical to the survival of the species has not been specifically described for austral cornflower (DEWHA, 2008c). Therefore, habitat critical to the survival of the species has been considered according to the following description (as provided in the *SIG 1.1* (DEWHA, 2013)).

> *Habitat critical to the survival of a species or ecological communities are areas that are necessary:*
>
> - *"For activities such as foraging, breeding, roosting, or dispersal;*

- *For the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators);*
- *To maintain genetic diversity and long-term evolutionary development; and/or*
- *For the reintroduction of populations or recovery of the species or ecological community.*

5.3.14.3 FIELD SURVEYS

Survey Methodology and effort

A total of 245 vegetation and habitat assessments were completed across the Study Area during the 10 field surveys, including random meanders completed concurrently with these surveys in suitable habitat for the species across the Study Area.

This total includes 42 BioCondition assessments, including 35 conducted in eucalypt open woodland/riparian communities, three in patches of brigalow woodland, two in vine thicket/dry rainforest communities, and two in open grasslands/cleared environments.

A total of 17 targeted flora transects were also conducted during the September 2024 survey period.

For further detail on the ecological investigations completed within the Study Area, including desktop searches, survey timing and survey methodology, refer to Section 4.8.

Survey Results

This species was not observed during field surveys, despite suitable habitat being identified.

Survey Adequacy

Considering relevant guidelines and recommendations, the field survey methodology and effort has been considered adequate for this species. Survey guideline advice for austral cornflower, field survey effort and adequacy is outlined in Table 5-32.

TABLE 5-32 AUSTRAL CORNFLOWER FIELD SURVEY EFFORT

Survey Guidelines and Recommendations	Survey Effort Utilised and Timing	Comment on Field Survey Adequacy
Flora Survey Guidelines – Protected Plants, Nature Conservation Act 1992 (DES, 2020) Random, non-selective traverses of all habitat types throughout the Study Area, whether identified as suitable or un-suitable habitat for threatened flora.	245 vegetation and habitat assessments were completed across 10 survey periods, including 42 BioCondition assessments. Meander searches were undertaken at the same time as vegetation and habitat assessments within the Study Area. 17 targeted flora transects conducted during the September 2024 survey period in impact areas ranging from 30 minutes to an hour.	Survey effort considered adequate. This species has not been observed during field surveys, despite suitable habitat being identified.

5.3.14.4 HABITAT ASSESSMENT AND MAPPING

Some of the key threats to austral cornflower include vegetation clearing, invasion by weeds (including exotic grasses), and grazing pressure (DEWHA, 2008c). It should be noted that much of the habitat within the Study Area is subject to a high level of these threats, which is likely to affect the persistence of austral cornflower within the Study Area. However, in line with a conservative approach, potential austral cornflower habitat has been mapped within the Study Area in association with the following BHT:

- Eucalypt woodlands and open forests.

In the absence of an official definition, potential species habitat defined above and mapped to occur within the Study Area has been considered habitat critical to the survival of austral cornflower.

This habitat has been mapped, with a total of 21,768.5 ha of potential habitat occurring in the Study Area. Mapped habitat for austral cornflower is shown on Figure 5-28 with habitat types summarised below in Table 5-33.

TABLE 5-33 AUSTRAL CORNFLOWER HABITAT SUMMARY IN THE STUDY AREA

	Potential Habitat	**Generally Unsuitable Habitat**
Description	Eucalypt open forests with a grassy understorey on black clay soils.	Non-eucalypt communities, or eucalypt communities that lack grassy understory and black clay soils.
Mapped habitat within the Study Area (by BHT)	• Eucalypt woodland and open forest dominated by *E. crebra* with a grassy understorey.	• Grasslands and cultivated agricultural land; • Brigalow woodlands dominated by *Acacia harpophylla;* • Vine forest/ thickets and dry rainforest; • Waterbodies and drainage features; and • Riparian woodland and open forest dominated by *E. tereticornis* often associated with stream channels.
Total in the Study Area (ha)	21,768.5	25,004.9
Total in the Project Area (ha)	3,091.1	3,646.3

Legend

- Study Area
- Project Area
- Proposed Disturbance Footprint
- Austral Cornflower Potential Habitat
- Road
- Track and Path

Coordinate System:
GDA2020 MGA Zone 56

Date: 07/05/2026

Created By: MB

Drawing Size: A3

0 2 4Km

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F5-28 Potential Austral Cornflower Habitat within the Study Area

Theodore Wind Farm PER

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ERM

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5.3.15 SOLANUM DISSECTUM

Solanum dissectum is listed as Endangered under the EPBC Act, effective 7 December 2016, and is assessed as having the potential to occur in the Study Area (see LoO in Appendix C).

5.3.15.1 SPECIES DISTRIBUTION AND HISTORICAL RECORDS

S. dissectum is distributed between Blackwater, Bauhinia, Thangool and Dululu, though is confined to localised areas where the species has been observed (TSSC, 2016a). The Study Area is located outside the species modelled habitat distribution, though parts of the Locality intersect the 'species or species habitat may occur' modelled distribution (DCCEEW, 2024a) (Figure 5-29). No historical record of the species occurs within the Study Area or the Locality, with the closest record of the species located 30 km north-west of the Study Area near Moura (dated 2017) (ALA, 2024).

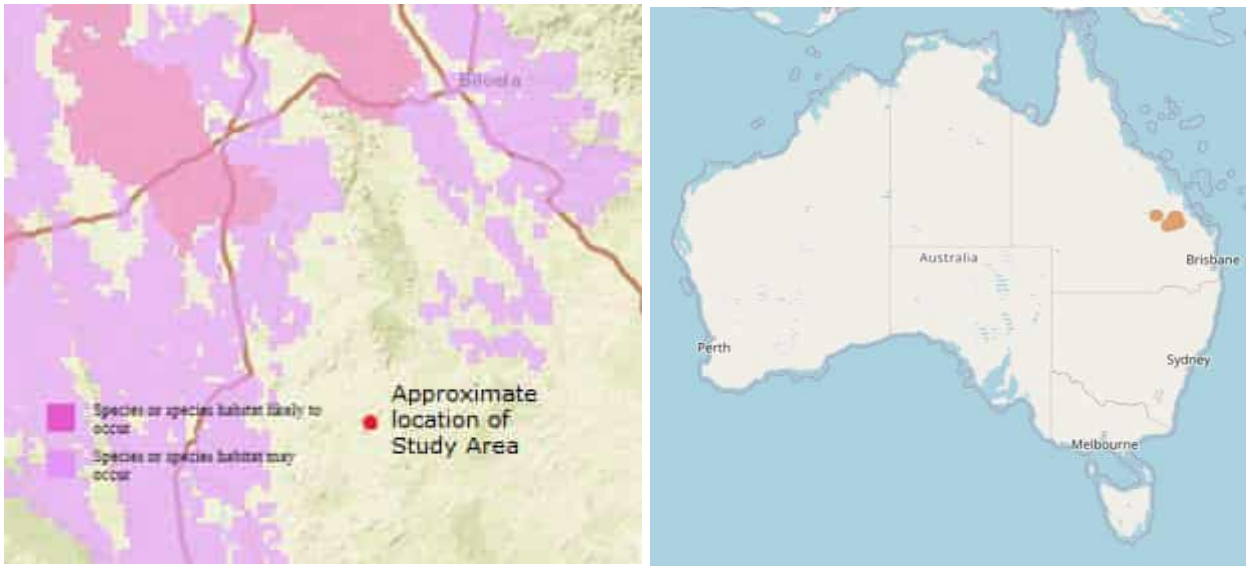


FIGURE 5-29 *SOLANUM DISSECTUM* MODELLED DISTRIBUTION (DCCEEW, 2024A) AND RECORDS (ALA, 2024)

5.3.15.2 HABITAT REQUIREMENTS

The species occurs in open forest and woodland habitats on solodic clay soils, characterised by brigalow (*Acacia harpophylla)* and/or lapunyah (*Eucalyptus thozetiana*). It is restricted to very small, localised patches within its distribution (TSSC, 2016a).

Habitat Critical to the Survival of the Species

Habitat critical to the survival of the species has not been specifically described for *S. dissectum* (TSSC, 2016a). Therefore, habitat critical to the survival of the species has been considered according to the following description (as provided in the *SIG 1.1* (DEWHA, 2013)).

> *Habitat critical to the survival of a species or ecological communities are areas that are necessary:*
>
> - *"For activities such as foraging, breeding, roosting, or dispersal;*
> - *For the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators);*

- *To maintain genetic diversity and long-term evolutionary development; and/or*
- *For the reintroduction of populations or recovery of the species or ecological community.*

5.3.15.3 FIELD SURVEYS

Survey Methodology and effort

A total of 245 vegetation and habitat assessments were completed across the Study Area during the 10 field surveys, including random meanders completed concurrently with these surveys in suitable habitat for the species across the Study Area.

This total includes 42 BioCondition assessments, including 35 conducted in eucalypt open woodland/riparian communities, three in patches of brigalow woodland, two in vine thicket/dry rainforest communities, and two in open grasslands/cleared environments.

A total of 17 targeted flora transects were also conducted during the September 2024 survey period.

For further detail on the ecological investigations completed within the Study Area, including desktop searches, survey timing and survey methodology, refer to Section 4.8.

Survey Results

This species was not observed during field surveys, despite suitable habitat being identified.

Survey Adequacy

Considering relevant guidelines and recommendations, the field survey methodology and effort has been considered adequate for this species. Survey guideline advice for *S. dissectum*, field survey effort and adequacy is outlined in Table 5-34.

TABLE 5-34 *S. DISSECTUM* FIELD SURVEY ADEQUACY

Survey Guidelines and Recommendations	Survey Effort Utilised and Timing	Comment on Field Survey Adequacy
Flora Survey Guidelines – Protected Plants, Nature Conservation Act 1992 (DES, 2020) Random, non-selective traverses of all habitat types throughout the Study Area, whether identified as suitable or un-suitable habitat for threatened flora.	245 vegetation and habitat assessments were completed across 10 survey periods, including 42 BioCondition assessments. Meander searches were undertaken at the same time as vegetation and habitat assessments within the Study Area. 17 targeted flora transects conducted during the September 2024 survey period in impact areas ranging from 30 minutes to an hour.	Survey effort considered adequate This species has not been observed during field surveys, despite suitable habitat being identified.

5.3.15.4 HABITAT ASSESSMENT AND MAPPING

Potential *S. dissectum* habitat occurs within the Study Area in association with the following BHT:

- Brigalow woodlands.

Based on the definition provided in Section 5.3.15.2, although the Study Area is located outside the species modelled distribution, to be conservative the habitat identified within the Study Area has been considered to have the potential to constitute habitat critical to the survival of the species due to the species highly restricted distribution and the presence of recent records within 50 km of the Study Area.

This habitat has been mapped, with a total of 261.4 ha of potential habitat occurring in the Study Area. Mapped habitat for *S. dissectum* is shown on Figure 5-30 with habitat types summarised below in Table 5-35.

TABLE 5-35 *S. DISSECTUM* HABITAT SUMMARY IN THE STUDY AREA

	Potential Habitat	**Generally Unsuitable Habitat**
Description	Open forest and woodland habitats on solodic clay soils, characterised by brigalow (*Acacia harpophylla*) and/or lapunyah (*Eucalyptus thozetiana*).	Habitats not characterised by brigalow (*Acacia harpophylla*) and/or lapunyah (*Eucalyptus thozetiana*).
Mapped habitat within the Study Area (by BHT)	• Brigalow woodlands dominated by *Acacia harpophylla.*	• Grasslands and cultivated agricultural land; • Eucalypt woodland and open forest dominated by *E. crebra* with a grassy understorey; • Vine forest/ thickets and dry rainforest; • Waterbodies and drainage features; and • Riparian woodland and open forest dominated by *E. tereticornis* often associated with stream channels.
Total in the Study Area (ha)	261.4	46,568.6
Total in the Project Area (ha)	12.8	6,724.6

Legend

- Study Area
- Project Area
- Proposed Disturbance Footprint
- *Solanum dissectum* Potential Habitat
- Road
- Track and Path

Coordinate System:
GDA2020 MGA Zone 56

Date: 07/05/2026

Created By: MB

Drawing Size: A3

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F5-30 Potential *Solanum dissectum* Habitat within the Study Area

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5.3.16 SOLANUM JOHNSONIANUM

Solanum johnsonianum is listed as Endangered under the EPBC Act, effective 7 December 2016, and was assessed as having the potential to occur in the Study Area as a conservative approach despite the Study Area being located outside the species modelled distribution (see Section 5.3.16.1 below and the LoO in Appendix C).

5.3.16.1 SPECIES DISTRIBUTION AND HISTORICAL RECORDS

S. johnsonianum is distributed between Rolleston, Theodore, Biloela and Dululu, though is confined to localised areas where the species has been observed (TSSC, 2016b). The Study Area is located just outside the species modelled habitat distribution, though parts of the Locality intersect the 'species or species habitat may occur' modelled distribution (DCCEEW, 2024a) (Figure 5-31). No historical record of the species occurs within the Study Area or the Locality, with the closest record of the species located 30 km north-west of the Study Area near Moura (dated 2018) (ALA, 2024) (Figure 5-31).

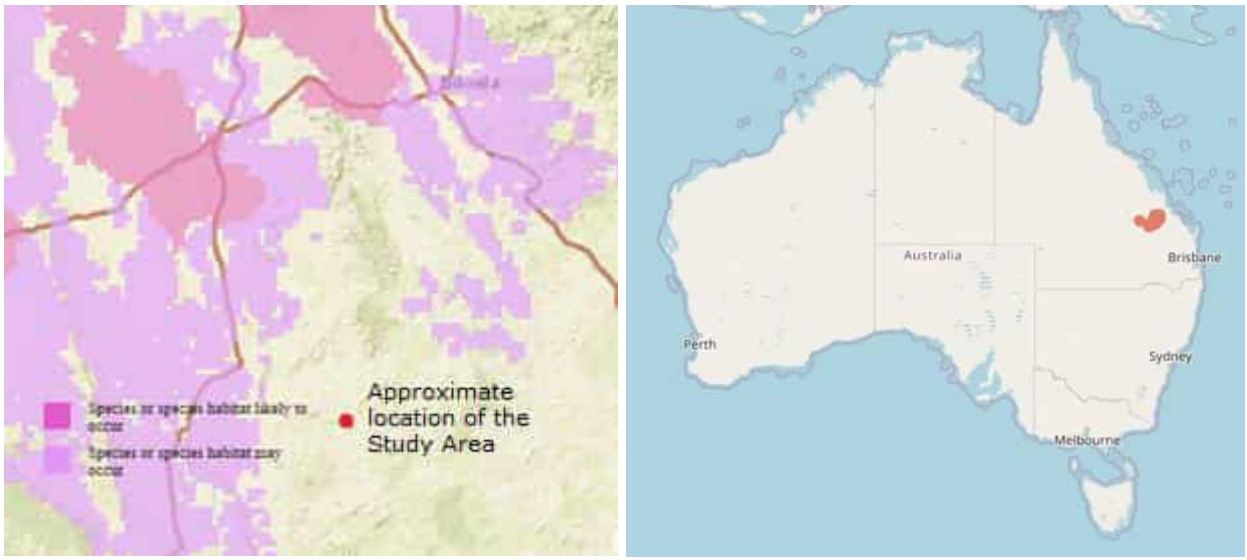


FIGURE 5-31 *SOLANUM JOHNSONIANUM* MODELED DISTRIBUTION (DCCEEW, 2024A) AND RECORDS (ALA, 2024)

5.3.16.2 HABITAT REQUIREMENTS

S. johnsonianum occurs in open forest and woodland habitats on heavy cracking clay soils dominated or co-dominated by brigalow (*A. harpophylla)*. Other species associated with *S. johnsonianum* include *Eucalyptus thozetiana* with an understory of wilga (*Geijera parviflora*). It is restricted to very small localised patches within it's distribution (TSSC, 2016b).

Habitat Critical to the Survival of the Species

Habitat critical to the survival of the species has not been specifically described for *S. johnsonianum* (TSSC, 2016b). Therefore, habitat critical to the survival of the species has been considered according to the following description (as provided in the *SIG 1.1* (DEWHA, 2013)).

> *Habitat critical to the survival of a species or ecological communities are areas that are necessary:*
>
> - *"For activities such as foraging, breeding, roosting, or dispersal;*

- *For the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators);*
- *To maintain genetic diversity and long-term evolutionary development; and/or*
- *For the reintroduction of populations or recovery of the species or ecological community.*

5.3.16.3 FIELD SURVEYS

Survey Methodology and effort

A total of 245 vegetation and habitat assessments were completed across the Study Area during the 10 field surveys, including random meanders completed concurrently with these surveys in suitable habitat for the species across the Study Area.

This total includes 42 BioCondition assessments, including 35 conducted in eucalypt open woodland/riparian communities, three in patches of brigalow woodland, two in vine thicket/dry rainforest communities, and two in open grasslands/cleared environments.

A total of 17 targeted flora transects were also conducted during the September 2024 survey period.

For further detail on the ecological investigations completed within the Study Area, including desktop searches, survey timing and survey methodology, refer to Section 4.8.

Survey Results

This species was not observed during field surveys, despite suitable habitat being identified.

Survey Adequacy

Considering relevant guidelines and recommendations, the field survey methodology and effort has been considered adequate for this species. Survey guideline advice for *S. johnsonianum*, field survey effort and adequacy is outlined in Table 5-36.

TABLE 5-36 *S. JOHNSONIANUM*, FIELD SURVEY ADEQUACY

Survey Guidelines and Recommendations	Survey Effort Utilised and Timing	Comment on Field Survey Adequacy
Flora Survey Guidelines – Protected Plants, Nature Conservation Act 1992 (DES, 2020) Random, non-selective traverses of all habitat types throughout the Study Area, whether identified as suitable or un-suitable habitat for threatened flora.	245 vegetation and habitat assessments were completed across 10 survey periods, including 42 BioCondition assessments. Meander searches were undertaken at the same time as vegetation and habitat assessments within the Study Area. 17 targeted flora transects conducted during the September 2024 survey period in impact areas ranging from 30 minutes to an hour.	Survey effort considered adequate. This species has not been observed during field surveys, despite suitable habitat being identified.

5.3.16.4 HABITAT ASSESSMENT AND MAPPING

Potential *S. johnsonianum* habitat occurs within the Study Area in association with the following BHT:

- Brigalow woodlands.

Based on the definition provided in Section 5.3.16.2, although the Study Area is located outside the species modelled distribution, to be conservative the habitat identified within the Study Area has been considered to have the potential to constitute habitat critical to the survival of the species due to the species highly restricted distribution and the presence of recent records within 50 km of the Study Area.

This habitat has been mapped, with a total of 261.4 ha of potential habitat occurring in the Study Area. Mapped habitat for *S. johnsonianum* is shown on Figure 5-32 with habitat types summarised below in Table 5-37.

TABLE 5-37 *S. JOHNSONIANUM* HABITAT SUMMARY IN THE STUDY AREA

	Potential Habitat	**Generally Unsuitable Habitat**
Description	Open forest and woodland habitats on heavy cracking clay soils dominated or co-dominated by brigalow (*A. harpophylla*).	Habitats not dominated by brigalow (*Acacia harpophylla*).
Mapped habitat within the Study Area (by BHT)	• Brigalow woodlands dominated by *Acacia harpophylla.*	• Grasslands and cultivated agricultural land; • Eucalypt woodland and open forest dominated by *E. crebra* with a grassy understorey; • Vine forest/ thickets and dry rainforest; • Waterbodies and drainage features; and • Riparian woodland and open forest dominated by *E. tereticornis* often associated with stream channels.
Total in the Study Area (ha)	261.4	46,568.6
Total in the Project Area (ha)	12.8	6,724.6

Legend

- Study Area
- Project Area
- Proposed Disturbance Footprint
- *Solanum johnsonianum* Potential Habitat
- Road
- Track and Path

Coordinate System:
GDA2020 MGA Zone 56

Date: 07/05/2026

Created By: MB

Drawing Size: A3

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F5-32 Potential *Solanum johnsonianum* Habitat within the Study Area

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5.3.17 XEROTHAMNELLA HERBACEA

Xerothamnella herbacea is listed as Endangered under the EPBC Act, effective 16 July 2000, and was assessed as having the potential to occur in the Study Area.

5.3.17.1 SPECIES DISTRIBUTION AND HISTORICAL RECORDS

X. herbacea is known only from a few official observations: two records north of Chinchilla, one record near Theodore, and a record near Goondoowindi. The Study Area is located within the 'species or species habitat may occur' modelled distribution of the species (DCCEEW, 2024a)(Figure 5-33). No historical record of the species occurs within the Study Area or the Locality, with the closest record of the species located 30 km north-west of the Study Area near Moura (dated 2018) (ALA, 2024) (Figure 5-33).



FIGURE 5-33 *XEROTHAMNELLA HERBACEA* MODELED DISTRIBUTION (DCCEEW, 2024A) AND RECORDS (ALA, 2024)

5.3.17.2 HABITAT REQUIREMENTS

The species occurs in well-shaded and gilgai-rich microhabitats in brigalow (*Acacia harpophylla*) dominated woodlands with heavy, grey to dark brown clay soils. The species is known to occur in cleared/non-remnant vegetation (DEWHA, 2008d). In Queensland, *X. herbacea* has been found in gidgee woodland with blunt-leaved cassia and *Senna artemisioides* subsp. *coriacea* on clay soils with a gravel surface, as well as on low slopes of dissected tablelands with clay soils and stony surface debris (DCCEEW, 2024a).

Habitat Critical to the Survival of the Species

Habitat critical to the survival of the species has not been specifically described for *X. herbacea* (DEWHA, 2008d). Therefore, habitat critical to the survival of the species has been considered according to the following description (as provided in the *SIG 1.1* (DEWHA, 2013)).

> *Habitat critical to the survival of a species or ecological communities are areas that are necessary:*
>
> - *"For activities such as foraging, breeding, roosting, or dispersal;*

- *For the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators);*
- *To maintain genetic diversity and long-term evolutionary development; and/or*
- *For the reintroduction of populations or recovery of the species or ecological community.*

5.3.17.3 FIELD SURVEYS

Survey Methodology and effort

A total of 245 vegetation and habitat assessments were completed across the Study Area during the 10 field surveys, including random meanders completed concurrently with these surveys in suitable habitat for the species across the Study Area.

This total includes 42 BioCondition assessments, including 35 conducted in eucalypt open woodland/riparian communities, three in patches of brigalow woodland, two in vine thicket/dry rainforest communities, and two in open grasslands/cleared environments.

A total of 17 targeted flora transects were also conducted during the September 2024 survey period.

For further detail on the ecological investigations completed within the Study Area, including desktop searches, survey timing and survey methodology, refer to Section 4.8.

Survey Results

This species was not observed during field surveys, despite suitable habitat being identified.

Survey Adequacy

Considering relevant guidelines and recommendations, the field survey methodology and effort has been considered adequate for this species. Survey guideline advice for *X. herbacea*, field survey effort and adequacy is outlined in Table 5-38.

TABLE 5-38 *XEROTHAMNELLA HERBACEA* FIELD SURVEY ADEQUACY

Survey Guidelines and Recommendations	Survey Effort Utilised and Timing	Comment on Field Survey Adequacy
Flora Survey Guidelines – Protected Plants, Nature Conservation Act 1992 (DES, 2020) Random, non-selective traverses of all habitat types throughout the Study Area, whether identified as suitable or un-suitable habitat for threatened flora.	245 vegetation and habitat assessments were completed across 10 survey periods, including 42 BioCondition assessments. Meander searches were undertaken at the same time as vegetation and habitat assessments within the Study Area. 17 targeted flora transects conducted during the September 2024 survey period in impact areas ranging from 30 minutes to an hour.	Survey effort considered adequate. This species has not been observed during field surveys, despite suitable habitat being identified.

5.3.17.4 HABITAT ASSESSMENT AND MAPPING

Potential *X. herbacea* habitat occurs within the Study Area in association with the following BHT:

- Brigalow woodlands.

Based on the definition provided in Section 5.3.17.2, the total area of potential *X. herbacea* habitat in the Study Area has conservatively been considered to constitute habitat critical to the survival of the species.

This habitat has been mapped, with a total of 261.4 ha of potential habitat occurring in the Study Area. Mapped habitat for *X. herbacea* is shown on Figure 5-34 with habitat types summarised below in Table 5-39.

TABLE 5-39 *XEROTHAMNELLA HERBACEA* HABITAT SUMMARY IN THE STUDY AREA

	Potential Habitat	**Generally Unsuitable Habitat**
Description	Brigalow *(Acacia harpophylla*) dominated woodlands.	Habitats not dominated by brigalow (*Acacia harpophylla*).
Mapped habitat within the Study Area (by BHT)	• Brigalow woodlands dominated by *Acacia harpophylla.*	• Grasslands and cultivated agricultural land; • Eucalypt woodland and open forest dominated by *E. crebra* with a grassy understorey; • Vine forest/ thickets and dry rainforest; • Waterbodies and drainage features; and • Riparian woodland and open forest dominated by *E. tereticornis* often associated with stream channels.
Total in the Study Area (ha)	261.4	46,568.6
Total in the Project Area (ha)	12.8	6,724.6

Legend

- Study Area
- Project Area
- Proposed Disturbance Footprint
- *Xerothamnella herbacea* Potential Habitat
- Road
- Track and Path

Coordinate System:
GDA2020 MGA Zone 56

Date: 07/05/2026

Created By: MB

Drawing Size: A3

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F5-34 Potential *Xerothamnella herbacea* Habitat within the Study Area

Theodore Wind Farm PER

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5.4 LISTED MIGRATORY SPECIES

The PMST results (Appendix B) indicated the possible occurrence of 12 EPBC Act listed migratory species within the Study Area. Based on field surveys and a likelihood of occurrence assessment (Appendix C), two EPBC Act listed migratory species have been assessed as having the potential to occur within the Study Area (Table 5-40). No signs or observations of these species within the Study Area occurred during field surveys. However, species' presence within the Study Area cannot be ruled out due to overlapping distribution and suitable habitat occurring within the Study Area.

Satin flycatcher (*Myiagra cyanoleuca*) and rufous fantail (*Rhipidura rufifrons*) were originally included in the referral information and assessed for potential impacts of the Proposed Action. Following recent changes to the EPBC Act Migratory Species list (*List of Migratory Species Amendment (1) Instrument 2024*, dated 11/09/2024), these species no longer require assessment under the EPBC Act as MNES and are therefore not assessed as part of this PER.

TABLE 5-40 LIKELIHOOD OF OCCURRENCE RESULTS (MIGRATORY SPECIES)

Scientific Name	Common Name	EPBC Act Status	Likelihood of Occurrence
Birds			
Hirundapus caudacutus	White-throated needletail	V and Mi	Potential
Apus pacificus	Fork-tailed swift	Mi	Potential

EPBC Act listing status: Mi = Migratory

5.4.1 WHITE-THROATED NEEDLETAIL

White-throated needletail (EPBC Act migratory) is also listed under the EPBC Act as Vulnerable and has therefore been addressed within Section 5.3.8.

5.4.2 FORK-TAILED SWIFT

Fork-tailed swift is listed as migratory under the EPBC Act due to its inclusion in the *China-Australia Migratory Bird Agreement (CAMBA*), Ja*pan-Australia Migratory Bird Agreement (JAMBA*) and the *Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA*). The species is considered as having the potential to occur in the Study Area.

5.4.2.1 SPECIES DISTRIBUTION AND HISTORICAL RECORDS

Fork-tailed swift migrates to Australia during the species' non-breeding season, roughly October to April (DCCEEW, 2024a). The Study Area occurs within the 'species or species habitat likely to occur' modelled distribution (DCCEEW, 2024a). One outdated historical record of the species exists within the Locality from 2002 (ALA, 2024).

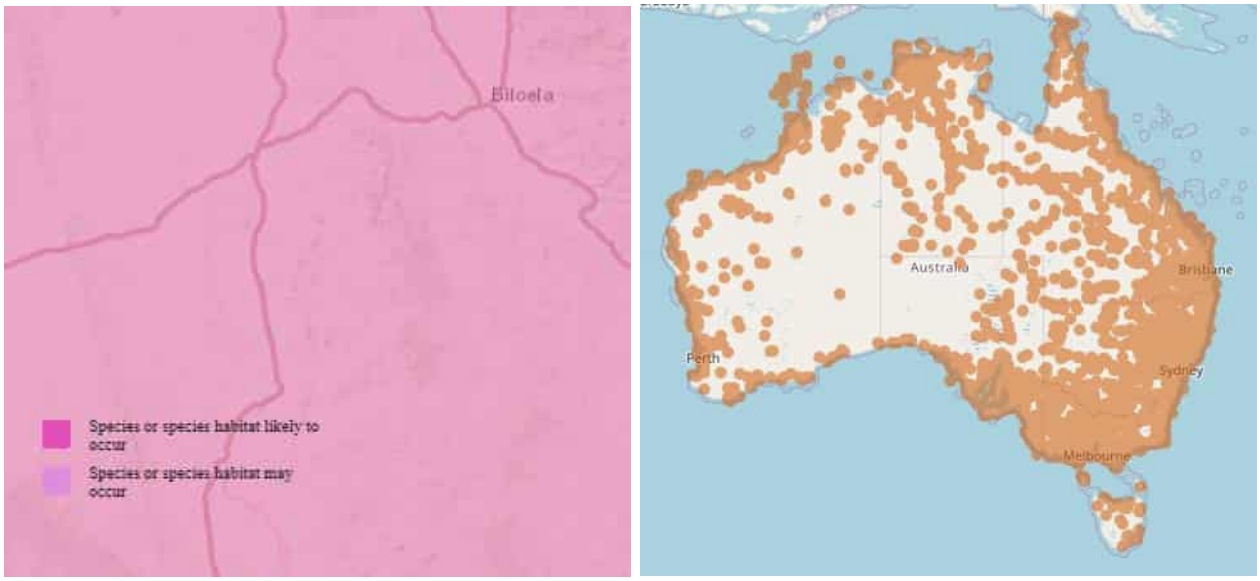


FIGURE 5-35 FORK-TAILED SWIFT MODELED DISTRIBUTION (DCCEEW, 2024A) AND RECORDS (ALA, 2024)

5.4.2.2 HABITAT REQUIREMENTS

During it's time in Australia, the species remains almost exclusively aerial, foraging above a variety of habitats across all states of Australia. The species is largely considered to roost aerially, with it being extremely rare for the species to roost terrestrially in Australia.

Important Habitat

The *Draft referral guideline for 14 birds listed as migratory species under the EPBC Act* (DoE, 2015) identifies that important habitat for the fork-tailed swift is '*a range of habitats, from inland open plains to wooded areas, where it is exclusively aerial'*.

5.4.2.3 FIELD SURVEYS

Survey Methodology and effort

A total of 171 20-minute BUS were completed over 38 locations across the Study Area, during eight field survey periods (four across each season):

Dry season

- October 2022 - 23 surveys, 12 morning and 11 afternoon;
- June 2023 - 24 surveys repeat visits to BUS points including 12 morning and 12 afternoon surveys;
- September/October 2023 - 26 surveys, repeat visits to BUS points including 12 morning and 14 afternoon surveys; and
- June 2024 -18 surveys, repeat visits to BUS points including 9 morning and 9 afternoon surveys.

Wet Season

- February 2023 - 32 surveys, repeat visits to BUS points including 16 morning and 16 afternoon surveys;

- March 2023-2 8 surveys, repeat visits to BUS points including 14 morning and 14 afternoon surveys;
- December 2023 - 40 surveys, repeat visits to BUS points including 20 morning and 20 afternoon surveys; and
- February 2024-27 surveys, repeat visits to BUS points including 13 morning and 14 afternoon surveys.

It is important to note that the fork-tailed swift is a migratory species, and that the species is more likely to be observed utilising the Study Area in the warmer months (roughly from October to April).

For further detail on the ecological investigations completed within the Study Area, including desktop searches, survey timing and survey methodology, refer to Section 4.8.

Survey Results

The species was not observed during field surveys.

Survey Adequacy

Considering relevant guidelines and recommendations, the field survey methodology and effort has been considered adequate for this species. Survey guideline advice for fork-tailed swift and field survey effort and adequacy are outlined in Table 5-41.

TABLE 5-41 FORK-TAILED SWIFT FIELD SURVEY ADEQUACY

Survey Guidelines and Recommendations	Survey Effort Utilised and Timing	Comment on Field Survey Adequacy
Draft referral guidelines for 14 birds listed as migratory species under the EPBC Act (DoE, 2015) No survey guidelines specific to the fork-tailed swift – however, recommended to focus survey efforts from high vantage points. This species is found across a range of habitats (non-breeding habitats only), from inland plains to wooded areas. It is exclusively aerial.	171 dawn and dusk timed surveys (20 minutes), bird utilisation surveys across 38 locations in the Study Area.	Survey effort considered adequate. Surveys were conducted from vantage points in the Study Area and done in the appropriate timing to detect the species. The species was not detected in any of the survey. The habitat in the Study Area, was not deemed suitable for the species to roost in.

5.4.2.4 HABITAT ASSESSMENT AND MAPPING

Considering the habitat requirements provided in Section 5.4.2.2, the entirety of the Study Area may be considered suitable foraging habitat for the fork-tailed swift. It must be noted however, that the species will only occur as a flyover visitor and is unlikely to roost within the Study Area. Habitat for the fork-tailed swift has therefore not been mapped within the Study Area as the entirely of the Study Area is considered potential arial foraging habitat. Additionally, based on the 'important habitat' description also provided in Section 5.4.2.2, this potential foraging habitat may constitute important habitat for the species. An assessment of collision risk and management measures to minimise impacts is considered in the Bird and Bat Management Plan (BBMP), Appendix D.

As demonstrated in Figure 5-16, landscape features within the north of the Study Area (extending to the north and east outside of the Study Area) contain higher slope gradients that may present a terrain that promotes the occurrence of suitable updraughts that might support foraging for fork-tailed swift. The use of this landscape feature for potential foraging by the species cannot be ruled out, and as a result this area within the Study Area is considered to have the highest potential value for foraging for the species.

5.5 THE GREAT BARRIER REEF MARINE PARK, WORLD HERITAGE PROPERTY, AND NATIONAL HERITAGE PLACE (THE GREAT BARRIER REEF)

The following Sections summarise information relevant to assess the potential impacts of the Proposed Action on the Great Barrier Reef. These Sections provide historical information and relevant topographical and hydrological parameters for the Study Area, including numerical data where available.

5.5.1 LOCAL RAINFALL AND CLIMATIC CONDITIONS

The Study Area is located approximately 20km east of the rural township of Theodore in the Shire of Banana, Queensland. Theodore is characterised by a sub-tropical climate, with a distinct wet season (October to February) and dry season (March to September). The minimum mean monthly rainfall for the region is 26.7 mm in August, with a maximum mean monthly rainfall of 92.2 mm in February. The risk of erosion and sediment runoff induced by rainfall and stormwater runoff would be greatest during the wet season months. The mean annual rainfall at Theodore (1967 to 2024) is 659.4 mm, 7% higher than the long-term average (1900 to 2015) of 616 mm for the state of Queensland (BoM, 2021).

Rainfall data is presented Figure 5-36 and was sourced from the Bureau of Meteorology (BOM) Theodore weather station (station no. 039158) which is located approximately 20 km west of the Study Area. The dataset from Theodore Station represents monthly rainfall data collected from July 1967 to July 2024.

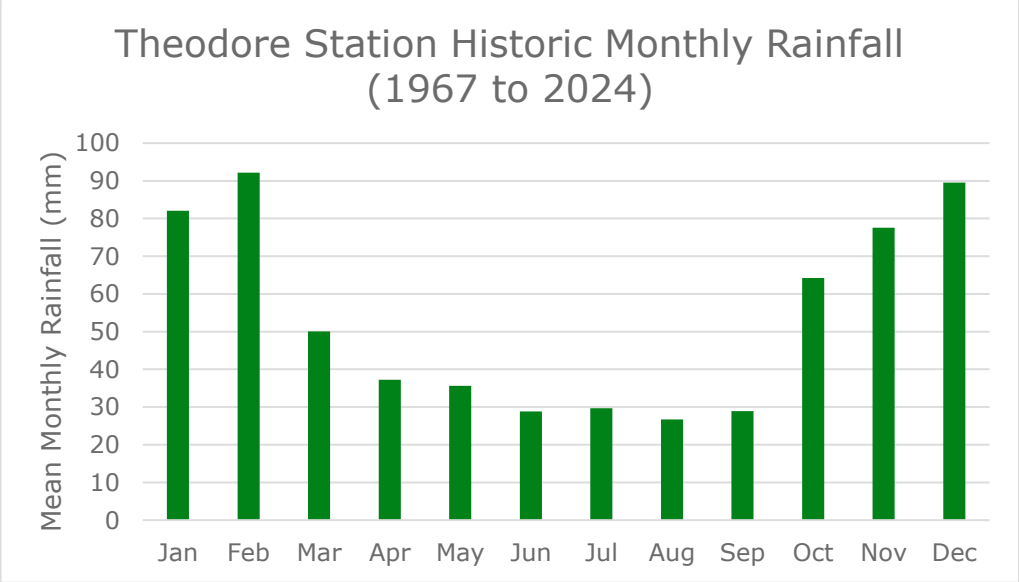


FIGURE 5-36 THEODORE STATION (039158) HISTORIC MONTHLY RAINFALL

5.5.2 HISTORICAL LAND USE

The Australian Land Use and Management Classification mapping (Department of Agriculture, 2016), the predominant land use of the Study Area is 'Grazing Native Vegetation. Under the ALUM classification system, grazing native vegetation includes "land uses based on grazing by domestic stock on native vegetation where there has been limited or no deliberate attempt at pasture modification." A grazing land use implies the ground will have been compacted in areas where stock have been present. Heavy stock traffic can lead to increased erosion and sediment loss. Smaller land use areas scattered throughout the Study Area include residential, utilities, reservoir/dam, cropping, and grazing modified pastures.

Existing land management practices will be largely unaffected by the Proposed Action as the host properties are able to continue to use the land for agricultural activities throughout the life of the project, including the shared use of access tracks and locations with landowners for the effective continuation of existing land use with potential for improved productivity.

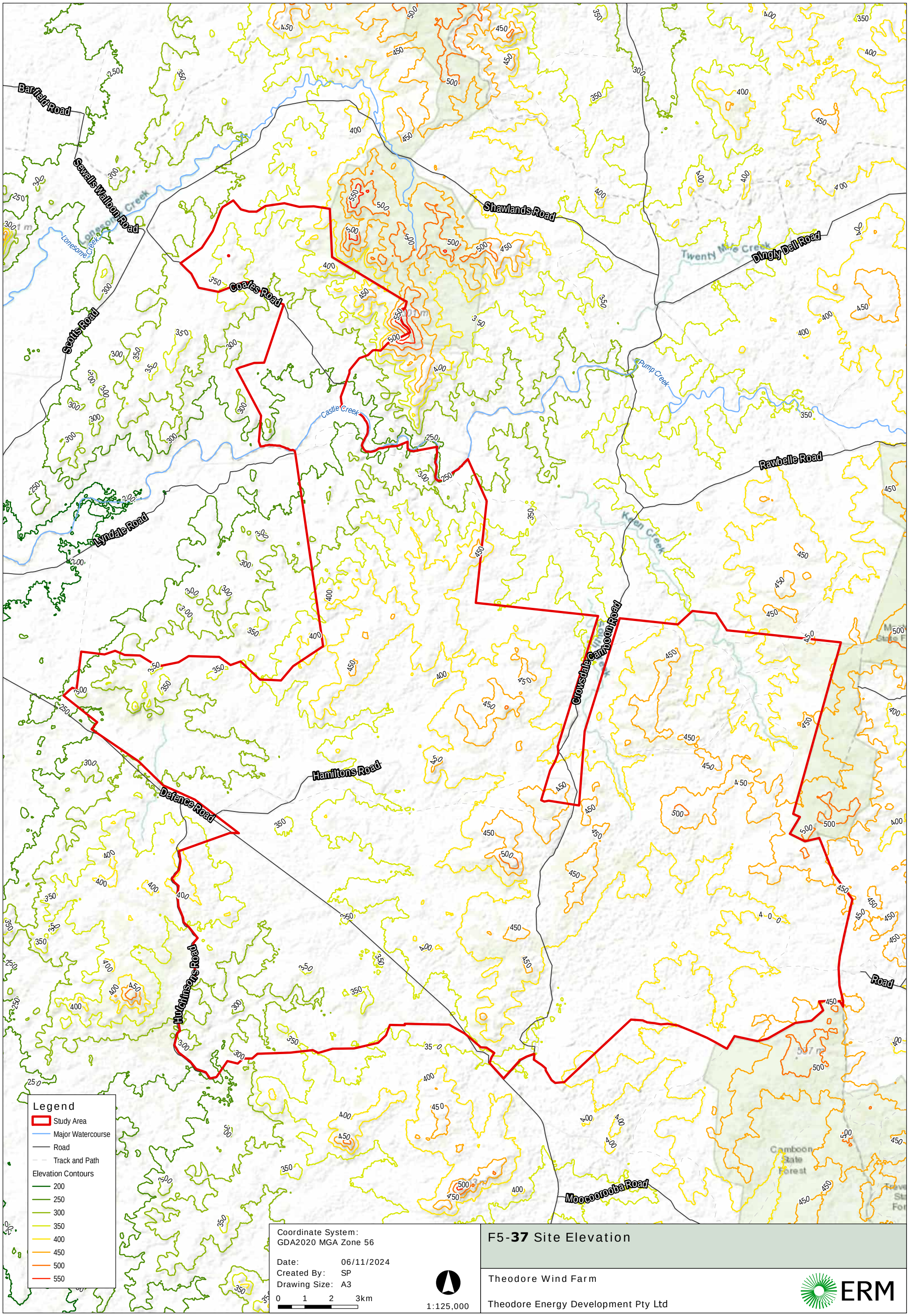
Notable roads within the vicinity of the Proposed Action include Crowsdale Camboon Road in the east, Defence Road in the west and Hamilton's Road in the north-west. Smaller roads and tracks include Rockhampton Street and Park Street which adjoin the southern section of Crowsdale Camboon Road, and several Queensland Parks and Wildlife Service owned unnamed tracks in the east.

5.5.3 TOPOGRAPHY

The Study Area is located across a range of terrains from generally low hilly country with long moderate gentle slopes, to small alluvial plains, moderate high hills with rounded crests and straight often gentle side slopes with narrow valley plains. A small portion of the Study Area is located within areas described as steep, hilly mountainous country.

Contour mapping available on Queensland Globe and presented in Figure 5-37 indicates a maximum point of elevation of 540m AHD at the centre of the Study Area, with a minimum point of elevation of 220 m AHD recorded along Castle Creek in the north of the Study Area.

The Proposed Action does not present significant changes to the topographical landscape of the Study Area. Cut and fill earthworks are anticipated to support the development of hard standing infrastructure, such WTGs and their foundations.



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5.5.4 SOIL TYPE(S) AND ERODIBILITY

Australian Soil Classification mapping (accessed via Queensland Globe) was used to identify Sodosol and Chromosol as the dominant soil types throughout the Study Area. This is presented in Figure 5-38.

Sodosols are defined as texture-contrast soils, and are susceptible to high erodibility, particularly following the removal of vegetation (QLD Gov, 2013). Sodic soils are dispersive and highly susceptible to deep, narrow rilling on slopes and drains. Where water flows not managed appropriately, sodic soils are highly susceptible to tunnel erosion (IECA, 2008).

In contrast to sodosols, chromosols do not exhibit a sodic subsoil, although they may be susceptible to erosion due to characteristics such as soil structure decline and poor local drainage.

Legend

- Study Area
- Project Area
- Proposed Disturbance Footprint

Australian Soil Classification (ASC)

- Chromosol
- Dermosol
- Kurosol
- Rudosol
- Sodosol
- Tenosol
- Vertosol
- Road
- Track and Path

Coordinate System:
GDA2020 MGA Zone 56
Date: 07/05/2026
Created By: MB
Drawing Size: A3

0 2 4Km

1:120,000

F5-38 Soil Types

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5.5.5 KNOWN OR POTENTIAL CONTAMINANTS

There is currently limited information available regarding the presence and extent of potential contaminants within the Study Area. Given the existing land uses are predominantly grazing, anticipated potential contaminants associated would normally be elevated nutrients (nitrogen and/or phosphorus), and animal wastes.

Contaminants introduced to the Study Area as a result of the Proposed Action may include concrete (used in the footings of WTGs and other hardstanding infrastructure), hydrocarbons (associated with fuels for vehicles), and various oils and chemicals associated with the construction, operation and maintenance of infrastructure. Construction activities for the Proposed Action present the potential risk for an increase in erosion and sedimentation.

The Proposed Action will include a series of action plans outlining procedures in the event of identifying potential contamination within the clearing area or in the event of a spill. The project will be governed by Construction Environment Management Plan (CEMP) which will include an Erosion and Sediment Control Plan (ESCP). With effective implementation of the management plans and procedures, risks associated with contaminated land are expected to be minimal.

5.5.6 GROUNDCOVER

The condition of groundcover in the Study Area has largely been influenced by historical land clearing and cattle grazing, with large areas of cleared land featuring no remnant vegetation occurring throughout. This is most prominent in the centre and north of the Study Area, though some large swathes of cleared land also occur in the southeast of the Study Area. Almost half of the Study Area, (approximately 22,561 ha) has been cleared.

The Proposed Action has been designed to be responsive to environmental constraints on the land and minimises the amount of clearing required to facilitate the WTGs and associated infrastructure. Throughout the 1,537.4 ha Disturbance Footprint, it is anticipated that a maximum area of 607.7 ha of clearing of Regulated Vegetation will be required. Native vegetation will be cleared for the construction of the Proposed Action, however each turbine will be micro-sited before construction to ensure minimal clearing.

5.5.7 HYDROLOGICAL CONNECTION TO THE GREAT BARRIER REEF

The Study Area is located within the Dawson River catchment (Figure 5-40). The Dawson River is located approximately 15km to the west of the Study Area at its closest point, flowing from south to north. The Dawson River catchment is a sub catchment of the larger Fitzroy River catchment, which is one of the largest in Queensland, covering an area of >142,600 square kilometres. The Dawson River converges with the Mackenzie River to form the Fitzroy River approximately 140 km (as the crow flies) to the north of the Study Area near the rural township of Duaringa. From this point, the Fitzroy River generally flows east to west, flowing through Rockhampton before reaching the Great Barrier Reef Marine Park (GBRMP) at the coast north of Gladstone, approximately 480km upstream of the Study Area.

The Fitzroy River catchment is the largest of six catchments that comprise the Fitzroy region, a natural resource management region that drains into the Great Barrier Reef off coastal Queensland.

Flows within the Dawson River are influenced by seasonal rainfall, with higher flows typically observed during the wet season (December to February) and lower flows during the dry season

(April to August). As such, erosion and sedimentation risk for the region is expected to be greatest during these wet season months.

Streamflow data for the Dawson River is presented Figure 5-39 and was sourced from the Queensland Government Water Monitoring Information Portal. Figure 5-39 displays data collected at the Dawson River at Woodleigh open gauging station (identifier no. 130317B) which is located approximately 30km west of the Study Area. The dataset from the Dawson River at Woodleigh open gauging station represents streamflow data collected from October 1985 to September 2024.

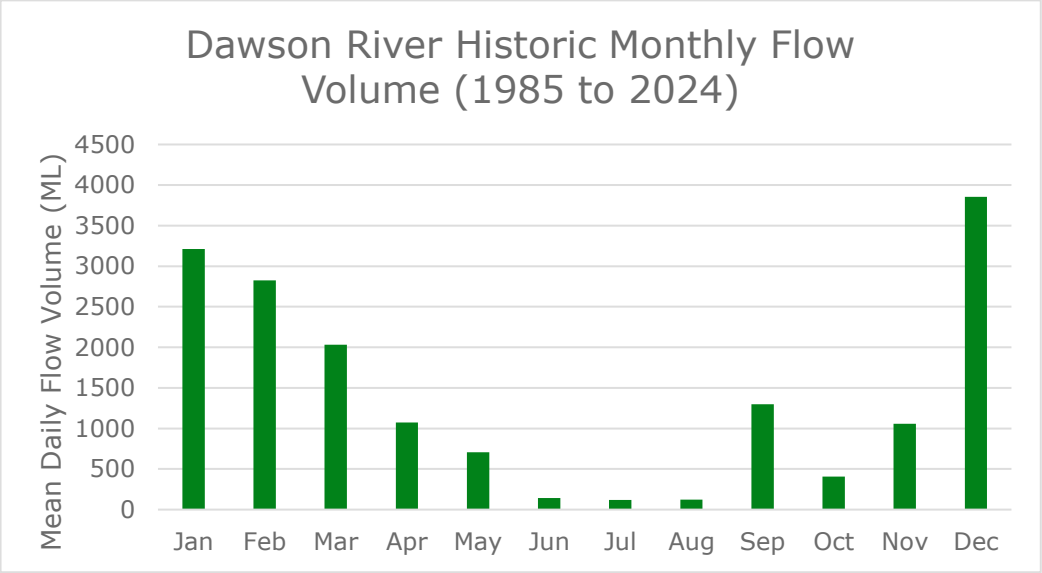


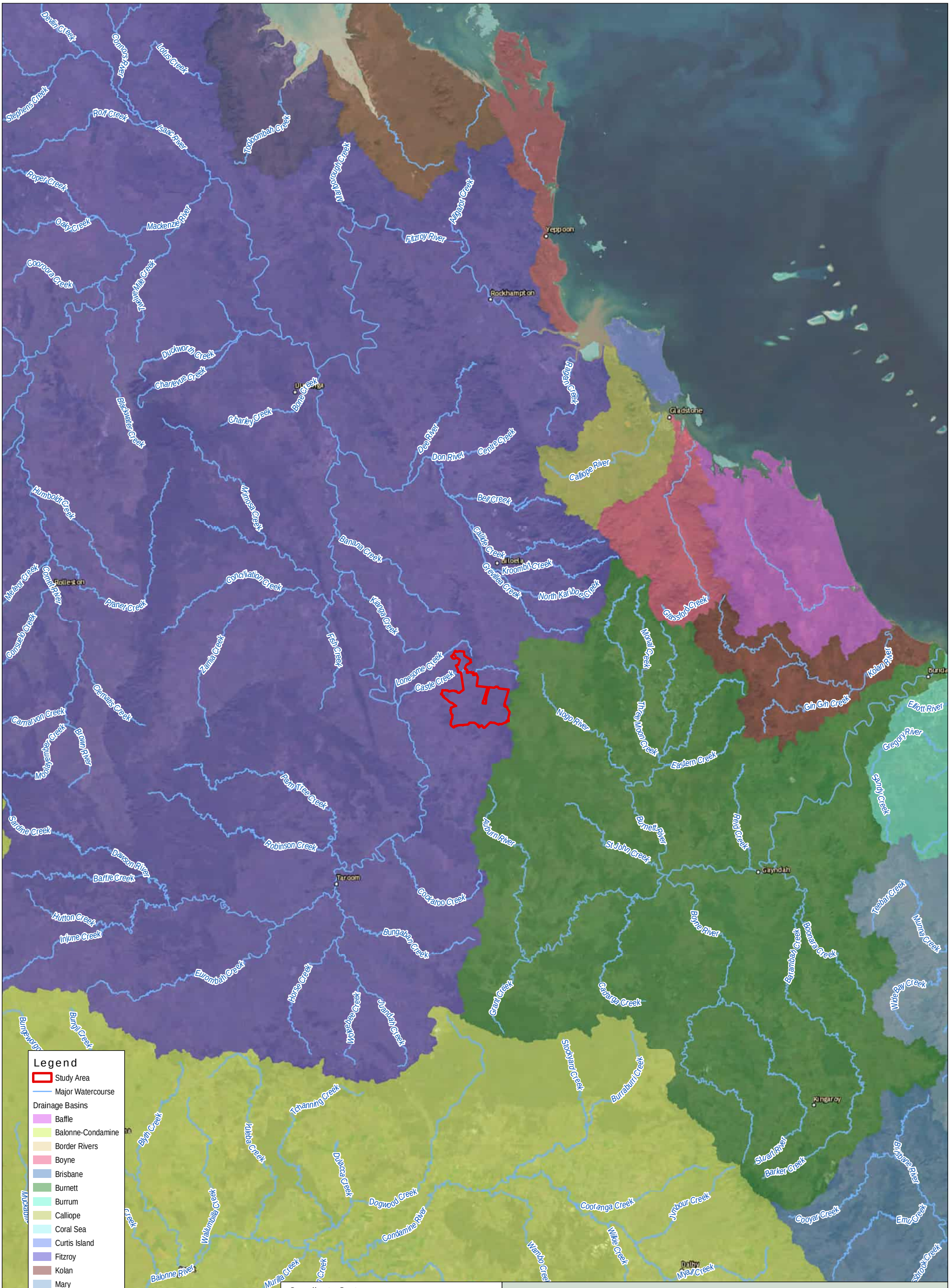
FIGURE 5-39 MEAN DAILY FLOW VOLUME AT STATION 130317B

Within the Study Area there are several tributaries of the Dawson River, the most notable of which is Castle Creek, classified as Stream Order 5 under the Strahler system of stream order. Castle Creek intersects the Study Area in the north however, it does not intersect the Disturbance Footprint. Several other tributaries of the Dawson River and Castle Creek the flow through the Study Area, as detailed in Figure 5-41.

The Proposed Action will result in a negligible increase in impervious surfaces in the post-development landscape. The Disturbance Footprint shows limited amount of works near or within waterways (other than the construction of access tracks). It is noted, approval for waterway barrier works defined under the *Fisheries Act 1994* will be required prior to construction. The overall change in imperviousness across the catchment is considered to be negligible, with some small, temporary changes in flows during the construction phase. The Proposed Action is not expected to cause any impacts to the downstream waterways or nearby property owners.

Detailed design will refine the corridor of disturbance across the Disturbance Footprint, ensuring potential impacts to the natural drainage patterns of watercourses are minimised. Impacts to the watercourses associated with the Proposed Action do not result in a significant residual impact.

Development and implementation of a site specific ESCP will ensure the Proposed Action does not pose any unacceptable risks to surface water quality.



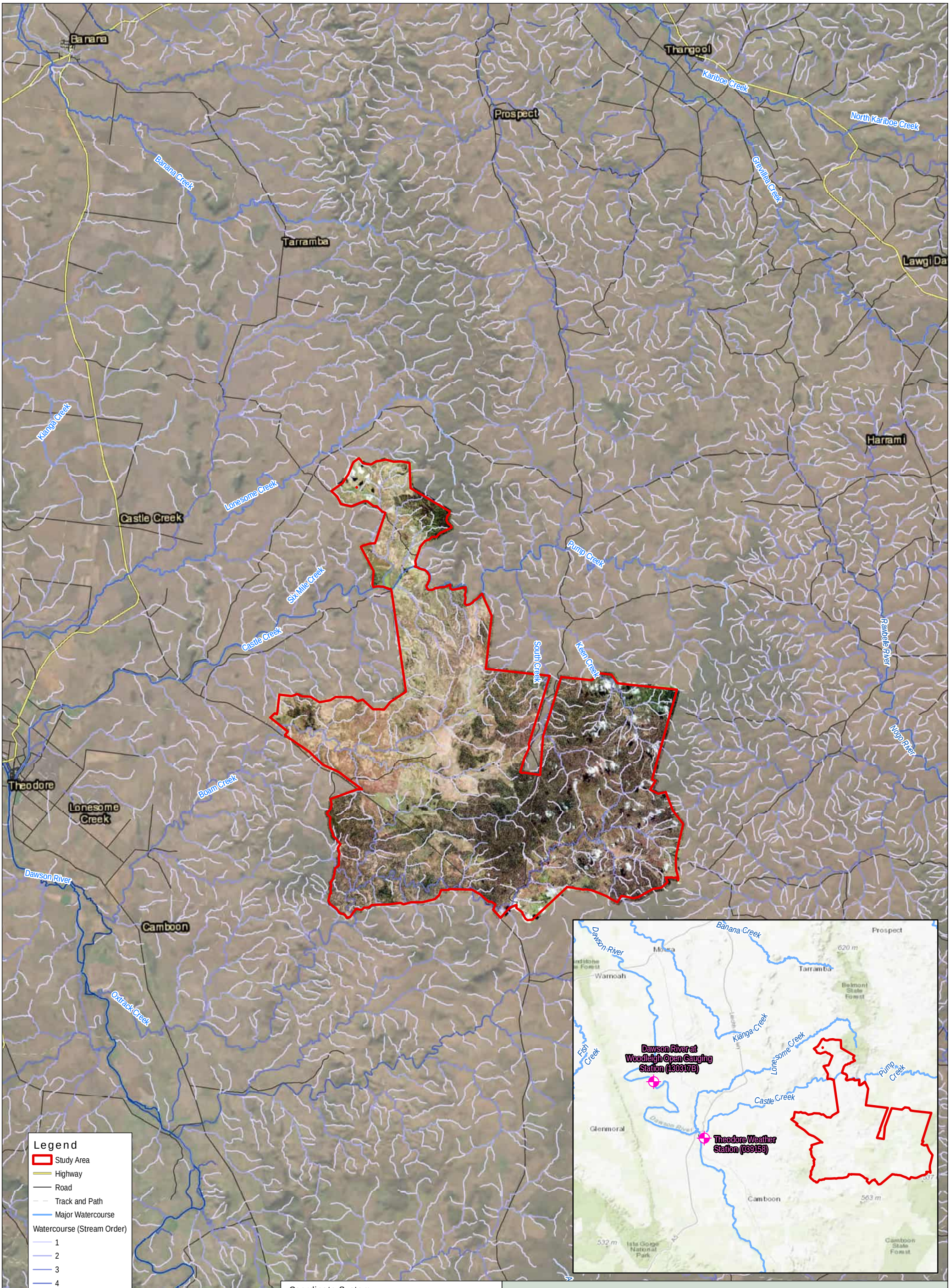
F5-40 Great Barrier Reef Drainage Basin Catchment

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Banana
Thangool
Kariboe Creek
Prospect
North Kariboe Creek
Banana Creek
Crevillia Creek
Tarramba
Lawgi Da
Kianga Creek
Harrami
Lonesome Creek
Castle Creek
Pump Creek
Six Mile Creek
Castle Creek
South Creek
Keen Creek
Rawbelle River
Nogo River
Theodore
Lonesome Creek
Boam Creek
Dawson River
Camboon
Oxtrack Creek
Legend
Study Area
Highway
Road
Track and Path
Major Watercourse
Watercourse (Stream Order)
1
2
3
4
5
6
7
8
Dawson River
Banana Creek
Prospect
Moura
620 m
Tarramba
Warnoah
Belmont State Forest
Kianga Creek
Fish Creek
Lonesome Creek
Pump Creek
Dawson River at Woodleigh Open Gauging Station (130317B)
Castle Creek
Glenmoral
Theodore Weather Station (039158)
Camboon
563 m
532 m
Isla Gorge National Park
Camboon State Forest
Coordinate System:
GDA2020 MGA Zone 56
Date: 06/11/2024
Created By: SP
Drawing Size: A3
0 2.5 5 7.5km
1:250,000
F5-41 Watercourses
Theodore Wind Farm
Theodore Energy Development Pty Ltd
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Public Environment Report – Impact Assessment (Section 6)

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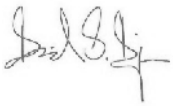
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ACRONYMS AND ABBREVIATIONS

Acronym	Description
AEP	Annual Exceedance Probability
ALA	Atlas of Living Australia
BACI	Before-After-Control-Impact
BBMP	Bird and Bat Management Plan
BHT	Broad Habitat Types
BPESC	Best Practice Erosion and Sediment Control
BUS	Bird Utilisation Survey
CEMP	Construction Environmental Management Plan
CRM	Collision Risk Model
DBH	Diameter at Breast Height
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DESI	Department of Environment, Science and Innovation
DEWHA	Department of Environment, Water, Heritage and the Arts
Disturbance Footprint	The area whereby the final layout and impacts have been considered and occupies an area of 1,537.4 ha.
E	Endangered
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
FMP	Fire Management Plan
GBR	Great Barrier Reef
IBA	Important Bird and Biodiversity Areas
IECA	International Erosion Control Association
MHQA	Modified Habitat Quality Assessment
Mi	Migratory
MNES	Matters of National Environmental Significance
MSDS	Material Safety Data Sheet
Type 1 natural regeneration	Natural regeneration restricted to low shrubbery and grass post-construction
Type 2 rehabilitation/ revegetation	Revegetation reinstated of equivalent pre-construction vegetation without height restrictions post-construction
NSW	New South Wales
PMST	Protected Matters Search Tool

Acronym	Description
Project Area	The corridor of land on which the Disturbance Footprint will be located, including a 100 metre buffer for micro-siting.
Proposed Action	Theodore Wind Farm
QLD	Queensland
QUDM	Queensland Urban Drainage Manual
REs	Regional Ecosystems
RSA	Rotor Swept Area
RULSE	Revised Universal Soil Loss Equation
SIA	Significant Impact Assessment
SRI	Significant Residual Impact
SATs	Spot Assessment Technique
SIG 1.1	Significant Impact Guidelines 1.1 – Matters of National Environmental Significance
SPRAT	Species Profile and Threats Database
State Code 23	Queensland State Code 23 – Wind farm developments
Study Area	The 9 land parcels, across 3 properties, and road reserve areas, 46,830 ha, in which the Proposed Action will be located.
TECs	Threatened Ecological Community
The Proponent	Theodore Energy Development Pty Ltd
V	Vulnerable
VCA	Vegetation Classification and Assessment
WONS	Weeds of National Significance
WTG	Wind Turbine Generators

6. IMPACT ASSESSMENT

6.1 OVERVIEW

The Proposed Action has the potential to impact on the ecological values in the Study Area during its construction, operation and decommissioning phases. This impact assessment includes the following information:

- Detailed assessment of the nature and extent of the likely short-term and long-term impacts;
- Statements on whether any impacts are likely to be unknown, unpredictable or irreversible;
- The component(s) and stage(s) of the Proposed Action that are of relevance to potential impacts on each protected matter;
- Analysis of the significance of impacts to protected matters; and
- Technical data and other information used or needed to make a detailed assessment of the relevant impacts.

This impact assessment has been undertaken with consideration for relevant departmental policies and guidelines. Table 6-1 summarises the legislation and policies considered in this Section of the report.

TABLE 6-1 KEY LEGISLATION AND POLICIES

Act/Policy	Administering Authority	Purpose
Commonwealth Legislation		
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	The EPBC Act administers the protection of the environment within Australia – in particular Matters of National Environmental Significance (MNES), which include: • World heritage properties; • National heritage properties; • Wetlands of international importance; • Threatened species and ecological communities; • Migratory species; • Commonwealth marine areas; • The Great Barrier Reef Marine Park; • Nuclear Actions (include. uranium mines); and • Water Resources.
Significant Impact Guidelines 1.1 – Matters of National Environmental Significance (SIG 1.1) 2013	Department of the Environment, Water, Heritage and the Arts (DEWHA)	The significance of impacts to MNES are assessed against the SIG 1.1. For all EPBC Act listed species and ecological communities, impacts are assessed against relevant Significant Impact Assessment (SIA) criteria applicable to: 'Habitat critical to survival of the species'; and/or An 'important population' of the species; and/or 'Important habitat for a migratory species'.

Act/Policy	Administering Authority	Purpose
Species Profile and Threats Database (SPRAT)	DCCEEW	The SPRAT database provides information about species and ecological communities listed under the EPBC Act 1999. It provides information on species descriptions, population, distribution, habitat, ecology and threats. It also provides links to recovery plans and survey guidelines. Species information is compiled by summarising information from a range of sources.
EPBC Act Environmental Offsets Policy 2012	DCCEEW	This policy applies where a significant impact on an MNES is expected to occur as a result of the Proposed Action. The policy provides guidance on the role of offsets and when a proposed offset is considered suitable.

6.1.1 SIGNIFICANT IMPACT ASSESSMENT SUMMARY

Six MNES were identified as known or likely to occur in the Study Area, including four threatened species and two Threatened Ecological Communities (TECs). Additionally, 13 MNES, including threatened and migratory species, were identified as having the potential to occur within the Study Area.

Potential impacts from the Proposed Action to MNES have been assessed against the *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* (SIG 1.1) (DoE, 2013a). These significant impact assessments (SIA) have been completed assuming the proposed avoidance, minimisation, mitigation and management measures (as detailed within Section 7 of the Theodore Wind Farm PER) will be implemented. The results of the SIAs are summarised below in Table 6-2 and are provided in further detail in Section 6.6. It should be noted that the actual area of disturbance may be lower than that documented in this impact assessment as a result of further avoidance associated with detailed design, micro-siting and data obtained from pre-clearance surveys.

TABLE 6-2 MNES SIGNIFICANT IMPACT ASSESSMENT SUMMARY

MNES	EPBC Act Status	Likelihood of Occurrence	Habitat in Study Area (ha)	Direct Impact (ha)	Percentage of Habitat Impacted (%)	Potential Rehabilitation Area (ha)	Habitat Permanently Impacted (Subject to final revegetation)	SRI status
Brigalow TEC	E	Known	225.5 ha of Brigalow TEC	1.3 ha of Brigalow TEC	0.6% of Brigalow TEC	N/A	1.3 ha of Brigalow TEC	**Unlikely**
Poplar Box TEC	E	Known	478.4 ha of Poplar Box TEC	6.6 ha of Poplar Box TEC	1.4% of Poplar Box TEC	N/A	6.6 ha of Poplar Box TEC	**Likely**
Greater glider (southern and central)	E	Known	1,662.1 ha of Likely/Current Denning Habitat 381.4 ha of Potential Denning Habitat 20,070.2 ha of Foraging and Dispersal Habitat	19.8 ha of Likely/Current Denning Habitat 1.1 ha of Potential Denning Habitat 607.3ha of Foraging and Dispersal Habitat	1.2% of Likely/Current Denning Habitat 0.3% of Potential Denning Habitat 3.0% of Foraging and Dispersal Habitat	N/A	19.8 ha of Likely/Current Denning Habitat 1.1 ha of Potential Denning Habitat 607.3ha of Foraging and Dispersal Habitat	**Likely**
Yellow-bellied glider (south-eastern)	V	Potential	16.0 ha of Potential Denning Habitat 110.2 ha of Potential Foraging Habitat	0.3 ha of Potential Denning Habitat 5.4 ha of Potential Foraging Habitat	1.6% of Potential Denning Habitat 4.9% of Potential Foraging Habitat	N/A	0.3 ha of Potential Denning Habitat 5.4 ha of Potential Foraging Habitat	**Unlikely**
Koala	E	Known	1,613.4 ha of Preferred Foraging and Breeding Habitat 21,216.6 ha of General Foraging and Breeding Habitat 6,950.5 ha of Dispersal Habitat	8.1 ha of Preferred Foraging and Breeding Habitat 640.2 ha of General Foraging and Breeding Habitat 247.2 ha of Dispersal Habitat	0.5% of Preferred Foraging and Breeding Habitat 3.0% of General Foraging and Breeding Habitat 3.6% of Dispersal Habitat	247.2 ha of Dispersal Habitat	8.1 ha of Preferred Foraging and Breeding Habitat 640.2 ha of General Foraging and Breeding Habitat	**Likely**
Large-eared pied bat	E	Likely	2,856.1 ha of Foraging Habitat	8.3 ha of Foraging Habitat	0.5% of Foraging Habitat	N/A	8.3 ha of Foraging Habitat	**Unlikely**
Squatter pigeon (southern)	V	Known	9,575.4 ha of Breeding Habitat 2,333.5 ha of Foraging and Dispersal Habitat	123.0 ha of Breeding Habitat 54.2 ha of Foraging and Dispersal Habitat	1.3% of Breeding Habitat 2.3% of Foraging and Dispersal Habitat	31.7 ha of Foraging and Dispersal Habitat	123.0 ha of Breeding Habitat 22.5 ha of Foraging and Dispersal Habitat	**Likely**
White-throated needletail	V, Mi	Potential	46,773 ha of Potential Foraging Habitat[1]	N/A[1]	N/A[1]	N/A[1]	0 ha of Potential Foraging Habitat[1]	**Unlikely**
Black-breasted buttonquail	V	Potential	277.2 ha of Potential Foraging and Roosting Habitat	4.4 ha of Potential Foraging and Roosting Habitat	1.6% of Potential Foraging and Roosting Habitat	N/A	4.4 ha of Potential Foraging and Roosting Habitat	**Unlikely**
Australian painted snipe	E	Potential	56 ha of Potential Foraging Habitat	1.3 ha of Potential Foraging Habitat	2.4% of Potential Foraging Habitat	N/A	1.3 ha of Potential Foraging Habitat	**Unlikely**
Diamond firetail	V	Potential	7,899.3 ha of Potential Breeding and Foraging Habitat	253.8 ha of Potential Breeding and Foraging Habitat	3.2% of Potential Breeding and Foraging Habitat	158.5 ha of Potential Breeding and Foraging Habitat	95.3 ha of Potential Breeding and Foraging Habitat	**Potential**
Ooline	V	Potential	277.2 ha of Potential Habitat	4.4 ha of Potential Habitat	1.6% of Potential Habitat	N/A	4.4 ha of Potential Habitat	**Unlikely**
Cossinia	E	Potential	277.2 ha of Potential Habitat	4.4 ha of Potential Habitat	1.6% of Potential Habitat	N/A	4.4 ha of Potential Habitat	**Unlikely**
Austral cornflower	V	Potential	21,768.5 ha of Potential Habitat	648.1 ha of Potential Habitat	3.0% of Potential Habitat	415.2 ha of Potential Habitat	232.9 ha of Potential Habitat	**Unlikely**
Solanum dissectum	E	Potential	261.4 ha of Potential Habitat	1.7 ha of Potential Habitat	0.7% of Potential Habitat	1.5 ha of Potential Habitat	0.2 ha of Potential Habitat	**Unlikely**
Solanum johnsonianum	E	Potential	261.4 ha of Potential Habitat	1.7 ha of Potential Habitat	0.7% of Potential Habitat	1.5 ha of Potential Habitat	0.2 ha of Potential Habitat	**Unlikely**
Xerothamnella herbacea	E	Potential	261.4 ha of Potential Habitat	1.7 ha of Potential Habitat	0.7% of Potential Habitat	N/A	1.7 ha of Potential Habitat	**Unlikely**
Fork-tailed swift	Mi	Potential	46,773 ha of Potential Foraging Habitat[1]	N/A[1]	N/A[1]	N/A[1]	0 ha of Potential Foraging Habitat[1]	**Unlikely**

EPBC Act listing status: E = Endangered, V = Vulnerable, Mi = Migratory

[1] White-throated needletail and fork-tailed swift (both potentially occurring) are aerial foraging species, and no roosting habitat has been identified. Both species are therefore considered to only utilise the arial space within the Study Area for foraging if they were to occur.

6.2 POTENTIAL IMPACTS FROM CONSTRUCTION

The key activities with the potential to impact ecological values during construction are:

- Vegetation clearing for new access tracks, temporary construction compounds and laydown areas, borrow pits, water storages, batching plants, turbine hardstands, trenches for reticulation and instrumentation cables, electrical substations and overhead powerlines and associated earthworks;
- Excavating trenches;
- Blasting for turbine foundations (if required); and
- Construction traffic movements and plant operation (rock crushing and batching plants).

Construction works are anticipated to have a duration of 36-60 months. The Disturbance Footprint of the Proposed Action (that is, the maximum area to be cleared) is 1,537.4 ha and includes a maximum impact of 595.3 ha to remnant vegetation associated with the clearing for infrastructure. The Disturbance Footprint is 3.3% of the total Study Area. It is anticipated that rehabilitation opportunities post-construction will occur to reduce the percentage of total disturbance required to facilitate construction.

6.2.1 HABITAT LOSS AND INDIVIDUAL MORTALITY FROM VEGETATION CLEARING

Construction activities will result in 1,537.4 ha of disturbance to broad habitat types (BHTs) across the Study Area throughout the duration of the construction phase. The following disturbance to BHTs and habitat within the Disturbance Footprint are anticipated to occur:

- 873.5 ha to Grasslands and cultivated agricultural land;
- 648.1 ha to Eucalypt woodland and open forest dominated by *E. crebra* with a grassy understorey;
- 8.3 ha to Riparian woodland and open forest dominated by *E. populnea, E. tereticornis* often associated with stream channels;
- 4.4 ha to Vine forest/thickets and dry rainforest;
- 1.3 ha to Waterbodies and drainage features; and
- 1.7 ha to Brigalow woodlands.

The loss of this vegetation is expected to negatively impact the native flora and fauna by reducing species composition and structural diversity of the area to be cleared. This impact will result in the permanent removal of these vegetation types, and the associated habitat values they provide for the native flora and fauna such as foraging, breeding, dispersal etc. for the duration of the Proposed Action. The permanent impact associated with habitat loss will be limited to approximately **537.3 ha**, or 1.1% of the available habitat in the Study Area, following the completion of post-construction rehabilitation, outlined in Section 8. The impacts of habitat loss from vegetation clearing are considered to constitute long-term and short-term impacts, dependent on the MNES-specific habitat requirements. This is further outlined in Section 6.6.

There is potential for direct mortality or injury to native fauna during the construction and operational activities. While many fauna groups are highly mobile (e.g. birds) and are likely to move when machinery and vehicles approach, other less mobile groups (e.g. reptiles and amphibians) may be more vulnerable to this impact. Similarly, there will be excavation (construction only) which may pose a trapping hazard for some fauna groups (e.g. amphibians, small reptiles, and small mammals).

6.2.2 HABITAT FRAGMENTATION AND PATCH ISOLATION

Habitat fragmentation is defined as a process during which "*a large expanse of habitat is transformed into a number of smaller patches of smaller total area, isolated from each other by a matrix of habitats unlike the original*" (Wilcove, McLellan, & Dobson, 1986).

Fragmentation has the potential to negatively impact ecological values and native species through habitat loss, habitat patch isolation (disrupting connectivity and reducing dispersal ability and gene flow), reducing patch size (small habitat patches may not be able to sustain local populations or individual territories) and edge effects (more edges increase the probability of individuals leaving the habitat patch, increasing mortality rates and reducing reproduction rates) (Fahrig, 2003). Specifically, creating more extensive edges through fragmentation increases the colonisation by exotic plant and animal species, and allows for more effective hunting by predator species. Additionally, certain native species such as noisy miners (*Manorina melanocephala*) and yellow-throated miners (*M. flavigula*) may also benefit from fragmentation and disrupt the ecological functioning within woodland habitat patches by outcompeting insect and nectar-feeding bird species (Neldner, et al., 2017).

The Proposed Action has the potential to contribute to fragmentation of native species habitat on a regional scale, due to the proximity of the Study Area to Belmont State Forest and Camboon State Forest and its position within a mapped regionally significant Biodiversity Corridor. Within the Study Area, more than half (60%) is mapped as non-remnant or sparse regrowth vegetation that has been impacted by clearing, cattle grazing and crop fields, with several existing cleared vehicle and cattle tracks. The remaining areas exist as relatively connected stands of remnant vegetation, however this vegetation and connectivity areas may suffer from further fragmentation if inappropriately managed. This potential impact would be considered a long-term impact.

The Disturbance Footprint intersects some areas mapped as remnant vegetation which could result in further fragmentation. However, this is limited based on the narrow linear nature of the proposed clearing with any clearing proposed to occur in small, localised strips or small patches, and as such, is unlikely to present an obstacle for most species. All clearing for access corridors will be limited to 40 m in width during the construction phase. As such, this loss of habitat is likely to have a greater impact on flora and fauna species with smaller home ranges and specific habitat requirements (e.g. small mammals, amphibians and reptiles) compared to species with larger home ranges and more general habitat preferences (e.g. larger mammals and generalist birds).

Vegetation clearing has the potential to restrict dispersal of arboreal mammals, including greater glider (known to occur within the Study Area) and yellow-bellied glider (potentially occurring). The nocturnal movements of greater glider are usually restricted to gliding between canopy trees. When dispersing, greater glider can reportedly cover distances up to 100 m (Kerle, 2001 as cited in NSW Scientific Committee, 2024), and oberservations have been made

of individuals gliding over distances of 75 m from a tree canopy 45 m high (R. Kavanagh pers. comm. as cited in Taylor & Goldingay, 2009). However, they typically glide no further than 30 m and tend to have a steeper glide trajectory compared to other gliding mammals (R. Kavanagh pers. comm. August 2013 as cited in NSW Scientific Committee, 2024). Studies on the effectiveness of road-crossing infrastructure found that a 55 m wide road can effectively restrict greater glider dispersal between two remnant forest patches (Taylor & Goldingay, 2009).

Artificial wildlife crossing structures (glide poles) have been utilised within glider habitat throughout eastern Australia to assist dispersal between areas fragmented by clearing, such as roads and highways (DCCEEW, 2022). However, only one example of greater gliders using these structures currently exists, at the Sugarloaf Pipeline project in Victoria. Annual monitoring from GHD found greater gliders were occasionally recorded on glide poles at this site, though it was not established whether they were using the structures to cross cleared areas or to move parallel to gaps (GHD 2017; Dalton 2018 as cited in DCCEEW, 2022a). Conservation advice and species-specific guidance suggest further research on greater glider dispersal ability and persistence in fragmented habitat is required (DCCEEW, 2022; DES, 2022).

Yellow-bellied gliders (south-eastern) tend not to traverse open spaces larger than their gliding distance. The species' maximum glide distance could be as high as 120 m–140 m (Kavanagh & Rohan-Jones 1982; Kambouris et al. 2013; Goldingay 2014 as cited in DAWE, 2022), though conservation advice suggests management should be informed by average gliding distance (DAWE, 2022a). Studies recording glide distances in low-canopy forest documented an average of 25.2 m and suggested a glide ratio (horizontal distance/height dropped) of 2.0 should be used to inform management decisions concerned with gliding capabilities (Goldingay, 2014). Habitat fragmentation may be effectively managed by installing glide poles, which yellow-bellied gliders (south-eastern) have been documented using (Goldingay et al. 2019; Taylor & Rohweder 2020 as cited in DAWE, 2022a).

Overhead cable systems (powerlines) have the potential to impact fauna. Birds and bats may become entangled in overhead cable infrastructure while traversing the Study Area. Depending on positioning and height, overhead cables may also attract birds to the vicinity of operating turbines by providing a potential perching resource. Overhead cable systems will be designed to allow for safe operations, using buffers between conductors and the ground, and conductors and adjacent vegetation. The transmission line has adopted a design which allows for reduced interference to canopy dwelling species due to minimising impacts to canopy vegetation.

6.2.3 INCREASED PREVALENCE OF INVASIVE PLANTS AND ANIMALS

Vegetation removal, increased vehicular activity and introduction of foreign material during the construction phase can lead to the introduction and/or spread of weeds and pest species throughout the Study Area. This introduction or spread of weeds and pests could be a result of on-foot movement, vehicular movement or the disturbance and clearing of vegetation.

Four Weeds of National Significance (WONS) and Category 3 restricted invasive plants were recorded throughout the Study Area including velvet prickly pear (*Opuntia tomentosa*), parthenium (*Parthenium hysterophorus)*, cats claw creeper (*Dolichandra unguis-cati*) and lantana (*Lantana camara)*. Additionally, six invasive fauna species were observed within the Study Area during field surveys including feral rabbit (*Oryctolagus cuniculus*), wild dog (*Canis*

lupus), feral pig (*Sus scrofa*), feral cat (*Felis catus*), house mouse (*Mus musculus*) and cane toad (*Rhinella marina*). Such weed and pest species have the potential to negatively impact native flora and fauna communities through competition for resources, habitat degradation and/or predation, parasitism or poisoning. This potential impact would be considered a long-term impact.

Presence of lantana has been observed to reduce species richness through outcompeting native flora species (particularly tree and shrub species) within Australian vegetation communities. Lantana infestation can result in altered species composition and structural diversity, and shifting tall open forests to low, dense, lantana-dominated shrubland, potentially decreasing habitat value for certain fauna (Gooden, French, Turner, & Downey, 2009).

Similarly, pest animal species are also known to negatively impact native flora and fauna. Native predators are known to be significantly impacted through poisoning by consumption of cane toads (DEWHA, 2010); specific microhabitat features, such as invertebrate diversity, leaf litter and fallen log cover, are known to be susceptible to degradation by rabbit and pigs (DoEE, 2016; DoEE, 2017); and broad range of native species are known to be vulnerable to predation from feral cats and dogs (DoE, 2015c; Centre for Invasive Species Solutions, 2024).

6.2.4 INCREASED VEHICLE IMPACTS ON FAUNA AND HABITAT

Impacts on fauna from vehicles and machinery operation have the potential to occur throughout the life of the Proposed Action, however peak traffic periods will be during the construction period. This potential impact would therefore be considered a short-term impact. Vehicle and machinery movements during the operational phase are likely to be minimal. It is well understood that collision with vehicles and machinery has the potential to kill or seriously injure fauna.

Vehicles and machinery can also damage vegetation and fauna habitat when traversing the Study Area. These impacts may be exacerbated if vehicles and machinery deviate from access roads or do not adhere to established on-site road rules and speed restrictions.

6.2.5 ALTERED FIRE REGIMES AND BUSHFIRE RISK

The Proposed Action has the potential to alter fire regimes and bushfire risk on a local scale, by increasing potential sources of ignition, and altering vegetation composition and fuel loads. Depending on the extent and severity of a fire, impacts to MNES within the Study Area may be short or long term. Risks of fire range from injury or loss of human life, loss or degradation of vegetation communities and habitat, fauna injury or mortality and impacts to water quality. Risk of a fire ignition within the Study Area is more likely to be associated with construction phase activities, for example, the use of machinery and vehicles or hot works.

Clearing of intact vegetation, increased activity and introduction of foreign material has the potential to facilitate the introduction and/or spread of weed plant species. This in turn could change the floristic composition within the Study Area, and lead to increase in fuel load in some areas. Increased fuel loads can lead to higher intensity and more damaging fire conditions. Higher intensity, more frequent wildfires are a key threatening process for a number of threatened native species (DoE, 2014; DAWE, 2022c).

6.2.6 ALTERED HYDROLOGY

6.2.6.1 STORMWATER QUANTITY

Impervious Areas

Changes in hydrology would typically be associated with a change in the imperviousness of the catchment, or as a result of substantial diversion of overland flows due to the Proposed Action. This could occur throughout all phases of the project lifecycle, from construction, during operation and through to the decommissioning phases.

On a sub-catchment scale, the 1,537.4 ha Disturbance Footprint represents a nominal 0.03% of the encompassing Dawson sub catchment (5,077,521 ha). The 1,537.4 ha Disturbance Footprint is inclusive of all disturbance and infrastructure areas, and the proportion of the footprint represented by impervious infrastructure will be notably smaller.

Whilst it is unlikely for the Proposed Action to have a measurable effect on sub-catchment hydrology, localised impacts pertaining to impervious infrastructure have the potential to arise. These may include the following:

- Localised flooding/ponding of stormwater due to reduced infiltration;
- Increase in peak flows rates and flow velocity;
- Decline in water quality due to a reduction in vegetation sediment trapping;
- Increased erosion due to an increase in concentrated flows.

Implementation and sizing of stormwater infrastructure will be in accordance with the methodology and principles described in the Queensland Urban Drainage Manual (QUDM) (IPWEA, 2024), as a means of maintaining flows to similar levels observed throughout the pre-development catchment.

Impacts to local hydrology and flow regimes may also arise due to the placement of infrastructure within identified flood risk zones, and watercourse crossings. These impacts are assessed below.

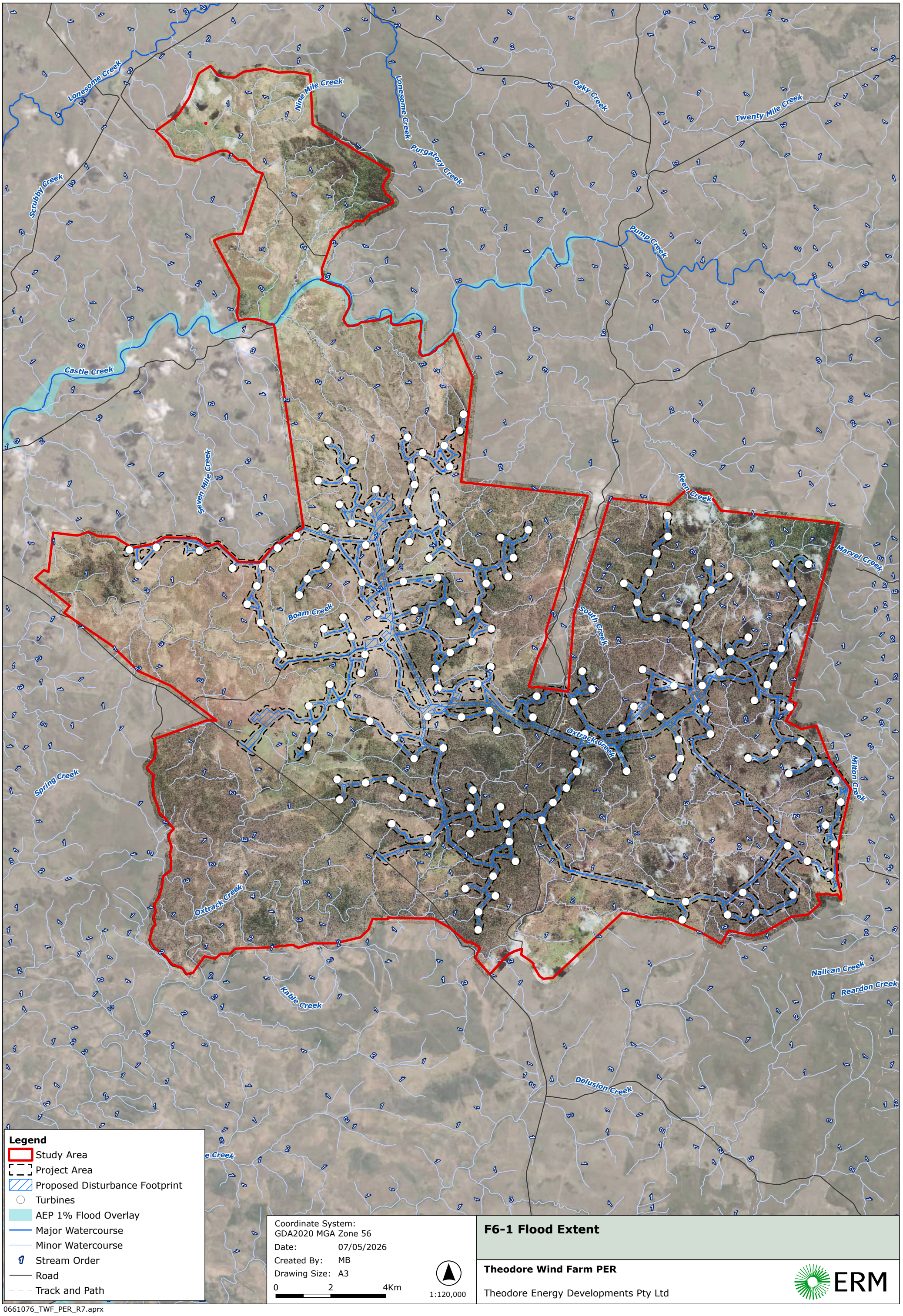
Given the localised nature of any potential impacts, any changes in stormwater quantity as a result of the Proposed Action are not anticipated to impact identified MNES.

Flooding

Based on a review of flood extent mapping (DoR, 2015) (Figure 6-1), none of the Disturbance Footprint is located within areas considered likely to be affected by a 1% annual exceedance probability (AEP) flood event of Castle Creek. The flood extent does not intersect any of the project infrastructure or clearing areas. The proposed turbines, access tracks, substations, Operation and Maintenance facility, alongside all other temporary infrastructure (such as the concrete batching plants and laydown areas) are all located outside of the 1% AEP flood area.

It is anticipated that any potential flooding impacts will be minor, confined to the ponding of water, or small-scale localised flooding during a large-scale flood event (i.e. 1% AEP).

It should be noted that the initial flood risk assessment represents a high-level assessment only, with data derived from publicly accessible desktop resources. Detailed flood modelling will be undertaken at the detailed design phase to determine the full extent of the flood risk.



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Watercourse Crossings

An evaluation of the Disturbance Footprint determined there are 57 potential watercourse crossings associated with the Disturbance Footprint. Each crossing attributed a nominal 40 m^2 of disturbance during construction, with widening only in specific areas. Cumulatively, the 57 watercourse crossings represent a disturbance area of 0.23 ha.

As per Figure 6-1, a majority (51) of the 57 potential watercourse crossings occur at points where the access track network intersects predominantly ephemeral waterways that are defined as Stream Order 1 or 2 under the Strahler system of stream order (DoR, 2024).

The potential impacts that may arise from disturbance associated with watercourse crossings includes the following:

- Increased sediment and nutrient loads due to altered roadside drainage arrangements;
- Disturbance and/or removal of riparian and in-stream vegetation;
- Prevention of fish passage through the crossing structure; and
- Alteration of the stream's natural flow pattern, both in-channel and floodplain flows.

The Disturbance Footprint has been designed to minimise impacts to mapped watercourses for all non-linear infrastructure. Where linear infrastructure is proposed to impact mapped watercourses, detailed design will further refine the corridor of disturbance to ensure potential impacts to the natural drainage patterns of watercourses are minimised. Where waterway crossings are considered, the design and development will comply with the accepted development requirements for waterway barrier works. By implementing controls consistent with the requirements for waterway barrier works, impacts to downstream areas are likely to be managed to acceptable levels. While some localised short-term impacts may occur, long-term impacts downstream are not expected.

6.2.6.2 STORMWATER QUALITY

Pollution from Increased Sediment and Erosion Run-Off

To quantify the extent of erosion and sedimentation from the Study Area, an erosion risk assessment was undertaken using the Revised Universal Soil Loss Equation (RUSLE). The RUSLE is an empirical equation used predict soil loss based on key data inputs (rainfall data, soil properties, digital elevation, and land use), classifying erosion risk into seven categories, ranging from very low to extremely high risk. A visualisation of the erosion risk (based on the outcomes of the RUSLE) across the Disturbance Footprint is presented in Figure 6-2.

The Proposed Action has the potential to increase erosion and sedimentation beyond the pre-disturbance baseline through the following actions:

- Construction activities and land clearing works, particularly on steep slopes;
- Excessive soil disturbance and duration of exposure;
- Site traffic, particularly on unsealed roads, and along steep slopes;
- Inappropriate site practices resulting in features such as stockpiles, tracks and excavations washed away by rainfall or other surface water features;
- High velocity and concentrated flow from stormwater runoff occurring across impervious surfaces such as hardstand areas and access roads;
- Instream works for the construction of watercourse crossings;

- Works areas not stabilised and rehabilitated effectively; and
- Improper maintenance of erosion and sediment control structures.

The likelihood and scale of impact as a result of these activities is expected to be amplified when undertaken in regions of the Study Area with a high to extreme erosion risk classification (refer Figure 6-2), and during periods of the year characterised by high rainfall and streamflow (refer to Section 5.5.1 of the Theodore Wind Farm PER). Accordingly, risk will be lower when undertaken in regions where erosion risk is low, and when rainfall and streamflow are minimal.

The RUSLE assessment undertaken for the Proposed Action presents a conservative and high-level estimate of erosion risk, utilising publicly available information from sources such as Queensland Globe and the Queensland Government's QSpatial Catalogue.

The key findings of the RUSLE assessment are as follows;

- 69.9% of the Disturbance Footprint is classified as very low to low erosion risk;
- There is 0.1% of extremely high erosion risk within the Disturbance Footprint;
- High to very high erosion risk occurs in 6.4% of the Disturbance Footprint, driven by the hilly terrain of the region.

Erosion and sedimentation in areas of low to moderate erosion risk will typically be manageable with basic or industry standard controls. Where there is disturbance to areas of high or extremely high erosion risk, high-level erosion and sediment controls will be implemented. These controls are to be aligned with the methodology set out in the International Erosion Control Association (IECA) Best Practice Erosion and Sediment Control (BPESC) Book 1 (2008) and detailed in Section 7.2.2 of the Theodore Wind Farm PER. Areas of high to extreme erosion risk tend to be located in areas with steep and long slopes. The turbine locations are typically away from steep slopes and therefore avoid extremely high erosion risk areas. The IECA recommends the avoidance of areas with an extreme erosion risk wherever possible. This recommendation is reflected in the layout of the Disturbance Footprint, of which 0.25% is classified as having an extremely high erosion risk.

Legend

- Study Area
- Project Area

RUSLE

- Very Low (<150)
- Low (151-225)
- Low - Moderate (226-350)
- Moderate (351-500)
- High (501-750)
- Very High (751-1,500)
- Extremely High (>1,500)
- Road
- Track and Path

Coordinate System:
GDA2020 MGA Zone 56

Date: 07/05/2026

Created By: MB

Drawing Size: A3

0 2 4Km

1:120,000

F6-2 Revised Universal Soil Loss Equation (RUSLE)

Theodore Wind Farm PER

Theodore Energy Developments Pty Ltd

ERM

Pollution from Spills

The Proposed Action does not anticipate any direct releases to receiving waters, although the following activities present a potential risk to water quality throughout all stages of the Proposed Action lifecycle:

- Leakage or accidental spillage of oil, fuel or other liquids associated with Project infrastructure, with potential to migrate off site if not captured and managed;
- Chemical leaks from batteries during the construction stages, such as accidental damage during installation has the potential to migrate off site if not captured and managed;
- The use and storage of fuel for vehicles presents a potential for hydrocarbon spills which can contaminate surface water and result in off-site migration if not captured and managed; and
- Use of water for dust suppression (and other earthworks), dependent on the type of water used. If the water used is of a poorer quality compared with the background surface water quality, this can cause an impact to surface water quality.
    - Noting that it is anticipated that water for dust suppression and earthworks will be sourced from groundwater (to include artesian and sub-artesian), rainwater (sourced from dams or collection ranks), and offsite (via trucks).

Pollution from Concrete

The potential for release of concrete based pollutants may lead to an increase in the pH of receiving surface waters. There are 5 proposed locations for concrete batching plants across the Study Area, which will support the production of concrete for the WTGs foundations and other infrastructure footings. Activities and processes that may result in the release of concrete based pollutants from the Study Area include the following:

- Concrete batching, cutting, and disposal;
- Spills of wet concrete;
- Dampening of freshly laid concrete;
- Cleaning of concrete polluted equipment (e.g. machinery, vehicles, tools) without appropriate controls for the capture of contaminated cleaning water;
- Concrete dust released into waterways; and
- Erosion of exposed concrete surfaces resulting in concrete pollution of downstream waterways.

6.2.7 ENVIRONMENTAL POLLUTION AND HAZARDOUS MATERIALS

Construction traffic movement, on-site activities and plant operation may introduce light and noise pollution, vibration and dust generation, and hazardous materials that have the potential to negatively impact adjacent vegetation communities and disturb native fauna. Impacts on MNES from environmental pollution and hazardous materials have the potential to occur throughout the life of the Proposed Action, however peak work periods will be during the construction period. This potential impact would therefore be considered a short-term impact.

Light and noise pollution have the potential to affect the physiology, behaviour and reproduction of a range of animal taxa, with these effects including reduction in animal fitness, increased risk of predation, reduced success or alternations of acoustic communication,

increase vigilance and reduced reproductive success (Newport, Shorthouse, & Manning, 2014). In Australia, it has been found that some species, such as squirrel gliders, are negatively affected by noise and light pollution and show a decrease in activity levels as light and noise pollution increase (Francis, Spooner, & Matthews, 2015). Studies suggest that the consistency of noise is more important than volume, with irregular and unpredictable noise being emitted during construction and decommissioning likely to be more disruptive to wildlife (Jones, Pejchar, & Kiesecker, 2015). For native fauna communities in general, individuals may relocate to adjacent areas during times of noise disturbance.

Blasting will result in disturbance to wildlife through vibration, noise and possibly injury from flying rock. Blasting will occur infrequently but has the potential effect of displacing nearby wildlife from retained foraging and breeding habitat.

Dust generated by vehicle and machinery movements has the potential to smother vegetation directly adjacent to the works and inhibit plant growth and palatability for native fauna. However, these effects would be localised and management measures are available to limit dust generation and dispersion.

Erosion from construction activities can alter the physical condition of an environment through the removal of topsoil and potential run off into nearby waterways. This runoff can indirectly cause impacts to aquatic habitats through changing the physical and/or chemical condition of waterways within the Study Area and within downstream environments. Additionally, there is the potential for the Proposed Action to result in pollution of waterways and aquatic habitats within and downstream of the Study Area and through improper vegetation management (inappropriate handling and use of herbicides and pesticides etc.) or potential fuel, chemical or hazardous material spills.

Hazardous materials also pose potential impacts to flora and fauna species within the Study Area. Hazardous materials likely to be used throughout the Proposed Action may include overhead cabling, barbed wire, fuel, herbicides, pesticides, oils, chemicals and other waste forms. These materials can cause direct mortality or injury to fauna species and harm flora species that may come in contact. The physical condition of environmental habitat can also be impacted by hazardous materials.

6.3 POTENTIAL IMPACTS FROM OPERATION

Operational activities and their potential impacts during the operation phase include:

- Operation of the Wind Turbine Generators (WTGs) for an estimated period of 30-35 years, resulting in potential bird and bat collision and barotrauma risks;
- Routine maintenance and servicing of WTGs, access tracks, electrical installations, and infrastructure as required, resulting in potential impacts of vehicle mortality and incidents, habitat disturbance (albeit, on a considerably smaller scale than construction phase activities), disturbance and potential hazardous materials exposure; and
- Operation of the wind farm causing changes in fauna behaviour, including avoiding previously utilised breeding or foraging resources or deviating around the areas where turbines are located (site alienation).

Operational phase activities, though longer in duration than those of construction phase activities, are anticipated to result in impacts that are of a more indirect nature, of lower frequency and smaller in intensity. Potential construction phase impacts listed above, such as

introduction/spread of invasive species, vehicle collision with fauna, altered fire regimes and hydrology, and environmental (light, noise and dust) pollution, are still relevant in the operational phase but are expected to be far less prevalent, and impacts to MNES are likely to be minimal.

6.3.1 INDIVIDUAL MORTALITY AND INJURY FROM TURBINE COLLISION AND BAROTRAUMA

One of the primary environmental concerns arising from wind farm developments in Australia and overseas is the potential impact to bird and bat species from collision with operating turbines. Wind farms are known to cause injury or mortality to birds and bats through collision with turbine blades. The potential impacts from wind farm turbine operation are generally considered to constitute long-term impacts.

In addition to mortality caused by direct collision with turbines, studies have also found that barotrauma (tissue damage caused by changes in barometric (air) pressure) caused by rapid air-pressure fluctuation near moving turbine blades accounts for a significant number of bat fatalities recorded at wind energy facilities (Baerwald, D'Amours, Klug, & Barclay, 2008).

Any incidental mortality is linked closely to the wind turbine generator Rotor Swept Area (RSA) height. RSA refers to the physical area swept by the rotating blades of a turbine during operation. The RSA height to be adopted for the Proposed Action is 87-250 m. RSA is important to note as it typically dictates the risk of impacts to certain species of birds and bats. Those species found to be flying at or above the RSA are typically more at risk from barotrauma and rotor collision than those that fly below the RSA.

Given the small area of habitat occupied by the WTGs relative to the entire Study Area, and that the bat species recorded at the Study Area (see Appendix E) tend to forage within the woodland canopy, the risk of bat injury or mortality is regarded as low. However, EPBC Act listed large-eared pied bat was recorded as ‘probable’ to occur at numerous survey locations throughout the Study Area. Impacts to this species are discussed below in Section 6.6.6.

The majority of birds recorded in the Study Area are woodland-dwelling, low-flying species. These species require woodland dominated by *Eucalyptus*, *Callitris* and *Acacia* sp., often with hollows for nesting and roosting habitat. Most woodland species were observed flying to a maximum height of 15 m or below, typically remaining beneath the height of the woodland canopy.

While few studies have been conducted to investigate the significant impacts of RSA on collision incidence, it is considered that passerine (perching birds) species, due to their fast flight patterns and high flight, and migratory species, may be more at risk than other species (Erickson, et al., 2001). The field surveys identified no EPBC Act listed passerine species that would be at greater risk of collision.

Overall, collision rates are considered to be very low for the majority of Australian bird species (Smales & Muir, 2005), including those recorded at the Study Area and surrounds. Empirical evidence shows that birds have a very high rate (99%), of wind turbine avoidance (Smales & Muir, 2005; Madders & Whitfield, 2006).

Impacts associated with turbine strike and site utilisation specific to the Proposed Action, including implementation of a Bird and Bat Management Plan (BBMP) is discussed further in Section 6.6 and Section 6.11. The BBMP is attached as Appendix D.

6.3.2 SITE ALIENATION

The construction and operation of the turbines and associated infrastructure may result in barriers to movement for species accessing and dispersing within the Study Area. The operation of the wind farm may also cause certain species to avoid the area altogether, abandoning potential key habitat resources previously used. Site alienation may affect a range of fauna in their regular traverses for breeding and foraging sites.

Birds and bats may change their flight paths to avoid collisions with turbines, potentially leading to an increase in energy expenditure and impacting on their breeding and foraging success. Migratory birds may be forced to alter their migratory flyways (Drewitt & Langston, 2006). It should be noted that only two EPBC Act listed migratory species, white-throated needletail and fork-tailed swift, have been considered to potentially occur within the Study Area.

Barriers may be created through the clearing and fragmentation of habitat and/or short-term construction activities and machinery during construction. Roads usually have a more open canopy, lack ground cover and have different thermal characteristics than the surrounding habitat, often creating a microhabitat where predation risk is higher and potentially resulting in behaviour changes and avoidance of these areas by certain species (Shepard, Kuhns, Dreslik, & Phillips, 2008).

It is expected that creating barriers to movement and dispersal may impact native species through changing dispersal behaviours, reducing access to resources (water, food, breeding (hollows, mate selection etc.)) and, depending on the strength of the barrier, disrupt ecosystem function and gene flow throughout the Study Area and broader region (Shepard, Kuhns, Dreslik, & Phillips, 2008). This potential impact would therefore be considered to constitute a long-term impact. It is likely that this impact will have a greater effect on native species that are more vulnerable to predation and are unable to disperse through non-remnant habitat, compared to those that have a lower predation threat and have greater dispersal ability (particularly within cleared, non-remnant habitat).

6.4 POTENTIAL IMPACTS FROM MAINTENANCE AND DECOMMISSIONING

Some of the potential impacts resulting from the construction and operation phases are considered likely to be repeated during the maintenance and decommissioning phases. Decommissioning phase impacts are similar to those that might occur during the construction phase (Section 6.2) but likely to be of much lower magnitude. At the end of decommissioning, the site would be rehabilitated to the extent agreed upon with the landholder. Potential impacts from maintenance and decommissioning include:

- Construction/operation traffic movements and plant operations;
- Vegetation clearing for new access tracks, temporary construction compounds and laydown areas, borrow pits, water storages and associated earthworks;
- Excavating trenches.

If a decision was taken to decommission the Proposed Action, this would involve:

- Dismantling and removal of WTGs;
- Removal of electrical reticulation where not part of permanent network infrastructure;

- Responsible disposal/recycling/reuse of infrastructure removed from site according to the waste hierarchy; and
- Areas not required for ongoing operational disturbance to be rehabilitated and or regenerated in accordance with rehabilitation management practices established in Section 8 of the PER and where not required for ongoing grazing or agricultural practices.

Considerable quantities of waste material will be generated during decommissioning of wind turbines and other infrastructure (overhead cabling, met masts) at the end of the Proposed Action's operational life. The Proponent will find sustainable and best practice waste management options during the decommissioning process, including implementing the waste reduction hierarchy and prioritising reuse and recycling options over disposal.

Underground cabling would be left *in situ*. Hardstand pads will be left in situ where rehabilitation to the prior state is not possible and deep ripped where rehabilitation to prior state is achievable, as identified in Section 8 of the PER. Turbine foundations may be left up to 500 mm below rehabilitated ground level as they do not present a risk to people or livestock. Excavations would be backfilled and rehabilitated. Access tracks could be retained on site for the continued benefit of the landholder, or they could be rehabilitated.

6.5 ASSESSMENT OF UNKNOWN, UNPREDICTED OR IRREVERSIBLE IMPACTS

The potential impacts described in Section 6.2, 6.3, an 6.4 will be monitored and managed through the use of mitigation, rehabilitation and management measures provided in Section 7. Potential impacts have been assessed based on the understanding of the local environment and the activities associated with the Proposed Action. The assessment of the Proposed Action has taken a conservative approach for understanding potential impacts. The assessment, in determining potential for impact occurrence and knowledge of the potential impacts adequately speaks to and outlines the known unknowns (impacts that we know cannot be predicted) and known knowns (impacts we are certain of). Known unknowns are dealt with by implementing research standards to decrease the amount of uncertainty and the capture the assumptions and create contingency of the potential impact.

Where unexpected, unpredicted or irreversible impacts may occur, these are likely to be in the form of unknown unknowns (knowledge of the impact and its occurrence are not known) and mitigation of unknown unknowns comes in the form of occurrence and learnings, and in this form the knowledge of the risk becomes a known unknown. Mitigating unknown unknowns is not highly successful, however can be mitigated with implementation of adaptive management practices. Adaptive management is implemented when an impact occurs which changes the management approach of that category of risk. Adaptive management has been built into all management plans that are to be finalised upon post-approval. Principles of adaptive management are also to be built into more general, broad management plans, such as the Construction Environmental Management Plan (CEMP) and Vegetation and Fauna Management Plan (VFMP).

6.6 MNES IMPACT ASSESSMENT

6.6.1 BRIGALOW (*ACACIA HARPOPHYLLA* DOMINANT AND CO-DOMINANT)

6.6.1.1 DIRECT IMPACTS

Direct impacts to Brigalow TEC associated with the Proposed Action are considered to be limited to habitat loss from vegetation clearing. The current layout of the Proposed Action has almost entirely avoided all Brigalow TEC within the Study Area as presented in Figure 5-1. It is noted that rehabilitation to affected areas will not restore this habitat to its former state, therefore any direct impact due to clearing at the construction phase is considered permanent.

Clearing within the Disturbance Footprint will result in several smaller patches of mapped Brigalow TEC (see Figure 5-1, Ground-truthed TEC Locations 8 and 15) being reduced in size to an extent that they no longer meet the minimum patch size criteria (> 0.5 ha). Therefore, the total amount (area in hectares) of Brigalow TEC in these patches has been added to the direct impact calculation.

A summary of the direct impacts on Brigalow TEC as a result of the Proposed Action is shown in Table 6-3. A total of 1.0 ha of Brigalow TEC is within the Disturbance Footprint of the Proposed Action. Due to fragmentation, 0.7 ha of Brigalow habitat will be unable to meet the key diagnostic criteria of Brigalow TEC due to a reduction in patch size, and therefore this area has been added to the permanent impact to the TEC.

TABLE 6-3 DIRECT IMPACTS TO BRIGALOW TEC

	Brigalow TEC
Study Area (ha)	225.5
Disturbance Footprint (ha)	1.0
Patches disturbed to an extent that they no longer meet the criteria for TEC (ha)	0.3
Percent of TEC within the Study Area to be impacted	0.6% of Brigalow TEC within the Study Area
Permanent impact (ha)	**1.3**

6.6.1.2 INDIRECT IMPACTS

The indirect impacts to Brigalow TEC as a result of the Proposed Action are summarised in Table 6-4, along with how these impacts will be managed and any residual impact that will affect the MNES. Avoidance, mitigation and management measures are discussed in detail in Section 7.

TABLE 6-4 INDIRECT IMPACTS TO BRIGALOW TEC

Indirect Impact	**Management of Indirect Impact**	**Residual Impact**
Habitat Fragmentation and Patch Isolation	• Areas identified as TEC will be avoided at the design and micro-siting stages. • Location of infrastructure will prioritise avoiding or minimising edge effects or dissecting tracts of native vegetation.	The Brigalow TEC observed within the Study Area is in a highly fragmented state at present. The management of potential indirect fragmentation and patch isolation will ensure

Indirect Impact	Management of Indirect Impact	Residual Impact
	• Turbine placement will maximise the use of areas that are less vegetated to avoid and minimise clearing of TEC. • Clear delineation of areas to be cleared, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance.	that remaining Brigalow TEC is still largely intact throughout the Study Area. Additionally, the Proposed Action will not remove or isolate TEC patches altogether, only clearing in the areas necessary for infrastructure and will not impact the TEC beyond the permanent impacts to 1.7 ha from clearing. Site works will be managed (from actions within the VFMP and CEMP) to ensure that existing TEC condition is retained. Therefore, this indirect impact will be minimised so as not to cause a residual impact to the TEC.
Increased Prevalence of Invasive Plants and Animals	• A Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • Staff and contractors will be given information on the location and consequences of biosecurity threats in the Study Area. • Access to a landholder's property will not occur unless authorised under a land use agreement. • Weed management and control methods will depend on the location, the identified weed species, the degree of infestation, provisions in relevant landholder agreements or conduct and compensation agreements, and local, state, and national regulatory requirements. • Imported material able to transport weed seed will be assessed to ensure they are free of contamination, disease and invasive weeds.	Management measures will limit the introduction or spread of invasive plant and animal species through relevant biosecurity measures, including weed washdowns and monitoring procedures to identify and remove weed species. This ensures that indirect impacts are minimised, preventing residual impacts on the TEC.
Increased Vehicle Impacts on Fauna and Habitat	• No driving will occur in unauthorised areas, routes and access tracks will be clearly communicated to all site visitors. All driving will be carried out at safe speeds designated for the site. • Staff and contractors will be made aware through general site induction and training of the potential to impact habitat, reporting requirements and mitigation and management measures that are to be implemented during on-site works.	Implementation of management measures will ensure residual impact to this TEC caused by operating vehicles during the construction, operation and decommissioning phases will not occur beyond the current Proposed Disturbance Footprint.
Altered Fire Regimes and Bushfire Risk	• A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES habitat. • Maintenance of an asset protection zone within the Operations Footprint is required to reduce the risk of reduction of habitat due to fire.	Management measures implemented in line with the site-specific Bushfire Management Plan will greatly reduce the potential for residual impact to this TEC caused by planned or unplanned fires. These measures will ensure that

Indirect Impact	Management of Indirect Impact	Residual Impact
	• Use of industry best practice hazard reduction measures to minimise bushfire risk and environmental impacts of on-site burning of cleared vegetation. • Ensuring a 30 m bushfire setback from vegetation around electrical infrastructure. Maintaining safe distances between vegetation and potential fire-starting hazards will increase safety and reduce fire risk. • Weed management and control methods (in line with the requirements of *Biosecurity Act 2014 (Qld)*) will reduce the potential of invasive plants changing species composition on-site and increasing fire risk. • Reduce on-site fuel load and maintain firebreaks and trails.	the indirect impact is minimised to not cause an indirect residual impact to the TEC.
Altered Hydrology	• The Proposed Action will adopt best practice erosion and sediment control measures, which will implement all relevant State Codes and Guidelines. • Watercourse crossings shall be stabilised to mitigate erosion of pavement and embankment materials during rainfall events up to and including the 10% AEP storm event. • Staff and contractors will be made aware through general site induction and training of the potential to generate runoff and mitigation and management measures that should be implemented. • Construction activities must not interfere or block natural drainage e.g. disturbing channel contours.	Impacts to on-site hydrology will be managed in accordance with the CEMP. Impacts to watercourses will be addressed by stabilising to prevent erosion, and only occur in discrete work areas, such that no increase in sedimentation is overserved affecting the TEC. These measures will ensure that the indirect impact is minimised to not cause an indirect residual impact to the TEC.
Environmental Pollution and Hazardous Materials	• All hazardous materials bought on-site will be accompanied by a Material Safety Data Sheet (MSDS), all relevant personnel will be trained in their proper use. • Only registered herbicides will be used for weed management by a suitably qualified bush regeneration contractor. • Imported materials that can transport hazardous substances will be assessed to ensure they are free of contamination, disease and invasive species. • Ensuring appropriate waste management (lidded bins), to reduce potential for spread of hazardous materials on-site. • Vehicles, plant and machinery will comply with site-specific speed limits to minimise dust generation. • Dust will be minimised through engineering controls on machinery and other available dust suppression controls, such as sprinklers. • Staff and contractors will be made aware through general site induction and training of the potential to generate dust and management measures that should be implemented. • Auditing of CEMP during construction.	The management measures proposed will result in the reduction of the indirect impacts of environmental pollution and hazardous materials. Hazardous materials brought onto the site will be tightly regulated. Dust generation will be minimised such that it is unlikely to damage species that comprise the TEC. These measures will ensure that the indirect impact is minimised to not cause an indirect residual impact to the TEC.

6.6.1.3 SIGNIFICANT IMPACT ASSESSMENT

A total of 225.5 ha of Brigalow TEC has been identified within the Study Area with 1.7 ha or 0.8% of this TEC occurring within the Disturbance Footprint.

A significant impact assessment based on the guidance provided in the SIG 1.1 is presented in Table 6-5. It has been concluded that the Proposed Action is **unlikely** to have a significant impact on Brigalow TEC. Avoidance, mitigation and management measures considered within this SIA are discussed in detail in Section 7.

TABLE 6-5 SIGNIFICANT IMPACT ASSESSMENT FOR BRIGALOW TEC

Criteria	Description	Criteria Triggered?
An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:		
Reduce the extent of an ecological community;	225.5 ha of Brigalow TEC occurs within the Study Area, 1.3 ha of which will be impacted by the Disturbance Footprint. Permanent impact to this 1.3 ha will result in a reduction of 0.6% of Brigalow TEC within the Study Area. Clearing of Brigalow is listed as a key threatening process under the Approved Conservation Advice for the TEC. However, the patches of Brigalow TEC impacted by the Proposed Action are small and in a highly fragmented state at present. The majority of the 225.5 ha of Brigalow TEC present within the Study Area will be retained. It is therefore unlikely the removal of 1.3 ha will reduce the overall extent of the ecological community.	Unlikely
Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines;	225.5 ha of Brigalow TEC occurs within the Study Area, with 1.3 ha (0.6%) of this TEC occurring impacted by Disturbance Footprint. The Brigalow TEC observed within the Study Area is in a highly fragmented state at present. Management of habitat fragmentation and patch isolation will ensure that Brigalow TEC is retained as much as possible throughout the Study Area, and impacts from the Proposed Action avoid further fragmentation of TEC patches. The Proposed Action is therefore unlikely to further fragment the Brigalow TEC within the Study Area.	Unlikely
Adversely affect habitat critical to the survival of an ecological community;	*Approved Conservation Advice for the Brigalow (Acacia harpophylla dominant and co-dominant) ecological community* (DoE, 2013b) states that habitat critical to the survival of the TEC areas 'includes all patches that meet the key diagnostic characteristics and condition thresholds for the ecological community; plus the buffer zones, particularly where these include native vegetation.' It is noted that the size threshold for a patch of Brigalow to be defined a TEC is 0.5 ha. Therefore, all patches are considered habitat critical for the survival of Brigalow TEC. However, the patches of Brigalow TEC impacted by the Proposed Action are small and in a highly fragmented state at present. Therefore, the impact to 1.3 ha, resulting	Unlikely

Criteria	Description	Criteria Triggered?
	from the Proposed Action is unlikely to adversely affect habitat critical to the survival of Brigalow TEC.	
Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns;	The Proposed Action layout has largely avoided impact of the Brigalow TEC, with 1.3 ha of total permanent impact. Brigalow TEC is often found in cracking clay soils, often not associated with alluvium landscapes that rely on floodwaters for deposition of minerals and soils (DoE, 2013b). The 1.3 ha of impact to Brigalow TEC is unlikely to significantly modify abiotic factors in the vicinity, to a greater extent than already impacted by historic land clearing and present land use (cattle grazing). The Proposed Action is therefore unlikely to significantly affect abiotic factors necessary for Brigalow TEC to survive.	Unlikely
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting;	Key canopy species for the brigalow TEC are *Acacia harpophylla* (Brigalow) potentially with *Casuarina cristata* or *Eucalyptus sp.* (DoE, 2013b). It is unlikely that a permanent impact to 1.3 ha of Brigalow TEC as a proportion of the much larger 225.5 ha available within the Study Area will substantially modify the structural or floral composition of the areas of retained TEC within the Study Area. Further, the Proponent will, as part of mitigation measures, engage in the abatement of threats in the form of management plans, and create exclusion areas as part of construction to prevent indirect impacts to Brigalow TEC outside of the Disturbance Footprint (see Section 7).	Unlikely
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: • Assisting invasive species, that are harmful to the listed ecological community, to become established; and/or • Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community; or	Threats to the Brigalow TEC include (DoE, 2013b): • Clearing; • Fire; • Weeds; • Pest animals; • Inappropriate grazing regimes; and • Climate change. Of these, several pose a threat to the quality or integrity of the TEC. Specifically, clearing, weeds, pest animals and inappropriate grazing regimes. Not all listed threats will be exacerbated by the Proposed Action due to previous historic and present agricultural use and the observed presence of feral flora and fauna species. Mitigation measures are proposed to avoid the further introduction and incursion of invasive species into the Study Area and specifically in ecologically sensitive areas such as areas of Brigalow TEC (see Section 7). The Proposed Action layout has avoided majority of the Brigalow TEC found within the Study Area. Impact to 1.3 ha (0.6%) of Brigalow TEC as a proportion of 225.5 ha available within the Study Area will not cause a substantial reduction in the quality or integrity of the ecological community. The Proponent will utilise measures to reduce the spread of weeds and seeds through appropriate biosecurity procedures (see Section 7). The Study Area is presently utilised for agricultural and grazing	Unlikely

Criteria	Description	Criteria Triggered?
	purposes, the Proposed Action will not be furthering agricultural practices such as herbicide and pesticide usage such that it would impact the TEC.	
Interfere with the recovery of an ecological community.	*Approved Conservation Advice for the Brigalow (Acacia harpophylla dominant and co-dominant) ecological community* (DoE, 2013b) lists priority actions to support conservation of the species and guide recovery as: • Research and monitoring to improve our understanding of the ecological community and the best methods to aid its management and recover; • Protect the ecological community to prevent further losses; • Restore the ecological community by active abatement of threats, appropriate management, restoration and other conservation initiatives; and • Communicate, engage with and support people to increase understanding of the value and function of the ecological community and encourage their efforts in its protection and recovery. Particularly landowners utilising land for agricultural practices. As the Proposed Action layout has largely avoided clearing of Brigalow TEC and the calculated impacts of 1.3 ha (0.6%) as a proportion of the observed occurrence of Brigalow TEC within the Study area it is unlikely that this would interfere with the recovery of the TEC. The Proponent will, as part of mitigation measures, engage in the abatement of threats in the form of management plans, and create exclusion areas as part of construction to prevent indirect impacts Brigalow TEC outside of the Proposed Action (see Section 7).	Unlikely
Significant Impact: Unlikely		

6.6.2 POPLAR BOX GRASSY WOODLANDS ON ALLUVIAL PLAINS TEC

6.6.2.1 DIRECT IMPACTS

Direct impacts to Poplar Box Grassy Woodlands on Alluvial Plains TEC (Poplar Box TEC) associated with the Proposed Action are considered to be limited to habitat loss from vegetation clearing. The current layout of the Proposed Action has endeavoured to avoid Poplar Box TEC within the Study Area as presented in Figure 5-2. It is noted that rehabilitation or revegetation to affected areas will not restore this habitat to its former state, therefore any direct impact due to clearing at the construction phase is considered permanent.

Clearing within the Disturbance Footprint will result in one patch of mapped Poplar Box TEC (see Figure 5-2, Ground-truthed TEC Locations 16, 17, 18) being reduced in size to an extent that they no longer meet the minimum patch size criteria (> 5 ha). Therefore, the total amount of Poplar Box TEC in these patches has been added to the direct impact calculation.

A summary of the direct impacts to Poplar Box TEC as a result of the Proposed Action is shown in Table 6-6. A total of 1.0 ha of Poplar Box TEC is within the Disturbance Footprint of the Proposed Action. Due to fragmentation, 5.6 ha of additional area of Poplar Box habitat will be unable to meet the key diagnostic criteria of Poplar Box TEC due to a reduction in patch size, and therefore this area has been added to the permanent impact to the TEC.

TABLE 6-6 DIRECT IMPACTS TO POPLAR BOX TEC

	Poplar Box TEC
Study Area (ha)	478.4
Disturbance Footprint (ha)	1.0
Areas disturbed to an extent that they no longer meet the criteria for TEC (ha)	5.6
Percent of habitat within the Study Area to be impacted	1.4% of Poplar Box TEC within the Study Area
Permanent impact (ha)	**6.6**

6.6.2.2 INDIRECT IMPACTS

The indirect impacts to Poplar Box TEC as a result of the Proposed Action are detailed in Table 6-7, along with how these impacts will be managed and any residual impact that will affect the MNES. Avoidance, mitigation and management measures are discussed in detail in Section 7.

TABLE 6-7 INDIRECT IMPACTS TO POPLAR BOX TEC

Indirect Impact	**Management of Indirect Impact**	**Residual Impact**
Habitat Fragmentation and Patch Isolation	• Areas identified as TEC will be avoided at the design and micro-siting stages. • Location of infrastructure will prioritise avoiding or minimising edge effects or dissecting tracts of native vegetation. • Turbine placement will maximise the use of areas that are less vegetated to avoid and minimise clearing of TEC. • Clear delineation of areas to be cleared, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance.	The management of habitat fragmentation and patch isolation will ensure that Poplar Box TEC is retained as much as possible throughout the Study Area, avoiding any whole destruction to an area of TEC and ensuring that any natural expansion of the TEC through natural ecological function is retained. Additionally, the Proposed Action will not remove or isolate TEC patches altogether, only clearing in the areas necessary for infrastructure and will not impact the TEC beyond the permanent impacts to 1.0 ha from clearing. Site works will be managed (from actions within the VFMP and CEMP) to ensure that existing TEC condition is retained. Therefore, this indirect impact will be minimised so as not to cause a residual impact toon the TEC.

Indirect Impact	Management of Indirect Impact	Residual Impact
Increased Prevalence of Invasive Plants and Animals	• A Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • Access to a landholder's property will not occur unless authorised under a land use agreement. • Weed management and control methods will depend upon the location, weed species identified, the degree of the infestation, relevant landholder agreement or conduct and compensation agreements provisions, and local, state and national regulatory requirements. • Imported material able to transport weed seed will be assessed to ensure they are free of contamination, disease and invasive weeds.	Management measures will limit the possibility of the introduction or spread of invasive plant and animal species through relevant Biosecurity measures including weed washdowns, and monitoring procedures to identify and remove weed species. This is such that the indirect impact will be minimised so as not to cause an indirect residual impact to the TEC.
Increased Vehicle Impacts on Fauna and Habitat	• No driving will occur in unauthorised areas, routes and access tracks will be clearly communicated to all site visitors. All driving will be carried out at safe speeds designated for the site. • Staff and contractors will be made aware through general site induction and training of the potential to impact habitat, reporting requirements and mitigation and management measures that are to be implemented during on-site works.	Implementation of management measures will ensure residual impact to this TEC caused by operating vehicles during the construction, operation and decommissioning phases will not occur beyond the current Proposed Disturbance Footprint.
Altered Fire Regimes and Bushfire Risk	• An Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES habitat. • Maintenance of an asset protection zone within the Operations Footprint is required to reduce the risk of reduction of habitat due to fire. • Use of industry best practice hazard reduction measures to minimise bushfire risk and environmental impacts of on-site burning of cleared vegetation. • Ensuring a 30 m bushfire setback from vegetation around electrical infrastructure. Maintaining safe distances between vegetation and potential fire-starting hazards will increase safety and reduce fire risk. • Weed management and control methods (in line with the requirements of *Biosecurity Act 2014 (Qld)*) will reduce the potential of invasive plants changing species composition on-site and increasing fire risk. • Reduce on-site fuel load and maintain firebreaks and trails.	Management measures implemented in line with the site-specific Bushfire Management Plan will greatly reduce the potential for residual impact to this TEC caused by planned or unplanned fires. These measures will ensure that the indirect impact is minimised so as to not cause an indirect residual impact to the TEC.

Indirect Impact	Management of Indirect Impact	Residual Impact
Altered Hydrology	• The Proposed Action will adopt best practice erosion and sediment control measures, which will implement all relevant State Codes and Guidelines. • Watercourse crossings shall be stabilised to mitigate erosion of pavement and embankment materials during rainfall events up to and including the 10% AEP storm event. • Staff and contractors will be made aware through general site induction and training of the potential to generate runoff and mitigation and management measures that should be implemented. • Construction activities must not interfere or block natural drainage e.g. disturbing channel contours.	Impacts to on-site hydrology will be managed in accordance with the CEMP. Impacts to watercourses will be addressed by stabilising work areas to prevent erosion, and will only occur in discrete work areas, such that no increase in sedimentation affects the TEC. These measures will ensure that the indirect impact is minimised so as to not cause an indirect residual impact to the TEC.
Environmental Pollution and Hazardous Materials	• All hazardous materials bought on-site will be accompanied by an MSDS, all relevant personnel will be trained in their proper use. • Only registered herbicides will be used for weed management by a suitably qualified bush regeneration contractor. • Imported materials that are able to transport hazardous substances will be assessed to ensure they are free of contamination, disease and invasive species. • Ensuring appropriate waste management (e.g. lidded bins), to reduce potential for spread of hazardous materials on-site. • Vehicles, plant and machinery will comply with site-specific speed limits to minimise dust generation. • Dust will be minimised through engineering controls on machinery and other available dust suppression controls, such as sprinklers. • Staff and contractors will be made aware through general site induction and training of the potential to generate dust and management measures that should be implemented. • Auditing of CEMP during construction.	The management measures proposed will result in the reduction of the indirect impacts of environmental pollution and hazardous materials. Hazardous materials brought onto the site will be regulated. Dust generation will be minimised such that it is unlikely to damage species that comprise the TEC. These measures will ensure that the indirect impact is minimised to not cause an indirect residual impact to the TEC.

6.6.2.3 SIGNIFICANT IMPACT ASSESSMENT

For the purpose of the SIA, the combined total of all Confirmed and Potential Poplar Box TEC within the Study Area (478.4 ha) is considered Poplar Box TEC. The impacts to 6.6 ha therefore equate to 1.4% of the total Poplar Box TEC mapped within the Study Area.

A significant impact assessment based on the guidance provided in the SIG 1.1 is presented in Table 6-8. It has been concluded that the Proposed Action is **likely** to have a significant impact on Poplar Box TEC. Avoidance, mitigation and management measures considered within this SIA are discussed in detail in Section 7.

TABLE 6-8 SIGNIFICANT IMPACT ASSESSMENT FOR POPLAR BOX TEC

Criteria	Description	Criteria Triggered?
An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:		
Reduce the extent of an ecological community;	A total of 478.4 ha of Poplar Box TEC is determined to occur within the Study Area, 6.6 ha of which will be impacted by the Disturbance Footprint. The permanent impact to this 6.6 ha will result in a reduction of approximately 1.4% of the TEC within the Study Area. Although this is a relatively low percent, an impact to 6.6 ha is considered likely to constitute a reduction in the extent of an ecological community.	Likely
Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines;	Poplar Box TEC is known to occur within the Study Area, with 6.6 ha of the TEC impacted by the Disturbance Footprint. The Poplar Box TEC observed within the Study Area is in a relatively well-connected state at present. The current layout of the Proposed Action has endeavored to avoid Poplar Box TEC within the Study Area as much as possible. The management of habitat fragmentation and patch isolation will ensure that Poplar Box TEC is retained as much as possible throughout the Study Area, avoiding any whole destruction to an area of TEC and ensuring that any natural expansion of the TEC through natural ecological function is retained. The Proposed Action is therefore unlikely to further fragment the Poplar Box TEC within the Study Area.	Unlikely
Adversely affect habitat critical to the survival of an ecological community;	The *Conservation Advice (including listing advice) for the Poplar Box Grassy Woodland on Alluvial Plains* (DoEE, 2019) defines areas critical to the survival of this ecological community as the 'best quality, most intact patches of the ecological community'. Areas most critical to the survival of the TEC are areas of Class A Poplar Box TEC as designated by the condition and diagnostic criteria. Class B areas connected to Class A within the Study Area should also be counted as an area critical to the survival of the TEC. As the Proposed Action will result in the clearing of some Condition Class B TEC, this impact has the potential to adversely affect areas critical to the survival of the TEC within the Study Area.	Potential

Criteria	Description	Criteria Triggered?
Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns;	478.4 ha of this TEC occurs within the Study Area, 6.6 ha (1.4%) of which is expected to be impacted by the Proposed Action. Poplar Box TEC is a grassy woodland that occurs on alluvial soils found within the Study Area. Abiotic factors will vary due to a wide range of factors and ecological conditions including microclimates, fire regimes and drought. The 1.0 ha of clearing impact to Poplar Box TEC is unlikely to significantly modify abiotic factors in the vicinity, to a greater extent than already impacted by historic land clearing and present land use (cattle grazing). The Proposed Action is therefore unlikely to significantly affect abiotic factors necessary for Poplar Box TEC to survive.	Unlikely
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting;	The *Conservation Advice (including listing advice) for the Poplar Box Grassy Woodland on Alluvial Plains* (DoEE, 2019) lists poplar box (*Eucalyptus populnea*) as the defining species for this ecological community. Additionally, there is a distinctly sparse or absent shrub layer in this TEC. For the Proposed Action, 6.6 ha of Poplar Box TEC lies within the Disturbance Footprint. It is not anticipated that clearing of 6.6 ha as a proportion of 478.4 ha (1.4%) of the TEC within the Study area would lead to a substantial change in the species composition in patches of the ecological community such that it would be significant and deleterious to the TEC broadly. Further, The Proponent will, as part of mitigation measures, engage in the abatement of threats in the form of management plans, and create exclusion areas as part of construction to prevent indirect impacts to Poplar Box TEC outside of the Disturbance Footprint (see Section 7).	Unlikely
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: • Assisting invasive species, that are harmful to the listed ecological community, to become established; and/or • Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community; or	A total of 478.4 ha of this TEC occurs within the Study Area, 1.0 ha of which is within the Disturbance Footprint. As listed in the *Conservation Advice (including listing advice) for the Poplar Box Grassy Woodland on Alluvial Plains* (DoEE, 2019), threats to the TEC under the EPBC Act include: • Over-abundance of noisy miners excluding other birds; • Loss of climatic habitat; • Land-clearing; • Competition and land degradation by rabbits and goats; • Invasive species and their impact on biodiversity (including cane toads, feral cats and foxes, plants etc.); and • Beak and feather disease affecting endangered psittacines. Of these, land clearing and invasive species are applicable to the Proposed Action. To minimise the impact of clearing, Poplar Box TEC has been avoided as much as possible at the design phase. Micro-siting is likely to further reduce impacts to Poplar Box TEC where present within the Disturbance Footprint.	Unlikely

Criteria	Description	Criteria Triggered?
	Weeds of National Significance and restricted biosecurity matters are known to occur within the Study Area. The Proponent will utilise measures to reduce the spread of weeds and seeds through appropriate biosecurity procedures (see Section 7). The Study Area is presently utilised for agricultural and grazing purposes, the Proposed Action will not be furthering agricultural practices such as herbicide and pesticide usage such that it would impact the TEC. Ultimately, the Proposed Action is unlikely to cause a substantial reduction in the quality or integrity of Poplar Box TEC in the Study Area outside of the Disturbance Footprint.	
Interfere with the recovery of an ecological community.	The *Conservation Advice (including listing advice) for the Poplar Box Grassy Woodland on Alluvial Plains* (DoEE, 2019), lists key recovery actions to conserving PBGW as: • Protect the ecological community to prevent further loss of extent and condition; • Restore the ecological community within its current and potential range by active abatement of threats, revegetation and other conservation initiatives; • Communicate - engage with and support people to increase understanding of the value and function of the ecological community and encourage their efforts in its protection and recovery; and • Research and monitoring to improve our understanding of the ecological community and methods for restoration and protection over the long-term. The removal of 6.6 ha of Poplar Box TEC (or 1.4% of the available TEC within the Study Area), is unlikely to interfere with the recovery of this TEC.	Unlikely
Significant Impact: Likely		

6.6.3 GREATER GLIDER (SOUTHERN AND CENTRAL)

6.6.3.1 DIRECT IMPACTS

Direct impacts to greater glider associated with the Proposed Action are considered to be limited to habitat loss from vegetation clearing. These impacts are quantified below and include impacts to:

- 19.8 ha of Likely/Current Denning Habitat;
- 1.1 ha of Potential Denning Habitat; and
- 607.3 ha of Foraging and Dispersal Habitat.

It is expected that some impacted areas of greater glider habitat will be revegetated after the construction phase. However, this revegetation will not restore this habitat to a required functional state for greater glider (in particular those areas identified as denning or future denning habitat). Therefore, the direct impact to greater glider associated with construction-phase clearing is considered permanent.

A summary of the direct impacts to greater glider habitat as a result of the Proposed Action is shown in TABLE 6-9. A total of 628.3 ha of greater glider habitat will be permanently impacted by the Proposed Action, which equates to 2.8% of the total available habitat identified within the Study Area.

TABLE 6-9 DIRECT IMPACTS TO GREATER GLIDER

	Likely/Current Denning Habitat	Potential Denning Habitat	Foraging and Dispersal Habitat
Study Area (ha)	1,662.1	381.4	20,070.2
Disturbance Footprint (ha)	19.8	1.1	607.3
Percent of habitat within the Study Area to be impacted	1.2% of Likely/Current Denning Habitat within the Study Area	0.3% of Potential Denning Habitat within the Study Area	3.0% of Foraging and Dispersal Habitat within the Study Area
Permanent impact (Operations Footprint) (ha)	**19.8**	**1.1**	**607.3**

6.6.3.2 INDIRECT IMPACTS

The indirect impacts to greater glider as a result of the Proposed Action are detailed in Table 6-10, along with how these impacts will be managed and any residual impact that will affect the MNES. Avoidance, mitigation and management measures are discussed in detail in Section 7.

TABLE 6-10 INDIRECT IMPACTS TO GREATER GLIDER

Indirect Impact	Management of Indirect Impact	Residual Impact
Habitat Loss and Individual Mortality from Vegetation Clearing	The impact of habitat loss is considered a direct impact and has been addressed in the above Section. The following points refer to the potential indirect impact of individual mortality during vegetation clearing associated with the Proposed Action. • Areas identified as MNES habitat will be avoided as much as possible at the design and micro-siting stages. • Clear delineation of areas to be cleared, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. • Pre-clearance surveys and fauna spotter catchers will be utilised. Microhabitat features (e.g. hollow bearing trees) will be avoided where sufficient flexibility is enabled by State and Federal approvals. • Staff and contractors will be made aware through general site induction and training of the potential to impact native fauna, reporting requirements and mitigation and management	The management measures to mitigate direct fatality or injury during construction and operation will result in the successful avoidance of impact to the species. This is such that any greater gliders found within the Disturbance Footprint in pre-clearance surveys will be avoided through micro-siting or translocated to safer habitat such that no indirect impact will result.

Indirect Impact	Management of Indirect Impact	Residual Impact
	measures that are to be implemented during on-site works. • Vehicles, plant and machinery will comply with site-specific speed limits to minimise the likelihood of collision with fauna. • Where trenching and excavations are created which may entrap fauna, suitable escape measures will be put in place, and excavations checked for fauna before backfilling. • Weekly site inspections to review flora and fauna control measures during construction. Sightings and incidents reported in daily pre-starts during construction. All near misses and incidents will be investigated to establish root cause. Where necessary corrective actions will be developed to improve existing processes.	
Habitat Fragmentation and Patch Isolation	• Areas identified as MNES habitat will be avoided as much as possible at the design and micro-siting stages. • Micro-siting of infrastructure will utilise existing clearance areas and avoid habitat fragmentation and patch isolation, with consideration of whether avoidance areas would still be connected to habitat in the broader landscape. • Prior to construction and detailed design, the incorporation of road pinch points to maximise connectivity will be considered to maintain habitat connectivity. While pinch points have a benefit for habitat, they present a technical and logistical barrier to safe and effective construction. Pre-clearance surveys will determine appropriate locations for road pinch points. • Location of infrastructure will prioritise avoiding or minimising edge effects or dissecting tracts of native vegetation. • Where possible, the Proposed Action will implement the use of innovative turbine blade transportation, including methods to minimise necessary clearance widths (e.g. 'Blade Manipulator' trucks). • Turbine placement will maximise the use of areas that are less vegetated to avoid and minimise clearing of key habitat. • No linear clearing will exceed the dispersal ability of the species, such that all habitat within the Study Area remaining after the construction phase will still be accessible and usable for the species. All clearing for access corridors will be limited to 40 m in width during the construction phase. • Clear delineation of areas to be cleared, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. Toolbox talks will relay site-specific clearing information to all field staff and contractors. • Rehabilitation of access corridors will occur once construction has been completed. Such	Habitat fragmentation and patch isolation will be managed to ensure that greater gliders are able to move and disperse throughout the entirety of identified habitat, maintaining connectivity with the landscape within and surrounding the Study Area. All clearing for access corridors will be limited to 40 m, and glide poles will be implemented to ensure greater glider dispersal across the identified habitat within the Study Area. Additionally, the Proposed Action will not remove or isolate habitat patches altogether, only clearing in the areas necessary for infrastructure. Therefore, this indirect impact will be minimised so as not to cause an indirect residual impact.

Indirect Impact	Management of Indirect Impact	Residual Impact
	rehabilitation will involve planting/natural regeneration of native species that are habitat for MNES.	
Increased Prevalence of Invasive Plants and Animals	• A Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • Staff and contractors will be given information on the location and consequences of biosecurity threats in the Study Area. • Access to a landholder's property will not occur unless authorised under a land use agreement. • WONS and Restrictive Invasive Species will be identified and monitored in the Study Area. Appropriate weed monitoring will occur to ensure new weed species are identified, recorded and controlled. • Weed management and control methods will depend upon the location, weed species identified, the degree of the infestation, relevant landholder agreement or conduct and compensation agreements provisions, and local, state and national regulatory requirements. • Weed loads will be minimised in high-traffic areas such as roads, easements and yards through regular monitoring and site personnel reporting protocols, with an investigation to be managed to prevent spread of weeds in accordance with the *Biosecurity Act 2014* (Qld). • Imported material able to transport weed seed will be assessed to ensure they are free of contamination, disease and invasive weeds.	Management measures will limit the possibility of the introduction or spread of invasive plant and animal species through relevant biosecurity measures incorporated into the Biosecurity Management Plan. This is such that the indirect impact will be minimised so as not to cause an indirect residual impact to the species.
Increased Vehicle Impacts on Fauna and Habitat	• No driving will occur in unauthorised areas, routes and access tracks will be clearly communicated to all site visitors. All driving will be carried out at safe speeds designated for the site. Night-time safe driving controls will also be applied, including additional speed restrictions, providing additional protection to nocturnal animals. • Site entry and exit points will be clearly marked to ensure vehicle movements are contained within the approved areas. • Staff and contractors will be made aware through general site induction and training of the potential to impact native fauna, reporting requirements and mitigation and management measures that are to be implemented during on-site works. • Injured, sick or dead fauna will be recorded and reported, during and after the construction and operation phases. This can be carried out by a fauna spotter-catcher	Implementation of management measures will ensure operating vehicles on-site during the construction, operation and decommissioning phases will not result in residual impacts to greater glider.

Indirect Impact	Management of Indirect Impact	Residual Impact
	during periods where disturbance is expected to occur (primarily construction activities). Where injured or sick fauna is detected, individuals will be taken to the nearest wildlife carer or veterinarian if practical.	
Altered Fire Regimes and Bushfire Risk	• An Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES habitat. • Maintenance of an asset protection zone within the Operations Footprint is required to reduce the risk of reduction of habitat due to fire. • Use of industry best practice hazard reduction measures to minimise bushfire risk and environmental impacts, such as on-site controlled burning of cleared vegetation. • Ensuring a 30 m bushfire setback from vegetation around electrical infrastructure. Maintaining safe distances between vegetation and potential fire-starting hazards will increase safety and reduce fire risk. • Weed management and control methods (in line with the requirements of the *Biosecurity Act 2014* (Qld)) will reduce the potential of invasive plants changing species composition on-site and increasing fire risk. • Reduce on-site fuel loads and maintain firebreaks and trails.	Management measures implemented in line with the site-specific Bushfire Management Plans will greatly reduce the potential risk for this species caused by planned or unplanned fires. Therefore, there is no anticipated indirect residual impact.
Altered Hydrology	• The Proposed Action will adopt best practice erosion and sediment control measures, which will implement all relevant State Codes and Guidelines. • Watercourse crossings shall be stabilised to mitigate erosion of pavement and embankment materials during rainfall events up to and including the 10% AEP storm event. • Staff and contractors will be made aware through general site induction and training of the potential to generate runoff and mitigation and management measures that should be implemented. • Construction activities must not interfere or block natural drainage e.g. disturbing channel contours. • Water barrier works will be designed to minimise impact on fish habitats, stock or movements through compliance with relevant design codes. During the detailed design phase, fish passage elements will be considered in all mapped waterways for fish passage, including compliance with the accepted development requirements for waterway barrier works or an operational works permit under the Planning Act.	Impacts to on-site hydrology will be managed in accordance with the CEMP. Impacts to watercourses will be addressed by stabilising to prevent erosion, and only occur in discrete work areas, such that no increase in sedimentation is overserved affecting habitat. Therefore, there is no anticipated indirect residual impact.

Indirect Impact	Management of Indirect Impact	Residual Impact
Environmental Pollution and Hazardous Materials	• All hazardous materials bought on-site will be accompanied by an MSDS, all relevant personnel will be trained in their proper use. • Only registered herbicides will be used for weed management by a suitably qualified bush regeneration contractor. • Imported materials that are able to transport hazardous substances will be assessed to ensure they are free of contamination, disease and invasive species. • Ensuring appropriate waste management (lidded bins), to reduce potential for spread of hazardous materials on-site. • Vehicles, plant and machinery will comply with site-specific speed limits to minimise noise and dust generation. • Staff and contractors will be made aware through general site induction and training of the potential to generate dust, light and noise pollution and management measures that should be implemented. • Auditing of the CEMP will occur during construction. • Dust will be minimised through engineering controls on machinery and other available dust suppression controls, such as sprinklers. • Light pollution will be minimised through engineering controls on infrastructure and machinery, such as colour selection and timing controls. • Noise will be minimised through engineering controls on infrastructure and machinery, such as noise barriers and timing controls. • Disturbance form blasting will be minimised through engineering controls and other available blasting suppression, such as barrier walls. • Electricity infrastructure designed to allow for safe operations, using buffers between conductors and the ground, and conductors and adjacent vegetation. The transmission line has adopted a design which allows for reduced interference to canopy dwelling species due to minimising impacts to canopy vegetation.	The management measures proposed will result in the reduction of the indirect impacts of environmental pollution and hazardous materials. Hazardous materials brought onto the site will be tightly regulated. Dust, light and noise generation will be minimised such that is it unlikely to adversely affect species or damage species habitat. These measures will ensure that the indirect impact is minimised so as to not cause an indirect residual impact to greater glider.
Site Alienation	• Locating turbines and access corridors away from key habitats where feasible (including remnant vegetation, waterways and drainage lines) reducing disturbance during all phases of the Proposed Action. • Mitigating habitat fragmentation and maintaining connectivity through the measures outlined above. • Using turbines with an RSA >40 m above ground level to provide a collision-free foraging zone within the canopy and 20 m above the canopy, reducing operational disturbance to terrestrial species. • Development and implementation of management plans (VFMP, CEMP) outlined above to reduce the potential impact of	The potential risk of site alienation will be managed to ensure that species are able to move, disperse and utilise habitat throughout the Study Area for the life of the Proposed Action. Avoidance, mitigation and management measures outlined in this PER will ensure that the potential for site alienation is minimised so as to not cause an indirect residual impact to greater glider.

Indirect Impact	Management of Indirect Impact	Residual Impact
	construction and operation phase activities including introducing invasive species, fire and altered hydrology. • Implementing engineering controls on infrastructure and machinery outlined above, such that dust, light and noise pollution and blasting does not adversely affect species or species habitat.	

Indirect impacts from the Proposed Action will be mitigated and managed appropriately, such that there is no residual impact on greater glider. Some indirect impacts have been considered as part of the significant impact assessment for this species but are concluded unlikely to contribute to a significant impact.

6.6.3.3 SIGNIFICANT IMPACT ASSESSMENT

Ground-truthed surveys have identified 1,662.1 ha of Likely/Current Denning Habitat, 381.4 ha of Potential Denning Habitat, and 20,070.2 ha of Foraging and Dispersal Habitat within the Study Area. A total of 628.3 ha of greater glider habitat is expected to be permanently impacted as a result of the Proposed Action, which includes:

- 19.8 ha of Likely/Current Denning Habitat (1.2% of this habitat type within the Study Area);
- 1.1 ha of Potential Denning Habitat (0.3% of this habitat type within the Study Area); and
- 607.3 ha of Foraging and Dispersal Habitat (3.0% of this habitat type within the Study Area).

A significant impact assessment based on the guidance provided in the SIG 1.1 is presented in Table 6-11. It has been concluded that the Proposed Action is **likely** to have a significant impact on the greater glider. Avoidance, mitigation and management measures considered within the assessment are discussed in detail in Section 7.

TABLE 6-11 SIGNIFICANT IMPACT ASSESSMENT FOR THE GREATER GLIDER

Criteria	Description	Criteria Triggered?
An action is likely to have a significant impact on an endangered species if there is a real chance or possibility that it will:		
Lead to a long-term decrease in the size of a population;	A known population of greater gliders utilise the Study Area with 24 individuals identified within the Study Area during field surveys. A total of 19.8 ha (1.2%) of greater glider Likely/Current Denning Habitat, 1.1 ha (0.3%) of Potential Denning Habitat and 607.3 ha (3.0%) of Foraging and Dispersal Habitat are projected to be cleared during the construction phase of the Proposed Action. Mitigation measures such as pre-clearance surveys and micro-siting at areas of planned infrastructure will ensure that impacts to essential microhabitat features (hollow-bearing trees) are further avoided	Unlikely

Criteria	Description	Criteria Triggered?
	where possible. Disturbance associated with linear infrastructure will also ensure that movement and gliding ability for the species is not affected. Considering the avoidance of hollow bearing trees through micro-sighting, the extent of species habitat throughout the Study Area (22,113.6 ha or 47% of the Study Area), and the relatively low impact to high-value denning habitat, it has been concluded that the Proposed Action is unlikely to result in the long-term decrease in the size of a population of greater glider.	
Reduce the area of occupancy of the species;	Greater glider conservation advice identifies an area of occupancy for the species at approximately 15,316 km^2 (DCCEEW, 2022). 22,113.6 ha of habitat suitable for greater glider has been mapped to occur throughout the Study Area (roughly 47% of the Study Area), with projected impacts to 19.8 ha of greater glider Likely/Current Denning Habitat (1.2% of this habitat within the Study Area), 1.1 ha of Potential Denning Habitat (0.3%) and 607.3 ha of Foraging and Dispersal Habitat (3.0%). The Proposed Action allows for a large degree of avoidance for high-value denning habitat, and the linear nature of predicted disturbances allows for retention of important habitat patches with connectivity to these patches retained. Impacts to 607.3 ha of Foraging and Dispersal Habitat (the habitat type mostly affected by the Proposed Action) is unlikely to reduce the area of occupancy for the species in the Study Area.	Unlikely
Fragment an existing population into two or more populations;	The home range for the greater glider varies across their natural extent, however it is accepted the species generally has a small home range due to low reproductive rate, sensitivity to disturbance and inability to traverse non-native forest (DCCEEW, 2022a). In Queensland sub-populations where the species' range is generally broader on account of less-productive forests (fewer hollows and poorer leaf nutrition), greater glider has outlier dispersal range of up to 19 ha (DES, 2022). However, with this broader home range, it is expected viability of greater glider habitat is more sensitive to disturbance of important den trees (Eyre, 2006). Habitat fragmentation will be managed to ensure that greater gliders are able to move and disperse throughout the entirety of identified habitat, maintaining connectivity with the landscape within and surrounding the Study Area. All clearing for access corridors will be limited to 40 m (greater glider can cover distances up to 100 m). Additionally, the Proposed Action will not remove or isolate habitat patches altogether, only clearing in the areas necessary for infrastructure. Avoidance of denning trees will be prioritised during construction phase, via pre-clearance surveys and micro-siting of	Unlikely

Criteria	Description	Criteria Triggered?
	infrastructure where sufficient flexibility is enabled by State and Federal approvals. This, in addition to a relatively small disturbance to 19.8 ha of greater glider Likely/Current Denning Habitat (1.2% of this habitat within the Study Area), 1.1 ha of Potential Denning Habitat (0.3%) and larger disturbance of 607.3 ha to the less ecologically significant Foraging and Dispersal Habitat (3.0%) makes it unlikely the Proposed Action will fragment the existing population or populations of greater glider that occur within the Study Area.	
Adversely affect habitat critical to the survival of a species;	Greater glider was observed utilising the Study Area at length, with 26 individuals observed in the south-east and central north of the Study Area over two survey periods. It is likely all greater glider habitat mapped within the Study Area constitutes habitat critical to the survival of the species. This habitat is accepted as habitat which contains any of the following (DCCEEW, 2022a): • Large contiguous eucalypt forest with mature hollow-bearing trees and diverse food tree species; • Habitat patches that can facilitate dispersal of the species; • Cool microclimate areas; and/or • Refuges from climate change or fire. Given the projected impact of 19.8 ha of greater glider Likely/Current Denning Habitat (1.2% of this habitat within the Study Area), 1.1 ha of Potential Denning Habitat (0.3%) and 607.3 ha of Foraging and Dispersal Habitat (3.0%), all of which constitutes habitat critical to the survival of the species, it is likely the Proposed Action will adversely affect habitat critical to the survival of the species, even with mitigation measures such as micro-siting at areas of proposed infrastructure.	Likely
Disrupt the breeding cycle of a population;	Greater gliders utilise the shelter provided by denning habitat for breeding (DES, 2022). Disturbances associated with the Proposed Action will impact 19.8 ha of Likely/Current Denning Habitat (1.2% of this habitat within the Study Area) and 1.1 ha of Potential Denning Habitat (0.3% of this habitat within the Study Area). In addition to relatively low impacts to greater glider denning habitat, pre-clearance surveys and micro-siting at areas of proposed infrastructure will be implemented to avoid impacting identified denning and breeding trees. Given this, it is unlikely the Proposed Action will impact or disrupt the breeding cycle of greater glider.	Unlikely

Criteria	Description	Criteria Triggered?
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;	The Proposed Action will result in the disturbance of 19.8 ha of greater glider Likely/Current Denning Habitat (1.2% of this habitat within the Study Area), 1.1 ha of Potential Denning Habitat (0.3%) and 607.3 ha of Foraging and Dispersal Habitat (3.0%). While there is potential the Proposed Action will lead a negative impact on greater glider, given the confirmed population(s) utilising the Study Area, it is unlikely that associated disturbance will decrease the quality or availability of habitat such that it would result in the species' decline.	Unlikely
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat;	Invasive species such as feral cats (*Felis catus*), European red fox (*Vulpes vulpes*) and wild dogs (*Canis lupus*) are ubiquitous in Queensland. All of these invasive species are known to occur in the Study Area. The Proposed Action will adopt and follow a Biosecurity Plan, as outline in Section 7. The activities related to the Proposed Action, both during construction and operation, will implement and follow biosecurity measures to reduce the risk of introducing new invasive species and to prevent the further spread of existing invasive species.	Unlikely
Introduce disease that may cause the species to decline; or	There is currently limited evidence of diseases causing detrimental effects on greater glider populations in Queensland. The Proposed Action is unlikely introduce a disease that would cause decline in this species.	Unlikely
Interfere with the recovery of the species.	There is no formally adopted Recovery Plan for this species. However, given the projected impact to habitat critical to the survival of the species, the Proposed Action has potential to interfere with the recovery of the species. Mitigation measures such as pre-clearance surveys and micro-siting of infrastructure where important habitat is identified will likely reduce interference with the recovery of this species. However, this cannot be quantified at present.	Potential
Significant impact: Likely		

6.6.4 YELLOW-BELLIED GLIDER (SOUTH-EASTERN)

6.6.4.1 DIRECT IMPACTS

Direct impacts to yellow-bellied glider associated with the Proposed Action are considered to be limited to habitat loss from vegetation clearing. These impacts are quantified below and include impacts to:

- 0.3 ha of Potential Denning Habitat; and
- 5.4 ha of Potential Foraging Habitat.

It is expected that some impacted areas of yellow-bellied glider habitat will be revegetated after the construction phase. However, no rehabilitation or revegetation in these areas is expected to restore any functionality for this species post-construction. Therefore, the direct impact to yellow-bellied glider associated with construction-phase clearing is considered permanent.

A summary of the direct impacts to yellow-bellied glider habitat as a result of the Proposed Action is shown in Table 6-12. A total of 5.6 ha of yellow-bellied glider habitat will be permanently impacted by the Proposed Action, which equates to 4.5% of the total available habitat identified within the Study Area.

TABLE 6-12 DIRECT IMPACTS TO YELLOW-BELLIED GLIDER

	Potential Denning Habitat	Potential Foraging Habitat
Study Area (ha)	16.0	110.2
Disturbance Footprint (ha)	0.3	5.4
Percent of habitat within the Study Area to be impacted	1.6% of Potential Denning Habitat within the Study Area	4.9% of Potential Foraging Habitat within the Study Area
Permanent impact (Operations Footprint) (ha)	**0.3**	**5.4**

6.6.4.2 INDIRECT IMPACTS

The indirect impacts to yellow-bellied glider as a result of the Proposed Action are detailed in Table 6-13, along with how these impacts will be managed and any residual impact that will affect the MNES. Avoidance, mitigation and management measures are discussed in detail in Section 7.

TABLE 6-13 INDIRECT IMPACTS TO YELLOW-BELLIED GLIDER

Indirect Impact	Management of Indirect Impact	Residual Impact
Habitat Loss and Individual Mortality from Vegetation Clearing	The impact of habitat loss is considered a direct impact and has been addressed in the above Section. The following points refer to the potential indirect impact of individual mortality during vegetation clearing associated with the Proposed Action. • Areas identified as MNES habitat will be avoided as much as possible at the design and micro-siting stages. • Clear delineation of areas to be cleared, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. • Pre-clearance surveys and fauna spotter catchers will be utilised. Microhabitat features (e.g. hollow bearing trees) will be avoided where sufficient flexibility is enabled by State and Federal approvals. • Staff and contractors will be made aware through general site induction and training of	The management measures to mitigate direct fatality or injury during construction and operation will result in the successful avoidance of impact to the species. This is such that any yellow-bellied glider habitat features found within the Disturbance Footprint in pre-clearance surveys will be avoided through micro-siting .

Indirect Impact	Management of Indirect Impact	Residual Impact
	the potential to impact native fauna, reporting requirements and mitigation and management measures that are to be implemented during on-site works. • Vehicles, plant and machinery will comply with site-specific speed limits to minimise the likelihood of collision with fauna. • Where trenching and excavations are created which may entrap fauna, suitable escape measures will be put in place, and excavations checked for fauna before backfilling. • Weekly site inspections to review flora and fauna control measures during construction. Sightings and incidents reported in daily pre-starts during construction. All near misses and incidents will be investigated to establish root cause. Where necessary corrective actions will be developed to improve existing processes.	
Habitat Fragmentation and Patch Isolation	• Areas identified as MNES habitat will be avoided as much as possible at the design and micro-siting stages. • Micro-siting of infrastructure will utilise existing clearance areas and avoid habitat fragmentation and patch isolation, with consideration of whether avoidance areas would still be connected to habitat in the broader landscape. • Prior to construction and detailed design, the incorporation of road pinch points to maximise connectivity will be considered to maintain habitat connectivity. While pinch points have a benefit for habitat they present a technical and logistical barrier to safe and effective construction. Pre-clearance surveys will determine appropriate locations for road pinch points. • Location of infrastructure will prioritise avoiding or minimising edge effects or dissecting tracts of native vegetation. • Where possible, the Proposed Action will implement the use of innovative turbine blade transportation, including methods to minimise necessary clearance widths (e.g. 'Blade Manipulator' trucks). • Turbine placement will maximise the use of areas that are less vegetated to avoid and minimise clearing of key habitat. • No linear clearing will exceed the dispersal ability of the species, such that all habitat within the Study Area remaining after the construction phase will still be accessible and usable for the species. All clearing for access corridors will be limited to 40 m in width during the construction phase. • Clear delineation of areas to be cleared, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. Toolbox talks will relay site-specific clearing information to all field staff and contractors.	Yellow-bellied gliders have not been observed within the Study Area. Habitat fragmentation and patch isolation will be managed to ensure that any potentially present yellow-bellied gliders are able to move and disperse throughout the entirety of identified habitat, maintaining connectivity with the landscape within and surrounding the Study Area. All clearing for access corridors will be limited to 40 m (the maximum glide distance of yellow-bellied glider is thought to be as high as 120 m–140 m). Additionally, the Proposed Action will not remove or isolate habitat patches altogether, only clearing in the areas necessary for infrastructure. Therefore, this indirect impact will be minimised so as not to cause an indirect residual impact.

Indirect Impact	Management of Indirect Impact	Residual Impact
	• Rehabilitation of access corridors will occur once construction has been completed. Such rehabilitation will involve planting/natural regeneration of native species that are habitat for MNES.	
Increased Prevalence of Invasive Plants and Animals	• A Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • Staff and contractors will be given information on the location and consequences of biosecurity threats in the Study Area. • Access to a landholder's property will not occur unless authorised under a land use agreement. • WONS and Restrictive Invasive Species will be identified and monitored in the Study Area. Appropriate weed monitoring will occur to ensure new weed species are identified, recorded and controlled. • Weed management and control methods will depend upon the location, weed species identified, the degree of the infestation, relevant landholder agreement or conduct and compensation agreements provisions, and local, state and national regulatory requirements. • Weed loads will be minimised in high-traffic areas such as roads, easements and yards through regular monitoring and site personnel reporting protocols, with an investigation to be managed to prevent spread of weeds in accordance with the *Biosecurity Act 2014* (QLD). • Imported material able to transport weed seed will be assessed to ensure they are free of contamination, disease and invasive weeds.	Management measures will limit the possibility of the introduction or spread of invasive plant and animal species through relevant biosecurity measures incorporated into the Biosecurity Management Plan. This is such that the indirect impact will be minimised so as not to cause an indirect residual impact to the species.
Increased Vehicle Impacts on Fauna and Habitat	• No driving will occur in unauthorised areas, routes and access tracks will be clearly communicated to all site visitors. All driving will be carried out at safe speeds designated for the site. Night-time safe driving controls will also be applied, including additional speed restrictions, providing additional protection to nocturnal animals. • Site entry and exit points will be clearly marked to ensure vehicle movements are contained within the approved areas. • Staff and contractors will be made aware through general site induction and training of the potential to impact native fauna, reporting requirements and mitigation and management measures that are to be implemented during on-site works. • Injured, sick or dead fauna will be recorded and reported, during and after the	Implementation of management measures will ensure operating vehicles on-site during the construction, operation and decommissioning phases will not result in residual impacts to yellow-bellied glider.

Indirect Impact	Management of Indirect Impact	Residual Impact
	construction and operation phases. This can be carried out by a fauna spotter-catcher during periods where disturbance is expected to occur (primarily construction activities). Where injured or sick fauna is detected, individuals will be taken to the nearest wildlife carer or veterinarian if practical.	
Altered Fire Regimes and Bushfire Risk	• A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES habitat. • Maintenance of an asset protection zone within the Operations Footprint is required to reduce the risk of reduction of habitat due to fire. • Use of industry best practice hazard reduction measures to minimise bushfire risk and environmental impacts, such as on-site controlled burning of cleared vegetation. • Ensuring a 30 m bushfire setback from vegetation around electrical infrastructure. Maintaining safe distances between vegetation and potential fire-starting hazards will increase safety and reduce fire risk. • Weed management and control methods (in line with the requirements of the *Biosecurity Act 2014 (Qld))* will reduce the potential of invasive plants changing species composition on-site and increasing fire risk. • Reduce on-site fuel loads and maintain firebreaks and trails.	Management measures implemented in line with the site-specific Bushfire Management Plan will greatly reduce the potential risk for this species caused by planned or unplanned fires. Therefore, there is no anticipated indirect residual impact.
Altered Hydrology	• The Proposed Action will adopt best practice erosion and sediment control measures, which will implement all relevant State Codes and Guidelines. • Watercourse crossings will be stabilised to mitigate erosion of pavement and embankment materials during rainfall events up to and including the 10% AEP storm event. • Staff and contractors will be made aware through general site induction and training of the potential to generate runoff and mitigation and management measures that should be implemented. • Construction activities must not interfere or block natural drainage e.g. disturbing channel contours. • Water barrier works will be designed to minimise impact on fish habitats, stock or movements through compliance with relevant design codes. During the detailed design phase, fish passage elements will be considered in all mapped waterways for fish passage, including compliance with the accepted development requirements for waterway barrier works or an operational works permit under the Planning Act.	Impacts to on-site hydrology will be managed in accordance with the CEMP. Impacts to watercourses will be addressed by stabilising to prevent erosion, and only occur in discrete work areas, such that no increase in sedimentation is overserved affecting habitat. Therefore, there is no anticipated indirect residual impact.

Indirect Impact	Management of Indirect Impact	Residual Impact
Environmental Pollution and Hazardous Materials	• All hazardous materials bought on-site will be accompanied by an MSDS, all relevant personnel will be trained in their proper use. • Only registered herbicides will be used for weed management by a suitably qualified bush regeneration contractor. • Imported materials that are able to transport hazardous substances will be assessed to ensure they are free of contamination, disease and invasive species. • Ensuring appropriate waste management (lidded bins), to reduce potential for spread of hazardous materials on-site. • Vehicles, plant and machinery will comply with site-specific speed limits to minimise noise and dust generation. • Staff and contractors will be made aware through general site induction and training of the potential to generate dust, light and noise pollution and management measures that should be implemented. • Auditing of the CEMP will occur during construction. • Dust will be minimised through engineering controls on machinery and other available dust suppression controls, such as sprinklers. • Light pollution will be minimised through engineering controls on infrastructure and machinery, such as colour selection and timing controls. • Noise will be minimised through engineering controls on infrastructure and machinery, such as noise barriers and timing controls. • Disturbance form blasting will be minimised through engineering controls and other available blasting suppression, such as barrier walls. • Electricity infrastructure designed to allow for safe operations, using buffers between conductors and the ground, and conductors and adjacent vegetation. The transmission line has adopted a design which allows for reduced interference to canopy dwelling species due to minimising impacts to canopy vegetation.	The management measures proposed will result in the reduction of the indirect impacts of environmental pollution and hazardous materials. Hazardous materials brought onto the site will be tightly regulated. Dust, light and noise generation will be minimised such that is it unlikely to adversely affect species or damage species habitat. These measures will ensure that the indirect impact is minimised so as to not cause an indirect residual impact to yellow-bellied glider.
Site Alienation	• Locating turbines and access corridors away from key habitats where feasible (including remnant vegetation, waterways and drainage lines) reducing disturbance during all phases of the Proposed Action. • Mitigating habitat fragmentation and maintaining connectivity through the measures outlined above. • Using turbines with an RSA >40 m above ground level to provide a collision-free foraging zone within the canopy and 20 m above the canopy, reducing operational disturbance to terrestrial species. • Development and implementation of management plans (VFMP, CEMP) outlined above to reduce the potential impact of	The potential risk of site alienation will be managed to ensure that species are able to move, disperse and utilise habitat throughout the Study Area for the life of the Proposed Action. Avoidance, mitigation and management measures outlined in this PER will ensure that the potential for site alienation is minimised so as to not cause an indirect residual impact to yellow-bellied glider.

Indirect Impact	Management of Indirect Impact	Residual Impact
	construction and operation phase activities including introducing invasive species, fire and altered hydrology. • Implementing engineering controls on infrastructure and machinery outlined above, such that dust, light and noise pollution and blasting does not adversely affect species or species habitat.	

Indirect impacts from the Proposed Action will be mitigated and managed appropriately, such that there is no residual impact on yellow-bellied glider. Some indirect impacts have been considered as part of the significant impact assessment for this species but are concluded unlikely to contribute to a significant impact.

6.6.4.3 SIGNIFICANT IMPACT ASSESSMENT

Ground-truthed surveys have identified 16.0 ha of yellow-bellied glider Potential Denning Habitat and 110.2 ha of Potential Foraging Habitat within the Study Area. A total 5.6 ha of yellow-bellied glider habitat is expected to be permanently impacted as a result of the Proposed Action, which includes:

- 0.3 ha of Potential Denning Habitat (1.6% of this habitat type within the Study Area); and
- 5.4 ha of Potential Foraging Habitat (4.9% of this habitat type within the Study Area).

A significant impact assessment based on the guidance provided in the SIG 1.1 is presented in Table 6-14. It has been concluded that the Proposed Action is **unlikely** to have a significant impact on the yellow-bellied glider. Avoidance, mitigation and management measures considered within the assessment are discussed in detail in Section 7.

TABLE 6-14 SIGNIFICANT IMPACT ASSESSMENT FOR YELLOW-BELLIED GLIDER

Criteria	Description	Criteria Triggered?
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
Lead to a long-term decrease in the size of an important population of a species;	Yellow-bellied glider is considered as having the potential to occur within the Study Area with no individuals observed during targeted field surveys. There is unlikely to be an important population within the Study Area. The amount of yellow-bellied glider habitat within the Study Area to be cleared is up to 0.3 ha of Potential Denning Habitat and 5.4 ha of Potential Foraging Habitat. Mitigation measures such as pre-clearance surveys and micro-siting at areas of planned infrastructure will ensure that impacts to essential microhabitat features (hollow-bearing trees) are further avoided where possible. Disturbance associated with linear infrastructure will also ensure that movement and dispersal ability for the species is not affected.	Unlikely

Criteria	Description	Criteria Triggered?
	Identified habitat within the Study Area will remain connected to adjacent, larger remnant forests, such as the Camboon State Forest. Therefore, the Proposed Action is unlikely to lead to a long-term decrease in the size of an important population.	
Reduce the area of occupancy of an important population;	This species is predicted to have an area of occupancy of 12,724 km^2 (DAWE, 2022a). The clearing of 5.6 ha of potential yellow-bellied glider habitat within the Study Area equates to only <0.005% of the species area of occupancy. The nature of clearing involved within the Proposed Action, being small areas of linear infrastructure across the landscape, is unlikely to reduce the species area of occupancy.	Unlikely
Fragment an existing important population into two or more populations;	The yellow-bellied glider is considered as having the potential to occur within the Study Area, with no evidence of the species or populations inhabiting the Study Area to date. Habitat fragmentation will be managed so that any potentially present yellow-bellied gliders are able to move and disperse throughout the entirety of identified habitat, maintaining connectivity with the landscape within and surrounding the Study Area. Additionally, the Proposed Action will not remove or isolate habitat patches altogether, only clearing in the areas necessary for infrastructure. Avoidance of denning trees will be prioritised during construction phase, via pre-clearance surveys and micro-siting of infrastructure where sufficient flexibility is enabled by State and Federal approvals. When considering mitigation measures and the limited area of proposed potential yellow-bellied glider habitat to be cleared (5.6 ha), it has been concluded that the Proposed Action is unlikely to fragment an existing important population.	Unlikely
Adversely affect habitat critical to the survival of a species;	Under the *Conservation Advice for Petaurus australis australis (yellow-bellied glider (south-eastern))* (DAWE, 2022a), habitat critical to the survival of the species is habitat that contains any one of the following attributes: 1. Large contiguous areas of floristically diverse eucalypt forest, which are dominated by winter-flowering and smooth-barked eucalypts, including mature living hollow-bearing trees and sap trees; 2. Areas identified as refuges under future climate change scenarios; 3. Short or long-term post-fire refuges that allow the species to persist, recover and recolonise burnt areas; 4. Habitat corridors required to facilitate dispersal between fragmented habitat patches and/or that enable recolonization or movement away	Unlikely

Criteria	Description	Criteria Triggered?
	from threats (further detail provided in the Conservation Advice document); and 5. Areas in which some trees have evidence of use for sap extraction by yellow-bellied glider. Each of the above numbered Conservation Advice items, have been addressed accordingly in the numbered responses. 1. The area of updated habitat is considered a large, continuous area, with winter-flowering and smooth-bark eucalypt canopy species. However, habitat is not considered floristically diverse with canopy species identified during field surveys limited. The smooth-bark eucalyptus species present within denning habitat are generally absent from the identified foraging and dispersal habitat that is dominated by *E. crebra* (on Land Zone 12 that does not correlate with species observations in Land Zone 3/5/7). The absence of smooth bark species and dominance of a single species to the west of the mapped foraging and dispersal habitat, together with observed disturbance limits the potential for the *E. crebra* dominated vegetation to be considered habitat and therefore has been excluded. 2. Updated habitat is not considered refuge under future climate change scenarios. The Study Area is located in the northern portion of the species distribution and contains lower quality habitat compared to surrounding areas (e.g. Camboon State Forest). 3. No recently burnt landscapes are present in the surrounding connecting habitat of the Study Area, and therefore the habitat is not currently considered a short or long-term post-fire refuge. 4. Yellow-bellied glider habitat within the Study Area is not considered a habitat corridor for the species, with no connected habitat identified to the north, east or west of the identified habitat. 5. Further, no evidence of sap extraction by yellow-bellied glider has been recorded within the Study Area. Overall, the potential impacts to yellow-bellied glider habitat will be limited to 0.3 ha of Potential Denning Habitat (1.6% of this habitat type within the Study Area) and 5.4 ha of Potential Foraging Habitat (4.9% of this habitat type within the Study Area). Further, retention of connectivity in potential habitat, means yellow-bellied glider will still be able to utilise all remaining mapped potential habitat for both denning, foraging and dispersal purposes should the species occur in the future.	

Criteria	Description	Criteria Triggered?
	Based on the above assessment, it is considered unlikely that the limited impacts to mapped potential habitat within the Study Area constitutes adversely affecting habitat critical to the survival of the species.	
Disrupt the breeding cycle of an important population;	No recent evidence of the species was identified in the Study Area or immediate surrounds based on desktop analysis and field surveys. Yellow-bellied gliders have a plausible home range of 25-85 ha (Craig, 1985; Goldingay & Quin, 2004 as cited in DAWE, 2022a). The Proposed Action will result in the clearing of up to 0.3 ha of Potential Denning Habitat (1.6%) and 5.4 ha of Potential Foraging Habitat (4.9%) within the Study Area. The design phase as well as micro-siting will avoid hollow-bearing trees that are necessary for the successful breeding cycle of the species. Therefore, the Proposed Action is unlikely to disrupt the breeding cycle of a population, should a population be identified within or near the Study Area.	Unlikely
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;	The Proposed Action will result in the removal of 5.6 ha or 4.5% of the total available potential yellow-bellied glider habitat within the Study Area. However, the habitat within the Study Area will remain connected to larger remnant patches outside of the Study Area. Additionally, no population is currently known to utilise this habitat, with the species considered only potentially occurring. Therefore, the small amount of clearing in the larger context of the landscape is unlikely to remove, isolate or decrease the quality of habitat that would result in species decline.	Unlikely
Result in invasive species that are harmful to a Vulnerable species becoming established in the endangered species' habitat;	Invasive species such as feral cats (*Felis catus*) and cane toads (*Rhinella marina*) are common pests encountered in Queensland and are particularly harmful to native, threatened mammals. Both of these invasive species are known to occur in the Study Area. The Proposed Action will adopt and follow a Biosecurity Plan, as outline in Section 7 of the Theodore Wind Farm PER. The activities related to the Proposed Action, both during construction and operation, will implement and follow biosecurity measures to reduce the risk of introducing new invasive species and to prevent the further spread of existing invasive species.	Unlikely

Criteria	Description	Criteria Triggered?
Introduce disease that may cause the species to decline; or	There is currently limited evidence of diseases noted in the Conservation Advice or literature causing detrimental effects on yellow-bellied glider populations in Queensland. There is also no evidence to suggest the Proposed Action will introduce a disease that would cause the species to decline. Additionally, precautions will be taken to ensure that the spread of disease does not occur, this includes following proposed biosecurity measures (see Section 7 of the Theodore Wind Farm PER).	Unlikely
Interfere with the recovery of the species.	There is no adopted or made Recovery Plan for this species. Clearing will largely occur within small, isolated turbine locations, or narrow linear areas within the Study Area. Additionally, the Study Area will remain connected to adjacent State Forests. The design phase, micro siting, and other mitigation methods will ensure that interference with the recovery of the species is unlikely.	Unlikely
Significant Impact: Unlikely		

6.6.5 KOALA

6.6.5.1 DIRECT IMPACTS

Direct impacts to koala associated with the Proposed Action are considered to be limited to habitat loss from vegetation clearing. These impacts are quantified below and include impacts to:

- 8.1 ha of Preferred Breeding and Foraging Habitat;
- 640.2 ha of General Breeding and Foraging Habitat; and
- 247.2 ha of Dispersal Habitat.

It is expected that some impacted areas of koala habitat will be rehabilitated post-construction. However, rehabilitation is not expected to restore most of the mapped breeding and foraging habitat to a useful state for koala for at least 6-8 years and will likely be re-cleared during decommissioning.

Koalas typically travel on the ground to traverse between patches of habitat, as such the ground itself forms an essential component of koala habitat. Connectivity between patches of habitat does not require complete continuity of vegetation, and scattered trees in a fragmented landscape can in fact extend the area of a habitat available to the species (Youngentob, Marsh, & Skewes, 2021). Koalas readily disperse on the ground covering distances of 1-3 km, and occasionally over 10 km when dispersing (Melzer 1995; White 1999; Dique et al. 2003; Matthews et al. 2016 as cited in Youngentob, Marsh, & Skewes, 2021).

The following statement in Youngentob et al. (2021) refers to how koalas move through the landscape and therefore, needs to be considered in determining impacts to ancillary dispersal habitat:

> *Walking on the ground is how koalas typically travel between trees, so the ground itself forms an essential component of koala habitat, without which movement between trees would be hindered or impossible.*

This statement highlights two essential components of ancillary koala dispersal habitat:

- The ground where koalas walk between trees inferred not to contain barriers; and
- The trees that koalas may use for shelter, and potentially foraging, while dispersing.

While both of these components together comprise dispersal habitat (and have been mapped as such), the presence of trees (as shelter or potential fodder) are an integral part of dispersal habitat, without which "the ground" on its own would not be considered dispersal habitat.

Disturbance to koala dispersal habitat is limited to 247.2 ha associated with short-term construction activities. This disturbance primarily occurs to cultivated agricultural land and is unlikely to result in the removal of koala habitat trees or isolated scattered paddock trees, especially following preclearance surveys.

Considering the species' dispersal ability in agricultural environments with scattered paddock trees, koalas will maintain movement and dispersal post-construction within the 247.2 ha of Dispersal Habitat that will be initially disturbed. The short-term nature of the disturbance of this habitat type within the Study Area is therefore not considered permanent and will not contribute to a significant residual impact to the species. However, the loss of Preferred and

General Breeding and Foraging Habitat associated with construction-phase clearing is considered permanent.

The rehabilitation of 247.2 ha of koala Dispersal Habitat includes 62.2 ha of Type 1 natural regeneration and 93.0 ha of Type 2 rehabilitation, as shown in Figure 6-3. Further discussion on rehabilitation types, estimated timing to return habitat to its previous functionality, as well as the management measures, completion criteria, interim targets and corrective actions for rehabilitation is provided in Section 8.

A summary of the direct impacts to koala habitat as a result of the Proposed Action is shown in Table 6-15. A total of 648.3 ha of koala habitat will be permanently impacted by the Proposed Action, which equates to 2.2% of the total available habitat identified within the Study Area.

TABLE 6-15 DIRECT IMPACTS TO KOALA HABITAT

	Preferred Breeding and Foraging Habitat	**General Breeding and Foraging Habitat**	**Dispersal Habitat**
Study Area (ha)	1,613.4	21,216.6	6,950.5
Disturbance Footprint (ha)	8.1	640.2	247.2
Percent of habitat within the Study Area to be impacted	0.5% of Preferred Breeding and Foraging Habitat within the Study Area	3.0% of General Breeding and Foraging Habitat within the Study Area	3.6% of Dispersal Habitat within the Study Area
Available **Revegetation areas** within the Disturbance Footprint (ha)	N/A	N/A	247.2
Permanent impact* (Operations Footprint) (ha)	**8.1**	**640.2**	**0**

**Permanent impact (Operations Footprint) is provided where revegetation and/or rehabilitation can return habitat for the species to function or utilise post-construction (i.e., for recolonisation, dispersal, foraging or breeding).*

Legend

- Study Area
- Operational Footprint
- Electrical Reticulation
- Koala Dispersal Habitat - Type 2 Revegetation/Rehabilitation
- Koala Dispersal Habitat - Type 1 Natural Regeneration
- Koala Dispersal Habitat
- Road
- Track and Path

Coordinate System:
GDA2020 MGA Zone 56

Date: 28/05/2026

Created By: MB

Drawing Size: A3

0 2 4Km

1:120,000

F6-3 Rehabilitation of Koala Dispersal Habitat

Theodore Wind Farm PER

Theodore Energy Developments Pty Ltd

ERM

0661076_TWF_PER_R8.aprx

6.6.5.2 INDIRECT IMPACTS

The indirect impacts to koala as a result of the Proposed Action are detailed in Table 6-16, along with how these impacts will be managed and any residual impact that will affect the MNES. Avoidance, mitigation and management measures are discussed in detail in Section 7.

TABLE 6-16 INDIRECT IMPACTS TO KOALA

Indirect Impact	Management of Indirect Impact	Residual Impact
Habitat Loss and Individual Mortality from Vegetation Clearing	The impact of habitat loss is considered a direct impact and has been addressed in the above Section. The following points refer to the potential indirect impact of individual mortality during vegetation clearing associated with the Proposed Action. • Areas identified as MNES habitat will be avoided as much as possible at the design and micro-siting stages. • Clear delineation of areas to be cleared, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. • Pre-clearance surveys and fauna spotter catchers will be utilised. Microhabitat features (e.g. hollow bearing trees) will be avoided where sufficient flexibility is enabled by State and Federal approvals. • Staff and contractors will be made aware through general site induction and training of the potential to impact native fauna, reporting requirements and mitigation and management measures that are to be implemented during on-site works. • Vehicles, plant and machinery will comply with site-specific speed limits to minimise the likelihood of collision with fauna. • Where trenching and excavations are created which may entrap fauna, suitable escape measures will be put in place, and excavations checked for fauna before backfilling. • Weekly site inspections to review flora and fauna control measures during construction. Sightings and incidents reported in daily pre-starts during construction. All near misses and incidents will be investigated to establish root cause. Where necessary corrective actions will be developed to improve existing processes.	The management measures to mitigate direct fatality or injury during construction and operation will result in the successful avoidance of impact to the species. This is such that any koalas found within the Disturbance Footprint in pre-clearance surveys will be avoided through micro-siting or translocated to safer habitat such that no indirect impact will result.
Habitat Fragmentation and Patch Isolation	• Areas identified as MNES habitat will be avoided as much as possible at the design and micro-siting stages. • Micro-siting of infrastructure will utilise existing clearance areas and avoid habitat fragmentation and patch isolation, with consideration of whether avoidance areas would still be connected to habitat in the broader landscape. • Prior to construction and detailed design, the incorporation of road pinch points to maximise connectivity will be considered to maintain	Habitat fragmentation and patch isolation will be managed to ensure that koalas are able to move and disperse throughout the entirety of identified habitat, maintaining connectivity with the landscape within and surrounding the Study Area. All clearing for access corridors will be limited to 40 m. Additionally, the Proposed Action will not remove or isolate habitat patches altogether, only

Indirect Impact	Management of Indirect Impact	Residual Impact
	habitat connectivity. While pinch points have a benefit for habitat they present a technical and logistical barrier to safe and effective construction. Pre-clearance surveys will determine appropriate locations for road pinch points. • Location of infrastructure will prioritise avoiding or minimising edge effects or dissecting tracts of native vegetation. • Where possible, the Proposed Action will implement the use of innovative turbine blade transportation, including methods to minimise necessary clearance widths (e.g. 'Blade Manipulator' trucks). • Turbine placement will maximise the use of areas that are less vegetated to avoid and minimise clearing of key habitat. • All clearing for access corridors will be limited to 40 m in width during the construction phase. • Clear delineation of areas to be cleared, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. Toolbox talks will relay site-specific clearing information to all field staff and contractors. • Rehabilitation of access corridors will occur once construction has been completed. Such rehabilitation will involve planting/natural regeneration of native species that are habitat for MNES.	clearing in the areas necessary for infrastructure. Therefore, this indirect impact will be minimised so as not to cause an indirect residual impact.
Increased Prevalence of Invasive Plants and Animals	• A Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • Staff and contractors will be given information on the location and consequences of biosecurity threats in the Study Area. • Access to a landholder's property will not occur unless authorised under a land use agreement. • WONS and Restrictive Invasive Species will be identified and monitored in the Study Area. Appropriate weed monitoring will occur to ensure new weed species are identified, recorded and controlled. • Weed management and control methods will depend upon the location, weed species identified, the degree of the infestation, relevant landholder agreement or conduct and compensation agreements provisions, and local, state and national regulatory requirements. • Weed loads will be minimised in high-traffic areas such as roads, easements and yards through regular monitoring and site personnel reporting protocols, with an investigation to be	Management measures will limit the possibility of the introduction or spread of invasive plant and animal species through relevant biosecurity measures incorporated into the Biosecurity Management Plan. This is such that the indirect impact will be minimised so as not to cause an indirect residual impact to the species.

Indirect Impact	Management of Indirect Impact	Residual Impact
	managed to prevent spread of weeds in accordance with the *Biosecurity Act 2014* (Qld). • Imported material able to transport weed seed will be assessed to ensure they are free of contamination, disease and invasive weeds.	
Increased Vehicle Impacts on Fauna and Habitat	• No driving will occur in unauthorised areas, routes and access tracks will be clearly communicated to all site visitors. All driving will be carried out at safe speeds designated for the site. Night-time safe driving controls will also be applied, including additional speed restrictions, providing additional protection to nocturnal animals. • Site entry and exit points will be clearly marked to ensure vehicle movements are contained within the approved areas. • Staff and contractors will be made aware through general site induction and training of the potential to impact native fauna, reporting requirements and mitigation and management measures that are to be implemented during on-site works. • Injured, sick or dead fauna will be recorded and reported, during and after the construction and operation phases. This can be carried out by a fauna spotter-catcher during periods where disturbance is expected to occur (primarily construction activities). Where injured or sick fauna is detected, individuals will be taken to the nearest wildlife carer or veterinarian if practical.	Implementation of management measures will ensure operating vehicles on-site during the construction, operation and decommissioning phases will reduce the risk of residual impacts to koala through vehicle collision.
Altered Fire Regimes and Bushfire Risk	• A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES habitat. • Maintenance of an asset protection zone within the Operations Footprint is required to reduce the risk of reduction of habitat due to fire. • Use of industry best practice hazard reduction measures to minimise bushfire risk and environmental impacts, such as on-site controlled burning of cleared vegetation. • Ensuring a 30 m bushfire setback from vegetation around electrical infrastructure. Maintaining safe distances between vegetation and potential fire-starting hazards will increase safety and reduce fire risk. • Weed management and control methods (in line with the requirements of the *Biosecurity Act 2014* (Qld)) will reduce the potential of invasive plants changing species composition on-site and increasing fire risk. • Reduce on-site fuel loads and maintain firebreaks and trails.	Management measures implemented in line with the site-specific Bushfire Management Plan will greatly reduce the potential risk for this species caused by planned or unplanned fires. Therefore, there is no anticipated indirect residual impact.

Indirect Impact	Management of Indirect Impact	Residual Impact
Altered Hydrology	• The Proposed Action will adopt best practice erosion and sediment control measures, which will implement all relevant State Codes and Guidelines. • Watercourse crossings shall be stabilised to mitigate erosion of pavement and embankment materials during rainfall events up to and including the 10% AEP storm event. • Staff and contractors will be made aware through general site induction and training of the potential to generate runoff and mitigation and management measures that should be implemented. • Construction activities must not interfere or block natural drainage e.g. disturbing channel contours. • Water barrier works will be designed to minimise impact on fish habitats, stock or movements through compliance with relevant design codes. During the detailed design phase, fish passage elements will be considered in all mapped waterways for fish passage, including compliance with the accepted development requirements for waterway barrier works or an operational works permit under the Planning Act.	Impacts to on-site hydrology will be managed in accordance with the CEMP. Impacts to watercourses will be addressed by stabilising to prevent erosion, and only occur in discrete work areas, such that no increase in sedimentation is overserved affecting habitat. Therefore, there is no anticipated indirect residual impact.
Environmental Pollution and Hazardous Materials	• All hazardous materials bought on-site will be accompanied by an MSDS, all relevant personnel will be trained in their proper use. • Only registered herbicides will be used for weed management by a suitably qualified bush regeneration contractor. • Imported materials that are able to transport hazardous substances will be assessed to ensure they are free of contamination, disease and invasive species. • Ensuring appropriate waste management (lidded bins), to reduce potential for spread of hazardous materials on-site. • Vehicles, plant and machinery will comply with site-specific speed limits to minimise noise and dust generation. • Staff and contractors will be made aware through general site induction and training of the potential to generate dust, light and noise pollution and management measures that should be implemented. • Auditing of the CEMP will occur during construction. • Dust will be minimised through engineering controls on machinery and other available dust suppression controls, such as sprinklers. • Light pollution will be minimised through engineering controls on infrastructure and machinery, such as colour selection and timing controls. • Noise will be minimised through engineering controls on infrastructure and machinery, such as noise barriers and timing controls.	The management measures proposed will result in the reduction of the indirect impacts of environmental pollution and hazardous materials. Hazardous materials brought onto the site will be regulated. Where permanent fencing is required for linear infrastructure (road corridors or transmission lines) within mapped koala foraging and breeding habitat, fencing will be designed and installed in accordance with the koala-sensitive design guideline (DES, 2022). Dust, light and noise generation will be minimised such that is it unlikely to adversely affect species or damage species habitat. These measures will ensure that the indirect impact is minimised so as to not cause an indirect residual impact to koala.

Indirect Impact	Management of Indirect Impact	Residual Impact
	• Disturbance form blasting will be minimised through engineering controls and other available blasting suppression, such as barrier walls. • Where new fencing is required within mapped koala foraging and breeding habitat, barbed wire fencing will not be used. • Electricity infrastructure designed to allow for safe operations, using buffers between conductors and the ground, and conductors and adjacent vegetation. The transmission line has adopted a design which allows for reduced interference to canopy dwelling species due to minimising impacts to canopy vegetation.	
Site Alienation	• Locating turbines and access corridors away from key habitats where feasible (including remnant vegetation, waterways and drainage lines) reducing disturbance during all phases of the Proposed Action. • Mitigating habitat fragmentation and maintaining connectivity through the measures outlined above. • Using turbines with an RSA >40 m above ground level to provide a collision-free foraging zone within the canopy and 20 m above the canopy, reducing operational disturbance to terrestrial species. • Development and implementation of management plans (VFMP, CEMP) outlined above to reduce the potential impact of construction and operation phase activities including introducing invasive species, fire and altered hydrology. • Implementing engineering controls on infrastructure and machinery outlined above, such that dust, light and noise pollution and blasting does not adversely affect species or species habitat.	The potential risk of site alienation will be managed to ensure that species are able to move, disperse and utilise habitat throughout the Study Area for the life of the Proposed Action. Avoidance, mitigation and management measures outlined in this PER will ensure that the potential for site alienation is minimised so as to not cause an indirect residual impact to koala.

Indirect impacts from the Proposed Action will be mitigated and managed appropriately, such that there is no residual impact on koala. Some indirect impacts have been considered as part of the significant impact assessment for this species but are concluded unlikely to contribute to a significant impact.

6.6.5.3 SIGNIFICANT IMPACT ASSESSMENT

Ground-truthed surveys have identified 29,780.5 ha of koala habitat, including 1,613.4 ha of Preferred Breeding and Foraging Habitat, 21,216.6 ha of General Breeding and Foraging Habitat, and 6,950.5 ha of Dispersal Habitat within the Study Area. A total 648.3 ha of habitat is expected to be permanently impacted as a result of the Proposed Action, which includes:

- 8.1 ha of Preferred Breeding and Foraging Habitat (0.5% of this habitat type within the Study Area); and
- 640.2 ha of General Breeding and Foraging Habitat (3.0 % of this habitat type within the Study Area);

A significant impact assessment based on the guidance provided in the SIG 1.1 is presented in Table 6-17. It has been concluded that the Proposed Action is **likely** to cause a significant impact to the koala. Avoidance, mitigation and management measures considered within the assessment are discussed in detail in Section 7.

TABLE 6-17 SIGNIFICANT IMPACT ASSESSMENT FOR THE KOALA

Criteria	Description	Criteria Triggered?
An action is likely to have a significant impact on an endangered species if there is a real chance or possibility that it will:		
Lead to a long-term decrease in the size of a population;	A total of 8.1 ha of Preferred Breeding and Foraging Habitat, 640.2 ha of General Breeding and Foraging Habitat, and 247.2 ha of Dispersal Habitat will be impacted within the Study Area as a result of the Proposed Action. The impact will involve clearing of small amounts of remnant vegetation and linear corridors for the construction of the Proposed Action's infrastructure. Mitigation measures such as pre-clearance surveys will ensure that impacts are further avoided to the species. All 247.2 ha of Dispersal Habitat will be returned to functionality post-construction. With these mitigation measures enacted, the extent of total species habitat throughout the Study Area (29,780.5 ha or 63.7% of the Study Area) and relatively low impacts to higher-value Preferred and General Breeding and Foraging Habitat, (8.1 ha or 0.5% of available habitat within the Study Area) it is unlikely the Proposed Action will result in the long-term decrease in the size of a population of koala.	Unlikely
Reduce the area of occupancy of the species;	Koala has a widespread distribution across the east coast of Australia that ranges more than 1,660,000 km^2. The species has a smaller and more fragmented area of occupancy estimated at 19,428 km^2 (DAWE, 2022b). A total of 29,780.5 ha of species habitat has been mapped to occur throughout the Study Area (64.0% of the Study Area), with projected permanent impacts to 648.3 ha or 2.2% of this available habitat. This impact equates to <0.04% of the species area of occupancy. Additionally, disturbance to dispersal habitat will not permanently remove the function of this habitat or create a barrier to movement, allowing for retention of important habitat patches and maintained connectivity between these patches. It is therefore considered unlikely that the Proposed Action will reduce the area of occupancy of the species.	Unlikely

Criteria	Description	Criteria Triggered?
Fragment an existing population into two or more populations;	The home range for the koala is highly variable, with the species known to disperse between 3 to 500 ha across various habitats (DAWE, 2022b). It is not expected an impact to 8.1 ha of Preferred Breeding and Foraging Habitat (0.5% of this habitat type within the Study Area), 640.2 ha of General Breeding and Foraging Habitat (3.0%) will fragment existing koala populations. Impacts associated with the Proposed Action will only remove habitat in small linear patches. Due to the linear nature of clearing it is expected koala will still be able to disperse across tracks and small cleared areas within the Study Area. It is therefore unlikely the Proposed Action will fragment an existing koala population into two or more populations.	Unlikely
Adversely affect habitat critical to the survival of a species;	Koala habitat within the Study Area has been concluded to be habitat critical to the survival of the species as it provides foraging, breeding and dispersal functions. The short-term disturbance to Dispersal Habitat is not considered to be significant, as the linear design of the Proposed Action will still allow for koala dispersal across the landscape (thus retaining its function). The proposed access tracks, overhead transmission lines and turbines will not reduce the ability for koalas to disperse through the landscape. Additionally, higher-value Preferred and General Breeding and Foraging Habitat is mostly avoided in the design phase, with 640.2 ha of a total 22,830.0 ha within the Study Area (approximately 3.0%) projected to be impacted by the Proposed Action. However, despite the implementation of mitigation measures including pre-clearance surveys and micro-siting of planned infrastructure, avoidance of high-value habitat and retention of movement and dispersal function through linear WTG design, it is considered likely that the Proposed Action will adversely affect habitat critical to the survival of the species due to the Preferred and General Breeding and Foraging Habitat to be impacted within the Study Area.	Likely
Disrupt the breeding cycle of a population;	Projected impacts are expected to occur across 8.1 ha (0.5%) of Preferred Breeding and Foraging Habitat and 640.2 ha (3.0%) of General Breeding and Foraging Habitat. Mitigation measures such as pre-clearance surveys and micro-siting of proposed infrastructure areas in both Preferred and General Breeding and Foraging Habitat will ensure connectivity values are retained (allowing for individuals to safely traverse between suitable habitat patches) and locally important or higher quality trees are preserved where possible. Given these mitigation measures, and that the	Unlikely

Criteria	Description	Criteria Triggered?
	Proposed Action is largely avoiding Preferred Breeding and Foraging Habitat, it is not expected the Proposed Action will disrupt the breeding cycle of a koala population within the Study Area.	
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;	Preferred Breeding and Foraging Habitat has largely been avoided, with only 0.5% of this habitat type within the Study Area projected to be disturbed. While a larger portion of General Breeding and Foraging Habitat is expected to be disturbed (3.0%), this still constitutes a very small percentage of habitat in relation to the larger context of the Study Area. It is unlikely the Proposed Action will decrease the availability or quality of koala habitat to the extent that the species will decline. Disturbance to Dispersal Habitat has not been considered for this criteria as the impacts to this habitat type will not permanently prevent koala from utilising these areas for dispersal purposes.	Unlikely
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat;	Invasive species such as feral cats (*Felis catus*) and wild dogs (*Canis lupus*) are common pests encountered Queensland and are particularly harmful to native, threatened mammals. Both of these invasive species are known to occur in the Study Area. The Proposed Action will adopt and follow a Biosecurity Plan, as outline in Section 7. The activities related to the Proposed Action, both during construction and operation, will implement and follow biosecurity measures to reduce the risk of introducing new invasive species and to prevent the further spread of existing invasive species.	Unlikely
Introduce disease that may cause the species to decline; or	Koala populations are known to be impacted by diseases, specifically koala retrovirus (KoRV) and chlamydia (*Chlamydia pecorum*). There is no evidence to suggest the construction and/or operational activities of the Proposed Action would introduce a disease, such as chlamydia, that would cause the species to be at risk of illness and subsequent population decline. Additionally, precautions will be taken to ensure that the spread of disease does not occur, as detailed in a Biosecurity Plan. This includes following biosecurity measures and ensuring proper personal protection equipment is worn by construction workers and vehicle washdowns before entering any sites near koala habitat.	Unlikely

Criteria	Description	Criteria Triggered?
Interfere with the recovery of the species.	The interim recovery objectives for the koala are: • Protect and conserve the quality and extent of habitat refuges for the persistence of the species during droughts and periods of extreme heat, especially in riparian environments and other areas with reliable soil moisture and fertility; and • Maintain the quality, extent and connectivity of large areas of koala habitat surrounding habitat refuges. The Proposed Action will only impact a relatively small portion of koala habitat within the Study Area (648.3 ha or 2.2%), with an even smaller portion of Preferred Breeding and Foraging habitat comprised of riparian woodland suitable for drought and extreme heat refuge to be affected (8.1 ha or 0.5%). Further, impacts associated with the Proposed Action will only remove habitat in small linear patches, with connectivity values retained and mitigation measures including pre-clearance surveys and micro-siting employed to further preserve important habitat traits. Therefore, the Proposed Action is unlikely to interfere with the above recovery objectives.	Unlikely
Significant impact: Likely		

6.6.6 LARGE-EARED PIED BAT

6.6.6.1 DIRECT IMPACTS

Direct impacts to large-eared pied bat associated with the Proposed Action are considered to be limited to habitat loss from vegetation clearing and individual mortality and injury from turbine collision. These impacts are quantified below and include impacts to:

- 8.3 ha of Foraging Habitat.

It is expected that some impacted areas of large-eared pied bat habitat will be revegetated after the construction phase. However, no rehabilitation or revegetation in these areas is expected to restore any functionality for this species post-construction. Therefore, the direct impact to large-eared pied bat associated with construction-phase clearing is considered permanent.

A quantitative risk assessment of direct impact to large-eared pied bat associated with the operational-phase collision risk with wind turbines is presented in the BBMP (Appendix D). In summary:

- The species is listed as endangered under the EPBC Act;
- Several 'probable' recordings of the species were detected within the Study Area through Anabat recordings;
- No records exist within the broader locality in the last 20 years (100 km radius of the Study Area);
- The species is a canopy and above canopy forager; and
- Potential foraging habitat is present within the Study Area.

Based on the collision risk assessment (CRA) methodology and risk matrix detailed within the BBMP (Appendix D), the large-eared pied bat has a 'moderately likely' likelihood of WTG collision, and as an endangered EPBC Act listed species, the consequence of an impact event is considered to be 'major'. Therefore, the species has been considered to be at a 'moderate' risk of being impacted by the Proposed Action through collision with WTGs. Further detail on the CRA is provided in Section 6.11 and within the BBMP (Appendix D).

The BBMP establishes species-specific impact thresholds and associated triggers for turbine-related mortality, along with the decision-making framework and adaptive management responses required when thresholds are reached. These thresholds include an Annual Threshold and a Significant Impact Threshold, the latter comprising an intermediate trigger (Trigger 1) and a significant impact trigger (Trigger 2). Based on an Australian population estimate of 20,000 individuals, the Trigger 2 for large-eared pied bat is 20 mortalities (0.1% of population) over a 10-year period (based on generational time). Adaptive management measures and corrective actions will be implemented proactively to avoid progression toward a Trigger 2 (a significant impact), including actions triggered by exceeding the Annual Threshold and/or Significant Impact Threshold Trigger 1. However, if a significant impact (Trigger 2) is reached for any bird or bat species, the Proponent must cease operation of the WTGs identified as contributing to the MNES mortality during ecologically relevant periods. WTGs must not recommence operation until approval is given from DCCEEW.

A summary of the direct impacts to large-eared pied bat habitat as a result of the Proposed Action is shown in Table 6-18. A total of 8.3 ha of large-eared pied bat habitat will be permanently impacted by the Proposed Action, which equates to 0.5% of the total available habitat identified within the Study Area.

TABLE 6-18 DIRECT IMPACTS TO LARGE-EARED PIED BAT

	Foraging Habitat
Study Area (ha)	2,856.1
Disturbance Footprint (ha)	8.3
Percent of habitat within the Study Area to be impacted	0.3% of Foraging Habitat within the Study Area
Permanent impact (Operations Footprint) (ha)	8.3

6.6.6.2 INDIRECT IMPACTS

The indirect impacts to large-eared pied bat as a result of the Proposed Action are detailed in Table 6-19, along with how these impacts will be managed and any residual impact that will affect the MNES. Avoidance, mitigation and management measures are discussed in detail in Section 7.

TABLE 6-19 INDIRECT IMPACTS TO LARGE-EARED PIED BAT

Indirect Impact	Management of Indirect Impact	Residual Impact
Habitat Loss and Individual Mortality from Vegetation Clearing	The impact of habitat loss is considered a direct impact and has been addressed in the above Section. The following points refer to the potential indirect impact of individual mortality during vegetation clearing associated with the Proposed Action. • Areas identified as MNES habitat will be avoided as much as possible at the design and micro-siting stages. • Clear delineation of areas to be cleared, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. • Pre-clearance surveys and fauna spotter catchers will be utilised. Microhabitat features (e.g. hollow bearing trees) will be avoided where sufficient flexibility is enabled by State and Federal approvals. • Staff and contractors will be made aware through general site induction and training of the potential to impact native fauna, reporting requirements and mitigation and management measures that are to be implemented during on-site works. • Vehicles, plant and machinery will comply with site-specific speed limits to minimise the likelihood of collision with fauna. • Where trenching and excavations are created which may entrap fauna, suitable escape measures will be put in place, and excavations checked for fauna before backfilling. • Weekly site inspections to review flora and fauna control measures during construction. Sightings and incidents reported in daily pre-starts during construction. All near misses and incidents will be investigated to establish root cause. Where necessary corrective actions will be developed to improve existing processes.	The management measures to mitigate direct fatality or injury during construction and operation will result in the successful avoidance of impact to the species. This is such that any roosting bats found within the Disturbance Footprint in pre-clearance surveys will be avoided through micro-siting or translocated to safer habitat such that no indirect impact will result.
Habitat Fragmentation and Patch Isolation	• Areas identified as MNES habitat will be avoided as much as possible at the design and micro-siting stages. • Micro-siting of infrastructure will utilise existing clearance areas and avoid habitat fragmentation and patch isolation, with consideration of whether avoidance areas would still be connected to habitat in the broader landscape. • Prior to construction and detailed design, the incorporation of road pinch points to maximise connectivity will be considered to maintain habitat connectivity. While pinch points have a benefit for habitat they present a technical and logistical barrier to safe and effective construction. Pre-clearance surveys will determine appropriate locations for road pinch points.	Habitat fragmentation and patch isolation will be managed to ensure that large-eared pied bats are able to move and disperse throughout the entirety of identified habitat, maintaining connectivity with the landscape within and surrounding the Study Area. All clearing for access corridors will be limited to 40 m. Additionally, the Proposed Action will not remove or isolate habitat patches altogether, only clearing in the areas necessary for infrastructure. Therefore, this indirect impact will be minimised so as not to cause an indirect residual impact.

Indirect Impact	Management of Indirect Impact	Residual Impact
	• Location of infrastructure will prioritise avoiding or minimising edge effects or dissecting tracts of native vegetation. • Where possible, the Proposed Action will implement the use of innovative turbine blade transportation, including methods to minimise necessary clearance widths (e.g. 'Blade Manipulator' trucks). • Turbine placement will maximise the use of areas that are less vegetated to avoid and minimise clearing of key habitat. • All clearing for access corridors will be limited to 40 m in width during the construction phase. • Clear delineation of areas to be cleared, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. Toolbox talks will relay site-specific clearing information to all field staff and contractors. • Rehabilitation of access corridors will occur once construction has been completed. Such rehabilitation will involve planting/natural regeneration of native species that are habitat for MNES.	
Increased Prevalence of Invasive Plants and Animals	• A Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • Staff and contractors will be given information on the location and consequences of biosecurity threats in the Study Area. • Access to a landholder's property will not occur unless authorised under a land use agreement. • WONS and Restrictive Invasive Species will be identified and monitored in the Study Area. Appropriate weed monitoring will occur to ensure new weed species are identified, recorded and controlled. • Weed management and control methods will depend upon the location, weed species identified, the degree of the infestation, relevant landholder agreement or conduct and compensation agreements provisions, and local, state and national regulatory requirements. • Weed loads will be minimised in high-traffic areas such as roads, easements and yards through regular monitoring and site personnel reporting protocols, with an investigation to be managed to prevent spread of weeds in accordance with the *Biosecurity Act 2014* (Qld). • Imported material able to transport weed seed will be assessed to ensure they are free of contamination, disease and invasive weeds.	Management measures will limit the possibility of the introduction or spread of invasive plant and animal species through relevant biosecurity measures incorporated into the Biosecurity Management Plan. This is such that the indirect impact will be minimised so as not to cause an indirect residual impact to the species.

Indirect Impact	Management of Indirect Impact	Residual Impact
Increased Vehicle Impacts on Fauna and Habitat	• No driving will occur in unauthorised areas, routes and access tracks will be clearly communicated to all site visitors. All driving will be carried out at safe speeds designated for the site. Night-time safe driving controls will also be applied, including additional speed restrictions, providing additional protection to nocturnal animals. • Site entry and exit points will be clearly marked to ensure vehicle movements are contained within the approved areas. • Staff and contractors will be made aware through general site induction and training of the potential to impact native fauna, reporting requirements and mitigation and management measures that are to be implemented during on-site works. • Injured, sick or dead fauna will be recorded and reported, during and after the construction and operation phases. This can be carried out by a fauna spotter-catcher during periods where disturbance is expected to occur (primarily construction activities). Where injured or sick fauna is detected, individuals will be taken to the nearest wildlife carer or veterinarian if practical.	Implementation of management measures will ensure operating vehicles on-site during the construction, operation and decommissioning phases will not result in residual impacts to large-eared pied bat.
Altered Fire Regimes and Bushfire Risk	• A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES habitat. • Maintenance of an asset protection zone within the Operations Footprint is required to reduce the risk of reduction of habitat due to fire. • Use of industry best practice hazard reduction measures to minimise bushfire risk and environmental impacts, such as on-site controlled burning of cleared vegetation. • Ensuring a 30 m bushfire setback from vegetation around electrical infrastructure. Maintaining safe distances between vegetation and potential fire-starting hazards will increase safety and reduce fire risk. • Weed management and control methods (in line with the requirements of the *Biosecurity Act 2014* (Qld).) will reduce the potential of invasive plants changing species composition on-site and increasing fire risk. • Reduce on-site fuel loads and maintain firebreaks and trails.	Management measures implemented in line with the site-specific Bushfire Management Plan will greatly reduce the potential risk for this species caused by planned or unplanned fires. Therefore, there is no anticipated indirect residual impact.

Indirect Impact	Management of Indirect Impact	Residual Impact
Altered Hydrology	• The Proposed Action will adopt best practice erosion and sediment control measures, which will implement all relevant State Codes and Guidelines. • Watercourse crossings shall be stabilised to mitigate erosion of pavement and embankment materials during rainfall events up to and including the 10% AEP storm event. • Staff and contractors will be made aware through general site induction and training of the potential to generate runoff and mitigation and management measures that should be implemented. • Construction activities must not interfere or block natural drainage e.g. disturbing channel contours. • Water barrier works will be designed to minimise impact on fish habitats, stock or movements through compliance with relevant design codes. During the detailed design phase, fish passage elements will be considered in all mapped waterways for fish passage, including compliance with the accepted development requirements for waterway barrier works or an operational works permit under the Planning Act.	Impacts to on-site hydrology will be managed in accordance with the CEMP. Impacts to watercourses will be addressed by stabilising to prevent erosion, and only occur in discrete work areas, such that no increase in sedimentation is overserved affecting habitat. Therefore, there is no anticipated indirect residual impact.
Environmental Pollution and Hazardous Materials	• All hazardous materials bought on-site will be accompanied by an MSDS, all relevant personnel will be trained in their proper use. • Only registered herbicides will be used for weed management by a suitably qualified bush regeneration contractor. • Imported materials that are able to transport hazardous substances will be assessed to ensure they are free of contamination, disease and invasive species. • Ensuring appropriate waste management (lidded bins), to reduce potential for spread of hazardous materials on-site. • Vehicles, plant and machinery will comply with site-specific speed limits to minimise noise and dust generation. • Staff and contractors will be made aware through general site induction and training of the potential to generate dust, light and noise pollution and management measures that should be implemented. • Auditing of the CEMP will occur during construction. • Dust will be minimised through engineering controls on machinery and other available dust suppression controls, such as sprinklers. • Light pollution will be minimised through engineering controls on infrastructure and machinery, such as colour selection and timing controls. • Noise will be minimised through engineering controls on infrastructure and machinery, such as noise barriers and timing controls.	The management measures proposed will result in the reduction of the indirect impacts of environmental pollution and hazardous materials. Hazardous materials brought onto the site will be tightly regulated. Dust, light and noise generation will be minimised such that is it unlikely to adversely affect species or damage species habitat. These measures will ensure that the indirect impact is minimised so as to not cause an indirect residual impact to large-eared pied bat.

Indirect Impact	Management of Indirect Impact	Residual Impact
	• Disturbance form blasting will be minimised through engineering controls and other available blasting suppression, such as barrier walls. • Electricity infrastructure designed to allow for safe operations, using buffers between conductors and the ground, and conductors and adjacent vegetation. The transmission line has adopted a design which allows for reduced interference to canopy dwelling species due to minimising impacts to canopy vegetation.	
Individual Mortality and Injury from Turbine Collision and Barotrauma	• WTGs will be located away from key bird and bat habitats (such as waterways and drainage lines). • Powerlines will be located so as to avoid fauna obstruction/entanglement and minimise potential perching resources within 200 m of high-risk turbines (identified within the BBMP (Appendix D)). • Turbine selection will incorporate innovative blade design features to minimise potential collision rates. WTG design will include acoustic and visual deterrents (e.g. ultrasound acoustic devices) and detection systems (e.g. IdentiFlight®, Robin Radar Systems) for high-risk turbines (identified within the BBMP (Appendix D)). • Development and implementation of a BBMP that considers the impacts that may occur to birds and mitigation measures to address potential impacts to migratory species considered 'potential' to occur within the Study Area. • Sightings and incidents reported in daily pre-starts during construction. • Carry out scientifically robust monitoring program for the detection/quantification of impacts on protected matters, including as a result of turbine strike and barotrauma. The monitoring program must be able to accurately and in a timely manner detect when impact triggers are reached. • All near misses and incidents will be investigated to establish root cause. Where necessary corrective actions will be developed to improve existing processes. • Injured, sick or dead fauna will be recorded and reported, during and after the construction and operation phases.	Mitigation and management measures outlined for the Proposed Action's WTGs will ensure that the potential impacts are minimised so as to not cause an indirect residual impact to large-eared pied bat. It is noted that the results of future bat surveys and any evidence of threatened or migratory species in the Study Area, will be incorporated into future risk assessments and CRM within the BBMP. Therefore, the principle of adaptive management will be applied to ensure that any future risks identified are adequately reported, analysed and subsequently managed as per the framework in the BBMP. The amount and magnitude of direct impact to large-eared pied bat associated with the operational-phase collision risk with wind turbines is further discussed in Section 6.11.

Indirect Impact	Management of Indirect Impact	Residual Impact
Site Alienation	• Locating turbines and access corridors away from key habitats where feasible (including remnant vegetation, waterways and drainage lines) reducing disturbance during all phases of the Proposed Action. • Mitigating habitat fragmentation and maintaining connectivity through the measures outlined above. • Using turbines with an RSA >40 m above ground level to provide a collision-free foraging zone within the canopy and 20 m above the canopy, reducing operational disturbance to terrestrial species. • Development and implementation of management plans (VFMP, CEMP) outlined above to reduce the potential impact of construction and operation phase activities including introducing invasive species, fire and altered hydrology. • Implementing engineering controls on infrastructure and machinery outlined above, such that dust, light and noise pollution and blasting does not adversely affect species or species habitat.	The potential risk of site alienation will be managed to ensure that species are able to move, disperse and utilise habitat throughout the Study Area for the life of the Proposed Action. Avoidance, mitigation and management measures outlined in this PER will ensure that the potential for site alienation is minimised so as to not cause an indirect residual impact to large-eared pied bat.

Indirect impacts from the Proposed Action will be mitigated and managed appropriately, such that there is no residual impact on large-eared pied bat. Some indirect impacts have been considered as part of the significant impact assessment for this species but are concluded unlikely to contribute to a significant impact.

6.6.6.3 SIGNIFICANT IMPACT ASSESSMENT

There is a total of 2,856.1 ha large-eared pied bat Foraging Habitat within the Study Area. A total of 8.3 ha of large-eared pied bat habitat is expected to be permanently impacted as a result of the Proposed Action. No roosting habitat was identified, however due to the proximity of Belmont State Forest and Mount Tam to the northern boundary of the Study Area, there is potential that areas of steep terrain may support roosting bats in this location that utilise the Study Area for foraging. No record of the species occurs within the Study Area or the Locality, with the closest record occurring within Presho State Forest, over 100 km to the west of the Study Area (ALA, 2024).

A significant impact assessment based on the guidance provided in the SIG 1.1 is presented in Table 6-20. It has been concluded that the Proposed Action is **unlikely** to have a significant impact on the large-eared pied bat. Avoidance, mitigation and management measures considered within this assessment are discussed in detail in Section 7.

TABLE 6-20 SIGNIFICANT IMPACT ASSESSMENT FOR LARGE-EARED PIED BAT

Criteria	Description	Criteria Triggered?
An action is likely to have a significant impact on an endangered species if there is a real chance or possibility that it will:		
Lead to a long-term decrease in the size of a population;	The Study Area likely provides foraging resources to support large-eared pied bat, however there is an absence of suitable caves for roosting. The species is considered likely to occur within the Study area due to the detection of 'probable' recordings of the species by Anabat recording devices deployed across the Study Area during multiple field surveys. A total of 2,856.1 ha of Foraging Habitat for large-eared pied bat (6.1% of the Study Area) has been identified and mapped within the Study Area, with a total of 8.3 ha of Foraging Habitat (0.3% of all Foraging Habitat within the Study Area) projected to be impacted as a result of the Proposed Action. Given the 'probable' recording locations of the species within the Study Area, there is potential for large-eared pied bat to occur within the Locality, with roost sites outside the Study Area. As no roosts sites were identified within the Study Area, impacts as a result of the Proposed Action are limited to loss of foraging habitat only. As no known roosts are likely to be impacted, and the large availability of foraging habitat retained in the Study Area, impacts to habitat associated with the Proposed Action are considered unlikely to lead to a long-term decrease in the size of the population. The total population size for large-eared pied bat likely ranges between 10,000 and 20,000 individuals (DCCEEW, 2023a). The Indicative Significant Impact Threshold (0.1% of population) for large-eared pied bat adopted for the Proposed Action is 20 mortalities over a five-year period. If this threshold is reached, adaptive management outlined in the BBMP will be implemented to determine the contribution factors and mitigate risk to large-eared pied bat associated with the operation of the Proposed Action's WTGs. It is therefore considered unlikely that the operational phase of Proposed Action will lead to a long-term decrease in the size of the population.	Unlikely

Criteria	Description	Criteria Triggered?
Reduce the area of occupancy of the species;	The estimated area of occupancy of large-eared pied bat is 1,500 km^2 (150,000 ha), of which the Study Area occurs at the northern-most extent (DCCEEW, Conservation Advice for Chalinolobus dwyeri (large-eared pied bat), 2023a). Area of occupancy for the species is determined by total area of know maternity roost sites, which provide an essential roosting, sheltering and breeding function for the species (DCCEEW, 2023). No roosting habitat is mapped to occur within the Study Area, however likely recordings of the species across multiple locations and multiple survey events indicate the possibility for large-eared pied bat roosting habitat within the Locality. Vegetation clearance in the proximity of roosts is identified as a key threat to large-eared pied bat in the species' conservation advice (DCCEEW, 2023). The Proposed Action is projected to impact a total of 8.3 ha of Foraging Habitat (0.3% of all Foraging Habitat within the Study Area). The retention of over 99% of large-eared pied bat Foraging Habitat within the Study Area means the Proposed Action is unlikely to reduce the area of occupancy of the species.	Unlikely
Fragment an existing population into two or more populations;	The Proposed Action is expected to impact a total of 8.3 ha of Foraging Habitat (0.3% of all Foraging Habitat within the Study Area). This impact will only remove small, linear patches of habitat and as the large-eared pied bat is a highly mobile species, it is considered unlikely that the Proposed Action will fragment an existing important population into two or more populations.	Unlikely
Adversely affect habitat critical to the survival of a species;	Large-eared pied bat conservation advice identifies that, due to loss, degradation and fragmentation of habitat, especially foraging habitat, all suitable habitat for the species likely constitutes habitat critical to the survival. Specifically, the presence of foraging habitat within close proximity to roosting sites should be considered habitat critical to the survival of the large-eared pied bat (DCCEEW, 2023). A total of 8.3 ha of large-eared pied bat Foraging Habitat (0.3% of all Foraging Habitat within the Study Area) is projected to be impacted as a result of the Proposed Action. Multiple 'probable' large-eared pied acoustic records were made within the Study Area across multiple survey events, indicating the potential for suitable roosting sites within the Locality. However, no roosting habitat, which is essential for the species, has been identified during field surveys and therefore, no roosting habitat has been mapped to occur within the Study Area. Given that no roosting habitat has been identified within the Study Area and the Proposed Action will result in <1% of the available habitat within the Study Area being directly impacted, it is considered unlikely that the Proposed Action will adversely affect habitat critical to the survival of the species.	Unlikely

Criteria	Description	Criteria Triggered?
Disrupt the breeding cycle of a population;	Large-eared pied bats utilise roosting habitat for breeding function. This includes cliffs, escarpments, overhangs, cracks or rocky ledges (DCCEEW, 2023). The Proposed Action is estimated to impact 8.3 ha of Foraging Habitat (0.3% of all Foraging Habitat within the Study Area), however no roosting habitat has been identified within the Study Area. Therefore, it is unlikely the Proposed Action will disrupt the breeding cycle of an important population of large-eared pied bat.	Unlikely
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;	A total of 2,856.1 ha of large-eared pied bat Foraging Habitat has been identified and mapped within the Study Area, with 8.3 ha (0.3% of all Foraging Habitat within the Study Area) of this habitat projected to be impacted by the Proposed Action. The species displays fidelity to established foraging habitat (DCCEEW, 2023). Foraging resources in proximity of established diurnal roosts are of high ecological value for large-eared pied bat, however no essential roosting habitat in the Study Area has been identified, and while there is potential for roosting habitat in the Locality, that cannot be confirmed. Given this, it is considered unlikely that impacts associated with the Proposed Action will modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	Unlikely
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Predation by introduced predators (such as feral cats (*Felis catus*), European red foxes (*Vulpes vulpes*) and rats (*Rattus sp*.)) has been suggested as a potential threat to cave roosting microbats in Australia. Additionally, roosting habitat disturbance by feral goats (*Capra hircus)* is considered a major risk to the species (DCCEEW, 2023). No feral goats were observed within the Study Area. The Proposed Action will adopt and follow a Biosecurity Plan, as outline in Section 7. The activities related to the Proposed Action, both during construction and operation, will implement and follow biosecurity measures to reduce the risk of introducing new invasive species and to prevent the further spread of existing invasive species.	Unlikely
Introduce disease that may cause the species to decline; or	The impact of diseases, including but not limited to, white-nose syndrome is a potential threat to the species. White-nose syndrome is caused by the fungus *Pseudogymnoascus destructans* and leads to death through an infection of the muzzle and other parts of the body. The disease has not yet been detected in Australia but is a threat to cave-dwelling bats in other parts of the world and could have a significant impact on this species if it is introduced (DCCEEW, 2023).	Unlikely

Criteria	Description	Criteria Triggered?
	Precautions will be taken to ensure that the spread of disease does not occur, as will be detailed in the Biosecurity Plan (see Section 7). This includes following biosecurity measures and ensuring proper personal protection equipment is worn by construction workers and vehicle washdowns before entering identified habitats.	
Interfere with the recovery of the species.	There is currently no adopted Recovery Plan for the species. The priority conservation objective stated within the species Conservation Advice is: *The distribution and the abundance of the species' subpopulations are maintained, and no known maternity roosts are lost. Foraging habitat within the vicinity of known roosts is maintained and is not cleared* (DCCEEW, 2023a). It is noted that the population structure of this species within QLD is poorly known (DCCEEW, 2023) and there are likely roosting sites located within the locality of the Study Area. However, as no roosting habitat was identified within the Study Area, it is considered unlikely that an impact to 8.3 ha of Foraging Habitat (0.3% of all Foraging Habitat within the Study Area) will interfere with the recovery of the species.	Unlikely
Significant Impact: Unlikely		

6.6.7 SQUATTER PIGEON (SOUTHERN)

6.6.7.1 DIRECT IMPACTS

Direct impacts to squatter pigeon associated with the Proposed Action are considered to be limited to habitat loss from vegetation clearing. Impacts due to individual mortality and injury from turbine collision are not anticipated for squatter pigeon as this species is typically low-flying and forages on the ground, well below the RSA.

Direct impacts to squatter pigeon habitat are quantified below and include impacts to:

- 123.0 ha of Breeding Habitat; and
- 54.2 ha of Foraging and Dispersal Habitat;

Squatter pigeons are commonly observed foraging on roadsides and dirt tracks (DCCEEW, 2024b). It is expected that 31.7 ha of Foraging and Dispersal Habitat will be revegetated after the construction phase. Revegetation is expected to return the functionality required for the squatter pigeon in Foraging and Dispersal Habitat and therefore, this impact is considered temporary. However, revegetation is not expected to return Breeding Habitat to a fully functional state, as this habitat requires a more complex structure. As a result, the entire 123.0 hectares of impact to Breeding Habitat is considered permanent.

The rehabilitation of 31.7 ha of squatter pigeon Foraging and Dispersal Habitat includes 13.1 ha of Type 1 natural regeneration and 18.6 ha of Type 2 rehabilitation, as shown in Figure 6-4. Further discussion on rehabilitation types, estimated timing to return habitat to its previous functionality, as well as the management measures, completion criteria, interim targets and corrective actions for rehabilitation is provided in Section 8.

A summary of the direct impacts to squatter pigeon habitat as a result of the Proposed Action is shown in Table 6-21. A total of 145.5 ha of squatter pigeon habitat will be permanently impacted by the Proposed Action, which equates to 0.6% of the total available habitat identified within the Study Area.

TABLE 6-21 DIRECT IMPACTS TO SQUATTER PIGEON HABITAT

	Breeding Habitat	**Foraging and Dispersal Habitat**
Study Area (ha)	9,575.4	2,333.5
Disturbance Footprint (ha)	123.0	54.2
Percent of habitat within the Study Area to be impacted	1.3% of Breeding Habitat within the Study Area	2.3% of Foraging and Dispersal Habitat within the Study Area
Available **Revegetation areas** within the Disturbance Footprint (ha)	N/A	31.7
Permanent impact* (Operations Footprint) (ha)	123.0	22.5 (or 1.0%)

**Permanent impact (Operations Footprint) is provided where revegetation and/or rehabilitation can return habitat for the species to function or utilise post-construction (i.e., for recolonisation, dispersal, foraging or breeding).*

Legend

- Study Area
- Operational Footprint
- Electrical Reticulation
- Squatter pigeon Foraging and Dispersal - Type 2 revegetation/ rehabilitation
- Squatter pigeon Foraging and Dispersal - Type 1 natural regeneration
- Squatter Pigeon Foraging and Dispersal Habitat
- Road
- Track and Path

Coordinate System:
GDA2020 MGA Zone 56
Date: 28/05/2026
Created By: MB
Drawing Size: A3

0 2 4Km

1:120,000

F6-4 Rehabilitation of Squatter Pigeon Foraging and Dispersal Habitat

Theodore Wind Farm PER

Theodore Energy Developments Pty Ltd

ERM

0661076_TWF_PER_R8.aprx

6.6.7.2 INDIRECT IMPACTS

The indirect impacts to squatter pigeon as a result of the Proposed Action are detailed in Table 6-22, along with how these impacts will be managed and any residual impact that will affect the MNES. Avoidance, mitigation and management measures are discussed in detail in Section 7.

TABLE 6-22 INDIRECT IMPACTS TO SQUATTER PIGEON

Indirect Impact	Management of Indirect Impact	Residual Impact
Habitat Loss and Individual Mortality from Vegetation Clearing	The impact of habitat loss is considered a direct impact and has been addressed in the above Section. The following points refer to the potential indirect impact of individual mortality during vegetation clearing associated with the Proposed Action. • Areas identified as MNES habitat will be avoided as much as possible at the design and micro-siting stages. • Clear delineation of areas to be cleared, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. • Pre-clearance surveys and fauna spotter catchers will be utilised. Microhabitat features (e.g. hollow bearing trees) will be avoided where sufficient flexibility is enabled by State and Federal approvals. • Staff and contractors will be made aware through general site induction and training of the potential to impact native fauna, reporting requirements and mitigation and management measures that are to be implemented during on-site works. • Vehicles, plant and machinery will comply with site-specific speed limits to minimise the likelihood of collision with fauna. • Where trenching and excavations are created which may entrap fauna, suitable escape measures will be put in place, and excavations checked for fauna before backfilling. • Weekly site inspections to review flora and fauna control measures during construction. Sightings and incidents reported in daily pre-starts during construction. All near misses and incidents will be investigated to establish root cause. Where necessary corrective actions will be developed to improve existing processes.	The management measures to mitigate direct fatality or injury during construction and operation will result in the successful avoidance of impact to the species. This is such that any squatter pigeon found within the Disturbance Footprint in pre-clearance surveys will be closely monitored, allowed to self-disperse, and worst-case scenario translocated to safer habitat such that no indirect residual impact will result.
Habitat Fragmentation and Patch Isolation	• Areas identified as MNES habitat will be avoided as much as possible at the design and micro-siting stages. • Micro-siting of infrastructure will utilise existing clearance areas and avoid habitat fragmentation and patch isolation, with consideration of whether avoidance areas would still be connected to habitat in the broader landscape. • Prior to construction and detailed design, the incorporation of road pinch points to maximise	Habitat fragmentation and patch isolation will be managed to ensure that squatter pigeons are able to move and disperse throughout the entirety of identified habitat, maintaining connectivity with the landscape within and surrounding the Study Area. All clearing for access corridors will be limited to 40 m. Additionally, the Proposed Action

Indirect Impact	Management of Indirect Impact	Residual Impact
	connectivity will be considered to maintain habitat connectivity. While pinch points have a benefit for habitat they present a technical and logistical barrier to safe and effective construction. Pre-clearance surveys will determine appropriate locations for road pinch points. • Location of infrastructure will prioritise avoiding or minimising edge effects or dissecting tracts of native vegetation. • Where possible, the Proposed Action will implement the use of innovative turbine blade transportation, including methods to minimise necessary clearance widths (e.g. 'Blade Manipulator' trucks). • Turbine placement will maximise the use of areas that are less vegetated to avoid and minimise clearing of key habitat. • All clearing for access corridors will be limited to 40 m in width during the construction phase. • Clear delineation of areas to be cleared, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. Toolbox talks will relay site-specific clearing information to all field staff and contractors. • Rehabilitation of access corridors will occur once construction has been completed. Such rehabilitation will involve planting/natural regeneration of native species that are habitat for MNES.	will not remove or isolate habitat patches altogether, only clearing in the areas necessary for infrastructure. Therefore, this indirect impact will be minimised so as not to cause an indirect residual impact.
Increased Prevalence of Invasive Plants and Animals	• A Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • Staff and contractors will be given information on the location and consequences of biosecurity threats in the Study Area. • Access to a landholder's property will not occur unless authorised under a land use agreement. • WONS and Restrictive Invasive Species will be identified and monitored in the Study Area. Appropriate weed monitoring will occur to ensure new weed species are identified, recorded and controlled. • Weed management and control methods will depend upon the location, weed species identified, the degree of the infestation, relevant landholder agreement or conduct and compensation agreements provisions, and local, state and national regulatory requirements. • Weed loads will be minimised in high-traffic areas such as roads, easements and yards through regular monitoring and site personnel	Management measures will limit the possibility of the introduction or spread of invasive plant and animal species through relevant biosecurity measures incorporated into the Biosecurity Management Plan. This is such that the indirect impact will be minimised so as not to cause an indirect residual impact to the species.

Indirect Impact	Management of Indirect Impact	Residual Impact
	reporting protocols, with an investigation to be managed to prevent spread of weeds in accordance with the *Biosecurity Act 2014* (Qld). • Imported material able to transport weed seed will be assessed to ensure they are free of contamination, disease and invasive weeds.	
Increased Vehicle Impacts on Fauna and Habitat	• No driving will occur in unauthorised areas, routes and access tracks will be clearly communicated to all site visitors. All driving will be carried out at safe speeds designated for the site. • Site entry and exit points will be clearly marked to ensure vehicle movements are contained within the approved areas. • Staff and contractors will be made aware through general site induction and training of the potential to impact native fauna, reporting requirements and mitigation and management measures that are to be implemented during on-site works. • Injured, sick or dead fauna will be recorded and reported, during and after the construction and operation phases. This can be carried out by a fauna spotter-catcher during periods where disturbance is expected to occur (primarily construction activities). Where injured or sick fauna is detected, individuals will be taken to the nearest wildlife carer or veterinarian if practical.	Implementation of management measures will ensure operating vehicles on-site during the construction, operation and decommissioning phases will not result in residual impacts to squatter pigeon.
Altered Fire Regimes and Bushfire Risk	• A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES habitat. • Maintenance of an asset protection zone within the Operations Footprint is required to reduce the risk of reduction of habitat due to fire. • Use of industry best practice hazard reduction measures to minimise bushfire risk and environmental impacts, such as on-site controlled burning of cleared vegetation. • Ensuring a 30 m bushfire setback from vegetation around electrical infrastructure. Maintaining safe distances between vegetation and potential fire-starting hazards will increase safety and reduce fire risk. • Weed management and control methods (in line with the requirements of the *Biosecurity Act 2014* (Qld)) will reduce the potential of invasive plants changing species composition on-site and increasing fire risk. • Reduce on-site fuel loads and maintain firebreaks and trails.	Management measures implemented in line with the site-specific Bushfire Management Plan will greatly reduce the potential risk for this species caused by planned or unplanned fires. Therefore, there is no anticipated indirect residual impact.

Indirect Impact	Management of Indirect Impact	Residual Impact
Altered Hydrology	• The Proposed Action will adopt best practice erosion and sediment control measures, which will implement all relevant State Codes and Guidelines. • Watercourse crossings shall be stabilised to mitigate erosion of pavement and embankment materials during rainfall events up to and including the 10% AEP storm event. • Staff and contractors will be made aware through general site induction and training of the potential to generate runoff and mitigation and management measures that should be implemented. • Construction activities must not interfere or block natural drainage e.g. disturbing channel contours. • Water barrier works will be designed to minimise impact on fish habitats, stock or movements through compliance with relevant design codes. During the detailed design phase, fish passage elements will be considered in all mapped waterways for fish passage, including compliance with the accepted development requirements for waterway barrier works or an operational works permit under the Planning Act.	Impacts to on-site hydrology will be managed in accordance with the CEMP. Impacts to watercourses will be addressed by stabilising to prevent erosion, and only occur in discrete work areas, such that no increase in sedimentation is overserved affecting habitat. Therefore, there is no anticipated indirect residual impact.
Environmental Pollution and Hazardous Materials	• All hazardous materials bought on-site will be accompanied by an MSDS, all relevant personnel will be trained in their proper use. • Only registered herbicides will be used for weed management by a suitably qualified bush regeneration contractor. • Imported materials that are able to transport hazardous substances will be assessed to ensure they are free of contamination, disease and invasive species. • Ensuring appropriate waste management (lidded bins), to reduce potential for spread of hazardous materials on-site. • Vehicles, plant and machinery will comply with site-specific speed limits to minimise noise and dust generation. • Staff and contractors will be made aware through general site induction and training of the potential to generate dust, light and noise pollution and management measures that should be implemented. • Auditing of the CEMP will occur during construction. • Dust will be minimised through engineering controls on machinery and other available dust suppression controls, such as sprinklers. • Light pollution will be minimised through engineering controls on infrastructure and machinery, such as colour selection and timing controls. • Noise will be minimised through engineering controls on infrastructure and machinery, such as noise barriers and timing controls.	The management measures proposed will result in the reduction of the indirect impacts of environmental pollution and hazardous materials. Hazardous materials brought onto the site will be tightly regulated. Dust, light and noise generation will be minimised such that is it unlikely to adversely affect species or damage species habitat. These measures will ensure that the indirect impact is minimised so as to not cause an indirect residual impact to squatter pigeon.

Indirect Impact	Management of Indirect Impact	Residual Impact
	• Disturbance form blasting will be minimised through engineering controls and other available blasting suppression, such as barrier walls. • Electricity infrastructure designed to allow for safe operations, using buffers between conductors and the ground, and conductors and adjacent vegetation. The transmission line has adopted a design which allows for reduced interference to canopy dwelling species due to minimising impacts to canopy vegetation.	
Site Alienation	• Locating turbines and access corridors away from key habitats where feasible (including remnant vegetation, waterways and drainage lines) reducing disturbance during all phases of the Proposed Action. • Mitigating habitat fragmentation and maintaining connectivity through the measures outlined above. • Using turbines with an RSA >40 m above ground level to provide a collision-free foraging zone within the canopy and 20 m above the canopy, reducing operational disturbance to terrestrial species. • Development and implementation of management plans (VFMP, CEMP) outlined above to reduce the potential impact of construction and operation phase activities including introducing invasive species, fire and altered hydrology. • Implementing engineering controls on infrastructure and machinery outlined above, such that dust, light and noise pollution and blasting does not adversely affect species or species habitat.	The potential risk of site alienation will be managed to ensure that species are able to move, disperse and utilise habitat throughout the Study Area for the life of the Proposed Action. Avoidance, mitigation and management measures outlined in this PER will ensure that the potential for site alienation is minimised so as to not cause an indirect residual impact to squatter pigeon.

Indirect impacts from the Proposed Action will be mitigated and managed appropriately, such that there is no residual impact on squatter pigeon. Some indirect impacts have been considered as part of the significant impact assessment for this species but are concluded unlikely to contribute to a significant impact.

6.6.7.3 SIGNIFICANT IMPACT ASSESSMENT

A total of 11,908.9 ha of squatter pigeon habitat has been mapped to occur within the Study Area, including 9,575.4 ha of Breeding Habitat and 2,333.5 ha of Foraging and Dispersal Habitat. A total 145.5 ha of habitat is expected to be permanently impacted as a result of the Proposed Action, which includes:

- 123.0 ha of Breeding Habitat; and
- 22.5 ha of Foraging and Dispersal Habitat.

A significant impact assessment based on the guidance provided in the SIG 1.1 is presented in Table 6-23. It has been concluded that the Proposed Action is **likely** to have a significant impact on the squatter pigeon. Avoidance, mitigation and management measures considered within this assessment are discussed in detail in Section 7.

TABLE 6-23 SIGNIFICANT IMPACT ASSESSMENT FOR THE SQUATTER PIGEON

Criteria	Description	Criteria Triggered?
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
Lead to a long-term decrease in the size of an important population of a species;	Squatter pigeon (southern) is known to occur within the Study Area. The species' SPRAT profile (DCCEEW, 2024b) outlines that all sub-populations occurring south of the Carnarvon Ranges in Central QLD are considered important sub-populations of the subspecies. This includes, but is not limited to: • Populations occurring in the Condamine River catchment and Darling Downs of southern Queensland; • Populations known to occur in the Warwick-Inglewood-Texas region of southern Queensland; and • Any populations potentially occurring in northern NSW. The Study Area is situated in relatively close proximity to the Carnarvon Ranges and the conservation-significant southern extent of the subspecies occurrence. Based on a conservative approach, the population utilising habitat within the Study Area is considered an important population. A total of 123.0 ha (1.3%) of squatter pigeon Breeding Habitat and 54.2 ha (2.3%) of Foraging and Dispersal Habitat is expected to be disturbed during construction. After post-construction rehabilitation, which is expected to return the functionality required for the squatter pigeon foraging and dispersal, the Proposed Action is expected to impact only 1.0% of all available Foraging and Dispersal Habitat within the Study Area. Further to this, squatter pigeon has an observed tendency to inhabit disturbed and partially disturbed areas. Therefore, the Proposed Action is unlikely to lead to a long-term decrease in the size of an important population.	Unlikely
Reduce the area of occupancy of an important population;	Squatter pigeon (southern) has an area of occupancy that is roughly estimated at 10,000 km^2, with a presumed low reliability in this figure (Garnett & Crowley, 2000). All sub-populations occurring south of the Carnarvon Ranges in Central QLD are considered important sub-populations of the subspecies, which includes populations occurring in the Condamine River catchment, Darling Downs region, Warwick-Inglewood-Texas region, and northern NSW (DCCEEW, 2024b). The Proposed Action will lead to a permanent impact to 1.3% of all available Breeding Habitat and 1.0% of all available Foraging and Dispersal Habitat within the Study Area, resulting in the disturbance to <0.01% of the sub-species total area of occupancy.	Unlikely

Criteria	Description	Criteria Triggered?
	Three individual observations of the species have been made across the Study Area. Additionally, based on a conservative approach, the Study Area falls within the conservation-significant southern extent of the species occurrence south of the Carnarvon Ranges, making the impacted population an 'important sub-population.' The linear nature of the Proposed Action and the retention of the majority of the squatter pigeon habitat in the Study Area will allow the persistence of the species. Therefore, it is likely with implemented mitigation measures such as pre-clearance surveys and micro-siting (see Section 7), impacts associated with the Proposed Action are unlikely to reduce area of occupancy for an important population of this species.	
Fragment an existing important population into two or more populations;	Clearing associated with the Proposed Action will largely occur within small, isolated turbine locations, or narrow linear areas within the Disturbance Footprint. The nature of the proposed clearing will ensure that southern squatter pigeon remains connected, both within and outside of the Study Area. Permanent disturbance to 1.3% of all available Breeding Habitat and 1.0% of all available Foraging and Dispersal Habitat within the Study Area are unlikely to fragment populations of this species due to southern squatter pigeon's comfort dispersing through disturbed areas.	Unlikely
Adversely affect habitat critical to the survival of a species;	A total of 11,908.9 ha of squatter pigeon habitat has been mapped to occur within the Study Area. Based on a conservative approach, the Study Area falls within the conservation-significant southern extent of the species occurrence south of the Carnarvon Ranges, making the impacted population an 'important sub-population.' Additionally, this habitat provides foraging and breeding function to the species. Due to the identified foraging and breeding habitat, and that the population of squatter pigeon within the Study Area potentially constitutes an 'important sub-population,' it has been considered likely the Study Area supports habitat critical to the survival of the species. Therefore, the projected permanent impact to 123.0 ha (or 1.3%) of all available Breeding Habitat and 22.5 ha (or 1.0%) of all available Foraging and Dispersal Habitat is considered likely to adversely affect habitat critical to the survival of the species.	Likely

Criteria	Description	Criteria Triggered?
Disrupt the breeding cycle of an important population;	A total of 123.0 ha (or 1.3%) of all available squatter pigeon Breeding Habitat is expected to be impacted within the Study Area during construction. Considering the retention of connectivity values, the species' ability to breed throughout the year (DCCEEW, 2024b), and the implementation of micro-siting at planned infrastructure sites, it is unlikely that the breeding cycle of southern squatter pigeon will be disrupted by the Proposed Action.	Unlikely
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;	A total of 1283.0 ha (or 1.3%) of southern squatter pigeon Breeding Habitat and 54.2 ha (or 2.3%) of Foraging and Dispersal Habitat is expected to be disturbed during construction. After post-construction rehabilitation, which is expected to return the functionality required for the squatter pigeon foraging and dispersal, the Proposed Action is expected to impact only 1.0% of all available Foraging and Dispersal Habitat within the Study Area. It is expected that the small areas of disturbance in the larger context of the landscape will not remove, isolate or decrease the quality of habitat to an extent that would result in species decline.	Unlikely
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;	Invasive species such as feral cats (*Felis catus*) and European red foxes (*Vulpes vulpes*) are common pests encountered in Queensland and are particularly harmful to native threatened birds. These invasive species are known to occur in the Study Area. The Proposed Action will adopt and follow a Biosecurity Plan, as outline in Section 7. The activities related to the Proposed Action, both during construction and operation, will implement and follow biosecurity measures to reduce the risk of introducing new invasive species and to prevent the further spread of existing invasive species.	Unlikely
Introduce disease that may cause the species to decline; or	There is currently limited evidence of diseases causing detrimental effects on southern squatter pigeon populations in Queensland. There is also no evidence to suggest the proposed disturbance would introduce a disease that would cause the species to decline. Additionally, precautions will be taken to ensure that the spread of disease does not occur. This includes following biosecurity measures as part of a Biosecurity Plan (see Section 7).	Unlikely
Interfere substantially with the recovery of the species.	The Proposed Action is expected to result in permanent impacts to 123.0 ha (1.3%) of Breeding Habitat and 22.5 ha (1.0%) of Foraging and Dispersal Habitat within the Study Area. There are no formally adopted recovery plans for this species. However, it is considered that the mostly linear nature of disturbance of habitat	Unlikely

Criteria	Description	Criteria Triggered?
	within the Study Area will not affect the recovery of this species. Clearing will not adversely affect retained areas of suitable habitat, and mitigation measures such as micro-siting and pre-clearance surveys will be utilised. This will enable the species to continually traverse the landscape, ensuring genetic viability of the population. The Proposed Action is also unlikely to restrict access or limit the availability of current breeding habitat adjacent to known waterbodies such as farm dams and watercourses. While there is potential the population within the Study Area constitutes an 'important sub-population' of squatter pigeon, with the above avoidance and mitigation measures enacted, it is unlikely the Proposed Action will interfere substantially with the recovery of the species.	
Significant Impact: Likely		

6.6.8 WHITE-THROATED NEEDLETAIL

6.6.8.1 DIRECT IMPACTS

The entire Study Area has been considered Potential Foraging Habitat for the white-throated needletail, as this species forages aerially. Initial construction-phase clearing of vegetation within the Study Area is only likely to represent a short-term disturbance to the species.

Direct impacts to white-throated needletail associated with the Proposed Action are therefore considered to be limited to individual mortality and injury from turbine collision. A quantitative risk assessment of direct impact to white-throated needletail associated with the operational-phase collision risk with wind turbines is presented in the BBMP (Appendix D). In summary:

- The species is listed as vulnerable and migratory under the EPBC Act;
- No records of the species exist within the Study Area and locality;
- Low-moderate abundance of records exist within the broader locality in the last 20 years (100 km radius of the Study Area);
- Species population is estimated at above 10,000 individuals (TSSC, 2019);
- Flight height generally occurs within the RSA (known to fly 1-300m above ground);
- The species is known to form large flocks of 1000s of individuals; and
- The species is considered to be exclusively aerial, with no roosting habitat mapped within the Study Area (it is assumed that the species could utilise the entire Study Area aerially).

Based on the CRA methodology and risk matrix detailed within the BBMP (Appendix D), the white-throated needletail has a 'moderately likely' likelihood of WTG collision due to its flight height and flock flying behaviour, and, as a vulnerable and migratory species, the consequence of an impact event is considered to be 'moderate'. Therefore, the species has been considered to be at a 'low' risk of being impacted by the Proposed Action Through collision with WTGs. Further detail on the CRA is provided in Section 6.11 and within the BBMP (Appendix D).

The BBMP establishes species-specific impact thresholds and associated triggers for turbine-related mortality, along with the decision-making framework and adaptive management responses required when thresholds are reached. These thresholds include an Annual Threshold and a Significant Impact Threshold, the latter comprising an intermediate trigger (Trigger 1) and a significant impact trigger (Trigger 2). Based on an Australian population estimate of 40,000 individuals (Garnett & Crowley, 2000), the Trigger 2 for white-throated needletail is 40 mortalities (0.1% of population) over a 5-year period (based on generational time). Adaptive management measures and corrective actions will be implemented proactively to avoid progression toward a Trigger 2 (a significant impact), including actions triggered by exceeding the Annual Threshold and/or Significant Impact Threshold Trigger 1. However, if a significant impact (Trigger 2) is reached for any bird or bat species, the Proponent must cease operation of the WTGs identified as contributing to the MNES mortality during ecologically relevant periods. WTGs must not recommence operation until approval is given from DCCEEW.

6.6.8.2 INDIRECT IMPACTS

The indirect impacts to white-throated needletail as a result of the Proposed Action are detailed in Table 6-24, along with how these impacts will be managed and any residual impact that will affect the MNES. Avoidance, mitigation and management measures are discussed in detail in Section 7.

TABLE 6-24 INDIRECT IMPACTS TO WHITE-THROATED NEEDLETAIL

Indirect Impact	Management of Indirect Impact	Residual Impact
Habitat Loss and Individual Mortality from Vegetation Clearing	Initial construction-phase clearing of vegetation within the Study Area is only likely to represent a short-term disturbance to the species, therefore there is no anticipated overall habitat loss. The following points refer to the potential indirect impact of individual mortality during vegetation clearing associated with the Proposed Action. • Areas identified as MNES habitat will be avoided as much as possible at the design and micro-siting stages. • Clear delineation of areas to be cleared, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. • Pre-clearance surveys and fauna spotter catchers will be utilised. Microhabitat features (e.g. hollow bearing trees) will be avoided where sufficient flexibility is enabled by State and Federal approvals. • Staff and contractors will be made aware through general site induction and training of the potential to impact native fauna, reporting requirements and mitigation and management measures that are to be implemented during on-site works. • Vehicles, plant and machinery will comply with site-specific speed limits to minimise the likelihood of collision with fauna. • Where trenching and excavations are created which may entrap fauna, suitable escape	The management measures to mitigate direct fatality or injury during construction and operation will result in the successful avoidance of impact to the species. White-throated needletail are anticipated as a flyover visitor only, as no roosting habitat was identified and this species forages aerially.

Indirect Impact	Management of Indirect Impact	Residual Impact
	measures will be put in place, and excavations checked for fauna before backfilling. • Weekly site inspections to review flora and fauna control measures during construction. Sightings and incidents reported in daily pre-starts during construction. All near misses and incidents will be investigated to establish root cause. Where necessary corrective actions will be developed to improve existing processes.	
Habitat Fragmentation and Patch Isolation	• Areas identified as MNES habitat will be avoided as much as possible at the design and micro-siting stages. • Micro-siting of infrastructure will utilise existing clearance areas and avoid habitat fragmentation and patch isolation, with consideration of whether avoidance areas would still be connected to habitat in the broader landscape. • Prior to construction and detailed design, the incorporation of road pinch points to maximise connectivity will be considered to maintain habitat connectivity. While pinch points have a benefit for habitat, they present a technical and logistical barrier to safe and effective construction. Pre-clearance surveys will determine appropriate locations for road pinch points. • Location of infrastructure will prioritise avoiding or minimising edge effects or dissecting tracts of native vegetation. • Where possible, the Proposed Action will implement the use of innovative turbine blade transportation, including methods to minimise necessary clearance widths (e.g. 'Blade Manipulator' trucks). • Turbine placement will maximise the use of areas that are less vegetated to avoid and minimise clearing of key habitat. • All clearing for access corridors will be limited to 40 m in width during the construction phase. • Clear delineation of areas to be cleared, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. Toolbox talks will relay site-specific clearing information to all field staff and contractors. • Rehabilitation of access corridors will occur once construction has been completed. Such rehabilitation will involve planting/natural regeneration of native species that are habitat for MNES.	Habitat fragmentation and patch isolation will be managed to ensure that white-throated needletail are able to move and disperse throughout the entirety of identified habitat, maintaining connectivity with the landscape within and surrounding the Study Area. White-throated needletail are anticipated as a flyover visitor only, as no roosting habitat was identified and this species forages aerially. The entire Study Area has been considered Potential Foraging Habitat for the white-throated needletail. Therefore, this indirect impact will be minimised so as not to cause an indirect residual impact.

Indirect Impact	Management of Indirect Impact	Residual Impact
Increased Prevalence of Invasive Plants and Animals	• A Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • Staff and contractors will be given information on the location and consequences of biosecurity threats in the Study Area. • Access to a landholder's property will not occur unless authorised under a land use agreement. • WONS and Restrictive Invasive Species will be identified and monitored in the Study Area. Appropriate weed monitoring will occur to ensure new weed species are identified, recorded and controlled. • Weed management and control methods will depend upon the location, weed species identified, the degree of the infestation, relevant landholder agreement or conduct and compensation agreements provisions, and local, state and national regulatory requirements. • Weed loads will be mimimised in high-traffic areas such as roads, easements and yards through regular monitoring and site personnel reporting protocols, with an investigation to be managed to prevent spread of weeds in accordance with the *Biosecurity Act 2014* (Qld). • Imported material able to transport weed seed will be assessed to ensure they are free of contamination, disease and invasive weeds.	Management measures will limit the possibility of the introduction or spread of invasive plant and animal species through relevant biosecurity measures incorporated into the Biosecurity Management Plan. This is such that the indirect impact will be minimised so as not to cause an indirect residual impact to the species.
Increased Vehicle Impacts on Fauna and Habitat	• No driving will occur in unauthorised areas, routes and access tracks will be clearly communicated to all site visitors. All driving will be carried out at safe speeds designated for the site. • Site entry and exit points will be clearly marked to ensure vehicle movements are contained within the approved areas. • Staff and contractors will be made aware through general site induction and training of the potential to impact native fauna, reporting requirements and mitigation and management measures that are to be implemented during on-site works. • Injured, sick or dead fauna will be recorded and reported, during and after the construction and operation phases. This can be carried out by a fauna spotter-catcher during periods where disturbance is expected to occur (primarily construction activities). Where injured or sick fauna is detected, individuals will be taken to the nearest wildlife carer or veterinarian if practical.	White-throated needletail are anticipated as a flyover visitor only, as no roosting habitat was identified and this species forages aerially. Therefore, this indirect impact is not expected to lead to an indirect residual impact.

Indirect Impact	Management of Indirect Impact	Residual Impact
Altered Fire Regimes and Bushfire Risk	• A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES habitat. • Maintenance of an asset protection zone within the Operations Footprint is required to reduce the risk of reduction of habitat due to fire. • Use of industry best practice hazard reduction measures to minimise bushfire risk and environmental impacts, such as on-site controlled burning of cleared vegetation. • Ensuring a 30 m bushfire setback from vegetation around electrical infrastructure. Maintaining safe distances between vegetation and potential fire-starting hazards will increase safety and reduce fire risk. • Weed management and control methods (in line with the requirements of the *Biosecurity Act 2014* (Qld)) will reduce the potential of invasive plants changing species composition on-site and increasing fire risk. • Reduce on-site fuel loads and maintain firebreaks and trails.	White-throated needletail are anticipated as a flyover visitor only, as no roosting habitat was identified and this species forages aerially. Therefore, this indirect impact is not expected to lead to an indirect residual impact.
Altered Hydrology	• The Proposed Action will adopt best practice erosion and sediment control measures, which will implement all relevant State Codes and Guidelines. • Watercourse crossings shall be stabilised to mitigate erosion of pavement and embankment materials during rainfall events up to and including the 10% AEP storm event. • Staff and contractors will be made aware through general site induction and training of the potential to generate runoff and mitigation and management measures that should be implemented. • Construction activities must not interfere or block natural drainage e.g. disturbing channel contours. • Water barrier works will be designed to minimise impact on fish habitats, stock or movements through compliance with relevant design codes. During the detailed design phase, fish passage elements will be considered in all mapped waterways for fish passage, including compliance with the accepted development requirements for waterway barrier works or an operational works permit under the Planning Act.	White-throated needletail are anticipated as a flyover visitor only, as no roosting habitat was identified and this species forages aerially. Therefore, this indirect impact is not expected to lead to an indirect residual impact.

Indirect Impact	Management of Indirect Impact	Residual Impact
Environmental Pollution and Hazardous Materials	• All hazardous materials bought on-site will be accompanied by an MSDS, all relevant personnel will be trained in their proper use. • Only registered herbicides will be used for weed management by a suitably qualified bush regeneration contractor. • Imported materials that are able to transport hazardous substances will be assessed to ensure they are free of contamination, disease and invasive species. • Ensuring appropriate waste management (lidded bins), to reduce potential for spread of hazardous materials on-site. • Vehicles, plant and machinery will comply with site-specific speed limits to minimise noise and dust generation. • Staff and contractors will be made aware through general site induction and training of the potential to generate dust, light and noise pollution and management measures that should be implemented. • Auditing of the CEMP will occur during construction. • Dust will be minimised through engineering controls on machinery and other available dust suppression controls, such as sprinklers. • Light pollution will be minimised through engineering controls on infrastructure and machinery, such as colour selection and timing controls. • Noise will be minimised through engineering controls on infrastructure and machinery, such as noise barriers and timing controls. • Disturbance form blasting will be minimised through engineering controls and other available blasting suppression, such as barrier walls. • Electricity infrastructure designed to allow for safe operations, using buffers between conductors and the ground, and conductors and adjacent vegetation. The transmission line has adopted a design which allows for reduced interference to canopy dwelling species due to minimising impacts to canopy vegetation.	The management measures proposed will result in the reduction of the indirect impacts of environmental pollution and hazardous materials. Hazardous materials brought onto the site will be tightly regulated. Dust, light and noise generation will be minimised such that is it unlikely to adversely affect species or damage species habitat. These measures will ensure that the indirect impact is minimised to not cause an indirect residual impact to white-throated needletail.
Individual Mortality and Injury from Turbine Collision and Barotrauma	• WTGs will be located away from key bird and bat habitats (such as waterways and drainage lines). • Powerlines will be located so as to avoid fauna obstruction/entanglement and minimise potential perching resources within 200 m of high-risk turbines (identified within the BBMP (Appendix D)). • Turbine selection will incorporate innovative blade design features to minimise potential collision rates. WTG design will include acoustic and visual deterrents (e.g. ultrasound acoustic devices) and detection systems (e.g. IdentiFlight®, Robin Radar Systems) for high-risk turbines (identified within the BBMP (Appendix D)).	Mitigation and management measures outlined for the Proposed Action's WTGs will ensure that the potential impacts are minimised so as to not cause an indirect residual impact to white-throated needletail. White-throated needletail has not been observed within the Study Area, and no suitable roosting habitat has been identified. It is noted that the results of future bird surveys and any evidence of threatened or migratory species in the Study Area, will be incorporated into future risk

Indirect Impact	Management of Indirect Impact	Residual Impact
	• Development and implementation of a BBMP that considers the impacts that may occur to birds and mitigation measures to address potential impacts to migratory species considered 'potential' to occur within the Study Area. • Sightings and incidents reported in daily pre-starts during construction. • Carry out scientifically robust monitoring program for the detection/quantification of impacts on protected matters, including as a result of turbine strike and barotrauma. The monitoring program must be able to accurately and in a timely manner detect when impact triggers are reached. • All near misses and incidents will be investigated to establish root cause. Where necessary corrective actions will be developed to improve existing processes. • Injured, sick or dead fauna will be recorded and reported, during and after the construction and operation phases.	assessments and CRM within the BBMP. Therefore, the principle of adaptive management will be applied to ensure that any future risks identified are adequately reported, analysed and subsequently managed per the framework in the BBMP. The amount of direct impact to white-throated needletail associated with the operational-phase collision risk with wind turbines is further discussed in Section 6.11.
Site Alienation	• Locating turbines and access corridors away from key habitats where feasible (including remnant vegetation, waterways and drainage lines) reducing disturbance during all phases of the Proposed Action. • Mitigating habitat fragmentation and maintaining connectivity through the measures outlined above. • Development and implementation of a Bird and Bat Management Plan (BBMP) that considers the impacts that may occur to birds and mitigation measures to address potential impacts to migratory species considered 'potential' to occur within the Study Area. • Development and implementation of management plans (VFMP, CEMP) outlined above to reduce the potential impact of construction and operation phase activities including introducing invasive species, fire and altered hydrology. • Implementing engineering controls on infrastructure and machinery outlined above, such that dust, light and noise pollution and blasting does not adversely affect species or species habitat.	The potential risk of site alienation will be managed to ensure that species are able to move, disperse and utilise habitat throughout the Study Area for the life of the Proposed Action. Avoidance, mitigation and management measures outlined in this PER and the BBMP will ensure that the potential for site alienation is minimised to not cause an indirect residual impact to white-throated needletail.

Indirect impacts from the Proposed Action will be mitigated and managed appropriately, such that there is no residual impact on white-throated needletail. Some indirect impacts have been considered as part of the significant impact assessment for this species but are concluded unlikely to contribute to a significant impact.

6.6.8.3 SIGNIFICANT IMPACT ASSESSMENT

A significant impact assessment based on the guidance provided in the SIG 1.1 is presented in in Table 6-25. It has been concluded that the Proposed Action is **unlikely** to have a significant impact on the white-throated needletail.

Considering the species nature as an aerial species in Australia, and proclivity to fly at RSA heights and above, there is a risk of turbine collision as a result of the Proposed Action (further discussed in Section 6.11). Therefore, should the species be observed in the Study Area, adaptive management measures will be undertaken to further prevent any impact to this species. Avoidance, mitigation and management measures considered within this assessment are discussed in detail in Section 7.

TABLE 6-25 SIGNIFICANT IMPACT ASSESSMENT FOR THE WHITE-THROATED NEEDLETAIL

Criteria	Description	Criteria Triggered?
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
Lead to a long-term decrease in the size of an important population of a species;	White-throated needletail is almost exclusively aerial in nature while in Australia, with the entire Study Area (46,830 ha) considered aerial foraging habitat for the species. It is unlikely that development for the Proposed Action will interfere with this species ability to forage and disperse. The white-throated needletail is considered potential to occur within the Study Area, with no individuals recorded during field surveys. The minimum threshold for an ecologically significant impact to a population for white-throated needletail is 40 individuals (Garnett & Crowley, 2000). As the species was not identified within the Study Area and no impacts to this species ability to forage aerially overhead will occur, it is considered unlikely that the Proposed Action will lead to a long-term decrease in the size of an important population of the species.	Unlikely
Reduce the area of occupancy of an important population;	White-throated needletail's area of occupancy while migrating through coastal Eastern Australia is estimated at approximately 126,000 km^2 (TSSC, 2019). As discussed, white-throated needletail, is almost exclusively aerial whilst migrating across Australia. Therefore, disturbance of vegetation associated with the Proposed Action is unlikely to reduce this area of occupancy. Additionally, no important population has been identified utilising the Study Area.	Unlikely
Fragment an existing important population into two or more populations;	White-throated needletail is a highly mobile species that migrates southwards over large areas of coastal Eastern Australia in the spring, summer, and autumn seasons (TSSC, 2019). It is not expected that the Project will fragment a population of this species given its dispersive and aerial nature.	Unlikely

Criteria	Description	Criteria Triggered?
Adversely affect habitat critical to the survival of a species;	The Study Area has been considered as habitat critical to the survival of the species conservatively, based on its potential utility for foraging behaviour. However, the Proposed Actions potential impacts will not adversely affect this habitat for white-throated needletail, as its foraging value is highly unlikely to be altered. Therefore, it is unlikely that the Proposed Action will adversely affect habitat critical to the survival of this species.	Unlikely
Disrupt the breeding cycle of an important population;	White-throated needletail does not breed during its migration to Australia. While a loss of old growth forest and mature hollow bearing trees in the northern hemisphere is suspected to be impacting the species' breeding success, it is not projected the Proposed Action will disrupt or have any impact on white-throated needletail's ability to breed.	Unlikely
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;	A loss of potential roosting sites in Australia is potentially contributing to the decline of the species, as well as the loss of suitably wooded habitat that invertebrate prey species require (TSSC, 2019). However, since no roosting habitat has been identified and all foraging habitat is aerial in nature, it is unlikely that the Proposed Action will modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	Unlikely
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;	No invasive species have been identified as a threat to the white-throated needletail. The Proposed Action will adopt and follow a Biosecurity Plan, as outline in Section 7. The activities related to the Proposed Action, both during construction and operation, will implement and follow biosecurity measures to reduce the risk of introducing new invasive species and to prevent the further spread of existing invasive species.	Unlikely
Introduce disease that may cause the species to decline; or	While not necessarily a disease, the use of insecticides, particularly organochlorines, has been linked with the decline of white-throated needletail through indirect impacts. These indirect impacts include secondary poisoning through bioaccumulation of insecticides in prey species, and the decrease in the availability of preferred invertebrate prey species (Tarburton, 2014). There is no evidence to suggest that the Proposed Action will increase the risk of these impacts. However, precautions will be taken as detailed in a Biosecurity Plan, to ensure that insecticides are not improperly applicated within the Study Area (see Section 7).	Unlikely

Criteria	Description	Criteria Triggered?
Interfere substantially with the recovery of the species.	There are no threat abatement or recovery actions proposed or underway for this species. Due to no individuals being observed during field surveys, and the habitat within the Study Area being exclusively aerial foraging habitat, it is considered unlikely that the Proposed Action will interfere with the recovery of the species.	Unlikely
An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:		
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species;	The loss of potential roosting sites as well as wooded habitat suitable for prey species in Australia, may potentially be contributing to the decline of the species (TSSC, 2019). However, since no roosting habitat has been identified and all foraging habitat is aerial in nature it is unlikely that the Proposed Action will substantially modify, destroy or isolate an area of important habitat for the migratory species.	Unlikely
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species; or	No invasive species have been identified as a threat to the white-throated needletail. Additionally, biosecurity risks associated with the Proposed Action will be managed with a Biosecurity Plan, as outlined in Section 7. Ensuring that this plan is adequately followed, it is considered unlikely that the Proposed Action will result in invasive species that are potentially harmful to the white-throated needletail becoming established in the Study Area.	Unlikely
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	The minimum threshold for an ecologically significant impact to a population for white-throated needletail is 40 individuals (Garnett & Crowley, 2000). The white-throated needletail is considered only potential to occur within the Study Area, with no individuals recorded during field surveys. As the white-throated needletail does not breed during its migration to Australia, it is not projected the Proposed Action will disrupt or have any impact on white-throated needletail's ability to breed. White-throated needletail is almost exclusively aerial in nature while in Australia, with the entire Study Area considered aerial foraging habitat for the species. No roosting habitat has been identified within the Study Area. It is therefore unlikely that development for the Proposed Action will interfere with this species ability to roost, forage and migrate.	Unlikely
Significant Impact: Unlikely		

6.6.9 BLACK-BREASTED BUTTONQUAIL

6.6.9.1 DIRECT IMPACTS

Direct impacts to black-breasted buttonquail associated with the Proposed Action are considered to be limited to habitat loss from vegetation clearing. Impacts due to individual mortality and injury from turbine collision are not anticipated for black-breasted button quail as this species is typically low-flying and forages on the ground, well below the RSA. The direct impacts to black-breasted buttonquail habitat are quantified below and include impacts to:

- 4.4 ha of Potential Foraging and Roosting Habitat.

It is expected that some impacted areas of black-breasted buttonquail habitat will be rehabilitated post-construction. However, no rehabilitation or revegetation in these areas is expected to restore any functionality for this species post-construction. Therefore, the direct impact to black-breasted button quail associated with construction-phase clearing is considered permanent.

A summary of the direct impacts to black-breasted buttonquail habitat as a result of the Proposed Action is shown in Table 6-26. A total of 4.4 ha of black-breasted buttonquail habitat will be permanently impacted by the Proposed Action, which equates to 1.6% of the total available habitat identified within the Study Area.

TABLE 6-26 DIRECT IMPACTS TO BLACK-BREASTED BUTTON QUAIL HABITAT

	Potential Foraging and Roosting Habitat
Study Area (ha)	277.2
Disturbance Footprint (ha)	4.4
Percent of habitat within the Study Area to be impacted	1.6% of Potential Foraging and Roosting Habitat within the Study Area
Permanent impact (Operations Footprint) (ha)	**4.4**

6.6.9.2 INDIRECT IMPACTS

The indirect impacts to black-breasted button quail as a result of the Proposed Action are detailed in Table 6-27, along with how these impacts will be managed and any residual impact that will affect the MNES. Avoidance, mitigation and management measures are discussed in detail in Section 7.

TABLE 6-27 INDIRECT IMPACTS TO BLACK-BREASTED BUTTON QUAIL

Indirect Impact	**Management of Indirect Impact**	**Residual Impact**
Habitat Loss and Individual Mortality from Vegetation Clearing	The impact of habitat loss is considered a direct impact and has been addressed in the above Section. The following points refer to the potential indirect impact of individual mortality during vegetation clearing associated with the Proposed Action. • Areas identified as MNES habitat will be avoided as much as possible at the design and micro-siting stages.	The management measures to mitigate direct fatality or injury during construction and operation will result in the successful avoidance of impact to the species. This is such that any black-breasted button quail found within the Disturbance Footprint in pre-clearance surveys will be closely

Indirect Impact	Management of Indirect Impact	Residual Impact
	• Clear delineation of areas to be cleared, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. • Pre-clearance surveys and fauna spotter catchers will be utilised. Microhabitat features (e.g. hollow bearing trees) will be avoided where sufficient flexibility is enabled by State and Federal approvals. • Staff and contractors will be made aware through general site induction and training of the potential to impact native fauna, reporting requirements and mitigation and management measures that are to be implemented during on-site works. • Vehicles, plant and machinery will comply with site-specific speed limits to minimise the likelihood of collision with fauna. • Where trenching and excavations are created which may entrap fauna, suitable escape measures will be put in place, and excavations checked for fauna before backfilling. • Weekly site inspections to review flora and fauna control measures during construction. Sightings and incidents reported in daily pre-starts during construction. All near misses and incidents will be investigated to establish root cause. Where necessary corrective actions will be developed to improve existing processes.	monitored, allowed to self-disperse, and worst-case scenario translocated to safer habitat such that no indirect residual impact will result.
Habitat Fragmentation and Patch Isolation	• Areas identified as MNES habitat will be avoided as much as possible at the design and micro-siting stages. • Micro-siting of infrastructure will utilise existing clearance areas and avoid habitat fragmentation and patch isolation, with consideration of whether avoidance areas would still be connected to habitat in the broader landscape. • Prior to construction and detailed design, the incorporation of road pinch points to maximise connectivity will be considered to maintain habitat connectivity. While pinch points have a benefit for habitat they present a technical and logistical barrier to safe and effective construction. Pre-clearance surveys will determine appropriate locations for road pinch points. • Location of infrastructure will prioritise avoiding or minimising edge effects or dissecting tracts of native vegetation. • Where possible, the Proposed Action will implement the use of innovative turbine blade transportation, including methods to minimise necessary clearance widths (e.g. 'Blade Manipulator' trucks). • Turbine placement will maximise the use of areas that are less vegetated to avoid and minimise clearing of key habitat.	Habitat fragmentation and patch isolation will be managed to ensure that black-breasted button quail are able to move and disperse throughout the entirety of identified habitat, maintaining connectivity with the landscape within and surrounding the Study Area. All clearing for access corridors will be limited to 40 m. Additionally, the Proposed Action will not remove or isolate habitat patches altogether, only clearing in the areas necessary for infrastructure. Therefore, this indirect impact will be minimised so as not to cause an indirect residual impact.

Indirect Impact	Management of Indirect Impact	Residual Impact
	• All clearing for access corridors will be limited to 40 m in width during the construction phase. • Clear delineation of areas to be cleared, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. Toolbox talks will relay site-specific clearing information to all field staff and contractors. • Rehabilitation of access corridors will occur once construction has been completed. Such rehabilitation will involve planting/natural regeneration of native species that are habitat for MNES.	
Increased Prevalence of Invasive Plants and Animals	• A Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • Staff and contractors will be given information on the location and consequences of biosecurity threats in the Study Area. • Access to a landholder's property will not occur unless authorised under a land use agreement. • WONS and Restrictive Invasive Species will be identified and monitored in the Study Area. Appropriate weed monitoring will occur to ensure new weed species are identified, recorded and controlled. • Weed management and control methods will depend upon the location, weed species identified, the degree of the infestation, relevant landholder agreement or conduct and compensation agreements provisions, and local, state and national regulatory requirements. • Weed loads will be mimimised in high-traffic areas such as roads, easements and yards through regular monitoring and site personnel reporting protocols, with an investigation to be managed to prevent spread of weeds in accordance with the *Biosecurity Act 2014* (Qld). • Imported material able to transport weed seed will be assessed to ensure they are free of contamination, disease and invasive weeds.	Management measures will limit the possibility of the introduction or spread of invasive plant and animal species through relevant biosecurity measures incorporated into the Biosecurity Management. This is such that the indirect impact will be minimised so as not to cause an indirect residual impact to the species.

Indirect Impact	Management of Indirect Impact	Residual Impact
Increased Vehicle Impacts on Fauna and Habitat	• No driving will occur in unauthorised areas, routes and access tracks will be clearly communicated to all site visitors. All driving will be carried out at safe speeds designated for the site. • Site entry and exit points will be clearly marked to ensure vehicle movements are contained within the approved areas. • Staff and contractors will be made aware through general site induction and training of the potential to impact native fauna, reporting requirements and mitigation and management measures that are to be implemented during on-site works. • Injured, sick or dead fauna will be recorded and reported, during and after the construction and operation phases. This can be carried out by a fauna spotter-catcher during periods where disturbance is expected to occur (primarily construction activities). Where injured or sick fauna is detected, individuals will be taken to the nearest wildlife carer or veterinarian if practical.	Implementation of management measures will ensure operating vehicles on-site during the construction, operation and decommissioning phases will not result in residual impacts to black-breasted button quail.
Altered Fire Regimes and Bushfire Risk	• A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES habitat. • Maintenance of an asset protection zone within the Operations Footprint is required to reduce the risk of reduction of habitat due to fire. • Use of industry best practice hazard reduction measures to minimise bushfire risk and environmental impacts, such as on-site controlled burning of cleared vegetation. • Ensuring a 30 m bushfire setback from vegetation around electrical infrastructure. Maintaining safe distances between vegetation and potential fire-starting hazards will increase safety and reduce fire risk. • Weed management and control methods (in line with the requirements of the *Biosecurity Act 2014* (Qld)) will reduce the potential of invasive plants changing species composition on-site and increasing fire risk. • Reduce on-site fuel loads and maintain firebreaks and trails.	Management measures implemented in line with the site-specific Bushfire Management Plan will greatly reduce the potential risk for this species caused by planned or unplanned fires. Therefore, there is no anticipated indirect residual impact.
Altered Hydrology	• The Proposed Action will adopt best practice erosion and sediment control measures, which will implement all relevant State Codes and Guidelines. • Watercourse crossings shall be stabilised to mitigate erosion of pavement and embankment materials during rainfall events up to and including the 10% AEP storm event. • Staff and contractors will be made aware through general site induction and training of the potential to generate runoff and mitigation and management measures that should be implemented. • Construction activities must not interfere or block natural drainage e.g. disturbing channel contours.	Impacts to on-site hydrology will be managed in accordance with the CEMP. Impacts to watercourses will be addressed by stabilising to prevent erosion, and only occur in discrete work areas, such that no increase in sedimentation is overserved affecting habitat. Therefore, there is no anticipated indirect residual impact.

Indirect Impact	Management of Indirect Impact	Residual Impact
	• Water barrier works will be designed to minimise impact on fish habitats, stock or movements through compliance with relevant design codes. During the detailed design phase, fish passage elements will be considered in all mapped waterways for fish passage, including compliance with the accepted development requirements for waterway barrier works or an operational works permit under the Planning Act.	
Environmental Pollution and Hazardous Materials	• All hazardous materials bought on-site will be accompanied by an MSDS, all relevant personnel will be trained in their proper use. • Only registered herbicides will be used for weed management by a suitably qualified bush regeneration contractor. • Imported materials that are able to transport hazardous substances will be assessed to ensure they are free of contamination, disease and invasive species. • Ensuring appropriate waste management (lidded bins), to reduce potential for spread of hazardous materials on-site. • Vehicles, plant and machinery will comply with site-specific speed limits to minimise noise and dust generation. • Staff and contractors will be made aware through general site induction and training of the potential to generate dust, light and noise pollution and management measures that should be implemented. • Auditing of the CEMP will occur during construction. • Dust will be minimised through engineering controls on machinery and other available dust suppression controls, such as sprinklers. • Light pollution will be minimised through engineering controls on infrastructure and machinery, such as colour selection and timing controls. • Noise will be minimised through engineering controls on infrastructure and machinery, such as noise barriers and timing controls. • Disturbance form blasting will be minimised through engineering controls and other available blasting suppression, such as barrier walls. • Electricity infrastructure designed to allow for safe operations, using buffers between conductors and the ground, and conductors and adjacent vegetation. The transmission line has adopted a design which allows for reduced interference to canopy dwelling species due to minimising impacts to canopy vegetation.	The management measures proposed will result in the reduction of the indirect impacts of environmental pollution and hazardous materials. Hazardous materials brought onto the site will be tightly regulated. Dust, light and noise generation will be minimised such that is it unlikely to adversely affect species or damage species habitat. These measures will ensure that the indirect impact is minimised so as to not cause an indirect residual impact to black-breasted button quail.

Indirect Impact	Management of Indirect Impact	Residual Impact
Site Alienation	• Locating turbines and access corridors away from key habitats where feasible (including remnant vegetation, waterways and drainage lines) reducing disturbance during all phases of the Proposed Action. • Mitigating habitat fragmentation and maintaining connectivity through the measures outlined above. • Using turbines with an RSA >40 m above ground level to provide a collision-free foraging zone within the canopy and 20 m above the canopy, reducing operational disturbance to terrestrial species. • Development and implementation of management plans (VFMP, CEMP) outlined above to reduce the potential impact of construction and operation phase activities including introducing invasive species, fire and altered hydrology. • Implementing engineering controls on infrastructure and machinery outlined above, such that dust, light and noise pollution and blasting does not adversely affect species or species habitat.	The potential risk of site alienation will be managed to ensure that species are able to move, disperse and utilise habitat throughout the Study Area for the life of the Proposed Action. Avoidance, mitigation and management measures outlined in this PER will ensure that the potential for site alienation is minimised so as to not cause an indirect residual impact to black-breasted button quail.

Indirect impacts from the Proposed Action will be mitigated and managed appropriately, such that there is no residual impact on black-breasted button quail. Some indirect impacts have been considered as part of the significant impact assessment for this species but are concluded unlikely to contribute to a significant impact

6.6.9.3 SIGNIFICANT IMPACT ASSESSMENT

There is a total of 277.2 ha of Potential Foraging and Roosting Habitat for the species within the Study Area, 4.4 ha of which is expected to be permanently impacted as a result of the Proposed Action.

A significant impact assessment based on the guidance provided in the SIG 1.1 is presented in Table 6-28. It has been concluded that the Proposed Action is **unlikely** to have a significant impact on the black-breasted button quail. Avoidance, mitigation and management measures considered within this assessment are discussed in detail in Section 7.

TABLE 6-28 SIGNIFICANT IMPACT ASSESSMENT FOR THE BLACK-BREASTED BUTTONQUAIL

Criteria	Description	Criteria Triggered?
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
Lead to a long-term decrease in the size of an important population of a species;	Black-breasted buttonquail is considered potential to occur within the Study Area. A total of 277.2 ha of Potential Foraging and Roosting Habitat for this species has been identified within the Study Area,	Unlikely

Criteria	Description	Criteria Triggered?
	however no individuals have been recorded within the Study Area or Locality within the last 20 years. As there is no known population of black-breasted buttonquail within the Study Area, it is unlikely that any potential population would be an 'important population'. It is therefore unlikely that the Proposed Action will lead to a long-term decrease in the size of an important population of the species.	
Reduce the area of occupancy of an important population;	The species is estimated to have an area of occupancy of 75,000 ha (Garnett & Crowley, 2000) and given the broad-scale loss of vine thicket vegetation and other black-breasted button-quail habitat (up to 90%, as suggested in Hamley et al., 1997), it is highly likely that the remaining distribution is severely fragmented (DoE, 2015a). Black-breasted buttonquail is considered potential to occur within the Study Area. A total of 277.2 ha of Potential Foraging and Roosting Habitat for this species has been identified within the Study Area, however no individuals have been recorded within the Study Area or Locality within the last 20 years. As there is no known population of black-breasted buttonquail within the Study Area, it is unlikely that any potential population would be an 'important population'. It is therefore unlikely that the Proposed Action will reduce the area of occupancy of an important population.	Unlikely
Fragment an existing important population into two or more populations;	Black-breasted buttonquail is considered potential to occur within the Study Area. A total of 277.2 ha of Potential Foraging and Roosting Habitat for this species has been identified within the Study Area, however no individuals have been recorded within the Study Area or Locality within the last 20 years. As there is no known population of black-breasted buttonquail within the Study Area, it is unlikely that any potential population would be an 'important population'. It is therefore unlikely that the Proposed Action will fragment an existing important population into two or more populations.	Unlikely
Adversely affect habitat critical to the survival of a species;	Black-breasted buttonquail is considered as having the potential to occur within the Study Area. A total 277.2 ha of Potential Foraging and Roosting Habitat for this species has been identified within the Study Area. Habitat critical to the survival of the black-breasted buttonquail has been defined within the National Recovery Plan for Black-breasted Button-quail (*Turnix melanogaster*) (Mathieson & Smith, 2009): • Foraging and breeding habitat;	Unlikely

Criteria	Description	Criteria Triggered?
	• Habitat for the long-term maintenance of the species; • Areas with potential habitat; and • Areas supporting recovery. Based on this definition, the potential habitat within the Study Area constitutes habitat critical to the survival of the species. A total of 4.4 ha of Potential Foraging and Roosting Habitat will be subject to disturbance by the Proposed Action. Impact to this 4.4 ha of habitat critical to the survival of the species is not considered to be 'adverse' given the very limited area impacted (1.6% of available habitat in the Study Area). Therefore, the Proposed Action is unlikely to adversely affect habitat critical to the survival of the species.	
Disrupt the breeding cycle of an important population;	Black-breasted buttonquail is considered potential to occur within the Study Area. A total of 277.2 ha of Potential Foraging and Roosting Habitat for this species has been identified within the Study Area, however no individuals have been recorded within the Study Area or Locality within the last 20 years. There is not expected to be any important population of the black-breasted buttonquail in the Study Area, due to the lack of records of the species in the Locality, and the fragmented existence of potential habitat. Therefore, impact to 4.4 ha of Potential Foraging and Roosting Habitat (1.6% of available habitat in the Study Area) is unlikely to disrupt the breeding cycle of an important population.	Unlikely
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;	Black-breasted buttonquail is considered potential to occur within the Study Area. A total of 277.2 ha of Potential Foraging and Roosting Habitat for this species has been identified within the Study Area, however no individuals have been recorded within the Study Area or Locality within the last 20 years. Due to the absence of any records of the species, and the fragmented existence of potential habitat, it is unlikely that impact to 4.4 ha of Potential Foraging and Roosting Habitat (1.6% of available habitat in the Study Area) would modify this species habitat to the extent that the species would decline.	Unlikely
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;	Based on the species conservation advice (DoE, 2015a), both invasive flora and fauna species have been identified as a threat to the black-breasted buttonquail. These include: • Habitat degradation as a result of domestic livestock and feral pigs (*Sus scrofa*); and • Predation by feral animals such as feral cats (*Felis catus*) and foxes (*Vulpes vulpes*).	Unlikely

Criteria	Description	Criteria Triggered?
	Biosecurity risks associated with the Proposed Action will be managed with a Biosecurity Plan, as outlined in Section 7. By ensuring that this plan is adequately followed, it is considered unlikely that the Proposed Action will result in increasing the risk of any of the above invasive species becoming established in this species habitat.	
Introduce disease that may cause the species to decline; and	No specific disease has been identified within the approved conservation advice as a threat to this species (DoE, 2015a). Biosecurity risks associated with the Proposed Action will be managed with a Biosecurity Plan, as outlined in Section 7. By ensuring that this plan is adequately followed, it is considered unlikely that the Project will introduce a disease that may cause the species to decline.	Unlikely
Interfere substantially with the recovery of the species.	The main recovery plan objectives for this species, outlined in National Recovery Plan for Black-breasted Button-quail (*Turnix melanogaster*) (Mathieson & Smith, 2009), include: • By 2032, maintain and improve the extent, condition and connectivity of habitat of the Black-breasted Button-quail; • By 2032, demonstrably reduce the severity of identified anthropogenic threats across the extent of the species' range; • By 2032, achieve, measure and sustain a stable or positive trend in area of occupancy and population size (assessed by new baseline counts) in the number of mature individuals of the Black-breasted Button-quail; and • This will be achieved by implementing the actions set out in this recovery plan that minimise threats while protecting and enhancing the species' habitat throughout its range, adequately monitoring the species, generating new knowledge to guide recovery actions and increasing public awareness. Although the Proposed Action will result in the disturbance of 4.4 ha of Potential Foraging and Roosting Habitat, as this habitat is only potential (no population has been identified within the Study Area) it is considered unlikely that this impact will interfere with the recovery of the species.	Unlikely
Significant Impact: Unlikely		

6.6.10 AUSTRALIAN PAINTED SNIPE

6.6.10.1 DIRECT IMPACTS

Direct impacts to Australian painted snipe associated with the Proposed Action are considered to be limited to habitat loss from vegetation clearing. These impacts are quantified below and include impacts to:

- 1.3 ha of Potential Foraging Habitat.

It is expected that some impacted areas of Australian painted snipe habitat will be revegetated after the construction phase. However, no rehabilitation or revegetation in these areas is expected to restore any functionality for this species post-construction. Therefore, the direct impact to Australian painted snipe associated with construction-phase clearing is considered permanent.

A quantitative risk assessment of direct impact to Australian painted snipe associated with the operational-phase collision risk with wind turbines is presented in the BBMP (Appendix D). In summary:

- The species is listed as endangered under the EPBC Act;
- No records exist for the species within the Study Area or Locality;
- No recent records (last 20 years) exist within the broader locality (several undated or outdated records exist);
- Population size is estimated to be at 2,500 individuals (DSEWPC, 2013);
- Flight height is usually below RSA (low level flight in wetlands) or greater than the RSA (migrating); and
- Potential foraging and roosting habitat in the form of farm dams present.

Based on the CRA methodology and risk matrix detailed within the BBMP (Appendix D), the Australian painted snipe has a 'moderately likely' likelihood of WTG collision, and as an endangered EPBC Act listed species, the consequence of an impact event is considered to be 'major'. Therefore, the species has been considered to be at a 'moderate' risk of being impacted by the Proposed Action through collision with WTGs. Further detail on the CRA is provided in Section 6.11 and within the BBMP (Appendix D).

The BBMP establishes species-specific impact thresholds and associated triggers for turbine-related mortality, along with the decision-making framework and adaptive management responses required when thresholds are reached. These thresholds include an Annual Threshold and a Significant Impact Threshold, the latter comprising an intermediate trigger (Trigger 1) and a significant impact trigger (Trigger 2). Based on an Australian population estimate of 2,500 individuals, the Trigger 2 for Australian painted snipe is 2 mortalities (0.1% of population) over a 10-year period (based on generational time). Adaptive management measures and corrective actions will be implemented proactively to avoid progression toward a Trigger 2 (a significant impact), including actions triggered by exceeding the Annual Threshold and/or Significant Impact Threshold Trigger 1. However, if a significant impact (Trigger 2) is reached for any bird or bat species, the Proponent must cease operation of the WTGs identified as contributing to the MNES mortality during ecologically relevant periods. WTGs must not recommence operation until approval is given from DCCEEW.

A summary of the direct impacts to Australian painted snipe habitat as a result of the Proposed Action is shown in Table 6-29. A total of 1.3 ha of Australian painted snipe habitat will be permanently impacted by the Proposed Action, which equates to 2.4% of the total available habitat identified within the Study Area.

TABLE 6-29 DIRECT IMPACTS TO AUSTRALIAN PAINTED SNIPE HABITAT

	Potential Foraging Habitat
Study Area (ha)	56
Disturbance Footprint (ha)	1.3
Percent of habitat within the Study Area to be impacted	2.4% of Potential Foraging Habitat within the Study Area
Permanent impact (Operations Footprint) (ha)	**1.3**

6.6.10.2 INDIRECT IMPACTS

The indirect impacts to Australian painted snipe as a result of the Proposed Action are detailed in Table 6-30, along with how these impacts will be managed and any residual impact that will affect the MNES. Avoidance, mitigation and management measures are discussed in detail in Section 7.

TABLE 6-30 INDIRECT IMPACTS TO AUSTRALIAN PAINTED SNIPE

Indirect Impact	Management of Indirect Impact	Residual Impact
Habitat Loss and Individual Mortality from Vegetation Clearing	The impact of habitat loss is considered a direct impact and has been addressed in the above Section. The following points refer to the potential indirect impact of individual mortality during vegetation clearing associated with the Proposed Action. • Areas identified as MNES habitat will be avoided as much as possible at the design and micro-siting stages. • Clear delineation of areas to be cleared, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. • Pre-clearance surveys and fauna spotter catchers will be utilised. Microhabitat features (e.g. hollow bearing trees) will be avoided where sufficient flexibility is enabled by State and Federal approvals. • Staff and contractors will be made aware through general site induction and training of the potential to impact native fauna, reporting requirements and mitigation and management measures that are to be implemented during on-site works. • Vehicles, plant and machinery will comply with site-specific speed limits to minimise the likelihood of collision with fauna. • Where trenching and excavations are created which may entrap fauna, suitable escape measures will be put in place, and excavations checked for fauna before backfilling. • Weekly site inspections to review flora and fauna control measures during construction. Sightings and incidents reported in daily pre-starts during construction. All near misses and incidents will be investigated to establish root cause. Where necessary corrective actions will be developed to improve existing processes.	The management measures to mitigate direct fatality or injury during construction and operation will result in the successful avoidance of impact to the species. This is such that any Australian painted snipe found within the Disturbance Footprint in pre-clearance surveys will be closely monitored, allowed to self-disperse, and worst-case scenario translocated to safer habitat such that no indirect residual impact will result.

Indirect Impact	Management of Indirect Impact	Residual Impact
Habitat Fragmentation and Patch Isolation	• Areas identified as MNES habitat will be avoided as much as possible at the design and micro-siting stages. • Micro-siting of infrastructure will utilise existing clearance areas and avoid habitat fragmentation and patch isolation, with consideration of whether avoidance areas would still be connected to habitat in the broader landscape. • Prior to construction and detailed design, the incorporation of road pinch points to maximise connectivity will be considered to maintain habitat connectivity. While pinch points have a benefit for habitat they present a technical and logistical barrier to safe and effective construction. Pre-clearance surveys will determine appropriate locations for road pinch points. • Location of infrastructure will prioritise avoiding or minimising edge effects or dissecting tracts of native vegetation. • Where possible, the Proposed Action will implement the use of innovative turbine blade transportation, including methods to minimise necessary clearance widths (e.g. 'Blade Manipulator' trucks). • Turbine placement will maximise the use of areas that are less vegetated to avoid and minimise clearing of key habitat. • All clearing for access corridors will be limited to 40 m in width during the construction phase. • Clear delineation of areas to be cleared, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. Toolbox talks will relay site-specific clearing information to all field staff and contractors. • Rehabilitation of access corridors will occur once construction has been completed. Such rehabilitation will involve planting/natural regeneration of native species that are habitat for MNES.	Habitat fragmentation and patch isolation will be managed to ensure that Australian painted snipe are able to move and disperse throughout the entirety of identified habitat, maintaining connectivity with the landscape within and surrounding the Study Area. All clearing for access corridors will be limited to 40 m. Additionally, the Proposed Action will not remove or isolate habitat patches altogether, only clearing in the areas necessary for infrastructure. Therefore, this indirect impact will be minimised so as not to cause an indirect residual impact.
Increased Prevalence of Invasive Plants and Animals	• A Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • Staff and contractors will be given information on the location and consequences of biosecurity threats in the Study Area. • Access to a landholder's property will not occur unless authorised under a land use agreement. • WONS and Restrictive Invasive Species will be identified and monitored in the Study Area. Appropriate weed monitoring will occur to	Management measures will limit the possibility of the introduction or spread of invasive plant and animal species through relevant biosecurity measures incorporated into the Biosecurity Management Plan. This is such that the indirect impact will be minimised so as not to cause an indirect residual impact to the species.

Indirect Impact	Management of Indirect Impact	Residual Impact
	ensure new weed species are identified, recorded and controlled. • Weed management and control methods will depend upon the location, weed species identified, the degree of the infestation, relevant landholder agreement or conduct and compensation agreements provisions, and local, state and national regulatory requirements. • Weed loads will be mimimised in high-traffic areas such as roads, easements and yards through regular monitoring and site personnel reporting protocols, with an investigation to be managed to prevent spread of weeds in accordance with the *Biosecurity Act 2014* (Qld). • Imported material able to transport weed seed will be assessed to ensure they are free of contamination, disease and invasive weeds.	
Increased Vehicle Impacts on Fauna and Habitat	• No driving will occur in unauthorised areas, routes and access tracks will be clearly communicated to all site visitors. All driving will be carried out at safe speeds designated for the site. Night-time safe driving controls will also be applied, including additional speed restrictions, providing additional protection to nocturnal animals. • Site entry and exit points will be clearly marked to ensure vehicle movements are contained within the approved areas. • Staff and contractors will be made aware through general site induction and training of the potential to impact native fauna, reporting requirements and mitigation and management measures that are to be implemented during on-site works. • Injured, sick or dead fauna will be recorded and reported, during and after the construction and operation phases. This can be carried out by a fauna spotter-catcher during periods where disturbance is expected to occur (primarily construction activities). Where injured or sick fauna is detected, individuals will be taken to the nearest wildlife carer or veterinarian if practical.	Implementation of management measures will ensure operating vehicles on-site during the construction, operation and decommissioning phases will not result in residual impacts to Australian painted snipe.
Altered Fire Regimes and Bushfire Risk	• A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES habitat. • Maintenance of an asset protection zone within the Operations Footprint is required to reduce the risk of reduction of habitat due to fire. • Use of industry best practice hazard reduction measures to minimise bushfire risk and environmental impacts, such as on-site controlled burning of cleared vegetation. • Ensuring a 30 m bushfire setback from vegetation around electrical infrastructure.	Management measures implemented in line with the site-specific Bushfire Management Plan will greatly reduce the potential risk for this species caused by planned or unplanned fires. Therefore, there is no anticipated indirect residual impact.

Indirect Impact	Management of Indirect Impact	Residual Impact
	Maintaining safe distances between vegetation and potential fire-starting hazards will increase safety and reduce fire risk. • Weed management and control methods (in line with the requirements of the *Biosecurity Act 2014* (Qld)) will reduce the potential of invasive plants changing species composition on-site and increasing fire risk. • Reduce on-site fuel loads and maintain firebreaks and trails.	
Altered Hydrology	• The Proposed Action will adopt best practice erosion and sediment control measures, which will implement all relevant State Codes and Guidelines. • Watercourse crossings shall be stabilised to mitigate erosion of pavement and embankment materials during rainfall events up to and including the 10% AEP storm event. • Staff and contractors will be made aware through general site induction and training of the potential to generate runoff and mitigation and management measures that should be implemented. • Construction activities must not interfere or block natural drainage e.g. disturbing channel contours. • Water barrier works will be designed to minimise impact on fish habitats, stock or movements through compliance with relevant design codes. During the detailed design phase, fish passage elements will be considered in all mapped waterways for fish passage, including compliance with the accepted development requirements for waterway barrier works or an operational works permit under the Planning Act.	Impacts to on-site hydrology will be managed in accordance with the CEMP. Impacts to watercourses will be addressed by stabilising to prevent erosion, and only occur in discrete work areas, such that no increase in sedimentation is overserved affecting habitat. Therefore, there is no anticipated indirect residual impact.
Environmental Pollution and Hazardous Materials	• All hazardous materials bought on-site will be accompanied by an MSDS, all relevant personnel will be trained in their proper use. • Only registered herbicides will be used for weed management by a suitably qualified bush regeneration contractor. • Imported materials that are able to transport hazardous substances will be assessed to ensure they are free of contamination, disease and invasive species. • Ensuring appropriate waste management (lidded bins), to reduce potential for spread of hazardous materials on-site. • Vehicles, plant and machinery will comply with site-specific speed limits to minimise noise and dust generation. • Staff and contractors will be made aware through general site induction and training of the potential to generate dust, light and noise pollution and management measures that should be implemented. • Auditing of the CEMP will occur during construction.	The management measures proposed will result in the reduction of the indirect impacts of environmental pollution and hazardous materials. Hazardous materials brought onto the site will be tightly regulated. Dust, light and noise generation will be minimised such that is it unlikely to adversely affect species or damage species habitat. These measures will ensure that the indirect impact is minimised so as to not cause an indirect residual impact to Australian painted snipe.

Indirect Impact	Management of Indirect Impact	Residual Impact
	• Dust will be minimised through engineering controls on machinery and other available dust suppression controls, such as sprinklers. • Light pollution will be minimised through engineering controls on infrastructure and machinery, such as colour selection and timing controls. • Noise will be minimised through engineering controls on infrastructure and machinery, such as noise barriers and timing controls. • Disturbance form blasting will be minimised through engineering controls and other available blasting suppression, such as barrier walls. • Electricity infrastructure designed to allow for safe operations, using buffers between conductors and the ground, and conductors and adjacent vegetation. The transmission line has adopted a design which allows for reduced interference to canopy dwelling species due to minimising impacts to canopy vegetation.	
Site Alienation	• Locating turbines and access corridors away from key habitats where feasible (including remnant vegetation, waterways and drainage lines) reducing disturbance during all phases of the Proposed Action. • Mitigating habitat fragmentation and maintaining connectivity through the measures outlined above. • Using turbines with an RSA >40 m above ground level to provide a collision-free foraging zone within the canopy and 20 m above the canopy, reducing operational disturbance to terrestrial species. • Development and implementation of management plans (VFMP, CEMP) outlined above to reduce the potential impact of construction and operation phase activities including introducing invasive species, fire and altered hydrology. • Implementing engineering controls on infrastructure and machinery outlined above, such that dust, light and noise pollution and blasting does not adversely affect species or species habitat.	The potential risk of site alienation will be managed to ensure that species are able to move, disperse and utilise habitat throughout the Study Area for the life of the Proposed Action. Avoidance, mitigation and management measures outlined in this PER will ensure that the potential for site alienation is minimised so as to not cause an indirect residual impact to Australian painted snipe.

Indirect impacts from the Proposed Action will be mitigated and managed appropriately, such that there is no residual impact on Australian painted snipe. Some indirect impacts have been considered as part of the significant impact assessment for this species but are concluded unlikely to contribute to a significant impact

6.6.10.3 SIGNIFICANT IMPACT ASSESSMENT

There is a total of 56.0 ha of Potential Foraging Habitat for the species within the Study Area, 1.3 ha of which is expected to be permanently impacted as a result of the Proposed Action.

A significant impact assessment based on the guidance provided in the SIG 1.1 is presented in Table 6-31. It has been concluded that the Proposed Action is **unlikely** to have a significant impact on the Australian painted snipe. Avoidance, mitigation and management measures considered within this assessment are discussed in detail in Section 7.

TABLE 6-31 SIGNIFICANT IMPACT ASSESSMENT FOR THE AUSTRALIAN PAINTED SNIPE

Criteria	Description	Criteria Triggered?
An action is likely to have a significant impact on an endangered species if there is a real chance or possibility that it will:		
Lead to a long-term decrease in the size of a population,	The Australian painted snipe is considered potential to occur within the Study Area with no known population observed during field surveys. It is expected that 1.3 ha (or 2.4%) of Australian painted snipe Potential Foraging Habitat will be impacted as a result of the Proposed Action. The Proposed Action's activities are unlikely to cause a local population to experience decline as there is no current evidence to suggest a local population utilises this habitat. Additionally, the impacts that will occur are small in size (2.4% of total habitat available), are mostly linear in nature, and are unlikely to impact any potentially occurring populations.	Unlikely
Reduce the area of occupancy of the species,	The current extent of occurrence for the species is extensive, at 4,500,000 km² ha, though the area of occupancy is estimated (with low reliability) to be 1,000 km² (Garnett & Crowley, 2000). Impact to 1.3 ha of potential habitat is considered unlikely to reduce this area of occupancy.	Unlikely
Fragment an existing population into two or more populations,	The Australian painted snipe is considered potential to occur within the Study Area with no known population observed during field surveys. It is expected that 1.3 ha (or 2.4%) of Australian painted snipe Potential Foraging Habitat will be impacted as a result of the Proposed Action. However, due to the high mobility of the species, the small area of impact to habitat, and the lack of evidence of a population utilising habitat within the Study Area, it is considered unlikely that an impact to 1.3 ha of Potential Foraging Habitat will fragment an existing population into two or more populations.	Unlikely
Adversely affect habitat critical to the survival of a species,	While Potential Foraging Habitat for this species has been mapped, this habitat is not considered to constitute habitat critical to the survival of the species due to its degraded nature. Habitat is in poor condition due to the historical cattle grazing within the Study Area. Therefore, the Proposed Action's impact to 1.3 ha of Potential Foraging Habitat is unlikely to adversely affect habitat critical to the survival of this species.	Unlikely

Criteria	Description	Criteria Triggered?
Disrupt the breeding cycle of a population,	No breeding habitat was identified within the Study Area, as the species requires shallow freshwater wetlands with interspersed small islands and nearby canopy cover. As there is no such habitat in the Study Area, it is unlikely that breeding cycles will be directly impacted. A species breeding cycle can be disrupted due to substantial changes in foraging behaviour, however the limited impact to 1.3 ha of Potential Foraging Habitat is unlikely to lead to a substantial impact. Ultimately, considering the lack of breeding habitat within the Study Area, and the limited value of foraging habitat, it is unlikely that the Proposed Action's impacts would disrupt the species breeding cycle.	Unlikely
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline,	The Proposed Action will result in the disturbance of 1.3 ha (or 2.4%) of Australian painted snipe Potential Foraging Habitat. This accounts for only a small area of habitat to be removed in relation to the larger context of the Study Area, which supports 56.0 ha of Potential Foraging Habitat for Australian painted snipe in total. It is expected that the limited amount of disturbance in the larger context of the landscape will not remove, isolate or decrease the quality of habitat such that it would result in species to decline.	Unlikely
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	The following invasive species are expected to be detrimental to the Australian painted snipe (DSEWPC, 2013): • Livestock via grazing and trampling of wetland vegetation and nests; • Feral foxes and cats via predation; and • Weeds that replace native wetland vegetation. The Proposed Action activities during construction and operation will adopt and follow biosecurity measures to prevent introduction of new invasive species or the spread of those known to the Study Area (see Section 7). The Study Area has been historically used for cattle grazing, and therefore no new impacts will arise as a result of the Proposed Action with regards to livestock.	Unlikely
Introduce disease that may cause the species to decline, or	The conservation advice for Australian painted snipe does not list any diseases as harmful to the species (DSEWPC, 2013). There is also no evidence to suggest the proposed disturbance would introduce a disease that would cause the species to decline. Additionally, precautions will be taken to ensure that the spread of disease does not occur. This includes following biosecurity measures as part of a Biosecurity Plan (see Section 7).	Unlikely
Interfere with the recovery of the species.	There are no formally adopted recovery plans for this species, but the conservation advice lists regional priority recovery actions that involve abatement/research of the following threats (DSEWPC, 2013):	Unlikely

Criteria	Description	Criteria Triggered?
	• Habitat loss, disturbance and modification; • Invasive weeds; • Trampling, browsing and grazing; • Animal predation or competition; and • Fire. Impacts to Potential Foraging Habitat for Australian painted snipe are limited to 1.3 ha of (2.4% of total habitat available). Other potential threats will be mitigated through implementation of the site-specific CEMP (see Section 7), through fire management, construction management, and biosecurity measures. Considering the potential impacts of the Proposed Action, along with proposed mitigation measures, the Proposed Action is unlikely to result in or exacerbate any of the threats outlined above.	
Significant Impact: Unlikely		

6.6.11 DIAMOND FIRETAIL

6.6.11.1 DIRECT IMPACTS

Direct impacts to diamond firetail associated with the Proposed Action are considered to be limited to habitat loss from vegetation clearing. Impacts due to individual mortality and injury from turbine collision are not anticipated for diamond firetail as this species is typically low-flying and forages close to the ground, well below the RSA. The direct impacts to diamond firetail habitat are quantified below and include impacts to:

- 253.8 ha of Potential Breeding and Foraging Habitat.

It is expected that 158.5 ha of impacted Potential Breeding and Foraging Habitat will be revegetated after the construction phase. Diamond firetail occurs in lightly timbered habitats, including farmland and grassland with scattered trees. They show preference for areas with relatively low tree density, few large logs, and little litter cover but high grass cover (DCCEEW, 2023b). The initial clearing of habitat for diamond firetail is only likely to represent a short-term disturbance to the species, and revegetation is expected to return the functionality required for the diamond firetail in some areas.

The rehabilitation of 158.5 ha of diamond firetail Potential Breeding and Foraging Habitat includes 66.3 ha of Type 1 natural regeneration and 92.2 ha of Type 2 rehabilitation, as shown in Figure 6-5. Further discussion on rehabilitation types, estimated timing to return habitat to its previous functionality, as well as the management measures, completion criteria, interim targets and corrective actions for rehabilitation is provided in Section 8.

A summary of the direct impacts to diamond firetail habitat as a result of the Proposed Action is shown in Table 6-32. A total of 95.3 ha of diamond firetail habitat will be permanently impacted by the Proposed Action, which equates to 1.2% of the total available habitat identified within the Study Area.

TABLE 6-32 DIRECT IMPACTS TO DIAMOND FIRETAIL HABITAT

	Potential Breeding and Foraging Habitat
Study Area (ha)	7,899.3
Disturbance Footprint (ha)	253.8
Percent of habitat within the Study Area to be impacted	3.2% of Potential Breeding and Foraging Habitat within the Study Area
Available **Revegetation areas** within the Disturbance Footprint (ha)	158.5
Permanent impact* (Operations Footprint) (ha)	95.3 (or 1.2%)

**Permanent impact (Operations Footprint) is provided where revegetation and/or rehabilitation can return habitat for the species to function or utilise post-construction (i.e., for recolonisation, dispersal, foraging or breeding).*

Legend

- Study Area
- Operational Footprint
- Electrical Reticulation
- Diamond Firetail Potential Breeding and Foraging Habitat - Type 2 revegetation/rehabilitation
- Diamond Firetail Potential Breeding and Foraging Habitat - Type 1 natural regeneration
- Diamond Firetail Potential Breeding and Foraging Habitat
- Road
- Track and Path

Coordinate System: GDA2020 MGA Zone 56
Date: 28/05/2026
Created By: MB
Drawing Size: A3

0 2 4Km

1:120,000

F6-5 Rehabilitation of Diamond Firetail Potential Breeding and Foraging Habitat

Theodore Wind Farm PER

Theodore Energy Developments Pty Ltd

ERM

0661076_TWF_PER_R8.aprx

6.6.11.2 INDIRECT IMPACTS

The indirect impacts to diamond firetail as a result of the Proposed Action are detailed in Table 6-33, along with how these impacts will be managed and any residual impact that will affect the MNES. Avoidance, mitigation and management measures are discussed in detail in Section 7.

TABLE 6-33 INDIRECT IMPACTS TO DIAMOND FIRETAIL

Indirect Impact	Management of Indirect Impact	Residual Impact
Habitat Loss and Individual Mortality from Vegetation Clearing	The impact of habitat loss is considered a direct impact and has been addressed in the above Section. The following points refer to the potential indirect impact of individual mortality during vegetation clearing associated with the Proposed Action. • Areas identified as MNES habitat will be avoided as much as possible at the design and micro-siting stages. • Clear delineation of areas to be cleared, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. • Pre-clearance surveys and fauna spotter catchers will be utilised. Microhabitat features (e.g. hollow bearing trees) will be avoided where sufficient flexibility is enabled by State and Federal approvals. • Staff and contractors will be made aware through general site induction and training of the potential to impact native fauna, reporting requirements and mitigation and management measures that are to be implemented during on-site works. • Vehicles, plant and machinery will comply with site-specific speed limits to minimise the likelihood of collision with fauna. • Where trenching and excavations are created which may entrap fauna, suitable escape measures will be put in place, and excavations checked for fauna before backfilling. • Weekly site inspections to review flora and fauna control measures during construction. Sightings and incidents reported in daily pre-starts during construction. All near misses and incidents will be investigated to establish root cause. Where necessary corrective actions will be developed to improve existing processes.	The management measures to mitigate direct fatality or injury during construction and operation will result in the successful avoidance of impact to the species. This is such that any diamond firetail found within the Disturbance Footprint in pre-clearance surveys will be closely monitored, allowed to self-disperse, and worst-case scenario translocated to safer habitat such that no indirect residual impact will result.
Habitat Fragmentation and Patch Isolation	• Areas identified as MNES habitat will be avoided as much as possible at the design and micro-siting stages. • Micro-siting of infrastructure will utilise existing clearance areas and avoid habitat fragmentation and patch isolation, with consideration of whether avoidance areas would still be connected to habitat in the broader landscape. • Prior to construction and detailed design, the incorporation of road pinch points to maximise	Habitat fragmentation and patch isolation will be managed to ensure that diamond firetail are able to move and disperse throughout the entirety of identified habitat, maintaining connectivity with the landscape within and surrounding the Study Area. All clearing for access corridors will be limited to 40 m. Additionally, the Proposed Action

Indirect Impact	Management of Indirect Impact	Residual Impact
	connectivity will be considered to maintain habitat connectivity. While pinch points have a benefit for habitat they present a technical and logistical barrier to safe and effective construction. Pre-clearance surveys will determine appropriate locations for road pinch points. • Location of infrastructure will prioritise avoiding or minimising edge effects or dissecting tracts of native vegetation. • Where possible, the Proposed Action will implement the use of innovative turbine blade transportation, including methods to minimise necessary clearance widths (e.g. 'Blade Manipulator' trucks). • Turbine placement will maximise the use of areas that are less vegetated to avoid and minimise clearing of key habitat. • All clearing for access corridors will be limited to 40 m in width during the construction phase. • Clear delineation of areas to be cleared, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. Toolbox talks will relay site-specific clearing information to all field staff and contractors. • Rehabilitation of access corridors will occur once construction has been completed. Such rehabilitation will involve planting/natural regeneration of native species that are habitat for MNES.	will not remove or isolate habitat patches altogether, only clearing in the areas necessary for infrastructure. Therefore, this indirect impact will be minimised so as not to cause an indirect residual impact.
Increased Prevalence of Invasive Plants and Animals	• A Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • Staff and contractors will be given information on the location and consequences of biosecurity threats in the Study Area. • Access to a landholder's property will not occur unless authorised under a land use agreement. • WONS and Restrictive Invasive Species will be identified and monitored in the Study Area. Appropriate weed monitoring will occur to ensure new weed species are identified, recorded and controlled. • Weed management and control methods will depend upon the location, weed species identified, the degree of the infestation, relevant landholder agreement or conduct and compensation agreements provisions, and local, state and national regulatory requirements. • Weed loads will be mimimised in high-traffic areas such as roads, easements and yards through regular monitoring and site personnel	Management measures will limit the possibility of the introduction or spread of invasive plant and animal species through relevant biosecurity measures incorporated into the Biosecurity Management Plan. This is such that the indirect impact will be minimised so as not to cause an indirect residual impact to the species.

Indirect Impact	Management of Indirect Impact	Residual Impact
	reporting protocols, with an investigation to be managed to prevent spread of weeds in accordance with the *Biosecurity Act 2014* (Qld). • Imported material able to transport weed seed will be assessed to ensure they are free of contamination, disease and invasive weeds.	
Increased Vehicle Impacts on Fauna and Habitat	• No driving will occur in unauthorised areas, routes and access tracks will be clearly communicated to all site visitors. All driving will be carried out at safe speeds designated for the site. • Site entry and exit points will be clearly marked to ensure vehicle movements are contained within the approved areas. • Staff and contractors will be made aware through general site induction and training of the potential to impact native fauna, reporting requirements and mitigation and management measures that are to be implemented during on-site works. • Injured, sick or dead fauna will be recorded and reported, during and after the construction and operation phases. This can be carried out by a fauna spotter-catcher during periods where disturbance is expected to occur (primarily construction activities). Where injured or sick fauna is detected, individuals will be taken to the nearest wildlife carer or veterinarian if practical.	Implementation of management measures will ensure operating vehicles on-site during the construction, operation and decommissioning phases will not result in residual impacts to diamond firetail.
Altered Fire Regimes and Bushfire Risk	• A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES habitat. • Maintenance of an asset protection zone within the Operations Footprint is required to reduce the risk of reduction of habitat due to fire. • Use of industry best practice hazard reduction measures to minimise bushfire risk and environmental impacts, such as on-site controlled burning of cleared vegetation. • Ensuring a 30 m bushfire setback from vegetation around electrical infrastructure. Maintaining safe distances between vegetation and potential fire-starting hazards will increase safety and reduce fire risk. • Weed management and control methods (in line with the requirements of the *Biosecurity Act 2014* (Qld).) will reduce the potential of invasive plants changing species composition on-site and increasing fire risk. • Reduce on-site fuel loads and maintain firebreaks and trails.	Management measures implemented in line with the site-specific Bushfire Management Plan will greatly reduce the potential risk for this species caused by planned or unplanned fires. Therefore, there is no anticipated indirect residual impact.

Indirect Impact	Management of Indirect Impact	Residual Impact
Altered Hydrology	• The Proposed Action will adopt best practice erosion and sediment control measures, which will implement all relevant State Codes and Guidelines. • Watercourse crossings shall be stabilised to mitigate erosion of pavement and embankment materials during rainfall events up to and including the 10% AEP storm event. • Staff and contractors will be made aware through general site induction and training of the potential to generate runoff and mitigation and management measures that should be implemented. • Construction activities must not interfere or block natural drainage e.g. disturbing channel contours. • Water barrier works will be designed to minimise impact on fish habitats, stock or movements through compliance with relevant design codes. During the detailed design phase, fish passage elements will be considered in all mapped waterways for fish passage, including compliance with the accepted development requirements for waterway barrier works or an operational works permit under the Planning Act.	Impacts to on-site hydrology will be managed in accordance with the CEMP. Impacts to watercourses will be addressed by stabilising to prevent erosion, and only occur in discrete work areas, such that no increase in sedimentation is overserved affecting habitat. Therefore, there is no anticipated indirect residual impact.
Environmental Pollution and Hazardous Materials	• All hazardous materials bought on-site will be accompanied by an MSDS, all relevant personnel will be trained in their proper use. • Only registered herbicides will be used for weed management by a suitably qualified bush regeneration contractor. • Imported materials that are able to transport hazardous substances will be assessed to ensure they are free of contamination, disease and invasive species. • Ensuring appropriate waste management (lidded bins), to reduce potential for spread of hazardous materials on-site. • Vehicles, plant and machinery will comply with site-specific speed limits to minimise noise and dust generation. • Staff and contractors will be made aware through general site induction and training of the potential to generate dust, light and noise pollution and management measures that should be implemented. • Auditing of the CEMP will occur during construction. • Dust will be minimised through engineering controls on machinery and other available dust suppression controls, such as sprinklers. • Light pollution will be minimised through engineering controls on infrastructure and machinery, such as colour selection and timing controls. • Noise will be minimised through engineering controls on infrastructure and machinery, such as noise barriers and timing controls.	The management measures proposed will result in the reduction of the indirect impacts of environmental pollution and hazardous materials. Hazardous materials brought onto the site will be tightly regulated. Dust, light and noise generation will be minimised such that is it unlikely to adversely affect species or damage species habitat. These measures will ensure that the indirect impact is minimised so as to not cause an indirect residual impact to diamond firetail.

Indirect Impact	Management of Indirect Impact	Residual Impact
	• Disturbance form blasting will be minimised through engineering controls and other available blasting suppression, such as barrier walls. • Electricity infrastructure designed to allow for safe operations, using buffers between conductors and the ground, and conductors and adjacent vegetation. The transmission line has adopted a design which allows for reduced interference to canopy dwelling species due to minimising impacts to canopy vegetation.	
Site Alienation	• Locating turbines and access corridors away from key habitats where feasible (including remnant vegetation, waterways and drainage lines) reducing disturbance during all phases of the Proposed Action. • Mitigating habitat fragmentation and maintaining connectivity through the measures outlined above. • Using turbines with an RSA >40 m above ground level to provide a collision-free foraging zone within the canopy and 20 m above the canopy, reducing operational disturbance to terrestrial species. • Development and implementation of management plans (VFMP, CEMP) outlined above to reduce the potential impact of construction and operation phase activities including introducing invasive species, fire and altered hydrology. • Implementing engineering controls on infrastructure and machinery outlined above, such that dust, light and noise pollution and blasting does not adversely affect species or species habitat.	The potential risk of site alienation will be managed to ensure that species are able to move, disperse and utilise habitat throughout the Study Area for the life of the Proposed Action. Avoidance, mitigation and management measures outlined in this PER will ensure that the potential for site alienation is minimised so as to not cause an indirect residual impact to diamond firetail.

Indirect impacts from the Proposed Action will be mitigated and managed appropriately, such that there is no residual impact on diamond firetail. Some indirect impacts have been considered as part of the significant impact assessment for this species but are concluded unlikely to contribute to a significant impact.

6.6.11.3 SIGNIFICANT IMPACT ASSESSMENT

A total of 7,899.3 ha of diamond firetail Potential Breeding and Foraging Habitat has been mapped to occur within the Study Area. After post-construction revegetation, 95.3 ha of Potential Breeding and Foraging Habitat (1.2% of habitat available within the Study Area) is expected to be permanently impacted as a result of the Proposed Action.

A significant impact assessment based on the guidance provided in the SIG 1.1 is presented in Table 6-34. It has been concluded that the Proposed Action has the **potential** to have a significant impact on the diamond firetail. Avoidance, mitigation and management measures are discussed in detail in Section 7.

TABLE 6-34 SIGNIFICANT IMPACT ASSESSMENT FOR DIAMOND FIRETAIL

Criteria	Description	Criteria Triggered?
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
Lead to a long-term decrease in the size of an important population of a species;	Despite a large survey effort, the diamond firetail has not been observed within the Study Area. However, the species is considered as having the potential to occur due to suitable habitat being identified during field surveys. The total amount of habitat to be permanently impacted as a result of the Proposed Action is 95.3 ha (or 1.2%) of Potential Breeding and Foraging. Impacts will mostly involve clearing of small patches of remnant vegetation for turbines as well as clearing for linear infrastructure. Given the high mobility of this species, habitat within the Study Area will remain largely connected in the landscape, and to higher quality habitat associated with adjacent state forests. Therefore, the Proposed Action is unlikely to lead to a long-term decrease in the size of any potentially occurring populations of diamond firetail.	Unlikely
Reduce the area of occupancy of an important population;	This species' area of occupancy is roughly estimated at 25,000 km^2 (DCCEEW, 2023b). The Proposed Action will lead to an impact to 95.3 ha, or 1.2% of the total available diamond firetail habitat within the Study Area which equates to 0.004% of the species area of occupancy. The broad habitat requirements of this species suggest that this species is likely to have high availability of habitat within the wider region. Although 95.3 ha of habitat will be impacted within the Study Area, the area of retained habitat within the Study Area is likely to continue to support any potentially occurring local populations. Therefore, the Proposed Action is unlikely to reduce the area of occupancy of any potentially occurring populations of diamond firetail.	Unlikely
Fragment an existing important population into two or more populations;	Impacts will mostly involve clearing of small patches of remnant vegetation for turbines as well as clearing for linear infrastructure. Given the high mobility of this species, habitat within the Study Area will remain largely connected in the landscape, and to higher quality habitat associated with adjacent state forests. It is therefore unlikely that the impact to 95.3 ha, or 1.2% of the total available diamond firetail habitat within the Study Area, will result in a barrier to movement for this species, or fragment any existing populations into two or more populations.	Unlikely

Criteria	Description	Criteria Triggered?
Adversely affect habitat critical to the survival of a species;	Habitat critical to the survival of the diamond firetail has been described within the species Conservation Advice (DCCEEW, 2023b) and includes areas with: • Eucalypt, acacia or casuarina woodlands, open forests and other lightly timbered habitats; • Low tree density, few large logs, and little litter cover but high grass cover for foraging, roosting and breeding; • Drooping she-oak (*Allocasuarina verticillata*) within the Mt Lofty Ranges. According to the species conservation advice: • Habitat critical to the survival of diamond firetail should not be cleared, fragmented or degraded; • Any known or likely habitat (identified within the modelled distribution of the species and presented within the species conservation advice (DCCEEW, 2023b)), should be considered as habitat critical to the survival of the species; • Areas that are not currently occupied by the species due to recent disturbance (e.g. fire, grazing or human activity), but should became suitable again in the future, should also be considered habitat critical to the survival of the species (DCCEEW, 2023b). Despite a large survey effort, the diamond firetail has not been observed within the Study Area. Suitable habitat has been identified, though this Potential Habitat is at the northern extent of the species range within the 'may occur' modelled distribution of the species, therefore outside the 'known and likely habitat' identified within the species conservation advice (TSSC, 2015). Based on the information provided above, habitat within the Study Area is considered potential habitat critical to the survival of the diamond firetail. However, the initial construction-phase clearing of diamond firetail habitat is likely to only represent a short-term disturbance to the species. Revegetation is expected to return the functionality of impacted habitat outside of the Operations Footprint, reducing the overall permanent impact to the species. As the species has the potential to occur in the Study Area, it is considered that impacted 95.3 ha (1.2%) of Potential Breeding and Foraging habitat constitutes habitat critical to the survival of the species, and as such the Proposed Action has the potential to adversely affect habitat critical to the survival of the species.	Potential

Criteria	Description	Criteria Triggered?
Disrupt the breeding cycle of an important population;	Despite a large survey effort, the diamond firetail has not been observed within the Study Area. The species is considered as having the potential to occur within the Study Area, with potentially suitable breeding habitat determined to be present. Permanent impacts of the Proposed Action will be limited to 95.8 ha of Potential Breeding and Foraging (1.2% of habitat available within the Study Area). Clearing that occurs during the construction stage will be staged and pre-clearance surveys will identify any potential nests within suitable habitat. Disturbance to any active nests will be avoided/mitigated through micro-siting or, in a worst-case scenario, translocated to safer habitat. Therefore, the Proposed Action is unlikely to disrupt the breeding cycle of an important population.	Unlikely
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;	A total of 253.8 ha of diamond firetail Potential Breeding and Foraging Habitat is expected to be disturbed during construction. After post-construction rehabilitation, which is expected to return the functionality required for the species, the Proposed Action is expected to only impact 95.3 ha, or 1.2% of all available Potential Breeding and Foraging within the Study Area. It is expected that the small area of disturbance in the larger context of the landscape is unlikely to remove/isolate or decrease the quality of habitat that would result in species decline.	Unlikely
Result in invasive species that are harmful to a Vulnerable species becoming established in the endangered species' habitat;	Invasive species such as feral cats (*Felis catus*) and European red foxes (*Vulpes vulpes*) are common pests encountered in Queensland and are particularly harmful to native threatened birds. These invasive species are known to occur in the Study Area. The Proposed Action will adopt and follow a Biosecurity Plan, as outline in Section 7. The activities related to the Proposed Action, both during construction and operation, will implement and follow biosecurity measures to reduce the risk of introducing new invasive species and to prevent the further spread of existing invasive species.	Unlikely
Introduce disease that may cause the species to decline; or	There is currently limited evidence of diseases causing detrimental effects to diamond firetail populations in Queensland. There is also no evidence to suggest the Proposed Action would introduce a disease that may cause the species to decline. Additionally, precautions will be taken to ensure that the spread of disease does not occur. This includes following biosecurity measures that are outlined in Section 7.	Unlikely

Criteria	Description	Criteria Triggered?
Interfere with the recovery of the species.	The Proposed Action is expected to result in permanent impacts to 95.3 ha of Breeding and Foraging Habitat (1.2% of habitat available within the Study Area). Despite a large survey effort, diamond firetail has not been observed within the Study Area. There are no formally adopted recovery plans for this species. However, the limited impact to potential habitat within the Study Area and the mostly linear nature of clearing associated with the Proposed Action is unlikely to affect the recovery of this species. Clearing is unlikely to adversely affect retained areas of suitable habitat, and mitigation measures such as micro-siting and pre-clearance surveys will be utilised. This will enable the species to continually traverse the landscape and utilise retained habitat, ensuring genetic viability of any potentially occurring local population. It is therefore unlikely the Proposed Action will interfere substantially with the recovery of the species.	Unlikely
Significant Impact: Potential		

6.6.12 OOLINE

6.6.12.1 DIRECT IMPACTS

Direct impacts to ooline associated with the Proposed Action are considered to be limited to habitat loss from vegetation clearing. These impacts are quantified below and include impacts to:

- 4.4 ha of Potential Habitat.

It is expected that some impacted areas of ooline habitat will be revegetated after the construction phase. However, no rehabilitation or revegetation in these areas is expected to restore any functionality for this species post-construction. Therefore, the direct impact to ooline associated with construction-phase clearing is considered permanent.

A summary of the direct impacts to ooline habitat as a result of the Proposed Action is shown in Table 6-35. A total of 4.4 ha of ooline habitat will be permanently impacted by the Proposed Action, which equates to 1.6% of the total available habitat identified within the Study Area.

TABLE 6-35 DIRECT IMPACTS TO OOLINE HABITAT

	Potential Habitat
Study Area (ha)	277.2
Disturbance Footprint (ha)	4.4
Percent of habitat within the Study Area to be impacted	1.6% of Potential Habitat within the Study Area
Permanent impact (Operations Footprint) (ha)	**4.4**

6.6.12.2 INDIRECT IMPACTS

The indirect impacts to ooline as a result of the Proposed Action are detailed in Table 6-36, along with how these impacts will be managed and any residual impact that will affect the MNES. Avoidance, mitigation and management measures are discussed in detail in Section 7.

TABLE 6-36 INDIRECT IMPACTS TO OOLINE

Indirect Impact	Management of Indirect Impact	Residual Impact
Habitat Fragmentation and Patch Isolation	• Areas identified as MNES habitat will be avoided as much as possible at the design and micro-siting stages. • Micro-siting of infrastructure will utilise existing clearance areas and avoid habitat fragmentation and patch isolation, with consideration of whether avoidance areas would still be connected to habitat in the broader landscape. • Prior to construction and detailed design, the incorporation of road pinch points to maximise connectivity will be considered to maintain habitat connectivity. While pinch points have a benefit for habitat they present a technical and logistical barrier to safe and effective construction. Pre-clearance surveys will determine appropriate locations for road pinch points. • Location of infrastructure will prioritise avoiding or minimising edge effects or dissecting tracts of native vegetation. • Where possible, the Proposed Action will implement the use of innovative turbine blade transportation, including methods to minimise necessary clearance widths (e.g. 'Blade Manipulator' trucks). • Turbine placement will maximise the use of areas that are less vegetated to avoid and minimise clearing of key habitat. • All clearing for access corridors will be limited to 40 m in width during the construction phase. • Clear delineation of areas to be cleared, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. Toolbox talks will relay site-specific clearing information to all field staff and contractors. • Rehabilitation of access corridors will occur once construction has been completed. Such rehabilitation will involve planting/natural regeneration of native species that are habitat for MNES.	Habitat fragmentation and patch isolation will be managed to ensure that ooline habitat maintains connectivity with the landscape within and surrounding the Study Area. All clearing for access corridors will be limited to 40 m. Additionally, the Proposed Action will not remove or isolate habitat patches altogether, only clearing in the areas necessary for infrastructure. Therefore, this indirect impact will be minimised so as not to cause an indirect residual impact.

Indirect Impact	Management of Indirect Impact	Residual Impact
Increased Prevalence of Invasive Plants and Animals	• A Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • Staff and contractors will be given information on the location and consequences of biosecurity threats in the Study Area. • Access to a landholder's property will not occur unless authorised under a land use agreement. • WONS and Restrictive Invasive Species will be identified and monitored in the Study Area. Appropriate weed monitoring will occur to ensure new weed species are identified, recorded and controlled. • Weed management and control methods will depend upon the location, weed species identified, the degree of the infestation, relevant landholder agreement or conduct and compensation agreements provisions, and local, state and national regulatory requirements. • Weed loads will be mimimised in high-traffic areas such as roads, easements and yards through regular monitoring and site personnel reporting protocols, with an investigation to be managed to prevent spread of weeds in accordance with the *Biosecurity Act 2014* (Qld). • Imported material able to transport weed seed will be assessed to ensure they are free of contamination, disease and invasive weeds.	Management measures will limit the possibility of the introduction or spread of invasive plant and animal species through relevant biosecurity measures incorporated into the Biosecurity Management Plan. This is such that the indirect impact will be minimised so as not to cause an indirect residual impact to the species.
Increased Vehicle Impacts on Fauna and Habitat	• No driving will occur in unauthorised areas, routes and access tracks will be clearly communicated to all site visitors. All driving will be carried out at safe speeds designated for the site. • Site entry and exit points will be clearly marked to ensure vehicle movements are contained within the approved areas. • Staff and contractors will be made aware through general site induction and training of the potential to impact native flora habitat, reporting requirements and mitigation and management measures that are to be implemented during on-site works. • Weekly site inspections to review flora and fauna control measures during construction. Sightings and incidents reported in daily pre-starts during construction. All near misses and incidents will be investigated to establish root cause. Where necessary corrective actions will be developed to improve existing processes.	Implementation of management measures will ensure operating vehicles on-site during the construction, operation and decommissioning phases will not result in residual impacts to ooline.

Indirect Impact	Management of Indirect Impact	Residual Impact
Altered Fire Regimes and Bushfire Risk	• A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES habitat. • Maintenance of an asset protection zone within the Operations Footprint is required to reduce the risk of reduction of habitat due to fire. • Use of industry best practice hazard reduction measures to minimise bushfire risk and environmental impacts, such as on-site controlled burning of cleared vegetation. • Ensuring a 30 m bushfire setback from vegetation around electrical infrastructure. Maintaining safe distances between vegetation and potential fire-starting hazards will increase safety and reduce fire risk. • Weed management and control methods (in line with the requirements of the *Biosecurity Act 2014* (Qld)) will reduce the potential of invasive plants changing species composition on-site and increasing fire risk. • Reduce on-site fuel loads and maintain firebreaks and trails.	Management measures implemented in line with the site-specific Bushfire Management Plan will greatly reduce the potential risk for this species caused by planned or unplanned fires. Therefore, there is no anticipated indirect residual impact.
Altered Hydrology	• The Proposed Action will adopt best practice erosion and sediment control measures, which will implement all relevant State Codes and Guidelines. • Watercourse crossings shall be stabilised to mitigate erosion of pavement and embankment materials during rainfall events up to and including the 10% AEP storm event. • Staff and contractors will be made aware through general site induction and training of the potential to generate runoff and mitigation and management measures that should be implemented. • Construction activities must not interfere or block natural drainage e.g. disturbing channel contours.	Impacts to on-site hydrology will be managed in accordance with the CEMP. Impacts to watercourses will be addressed by stabilising to prevent erosion, and only occur in discrete work areas, such that no increase in sedimentation is overserved affecting habitat. Therefore, there is no anticipated indirect residual impact.
Environmental Pollution and Hazardous Materials	• All hazardous materials bought on-site will be accompanied by an MSDS, all relevant personnel will be trained in their proper use. • Only registered herbicides will be used for weed management by a suitably qualified bush regeneration contractor. • Imported materials that are able to transport hazardous substances will be assessed to ensure they are free of contamination, disease and invasive species. • Ensuring appropriate waste management (lidded bins), to reduce potential for spread of hazardous materials on-site. • Vehicles, plant and machinery will comply with site-specific speed limits to minimise dust generation. • Staff and contractors will be made aware through general site induction and training of the potential to generate dust, light and noise	The management measures proposed will result in the reduction of the indirect impacts of environmental pollution and hazardous materials. Hazardous materials brought onto the site will be tightly regulated. Dust generation will be minimised such that is it unlikely to damage species habitat. These measures will ensure that the indirect impact is minimised so as to not cause an indirect residual impact to ooline.

Indirect Impact	Management of Indirect Impact	Residual Impact
	pollution and management measures that should be implemented. • Auditing of the CEMP will occur during construction. • Dust will be minimised through engineering controls on machinery and other available dust suppression controls, such as sprinklers. • Disturbance form blasting will be minimised through engineering controls and other available blasting suppression, such as barrier walls.	

Indirect impacts from the Proposed Action will be mitigated and managed appropriately, such that there is no residual impact on ooline. Some indirect impacts have been considered as part of the significant impact assessment for this species but are concluded unlikely to contribute to a significant impact

6.6.12.3 SIGNIFICANT IMPACT ASSESSMENT

Potential Habitat identified as suitable for ooline occurs within the Study Area in association with the BHT of *Vine forest / thickets and dry rainforest*. A total of 277.2 ha of Potential Habitat occurs within the Study Area, with 4.4 ha of this habitat expected to be permanently impacted as a result of the Proposed Action.

In the absence of an official description, Potential Habitat described above and mapped to occur within the Study Area has conservatively been considered habitat critical to the survival of ooline, though the Study Area does not support an important population of the species.

A significant impact assessment based on the guidance provided in the SIG 1.1 is presented in Table 6-37. It has been concluded that the Proposed Action is **unlikely** to have a significant impact on ooline. Avoidance, mitigation and management measures considered within this assessment are discussed in detail in Section 7.

TABLE 6-37 SIGNIFICANT IMPACT ASSESSMENT FOR OOLINE

Criteria	Description	Criteria Triggered?
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
Lead to a long-term decrease in the size of an important population of a species;	A total of 277.2 ha of Potential Habitat for ooline occurs within the Study Area (0.6% of the total Study Area), with 4.4 ha (or 1.6%) of this habitat expected to be disturbed as a result of the Proposed Action. No observations of the species have been made across the Study Area, with only one database record of the species from 2003 (ALA, 2024) occurring approximately 50 kms east of the Study Area. It is therefore considered unlikely an important population of ooline occurs within the Study Area and as such, an impact to approximately 1.6% of total available Potential	Unlikely

Criteria	Description	Criteria Triggered?
	Habitat within the Study Area is unlikely to lead to a long-term decrease in the size of any local populations of the species. Additionally, mitigation measures such as pre-clearance surveys and micro-siting at areas of planned infrastructure will ensure disturbance to the species are further avoided where possible.	
Reduce the area of occupancy of an important population;	Ooline occurs in central and southern Queensland and north-west New South Wales. Its area of occupancy in this range is unknown, though roughly 40 disjunct populations are known across its natural distribution (approximately 25 populations in Queensland and 15 in New South Wales) (DEWHA, 2008a). No observations of the species have been made across the Study Area, with only one database record of the species from 2003 (ALA, 2024) occurring approximately 50 kms east of the Study Area. It is therefore considered unlikely an important population of ooline occurs within the Study Area and as such, an impact to 4.4 ha (or 1.6%) of Potential Habitat within the Study Area is unlikely to reduce the area of occupancy of an important population of ooline.	Unlikely
Fragment an existing important population into two or more populations;	The Proposed Action will lead to the disturbance of 4.4 ha (or 1.6%) of ooline Potential Habitat within the Study Area. No observations of the species have been made across the Study Area, with only one database record of the species from 2003 (ALA, 2024) occurring approximately 50 kms east of the Study Area. It is therefore considered unlikely an important population of ooline occurs within the Study Area. Disturbances associated with the Proposed Action will largely occur at small, isolated turbine locations, or narrow, linear areas of projected access tracks within the Study Area. This will ensure that effects of fragmentation are minimised at all opportunities. With the addition of mitigation measures such as pre-clearance surveys and micro-siting at areas of planned infrastructure, it is unlikely that impacts to approximately 1.6% of total available Potential Habitat within the Study Area will fragment an existing important population of ooline into two or more populations.	Unlikely

Criteria	Description	Criteria Triggered?
Adversely affect habitat critical to the survival of a species;	Habitat critical to the survival of ooline has not been specifically described for this species. However, habitat for the species has been described within the species SPRAT profile as (DCCEEW, 2024a): *"semi-evergreen vine thickets and sclerophyll vegetation on undulating terrain of various geology […] associated with upper and mid-slopes in the landscape. The altitude is generally 300-460 m above sea level, with some stands known to occur at 600 m above sea level (Benson, 1993)."* A total of 277.2 ha of Potential Habitat has been mapped to occur within the Study Area. Though no observations of the species have been made across the Study Area and only database records of the species occur within approximately 50 kms of the Study Area, if a population was observed in future surveys, the surrounding habitat may be considered habitat critical to the survival of the species. The Proposed Action will lead to the disturbance of 4.4 ha (or 1.6%) of Potential Habitat within the Study Area. With the implementation of mitigation measures, such as pre-clearance surveys and micro-siting at areas of planned infrastructure, and noting the small area of impact in comparison to the broader Study Area, it is unlikely that the Proposed Action will adversely affect habitat critical to the survival of ooline.	Unlikely
Disrupt the breeding cycle of an important population;	The SPRAT profile for ooline identifies avifauna dispersal and passive fall as probable methods of reproduction for the species, with low rates of seed viability as one of the key threatening processes for ooline (DCCEEW, 2024a). Additionally, with no observations of the species across the Study Area and just one database record of the species approximately 50 kms east of the Study Area (ALA, 2024), it is unlikely an important population of ooline occurs within the Study Area. Considering the implementation of mitigation measures such as pre-clearance surveys and micro-siting at areas of planned infrastructure, it is unlikely that an impact to 4.4 ha (or 1.6%) of the Potential Habitat within the Study Area will disrupt the breeding cycle of an important population of ooline.	Unlikely

Criteria	Description	Criteria Triggered?
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;	The Proposed Action will result in the disturbance of 4.4 ha of ooline Potential Habitat (1.6% of total habitat available). This accounts for a small area of habitat to be disturbed in relation to the larger context of the Study Area, which supports 277.2 ha of Potential Habitat. It is expected that small scale disturbance in the larger context of the landscape will not remove, isolate or decrease the quality of habitat that would result in species decline.	Unlikely
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;	Invasive fauna such as feral goats (*Capra hircus*) and wild pigs (*Sus scrofa*) as well as invasive flora including tiger pear (*Opunita aurantiaca*) are identified as threats to ooline (DEWHA, 2008a). Wild pig and *Opuntioid* cactii are known to occur in the Study Area, though no wild goats have been observed. The Proposed Action will adopt and follow a Biosecurity Plan, as outline in Section 7. The activities related to the Proposed Action, both during construction and operation, will implement and follow biosecurity measures to reduce the risk of introducing new invasive species and to prevent the further spread of existing invasive species.	Unlikely
Introduce disease that may cause the species to decline; or	There is currently limited evidence of diseases causing detrimental effects on ooline populations in Queensland. There is also no evidence to suggest the proposed disturbance would introduce a disease that would cause the species to decline. Additionally, precautions will be taken to ensure that the spread of disease does not occur. This includes following biosecurity measures as part of a biosecurity plan (see Section 7).	Unlikely
Interfere substantially with the recovery of the species.	There are no formally adopted recovery plans for this species. However, there are *Regional* and *Local Priority Actions* identified by the *Approved Conservation Advice for Cadellia pentastylis* (DEWHA, 2008a), which determine key management issues of: • Habitat loss, disturbance and modification • Conservation information • Fire • Invasive weeds • Trampling, browsing or grazing • Recovery of additional sites and/or populations The Proposed Action will result in 4.4 ha of disturbance to Potential Habitat (1.6% of all habitat within the Study Area). It is unlikely this impact will lead to habitat loss, disturbance or modification of ooline habitat to the extent that recovery of the species is substantially interfered with. Additional priority actions will be managed so as not to interfere substantially with the recovery of	Unlikely

Criteria	Description	Criteria Triggered?
	the species, including control of invasive weeds through a biosecurity plan and mitigation measures such as pre-clearance surveys and micro-siting at areas of planned infrastructure to retain connectivity values and reduce impacts where possible. It is not expected the Proposed Action will lead to an increased fire risk. While the Study Area is used for agricultural purposes, it is not expected the Proposed Action will contribute to further impacts of trampling and grazing, especially regarding high-threat species such as feral goats. It is therefore considered unlikely the Proposed Action will substantially interfere with the recovery of ooline.	
Significant Impact: Unlikely		

6.6.13 COSSINIA

6.6.13.1 DIRECT IMPACTS

Direct impacts to cossinia associated with the Proposed Action are considered to be limited to habitat loss from vegetation clearing. These impacts are quantified below and include impacts to:

- 4.4 ha of Potential Habitat.

It is expected that some impacted areas of cossinia habitat will be revegetated after the construction phase. However, no rehabilitation or revegetation in these areas is expected to restore any functionality for this species post-construction. Therefore, the direct impact to cossinia associated with construction-phase clearing is considered permanent.

A summary of the direct impacts to cossinia habitat as a result of the Proposed Action is shown in Table 6-38. A total of 4.4 ha of cossinia habitat will be permanently impacted by the Proposed Action, which equates to 1.6% of the total available habitat identified within the Study Area.

TABLE 6-38 DIRECT IMPACTS TO COSSINIA HABITAT

	Potential Habitat
Study Area (ha)	277.2
Disturbance Footprint (ha)	4.4
Percent of habitat within the Study Area to be impacted	1.6% of Potential Habitat within the Study Area
Permanent impact (Operations Footprint) (ha)	**4.4**

6.6.13.2 INDIRECT IMPACTS

The indirect impacts to cossinia as a result of the Proposed Action are detailed in Table 6-39, along with how these impacts will be managed and any residual impact that will affect the MNES. Avoidance, mitigation and management measures are discussed in detail in Section 7.

TABLE 6-39 INDIRECT IMPACTS TO COSSINIA

Indirect Impact	Management of Indirect Impact	Residual Impact
Habitat Fragmentation and Patch Isolation	• Areas identified as MNES habitat will be avoided as much as possible at the design and micro-siting stages. • Micro-siting of infrastructure will utilise existing clearance areas and avoid habitat fragmentation and patch isolation, with consideration of whether avoidance areas would still be connected to habitat in the broader landscape. • Prior to construction and detailed design, the incorporation of road pinch points to maximise connectivity will be considered to maintain habitat connectivity. While pinch points have a benefit for habitat they present a technical and logistical barrier to safe and effective construction. Pre-clearance surveys will determine appropriate locations for road pinch points. • Location of infrastructure will prioritise avoiding or minimising edge effects or dissecting tracts of native vegetation. • Where possible, the Proposed Action will implement the use of innovative turbine blade transportation, including methods to minimise necessary clearance widths (e.g. 'Blade Manipulator' trucks). • Turbine placement will maximise the use of areas that are less vegetated to avoid and minimise clearing of key habitat. • All clearing for access corridors will be limited to 40 m in width during the construction phase. • Clear delineation of areas to be cleared, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. Toolbox talks will relay site-specific clearing information to all field staff and contractors. • Rehabilitation of access corridors will occur once construction has been completed. Such rehabilitation will involve planting/natural regeneration of native species that are habitat for MNES.	Habitat fragmentation and patch isolation will be managed to ensure that cossinia habitat maintains connectivity with the landscape within and surrounding the Study Area. All clearing for access corridors will be limited to 40 m. Additionally, the Proposed Action will not remove or isolate habitat patches altogether, only clearing in the areas necessary for infrastructure. Therefore, this indirect impact will be minimised so as not to cause an indirect residual impact.
Increased Prevalence of Invasive Plants and Animals	• A Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • Staff and contractors will be given information on the location and consequences of biosecurity threats in the Study Area. • Access to a landholder's property will not occur unless authorised under a land use agreement. • WONS and Restrictive Invasive Species will be identified and monitored in the Study Area.	Management measures will limit the possibility of the introduction or spread of invasive plant and animal species through relevant biosecurity measures incorporated into the Biosecurity Management Plan. This is such that the indirect impact will be minimised so as not to cause an indirect residual impact to the species.

Indirect Impact	Management of Indirect Impact	Residual Impact
	Appropriate weed monitoring will occur to ensure new weed species are identified, recorded and controlled. • Weed management and control methods will depend upon the location, weed species identified, the degree of the infestation, relevant landholder agreement or conduct and compensation agreements provisions, and local, state and national regulatory requirements. • Weed loads will be mimimised in high-traffic areas such as roads, easements and yards through regular monitoring and site personnel reporting protocols, with an investigation to be managed to prevent spread of weeds in accordance with the *Biosecurity Act 2014* (Qld). • Imported material able to transport weed seed will be assessed to ensure they are free of contamination, disease and invasive weeds.	
Increased Vehicle Impacts on Fauna and Habitat	• No driving will occur in unauthorised areas, routes and access tracks will be clearly communicated to all site visitors. All driving will be carried out at safe speeds designated for the site. • Site entry and exit points will be clearly marked to ensure vehicle movements are contained within the approved areas. • Staff and contractors will be made aware through general site induction and training of the potential to impact native flora habitat, reporting requirements and mitigation and management measures that are to be implemented during on-site works. • Weekly site inspections to review flora and fauna control measures during construction. Sightings and incidents reported in daily pre-starts during construction. All near misses and incidents will be investigated to establish root cause. Where necessary corrective actions will be developed to improve existing processes.	Implementation of management measures will ensure operating vehicles on-site during the construction, operation and decommissioning phases will not result in residual impacts to cossinia.
Altered Fire Regimes and Bushfire Risk	• A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES habitat. • Maintenance of an asset protection zone within the Operations Footprint is required to reduce the risk of reduction of habitat due to fire. • Use of industry best practice hazard reduction measures to minimise bushfire risk and environmental impacts, such as on-site controlled burning of cleared vegetation. • Ensuring a 30 m bushfire setback from vegetation around electrical infrastructure. Maintaining safe distances between vegetation and potential fire-starting hazards will increase safety and reduce fire risk.	Management measures implemented in line with the site-specific Bushfire Management Plan will greatly reduce the potential risk for this species caused by planned or unplanned fires. Therefore, there is no anticipated indirect residual impact.

Indirect Impact	Management of Indirect Impact	Residual Impact
	• Weed management and control methods (in line with the requirements of the *Biosecurity Act 2014* (Qld)) will reduce the potential of invasive plants changing species composition on-site and increasing fire risk. • Reduce on-site fuel loads and maintain firebreaks and trails.	
Altered Hydrology	• The Proposed Action will adopt best practice erosion and sediment control measures, which will implement all relevant State Codes and Guidelines. • Watercourse crossings shall be stabilised to mitigate erosion of pavement and embankment materials during rainfall events up to and including the 10% AEP storm event. • Staff and contractors will be made aware through general site induction and training of the potential to generate runoff and mitigation and management measures that should be implemented. • Construction activities must not interfere or block natural drainage e.g. disturbing channel contours.	Impacts to on-site hydrology will be managed in accordance with the CEMP. Impacts to watercourses will be addressed by stabilising to prevent erosion, and only occur in discrete work areas, such that no increase in sedimentation is overserved affecting habitat. Therefore, there is no anticipated indirect residual impact.
Environmental Pollution and Hazardous Materials	• All hazardous materials bought on-site will be accompanied by an MSDS, all relevant personnel will be trained in their proper use. • Only registered herbicides will be used for weed management by a suitably qualified bush regeneration contractor. • Imported materials that are able to transport hazardous substances will be assessed to ensure they are free of contamination, disease and invasive species. • Ensuring appropriate waste management (lidded bins), to reduce potential for spread of hazardous materials on-site. • Vehicles, plant and machinery will comply with site-specific speed limits to minimise dust generation. • Staff and contractors will be made aware through general site induction and training of the potential to generate dust, light and noise pollution and management measures that should be implemented. • Auditing of the CEMP will occur during construction. • Dust will be minimised through engineering controls on machinery and other available dust suppression controls, such as sprinklers. • Disturbance form blasting will be minimised through engineering controls and other available blasting suppression, such as barrier walls.	The management measures proposed will result in the reduction of the indirect impacts of environmental pollution and hazardous materials. Hazardous materials brought onto the site will be tightly regulated. Dust generation will be minimised such that is it unlikely to damage species habitat. These measures will ensure that the indirect impact is minimised so as to not cause an indirect residual impact to cossinia.

Indirect impacts from the Proposed Action will be mitigated and managed appropriately, such that there is no residual impact on cossinia. Some indirect impacts have been considered as part of the significant impact assessment for this species but are concluded unlikely to contribute to a significant impact.

6.6.13.3 SIGNIFICANT IMPACT ASSESSMENT

Potential Habitat identified as suitable for cossinia occurs within the Study Area in association with the broad habitat type *Vine forest / thickets and dry rainforest*. A total of 277.2 ha of Potential Habitat occurs within the Study Area, with 4.4 ha of this habitat expected to be permanently impacted as a result of the Proposed Action.

In the absence of an official description, Potential Habitat described above and mapped to occur within the Study Area has conservatively been considered habitat critical to the survival of cossinia, though the Study Area does not support an important population of the species.

A significant impact assessment based on the guidance provided in the SIG 1.1 is presented in Table 6-40. It has been concluded that the Proposed Action is **unlikely** to have a significant impact on cossinia. Avoidance, mitigation and management measures considered within this assessment are discussed in detail in Section 7.

TABLE 6-40 SIGNIFICANT IMPACT ASSESSMENT FOR COSSINIA

Criteria	Description	Criteria Triggered?
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
Lead to a long-term decrease in the size of a population;	A total of 277.2 ha (or 0.6%) of Potential Habitat suitable for cossinia occurs within the Study Area, with 4.4 ha (or 1.6%) of this Potential Habitat expected to be disturbed as a result of the Proposed Action. No observations of the species have been made across the Study Area. One out-of-date database record of the species from 2002 (ALA, 2024), occurs approximately 1 km east of the Study Area in Montour State Forest. An impact to approximately 1.6% of total available Potential Habitat within the Study Area is unlikely to impact any local populations of the species. Additionally, mitigation measures such as pre-clearance surveys and micro-siting at areas of planned infrastructure will ensure disturbance to the species is further avoided where possible. Therefore, the Proposed Action is unlikely to lead to a long-term decrease in the size of a population of cossinia.	Unlikely
Reduce the area of occupancy of the species;	Cossinia is endemic to central and southern Queensland. Its area of occupancy in this range is unknown, though occurs in a roughly 300 km range between Rockhampton and Kingaroy in scattered habitat patches as an uncommon or isolated individual (DEWHA, 2008b). The Proposed Action will lead to the disturbance of 4.4 ha of Potential Habitat for cossinia, or 1.6% of all habitat within the Study Area. No observations of the species have been made across the Study Area. One out-of-date database record of the	Unlikely

Criteria	Description	Criteria Triggered?
	species from 2002 (ALA) occurs approximately 1 km east of the Study Area in Montour State Forest. With the addition of mitigation measures such as pre-clearance surveys and micro-siting at areas of planned infrastructure, it is unlikely that impacts to approximately 4.4 ha of Potential Habitat or 1.6% of total available Potential Habitat within the Study Area will reduce the area of occupancy of cossinia.	
Fragment an existing population into two or more populations;	The Proposed Action will lead to disturbance of 4.4 ha of Potential Habitat suitable for cossinia, or 1.6% of all habitat within the Study Area. No observations of the species have been made across the Study Area. Disturbances associated with the Proposed Action will largely occur at small, isolated turbine locations, or narrow, linear areas of projected access tracks within the Study Area. This will ensure that effects of fragmentation are minimised at all opportunities. With the addition of mitigation measures such as pre-clearance surveys and micro-siting at areas of planned infrastructure, it is unlikely that an impact to approximately 1.6% of the total available Potential Habitat within the Study Area will fragment an existing population of cossinia into two or more populations.	Unlikely
Adversely affect habitat critical to the survival of a species;	Habitat critical to the survival of cossinia has not been specifically described. In lieu of an official description, cossinia habitat described within the species' conservation advice has been used: *"fragmented relict patches of* Araucarian *vine forests or vine thickets on fertile soils in central and southern Queensland* (DEWHA, 2008b)*."* A total of 277.2 ha of Potential Habitat has been mapped to occur within the Study Area in areas of semi-evergreen vine thickets. Though no observations of the species have been made across the Study Area and only out-of-date database records of the species occur 1 km east of the Study Area, if a population is observed in future surveys, the surrounding habitat may be considered habitat critical to the survival of the species. The Proposed Action will lead to the disturbance of 4.4 ha of Potential Habitat, or 1.6% of all habitat within the Study Area. It is expected that this small scale disturbance in the larger context of the landscape is unlikely to adversely affect habitat critical to the survival of the species.	Unlikely

Criteria	Description	Criteria Triggered?
Disrupt the breeding cycle of a population;	Disturbance to 4.4 ha (or 1.6%) of Potential Habitat suitable for Cossinia within the Study Area, is unlikely to disrupt the species' ability to reproduce within the Study Area. Additionally, with no observations of the species across the Study Area and just one out-of-date database record of the species approximately 1 km east of the Study Area (ALA, 2024), it is unlikely a population of cossinia occurs within the Study Area. Considering the implementation of mitigation measures such as pre-clearance surveys and micro-siting at areas of planned infrastructure, it is unlikely that the breeding cycle of a population of cossinia will be disrupted by the Proposed Action.	Unlikely
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;	The Proposed Action will result in the disturbance of 4.4 ha (or 1.6%) of cossinia Potential Habitat. This accounts for a small area of Potential Habitat to be removed in relation to the larger context of the Study Area, which supports 277.2 ha of Potential Habitat. It is expected that small scale disturbance in the larger context of the landscape will not remove, isolate or decrease the quality of habitat to the extent that the species is likely to decline.	Unlikely
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Cossinia often occurs in ecotonal habitat at the edge of dry rainforest ecosystems and is susceptible to edge effects and competition by introduced weeds (DEWHA, 2008b). Invasive flora is therefore considered one of the largest threatening processes to cossinia. Lantana (*Lantana camara*), Dutchman's Pipe (*Aristolochia elegans*), Madeira Vine (*Anredera cordifolia*), Cat's Claw Creeper (*Macfadyena unguis-cati*) and Climbing Asparagus (*Asparagus plumosus*) are the primary weeds which threaten cossinia (DEWHA, 2008b). Lantana and cat's claw creeper have been confirmed to occur within the Study Area. The Proposed Action will result in the disturbance of 4.4 ha (or 1.6%) of Potential Habitat within the Study Area, with associated impacts likely to introduce edge effects and invasive flora to this habitat without suitable mitigation measures. However, the Proposed Action will adopt and follow a Biosecurity Plan, as outline in Section 7. The activities related to the Proposed Action, both during construction and operation, will implement and follow biosecurity measures to reduce the risk of introducing new invasive species and to prevent the further spread of existing invasive species. Therefore, it is considered unlikely that the Proposed Action will increase the impact of invasive flora species on cossinia or cossinia Potential Habitat within he Study Area.	Unlikely

Criteria	Description	Criteria Triggered?
Introduce disease that may cause the species to decline; or	There is currently limited evidence of diseases causing detrimental effects on cossinia populations in Queensland. There is also no evidence to suggest the proposed disturbance would introduce a disease that would cause the species to decline. Additionally, precautions will be taken to ensure that the spread of disease does not occur. This includes following biosecurity measures as part of a biosecurity plan (see Section 7).	Unlikely
Interfere with the recovery of the species.	There are no formally adopted recovery plans for this species. However, there are *Regional* and *Local Priority Actions* identified by the *Approved Conservation Advice for Cossinia australiana* (DEWHA, 2008b) which, listed below, determine key management issues: • Habitat loss, disturbance and modification • Invasive weeds • Conservation information • Recovery of additional sites and/or populations The Proposed Action will result in 4.4 ha (or 1.6%) of disturbance to Cossinia Potential Habitat within the Study Area. It is unlikely this impact will lead to habitat loss, disturbance or modification to the extent that recovery of the species is interfered with. Additional priority actions will be managed so as not to interfere with the recovery of the species, including control of invasive weeds through a biosecurity plan and mitigation measures such as pre-clearance surveys and micro-siting at areas of planned infrastructure to retain connectivity values and reduce impacts where possible. It is therefore considered unlikely the Proposed Action will substantially interfere with the recovery of cossinia.	Unlikely
Significant Impact: Unlikely		

6.6.14 AUSTRAL CORNFLOWER

6.6.14.1 DIRECT IMPACTS

Direct impacts to austral cornflower associated with the Proposed Action are considered to be limited to habitat loss from vegetation clearing. These impacts are quantified below and include impacts to:

- 648.1 ha of Potential Habitat.

Of these areas cleared during construction, it is expected that there will be a reduction in impact through rehabilitation during the operations phase. Austral cornflower is a poor competitor and tends to prefer habitat where competition from grasses has been reduced by disturbance, and post-disturbance invasion of exotic grasses is suppressed (DEWHA, 2008c). Post-construction rehabilitation is expected to restore 415.2 ha of Potential Habitat to pre-disturbance composition and function. This will result in a permanent impact to only 232.9 ha of Potential Habitat for austral cornflower.

A summary of the direct impacts to austral cornflower habitat as a result of the Proposed Action is shown in Table 6-41. A total of 232.9 ha of austral cornflower habitat will be permanently impacted by the Proposed Action, which equates to 1.1% of the total available habitat identified within the Study Area.

TABLE 6-41 DIRECT IMPACTS TO AUSTRAL CORNFLOWER HABITAT

	Potential Habitat
Study Area (ha)	21,768.5
Disturbance Footprint (ha)	648.1
Percent of habitat within the Study Area to be impacted	3.0% of Potential Habitat within the Study Area
Available **Revegetation areas** within the Disturbance Footprint (ha)	415.2
Permanent impact* (Operations Footprint) (ha)	232.9 (1.1%)

**Permanent impact (Operations Footprint) is provided where revegetation and/or rehabilitation can return habitat for the species to function or utilise post-construction (i.e., for recolonisation, dispersal, foraging or breeding).*

6.6.14.2 INDIRECT IMPACTS

The indirect impacts to austral cornflower as a result of the Proposed Action are detailed in Table 6-42, along with how these impacts will be managed and any residual impact that will affect the MNES. Avoidance, mitigation and management measures are discussed in detail in Section 7.

TABLE 6-42 INDIRECT IMPACTS TO AUSTRAL CORNFLOWER

Indirect Impact	**Management of Indirect Impact**	**Residual Impact**
Habitat Fragmentation and Patch Isolation	• Areas identified as MNES habitat will be avoided as much as possible at the design and micro-siting stages. • Micro-siting of infrastructure will utilise existing clearance areas and avoid habitat fragmentation and patch isolation, with consideration of whether avoidance areas would still be connected to habitat in the broader landscape. • Prior to construction and detailed design, the incorporation of road pinch points to maximise connectivity will be considered to maintain habitat connectivity. While pinch points have a benefit for habitat they present a technical and logistical barrier to safe and effective construction. Pre-clearance surveys will determine appropriate locations for road pinch points. • Location of infrastructure will prioritise avoiding or minimising edge effects or dissecting tracts of native vegetation. • Where possible, the Proposed Action will implement the use of innovative turbine blade transportation, including methods to minimise	Habitat fragmentation and patch isolation will be managed to ensure that austral cornflower habitat maintains connectivity with the landscape within and surrounding the Study Area. All clearing for access corridors will be limited to 40 m. Additionally, the Proposed Action will not remove or isolate habitat patches altogether, only clearing in the areas necessary for infrastructure. Therefore, this indirect impact will be minimised so as not to cause an indirect residual impact.

Indirect Impact	Management of Indirect Impact	Residual Impact
	necessary clearance widths (e.g. 'Blade Manipulator' trucks). • Turbine placement will maximise the use of areas that are less vegetated to avoid and minimise clearing of key habitat. • All clearing for access corridors will be limited to 40 m in width during the construction phase. • Clear delineation of areas to be cleared, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. Toolbox talks will relay site-specific clearing information to all field staff and contractors. • Rehabilitation of access corridors will occur once construction has been completed. Such rehabilitation will involve planting/natural regeneration of native species that are habitat for MNES.	
Increased Prevalence of Invasive Plants and Animals	• A Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • Staff and contractors will be given information on the location and consequences of biosecurity threats in the Study Area. • Access to a landholder's property will not occur unless authorised under a land use agreement. • WONS and Restrictive Invasive Species will be identified and monitored in the Study Area. Appropriate weed monitoring will occur to ensure new weed species are identified, recorded and controlled. • Weed management and control methods will depend upon the location, weed species identified, the degree of the infestation, relevant landholder agreement or conduct and compensation agreements provisions, and local, state and national regulatory requirements. • Weed loads will be mimimised in high-traffic areas such as roads, easements and yards through regular monitoring and site personnel reporting protocols, with an investigation to be managed to prevent spread of weeds in accordance with the *Biosecurity Act 2014* (Qld). • Imported material able to transport weed seed will be assessed to ensure they are free of contamination, disease and invasive weeds.	Management measures will limit the possibility of the introduction or spread of invasive plant and animal species through relevant biosecurity measures incorporated into the Biosecurity Management Plan. This is such that the indirect impact will be minimised so as not to cause an indirect residual impact to the species.

Indirect Impact	Management of Indirect Impact	Residual Impact
Increased Vehicle Impacts on Fauna and Habitat	• No driving will occur in unauthorised areas, routes and access tracks will be clearly communicated to all site visitors. All driving will be carried out at safe speeds designated for the site. • Site entry and exit points will be clearly marked to ensure vehicle movements are contained within the approved areas. • Staff and contractors will be made aware through general site induction and training of the potential to impact native flora habitat, reporting requirements and mitigation and management measures that are to be implemented during on-site works. • Weekly site inspections to review flora and fauna control measures during construction. Sightings and incidents reported in daily pre-starts during construction. All near misses and incidents will be investigated to establish root cause. Where necessary corrective actions will be developed to improve existing processes.	Implementation of management measures will ensure operating vehicles on-site during the construction, operation and decommissioning phases will not result in residual impacts to austral cornflower.
Altered Fire Regimes and Bushfire Risk	• A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES habitat. • Maintenance of an asset protection zone within the Operations Footprint is required to reduce the risk of reduction of habitat due to fire. • Use of industry best practice hazard reduction measures to minimise bushfire risk and environmental impacts, such as on-site controlled burning of cleared vegetation. • Ensuring a 30 m bushfire setback from vegetation around electrical infrastructure. Maintaining safe distances between vegetation and potential fire-starting hazards will increase safety and reduce fire risk. • Weed management and control methods (in line with the requirements of the *Biosecurity Act 2014* (Qld)) will reduce the potential of invasive plants changing species composition on-site and increasing fire risk. • Reduce on-site fuel loads and maintain firebreaks and trails.	Management measures implemented in line with the site-specific Bushfire Management Plan will greatly reduce the potential risk for this species caused by planned or unplanned fires. Therefore, there is no anticipated indirect residual impact.
Altered Hydrology	• The Proposed Action will adopt best practice erosion and sediment control measures, which will implement all relevant State Codes and Guidelines. • Watercourse crossings shall be stabilised to mitigate erosion of pavement and embankment materials during rainfall events up to and including the 10% AEP storm event. • Staff and contractors will be made aware through general site induction and training of the potential to generate runoff and mitigation and management measures that should be implemented. • Construction activities must not interfere or block natural drainage e.g. disturbing channel contours.	Impacts to on-site hydrology will be managed in accordance with the CEMP. Impacts to watercourses will be addressed by stabilising to prevent erosion, and only occur in discrete work areas, such that no increase in sedimentation is overserved affecting habitat. Therefore, there is no anticipated indirect residual impact.

Indirect Impact	Management of Indirect Impact	Residual Impact
Environmental Pollution and Hazardous Materials	• All hazardous materials bought on-site will be accompanied by an MSDS, all relevant personnel will be trained in their proper use. • Only registered herbicides will be used for weed management by a suitably qualified bush regeneration contractor. • Imported materials that are able to transport hazardous substances will be assessed to ensure they are free of contamination, disease and invasive species. • Ensuring appropriate waste management (lidded bins), to reduce potential for spread of hazardous materials on-site. • Vehicles, plant and machinery will comply with site-specific speed limits to minimise dust generation. • Staff and contractors will be made aware through general site induction and training of the potential to generate dust, light and noise pollution and management measures that should be implemented. • Auditing of the CEMP will occur during construction. • Dust will be minimised through engineering controls on machinery and other available dust suppression controls, such as sprinklers. • Disturbance form blasting will be minimised through engineering controls and other available blasting suppression, such as barrier walls.	The management measures proposed will result in the reduction of the indirect impacts of environmental pollution and hazardous materials. Hazardous materials brought onto the site will be tightly regulated. Dust generation will be minimised such that is it unlikely to damage species habitat. These measures will ensure that the indirect impact is minimised so as to not cause an indirect residual impact to austral cornflower.

Indirect impacts from the Proposed Action will be mitigated and managed appropriately, such that there is no residual impact on austral cornflower. Some indirect impacts have been considered as part of the significant impact assessment for this species but are concluded unlikely to contribute to a significant impact.

6.6.14.3 SIGNIFICANT IMPACT ASSESSMENT

Potential Habitat identified as suitable for austral cornflower occurs within the Study Area in association with the BHT of *Eucalypt woodland and open forest dominated by E. crebra with a grassy understorey*. A total of 21,768.5 ha of Potential Habitat occurs within the Study Area, with 232.9 ha of this habitat expected to be permanently impacted as a result of the Proposed Action.

In the absence of an official description, Potential Habitat described above and mapped to occur within the Study Area has conservatively been considered habitat critical to the survival of austral cornflower, though the Study Area does not support an important population of the species.

A significant impact assessment based on the guidance provided in the SIG 1.1 is presented in Table 6-43. It has been concluded that the Proposed Action is **unlikely** to have a significant impact on austral cornflower. Avoidance, mitigation and management measures considered within this assessment are discussed in detail in Section 7.

TABLE 6-43 SIGNIFICANT IMPACT ASSESSMENT FOR AUSTRAL CORNFLOWER

Criteria	Description	Criteria Triggered?
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
Lead to a long-term decrease in the size of an important population of a species;	Due to the lack of observation of the species, it is unlikely an important population of Austral cornflower occurs within the Study Area. Additionally, mitigation measures such as pre-clearance surveys and micro-siting at areas of planned infrastructure will ensure disturbance to Potential Habitat is further avoided where possible, and any individuals of the species are also avoided should they be identified. Therefore, it is unlikely that an impact to approximately 1.1% of the total available Potential Habitat within the Study Area will lead to a long-term decrease in the size of an important population of Austral cornflower.	Unlikely
Reduce the area of occupancy of an important population;	Austral cornflower occurs in central and southern Queensland and its total area of occupancy is unknown but has contracted significantly compared to its historical range which extended to NSW and Victoria (DCCEEW, 2024a). Due to the lack of observation of the species, it is unlikely an important population of Austral cornflower occurs within the Study Area. Therefore, it is unlikely that an impact to approximately 1.1% of the total available Potential Habitat within the Study Area will reduce the area of occupancy of the species.	Unlikely
Fragment an existing important population into two or more populations;	Due to the lack of observation of the species, it is unlikely an important population of Austral cornflower occurs within the Study Area. Additionally, disturbances associated with the Proposed Action will largely occur at small, isolated turbine locations, or narrow, linear areas of projected access tracks within the Study Area. This will ensure that effects of fragmentation are minimised at all opportunities. Therefore, it is unlikely that an impact to approximately 1.1% of the total available Potential Habitat within the Study Area will fragment an existing important population into two or more populations.	Unlikely
Adversely affect habitat critical to the survival of a species;	Although the species was not identified during survey events, if a population is observed in future surveys, the surrounding habitat may be considered habitat critical to the survival of the species. However, this habitat is under pressure from historical and existing threats including historical logging and current grazing pressure, therefore reducing the habitat value of these areas for the species. Therefore, considering the historic and current pressures on this Potential Habitat, and the area of proposed impact (232.9 ha or 1.1% of the available habitat within the Study Area), it is considered unlikely that the Proposed Action will adversely affect habitat critical to the survival of this species.	Unlikely

Criteria	Description	Criteria Triggered?
Disrupt the breeding cycle of an important population;	Austral cornflower has been observed flowering in spring, late summer and autumn, but beyond this little information is available about the species reproductive cycle (DCCEEW, 2024a). A permanent disturbance to 232.9 ha (or 1.1%) of Potential Habitat within the Study Area is unlikely to disrupt the species' ability to reproduce. Additionally, no observations of the species have been made to date across the Study Area. Due to the lack of observation of the species, it is unlikely an important population of austral cornflower occurs within the Study Area. Therefore, it is unlikely that the Proposed Action would disrupt the breeding cycle of an important population of this species.	Unlikely
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;	The Proposed Action will result in the permanent disturbance of 232.9 ha of Potential Habitat (1.1% of total habitat available). This is a relatively small area in the context of the Study Area, which supports 21,768.5 ha of austral cornflower Potential Habitat. Additionally, the species is not known to occur in the Study Area. Mitigation measures such as pre-clearance surveys and micro-siting at areas of planned infrastructure will be completed prior to any disturbance of habitat or potentially occurring individuals of the species. The Proposed Action is therefore unlikely to cause the species to decline.	Unlikely
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;	Invasive flora are listed as a threat to the species, as are grazing fauna species (DEWHA, 2008c). The Proposed Action will adopt and follow a Biosecurity Plan, as outline in Section 7. The activities related to the Proposed Action, both during construction and operation, will implement and follow biosecurity measures to reduce the risk of introducing new invasive species and to prevent the further spread of existing invasive species.	Unlikely
Introduce disease that may cause the species to decline; or	Austral cornflower conservation advice does not list any diseases as a threat to the species (DEWHA, 2008c). There is no evidence to suggest the Proposed Action will introduce a disease that may cause the species to decline. Additionally, precautions will be taken to ensure that the spread of disease does not occur. This includes following biosecurity measures as part of a biosecurity plan (see Section 7).	Unlikely
Interfere substantially with the recovery of the species.	There are no formally adopted recovery plans for this species. However, there are *Regional* and *Local Priority Actions* identified in the *Approved Conservation Advice for Stemmacantha australis (Austral Cornflower)* (DEWHA, 2008c) which determine the following key management issues: • Habitat loss, disturbance and modification; • Conservation information; • Invasive weeds; • Trampling, browsing or grazing; and • Recovery of additional sites and/or populations.	Unlikely

Criteria	Description	Criteria Triggered?
	The Proposed Action will result in 232.9 ha (or 1.1%) of permanent disturbance to austral cornflower Potential Habitat within the Study Area. It is unlikely this impact will lead to habitat loss, disturbance or modification of austral cornflower habitat to the extent that recovery of the species is substantially interfered with. Additional priority actions will be managed so as not to interfere substantially with the recovery of the species, including control of invasive weeds through a biosecurity plan and mitigation measures such as pre-clearance surveys and micro-siting at areas of planned infrastructure to retain connectivity values and reduce impacts where possible. While the Study Area is used for agricultural purposes, it is not expected the Proposed Action will contribute to further impacts of trampling and grazing. It is therefore considered unlikely the Proposed Action will substantially interfere with the recovery of austral cornflower.	
Significant Impact: Unlikely		

6.6.15 SOLANUM DISSECTUM

6.6.15.1 DIRECT IMPACTS

Direct impacts to *Solanum dissectum* associated with the Proposed Action are considered to be limited to habitat loss from vegetation clearing. These impacts are quantified below and include impacts to:

- 1.7 ha of Potential Habitat.

It is expected that some impacted areas of *S. dissectum* habitat will be revegetated after the construction phase. Based on the species conservation advice, *S. dissectum* is likely to be a resprouting disturbance specialist, with bird dispersal a likely vector given that fruit are bright red in colour and fleshy (TSSC, 2016a). Additionally, brigalow has the ability to produce shoots from horizontal roots (suckering) in response to disturbance, resulting in there likely to be brigalow regrowth in areas not required for operation (Queensland Government, 2024). Because of this, post-construction rehabilitation is expected to restore 1.5 ha of Potential Habitat to pre-disturbance composition and function. This will result in a permanent impact to 0.2 ha of Potential Habitat for *S. dissectum*.

A summary of the direct impacts to *S. dissectum* habitat as a result of the Proposed Action is shown in Table 6-44. A total of 0.2 ha of *S. dissectum* habitat will be permanently impacted by the Proposed Action, which equates to 0.1% of the total available habitat identified within the Study Area.

TABLE 6-44 DIRECT IMPACTS TO *S. DISSECTUM* HABITAT

	Potential Habitat
Study Area (ha)	261.4
Disturbance Footprint (ha)	1.7
Percent of habitat within the Study Area to be impacted	0.7% of Potential Habitat within the Study Area
Available **Revegetation areas** within the Disturbance Footprint (ha)	1.5
Permanent impact* (Operations Footprint) (ha)	0.2 (or 0.1%)

**Permanent impact (Operations Footprint) is provided where revegetation and/or rehabilitation can return habitat for the species to function or utilise post-construction (i.e., for recolonisation, dispersal, foraging or breeding).*

6.6.15.2 INDIRECT IMPACTS

The indirect impacts to *S. dissectum* as a result of the Proposed Action are detailed in Table 6-45, along with how these impacts will be managed and any residual impact that will affect the MNES. Avoidance, mitigation and management measures are discussed in detail in Section 7.

TABLE 6-45 INDIRECT IMPACTS TO *S. DISSECTUM*

Indirect Impact	**Management of Indirect Impact**	**Residual Impact**
Habitat Fragmentation and Patch Isolation	• Areas identified as MNES habitat will be avoided as much as possible at the design and micro-siting stages. • Micro-siting of infrastructure will utilise existing clearance areas and avoid habitat fragmentation and patch isolation, with consideration of whether avoidance areas would still be connected to habitat in the broader landscape. • Prior to construction and detailed design, the incorporation of road pinch points to maximise connectivity will be considered to maintain habitat connectivity. While pinch points have a benefit for habitat they present a technical and logistical barrier to safe and effective construction. Pre-clearance surveys will determine appropriate locations for road pinch points. • Location of infrastructure will prioritise avoiding or minimising edge effects or dissecting tracts of native vegetation. • Where possible, the Proposed Action will implement the use of innovative turbine blade transportation, including methods to minimise necessary clearance widths (e.g. 'Blade Manipulator' trucks). • Turbine placement will maximise the use of areas that are less vegetated to avoid and minimise clearing of key habitat.	Habitat fragmentation and patch isolation will be managed to ensure that *S. dissectum* habitat maintains connectivity with the landscape within and surrounding the Study Area. All clearing for access corridors will be limited to 40 m. Additionally, the Proposed Action will not remove or isolate habitat patches altogether, only clearing in the areas necessary for infrastructure. Therefore, this indirect impact will be minimised so as not to cause an indirect residual impact.

Indirect Impact	Management of Indirect Impact	Residual Impact
	• All clearing for access corridors will be limited to 40 m in width during the construction phase. • Clear delineation of areas to be cleared, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. Toolbox talks will relay site-specific clearing information to all field staff and contractors. • Rehabilitation of access corridors will occur once construction has been completed. Such rehabilitation will involve planting/natural regeneration of native species that are habitat for MNES.	
Increased Prevalence of Invasive Plants and Animals	• A Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • Staff and contractors will be given information on the location and consequences of biosecurity threats in the Study Area. • Access to a landholder's property will not occur unless authorised under a land use agreement. • WONS and Restrictive Invasive Species will be identified and monitored in the Study Area. Appropriate weed monitoring will occur to ensure new weed species are identified, recorded and controlled. • Weed management and control methods will depend upon the location, weed species identified, the degree of the infestation, relevant landholder agreement or conduct and compensation agreements provisions, and local, state and national regulatory requirements. • Weed loads will be mimimised in high-traffic areas such as roads, easements and yards through regular monitoring and site personnel reporting protocols, with an investigation to be managed to prevent spread of weeds in accordance with the *Biosecurity Act 2014* (Qld). • Imported material able to transport weed seed will be assessed to ensure they are free of contamination, disease and invasive weeds.	Management measures will limit the possibility of the introduction or spread of invasive plant and animal species through relevant biosecurity measures incorporated into the Biosecurity Management Plan. This is such that the indirect impact will be minimised so as not to cause an indirect residual impact to the species.

Indirect Impact	Management of Indirect Impact	Residual Impact
Increased Vehicle Impacts on Fauna and Habitat	• No driving will occur in unauthorised areas, routes and access tracks will be clearly communicated to all site visitors. All driving will be carried out at safe speeds designated for the site. • Site entry and exit points will be clearly marked to ensure vehicle movements are contained within the approved areas. • Staff and contractors will be made aware through general site induction and training of the potential to impact native flora habitat, reporting requirements and mitigation and management measures that are to be implemented during on-site works. • Weekly site inspections to review flora and fauna control measures during construction. Sightings and incidents reported in daily pre-starts during construction. All near misses and incidents will be investigated to establish root cause. Where necessary corrective actions will be developed to improve existing processes.	Implementation of management measures will ensure operating vehicles on-site during the construction, operation and decommissioning phases will not result in residual impacts to *S. dissectum*.
Altered Fire Regimes and Bushfire Risk	• A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES habitat. • Maintenance of an asset protection zone within the Operations Footprint is required to reduce the risk of reduction of habitat due to fire. • Use of industry best practice hazard reduction measures to minimise bushfire risk and environmental impacts, such as on-site controlled burning of cleared vegetation. • Ensuring a 30 m bushfire setback from vegetation around electrical infrastructure. Maintaining safe distances between vegetation and potential fire-starting hazards will increase safety and reduce fire risk. • Weed management and control methods (in line with the requirements of the *Biosecurity Act 2014* (Qld)) will reduce the potential of invasive plants changing species composition on-site and increasing fire risk. • Reduce on-site fuel loads and maintain firebreaks and trails.	Management measures implemented in line with the site-specific Bushfire Management Plan will greatly reduce the potential risk for this species caused by planned or unplanned fires. Therefore, there is no anticipated indirect residual impact.
Altered Hydrology	• The Proposed Action will adopt best practice erosion and sediment control measures, which will implement all relevant State Codes and Guidelines. • Watercourse crossings shall be stabilised to mitigate erosion of pavement and embankment materials during rainfall events up to and including the 10% AEP storm event. • Staff and contractors will be made aware through general site induction and training of the potential to generate runoff and mitigation and management measures that should be implemented. • Construction activities must not interfere or block natural drainage e.g. disturbing channel contours.	Impacts to on-site hydrology will be managed in accordance with the CEMP. Impacts to watercourses will be addressed by stabilising to prevent erosion, and only occur in discrete work areas, such that no increase in sedimentation is overserved affecting habitat. Therefore, there is no anticipated indirect residual impact.

Indirect Impact	Management of Indirect Impact	Residual Impact
Environmental Pollution and Hazardous Materials	• All hazardous materials bought on-site will be accompanied by an MSDS, all relevant personnel will be trained in their proper use. • Only registered herbicides will be used for weed management by a suitably qualified bush regeneration contractor. • Imported materials that are able to transport hazardous substances will be assessed to ensure they are free of contamination, disease and invasive species. • Ensuring appropriate waste management (lidded bins), to reduce potential for spread of hazardous materials on-site. • Vehicles, plant and machinery will comply with site-specific speed limits to minimise dust generation. • Staff and contractors will be made aware through general site induction and training of the potential to generate dust, light and noise pollution and management measures that should be implemented. • Auditing of the CEMP will occur during construction. • Dust will be minimised through engineering controls on machinery and other available dust suppression controls, such as sprinklers. • Disturbance form blasting will be minimised through engineering controls and other available blasting suppression, such as barrier walls.	The management measures proposed will result in the reduction of the indirect impacts of environmental pollution and hazardous materials. Hazardous materials brought onto the site will be tightly regulated. Dust generation will be minimised such that is it unlikely to damage species habitat. These measures will ensure that the indirect impact is minimised so as to not cause an indirect residual impact to *S. dissectum*.

Indirect impacts from the Proposed Action will be mitigated and managed appropriately, such that there is no residual impact on *S. dissectum*. Some indirect impacts have been considered as part of the significant impact assessment for this species but are concluded unlikely to contribute to a significant impact.

6.6.15.3 SIGNIFICANT IMPACT ASSESSMENT

Potential Habitat identified as suitable for *S. dissectum* occurs within the Study Area in association with the BHT of *Brigalow woodlands*. A total of 261.4 ha of Potential Habitat occurs within the Study Area, with 0.2 ha of this habitat expected to be permanently impacted as a result of the Proposed Action.

In the absence of an official description, Potential Habitat described above and mapped to occur within the Study Area has conservatively been considered habitat critical to the survival of *S. dissectum*, though the Study area does not support an important population of the species.

A significant impact assessment based on the guidance provided in the SIG 1.1 is presented in Table 6-46. It has been concluded that the Proposed Action is **unlikely** to have a significant impact on *S. dissectum.* Avoidance, mitigation and management measures considered within this assessment are discussed in detail in Section 7.

TABLE 6-46 SIGNIFICANT IMPACT ASSESSMENT FOR *SOLANUM DISSECTUM*

Criteria	Description	Criteria Triggered?
An action is likely to have a significant impact on an endangered species if there is a real chance or possibility that it will:		
Lead to a long-term decrease in the size of a population,	The Proposed Action is expected to permanently impact 0.2 ha (or 0.1%) of *S. dissectum* Potential Habitat within the Study Area, though no known population of the species occurs in the Study Area or Locality. Impacts to 0.2 ha of Potential Habitat is not expected to constitute a substantial impact to the species, as this is a small area of habitat to be removed in relation to the larger context of the Study Area, which supports 261.4 ha of potential *S. dissectum* habitat. Therefore, the Proposed Action is unlikely to lead to a long-term decrease int eh size of a population.	Unlikely
Reduce the area of occupancy of the species,	The area of occupancy of the species is poorly understood due to the limited known occurrences of the species. Therefore, substantial impacts to species habitat have the potential to reduce the area of occupancy or fragment a population. However, impacts to 0.2 ha of potential habitat is not expected to constitute a substantial impact to the species, as this is a small area of habitat to be removed in relation to the larger context of the Study Area, which supports 261.4 ha of potential *S. dissectum* habitat. Therefore, the Proposed Action is unlikely to reduce the area of occupancy of the species.	Unlikely
Fragment an existing population into two or more populations,	The Proposed Action is expected to disturb 0.2 ha (or 0.1%) of *S. dissectum* Potential Habitat within the Study Area, though no known population of the species occurs in the Study Area or Locality. Additionally, disturbances associated with the Proposed Action will largely occur at small, isolated turbine locations, or narrow, linear areas of projected access tracks within the Study Area. This will ensure that effects of fragmentation are minimised at all opportunities. Therefore, the Proposed Action is unlikely to fragment an existing population into two or more populations.	Unlikely
Adversely affect habitat critical to the survival of a species,	Though the species was not identified during survey events and the closest recent record occurs approximately 30 km from the Study Area, if a population is observed in future surveys, the surrounding habitat may be considered habitat critical to the survival of the species. The Proposed Action's potential impact to 0.2 ha of Potential Habitat (only 0.1% of Potential Habitat within the Study Area) is unlikely to adversely affect habitat critical to the survival of this species.	Unlikely

Criteria	Description	Criteria Triggered?
Disrupt the breeding cycle of a population,	*S. dissectum* reproductive output (number of flowers, fruit and seeds) is thought to be somewhat low, with fewer than 100 seeds produced per stem during the species' fruiting period (between March and July each year) (TSSC, 2016a). However, the species is acknowledged to resprout successfully from disturbance and avifauna dispersal is a likely vector for reproduction. Considering the limited direct impact on the species' Potential Habitat (0.2 ha) and limited indirect impacts from operation, it is unlikely that the Proposed Action will disrupt the breeding cycle of *S. dissectum.* Further, mitigation measures such as a biosecurity plan (see Section 7), pre-clearance surveys and micro-siting at areas of planned infrastructure will be implemented to ensure the breeding cycle of a population is not disrupted.	Unlikely
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline,	The Proposed Action will result in the removal of 0.2 ha of Potential Habitat (0.1% of total habitat available). This accounts for a small area of habitat to be removed in relation to the larger context of the Study Area, which supports 261.4 ha of Potential Habitat. It is expected that small scale disturbance in the larger context of the landscape will not remove, isolate or decrease the quality of habitat that would result in species decline.	Unlikely
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Invasive weeds such as green panic (*Megathyrsus maximus pubiglumis*) and buffel grass (*Cenchrus ciliaris*) are identified as threats to *S. dissectum* as they can outcompete the species in its preferred microhabitat. The Proposed Action activities during construction and operation will adopt and follow biosecurity measures to prevent the introduction of new invasive species or the spread of those known to the Study Area (see Section 7).	Unlikely
Introduce disease that may cause the species to decline, or	*S. dissectum* conservation advice does not list any diseases as a threat to the species (TSSC, 2016a). There is no evidence to suggest the Proposed Action will introduce a disease that may cause the species to decline. Additionally, precautions will be taken to ensure that the spread of disease does not occur. This includes following biosecurity measures as part of a biosecurity plan (see Section 7).	Unlikely
Interfere with the recovery of the species.	There are no formally adopted recovery plans for this species. However, there are *Primary Conservation Actions* and *Conservation and Management Actions* identified in the *Conservation Advice for Solanum dissectum* (TSSC, 2016a) which aim to; • Maintain and protect existing populations, and protect and enhance habitat to provide potential for reproduction of plants within existing populations	Unlikely

Criteria	Description	Criteria Triggered?
	• Consult with private landowners with *Solanum dissectum* on their properties and develop site-specific management actions and the implementation of conservation agreements; and • Manage sites to identify, control and reduce the spread of invasive species such as introduced grasses, especially buffel grass. The Proposed Action will aim to control invasive grasses through a biosecurity plan. Mitigation measures such as pre-clearance surveys and micro-siting at areas of planned infrastructure will aim to retain connectivity values and reduce impacts where possible (as well as identify and protect any specimens that may occur). It is therefore considered unlikely the Proposed Action will interfere with the recovery of the species.	
Significant Impact: Unlikely		

6.6.16 SOLANUM JOHNSONIANUM

6.6.16.1 DIRECT IMPACTS

Direct impacts to *Solanum johnsonianum* associated with the Proposed Action are considered to be limited to habitat loss from vegetation clearing. These impacts are quantified below and include impacts to:

- 1.7 ha of Potential Habitat.

It is expected that some impacted areas of *S. johnsonianum* habitat will be revegetated after the construction phase. Based on the species conservation advice, *S. johnsonianum* is thought to respond positively to some disturbance, such as wildfire and shallow mechanical disturbance, which is believed to promote growth and flowering (TSSC, 2016b). Additionally, brigalow has the ability to produce shoots from horizontal roots (suckering) in response to disturbance, resulting in there likely to be brigalow regrowth in areas not required for operation (Queensland Government, 2024). Because of this, post-construction rehabilitation is expected to restore 1.5 ha of Potential Habitat to pre-disturbance composition and function. This will result in a permanent impact to only 0.2 ha of Potential Habitat for *S. johnsonianum*.

A summary of the direct impacts to *S. johnsonianum* habitat as a result of the Proposed Action is shown in Table 6-47. A total of 0.2 ha of *S. johnsonianum* habitat will be permanently impacted by the Proposed Action, which equates to 0.1% of the total available habitat identified within the Study Area.

TABLE 6-47 DIRECT IMPACTS TO *S. JOHNSONIANUM* HABITAT

	Potential Habitat
Study Area (ha)	261.4
Disturbance Footprint (ha)	1.7
Percent of habitat within the Study Area to be impacted	0.7% of Potential Habitat within the Study Area
Available **Revegetation areas** within the Disturbance Footprint (ha)	1.5
Permanent impact* (Operations Footprint) (ha)	0.2 (or 0.1%)

**Permanent impact (Operations Footprint) is provided where revegetation and/or rehabilitation can return habitat for the species to function or utilise post-construction (i.e., for recolonisation, dispersal, foraging or breeding).*

6.6.16.2 INDIRECT IMPACTS

The indirect impacts to *S. johnsonianum* as a result of the Proposed Action are detailed in Table 6-48, along with how these impacts will be managed and any residual impact that will affect the MNES. Avoidance, mitigation and management measures are discussed in detail in Section 7.

TABLE 6-48 INDIRECT IMPACTS TO *S. JOHNSONIANUM*

Indirect Impact	**Management of Indirect Impact**	**Residual Impact**
Habitat Fragmentation and Patch Isolation	• Areas identified as MNES habitat will be avoided as much as possible at the design and micro-siting stages. • Micro-siting of infrastructure will utilise existing clearance areas and avoid habitat fragmentation and patch isolation, with consideration of whether avoidance areas would still be connected to habitat in the broader landscape. • Prior to construction and detailed design, the incorporation of road pinch points to maximise connectivity will be considered to maintain habitat connectivity. While pinch points have a benefit for habitat they present a technical and logistical barrier to safe and effective construction. Pre-clearance surveys will determine appropriate locations for road pinch points. • Location of infrastructure will prioritise avoiding or minimising edge effects or dissecting tracts of native vegetation. • Where possible, the Proposed Action will implement the use of innovative turbine blade transportation, including methods to minimise necessary clearance widths (e.g. 'Blade Manipulator' trucks). • Turbine placement will maximise the use of areas that are less vegetated to avoid and minimise clearing of key habitat. • All clearing for access corridors will be limited to 40 m in width during the construction phase.	Habitat fragmentation and patch isolation will be managed to ensure that *S. johnsonianum* habitat maintains connectivity with the landscape within and surrounding the Study Area. All clearing for access corridors will be limited to 40 m. Additionally, the Proposed Action will not remove or isolate habitat patches altogether, only clearing in the areas necessary for infrastructure. Therefore, this indirect impact will be minimised so as not to cause an indirect residual impact.

Indirect Impact	Management of Indirect Impact	Residual Impact
	• Clear delineation of areas to be cleared, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. Toolbox talks will relay site-specific clearing information to all field staff and contractors. • Rehabilitation of access corridors will occur once construction has been completed. Such rehabilitation will involve planting/natural regeneration of native species that are habitat for MNES.	
Increased Prevalence of Invasive Plants and Animals	• A Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • Staff and contractors will be given information on the location and consequences of biosecurity threats in the Study Area. • Access to a landholder's property will not occur unless authorised under a land use agreement. • WONS and Restrictive Invasive Species will be identified and monitored in the Study Area. Appropriate weed monitoring will occur to ensure new weed species are identified, recorded and controlled. • Weed management and control methods will depend upon the location, weed species identified, the degree of the infestation, relevant landholder agreement or conduct and compensation agreements provisions, and local, state and national regulatory requirements. • Weed loads will be mimimised in high-traffic areas such as roads, easements and yards through regular monitoring and site personnel reporting protocols, with an investigation to be managed to prevent spread of weeds in accordance with the *Biosecurity Act 2014* (Qld). • Imported material able to transport weed seed will be assessed to ensure they are free of contamination, disease and invasive weeds.	Management measures will limit the possibility of the introduction or spread of invasive plant and animal species through relevant biosecurity measures incorporated into the Biosecurity Management Plan. This is such that the indirect impact will be minimised so as not to cause an indirect residual impact to the species.
Increased Vehicle Impacts on Fauna and Habitat	• No driving will occur in unauthorised areas, routes and access tracks will be clearly communicated to all site visitors. All driving will be carried out at safe speeds designated for the site. • Site entry and exit points will be clearly marked to ensure vehicle movements are contained within the approved areas. • Staff and contractors will be made aware through general site induction and training of the potential to impact native flora habitat, reporting requirements and mitigation and	Implementation of management measures will ensure operating vehicles on-site during the construction, operation and decommissioning phases will not result in residual impacts to *S. johnsonianum*.

Indirect Impact	Management of Indirect Impact	Residual Impact
	management measures that are to be implemented during on-site works. • Weekly site inspections to review flora and fauna control measures during construction. Sightings and incidents reported in daily pre-starts during construction. All near misses and incidents will be investigated to establish root cause. Where necessary corrective actions will be developed to improve existing processes.	
Altered Fire Regimes and Bushfire Risk	• A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES habitat. • Maintenance of an asset protection zone within the Operations Footprint is required to reduce the risk of reduction of habitat due to fire. • Use of industry best practice hazard reduction measures to minimise bushfire risk and environmental impacts, such as on-site controlled burning of cleared vegetation. • Ensuring a 30 m bushfire setback from vegetation around electrical infrastructure. Maintaining safe distances between vegetation and potential fire-starting hazards will increase safety and reduce fire risk. • Weed management and control methods (in line with the requirements of the *Biosecurity Act 2014* (Qld)) will reduce the potential of invasive plants changing species composition on-site and increasing fire risk. • Reduce on-site fuel loads and maintain firebreaks and trails.	Management measures implemented in line with the site-specific Bushfire Management Plan will greatly reduce the potential risk for this species caused by planned or unplanned fires. Therefore, there is no anticipated indirect residual impact.
Altered Hydrology	• The Proposed Action will adopt best practice erosion and sediment control measures, which will implement all relevant State Codes and Guidelines. • Watercourse crossings shall be stabilised to mitigate erosion of pavement and embankment materials during rainfall events up to and including the 10% AEP storm event. • Staff and contractors will be made aware through general site induction and training of the potential to generate runoff and mitigation and management measures that should be implemented. • Construction activities must not interfere or block natural drainage e.g. disturbing channel contours.	Impacts to on-site hydrology will be managed in accordance with the CEMP. Impacts to watercourses will be addressed by stabilising to prevent erosion, and only occur in discrete work areas, such that no increase in sedimentation is overserved affecting habitat. Therefore, there is no anticipated indirect residual impact.
Environmental Pollution and Hazardous Materials	• All hazardous materials bought on-site will be accompanied by an MSDS, all relevant personnel will be trained in their proper use. • Only registered herbicides will be used for weed management by a suitably qualified bush regeneration contractor. • Imported materials that are able to transport hazardous substances will be assessed to ensure they are free of contamination, disease and invasive species.	The management measures proposed will result in the reduction of the indirect impacts of environmental pollution and hazardous materials. Hazardous materials brought onto the site will be tightly regulated. Dust generation will be minimised such that is it unlikely to damage species habitat. These measures

Indirect Impact	Management of Indirect Impact	Residual Impact
	• Ensuring appropriate waste management (lidded bins), to reduce potential for spread of hazardous materials on-site. • Vehicles, plant and machinery will comply with site-specific speed limits to minimise dust generation. • Staff and contractors will be made aware through general site induction and training of the potential to generate dust, light and noise pollution and management measures that should be implemented. • Auditing of the CEMP will occur during construction. • Dust will be minimised through engineering controls on machinery and other available dust suppression controls, such as sprinklers. • Disturbance form blasting will be minimised through engineering controls and other available blasting suppression, such as barrier walls.	will ensure that the indirect impact is minimised so as to not cause an indirect residual impact to *S. johnsonianum*.

Indirect impacts from the Proposed Action will be mitigated and managed appropriately, such that there is no residual impact on *S. johnsonianum*. Some indirect impacts have been considered as part of the significant impact assessment for this species but are concluded unlikely to contribute to a significant impact.

6.6.16.3 SIGNIFICANT IMPACT ASSESSMENT

Potential Habitat identified as suitable for *S. johnsonianum* occurs within the Study Area in association with the BHT of *Brigalow woodlands*. A total of 261.4 ha of Potential Habitat occurs within the Study Area, with 0.2 ha of this habitat expected to be permanently impacted as a result of the Proposed Action.

In the absence of an official description, Potential Habitat described above and mapped to occur within the Study Area has conservatively been considered habitat critical to the survival of *S. johnsonianum*, though the Study area does not support an important population of the species.

A significant impact assessment based on the guidance provided in the SIG 1.1 is presented in Table 6-49. It has been concluded that the Proposed Action is **unlikely** to have a significant impact on *S. johnsonianum.* Avoidance, mitigation and management measures considered within the assessment are discussed in detail in Section 7.

TABLE 6-49 SIGNIFICANT IMPACT ASSESSMENT FOR *SOLANUM JOHNSONIANUM*

Criteria	Description	Criteria Triggered?
An action is likely to have a significant impact on an endangered species if there is a real chance or possibility that it will:		
Lead to a long-term decrease in the size of a population,	The Proposed Action is expected to permanently disturb 0.2 ha of Potential Habitat for *S. johnsonianum* (0.1% of total habitat available) within the Study Area, though no known population of the species occurs in the Study Area or Locality. Impacts to 0.2 ha of Potential Habitat is not expected to constitute a substantial impact to the species, as this is a small area of habitat to be removed in relation to the larger context of the Study Area, which supports 261.4 ha of Potential Habitat. Therefore, the Proposed Action is unlikely to lead to a long-term decrease in the size of a population.	Unlikely
Reduce the area of occupancy of the species,	The area of occupancy of the species is poorly understood due to the limited known occurrences of the species. Therefore, substantial impacts to species habitat have the potential to reduce the area of occupancy of the species. However, impacts to 0.2 ha of Potential Habitat is not expected to constitute a substantial impact to the species, as this is a small area of habitat to be removed in relation to the larger context of the Study Area, which supports 261.4 ha of Potential Habitat. Therefore, the Proposed Action is unlikely to reduce the area of occupancy of the species.	Unlikely
Fragment an existing population into two or more populations,	Impacts to 0.2 ha of Potential Habitat is not expected to constitute a substantial impact to the species, as this is a small area of habitat to be removed in relation to the larger context of the Study Area, which supports 261.4 ha of Potential Habitat. Additionally, disturbances associated with the Proposed Action will largely occur at small, isolated turbine locations, or narrow, linear areas of projected access tracks within the Study Area. This will ensure that effects of fragmentation are minimised at all opportunities. Therefore, the Proposed Action is unlikely to reduce the area of occupancy of the species.	Unlikely

Criteria	Description	Criteria Triggered?
Adversely affect habitat critical to the survival of a species,	Although the species was not identified during survey events and the closest recent record is approximately 30 km from the Study Area, if a population is observed in future surveys, the surrounding habitat may be considered habitat critical to the survival of the species. The Proposed Action's potential impact to 0.2 ha (or 0.1%) of Potential Habitat within the Study Area is unlikely to adversely affect habitat critical to the survival of this species.	Unlikely
Disrupt the breeding cycle of a population,	*S. johnsonianum* reproductive output (number of flowers, fruit and seeds) is thought to be somewhat low, with fewer than 100 seeds produced per stem during the species' fruiting period (between April to May each year) (TSSC, 2016b). Considering the limited direct impact to the species' Potential Habitat (0.2 ha) and limited indirect impacts from operation, it is unlikely that the Proposed Action will disrupt the breeding cycle of *S. johnsonianum.* Furthermore, mitigation measures such as a biosecurity plan (see Section 7), pre-clearance surveys and micro-siting at areas of planned infrastructure will be implemented to ensure the breeding cycle of a population is not disrupted.	Unlikely
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline,	The Proposed Action will result in the removal of 0.2 ha of potential *S. johnsonianum* habitat (0.1% of total habitat available). This accounts for a small area of habitat to be removed in relation to the larger context of the Study Area, which supports 261.4 ha of Potential Habitat. It is expected that small scale disturbance in the larger context of the landscape will not remove, isolate or decrease the quality of habitat that would result in species decline.	Unlikely
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Invasive weeds such as green panic (*Megathyrsus maximus pubiglumis*) and buffel grass (*Cenchrus ciliaris*) are identified as threats to *S. johnsonianum* as they can outcompete the species in its preferred microhabitat. The Proposed Action activities during construction and operation will adopt and follow biosecurity measures to prevent introduction of new invasive species or the spread of those known to the Study Area (see Section 7).	Unlikely
Introduce disease that may cause the species to decline, or	*S. johnsonianum* conservation advice does not list any diseases as a threat to the species (TSSC, 2016b). There is no evidence to suggest the Proposed Action will introduce a disease that may cause the species to decline. Additionally, precautions will be taken to ensure that the spread of disease does not occur. This includes following biosecurity measures as part of a biosecurity plan (see Section 7).	Unlikely

Criteria	Description	Criteria Triggered?
Interfere with the recovery of the species.	There are no formally adopted recovery plans for this species. However, there are *Primary Conservation Actions* and *Conservation and Management Actions* identified in the *Conservation Advice for Solanum johnsonianum* (TSSC, 2016b) which aim to; • Maintain and protect existing populations, and protect and enhance habitat to provide potential for reproduction of plants within existing populations • Consult with private landowners with *Solanum johnsonianum* on their properties and develop site-specific management actions and the implementation of conservation agreements; and • Manage sites to identify, control and reduce the spread of invasive species such as introduced grasses. The Proposed Action will aim to control invasive grasses through a biosecurity plan. Mitigation measures such as pre-clearance surveys and micro-siting at areas of planned infrastructure will aim to retain connectivity values and reduce impacts where possible (as well as identify and protect any specimens that may occur). It is therefore considered unlikely the Proposed Action will interfere with the recovery of the species.	Unlikely
Significant Impact: Unlikely		

6.6.17 XEROTHAMNELLA HERBACEA

6.6.17.1 DIRECT IMPACTS

Direct impacts to *Xerothamnella herbacea* associated with the Proposed Action are considered to be limited to habitat loss from vegetation clearing. These impacts are quantified below and include impacts to:

- 1.7 ha of Potential Habitat.

It is expected that some impacted areas of *X. herbacea* habitat will be revegetated after the construction phase. However, no rehabilitation or revegetation in these areas is expected to restore any functionality for this species post-construction. Therefore, the direct impact to *X. herbacea* associated with construction-phase clearing is considered permanent.

A summary of the direct impacts on *X. herbacea* habitat as a result of the Proposed Action is shown in Table 6-50. A total of 1.7 ha of *X. herbacea* habitat will be permanently impacted by the Proposed Action, which equates to 0.7% of the total available habitat identified within the Study Area.

TABLE 6-50 DIRECT IMPACTS TO *X. HERBACEA* HABITAT

	Potential Habitat
Study Area (ha)	261.4
Disturbance Footprint (ha)	1.7
Percent of habitat within the Study Area to be impacted	0.7% of Potential Habitat within the Study Area
Permanent impact (Operations Footprint) (ha)	**1.7**

6.6.17.2 INDIRECT IMPACTS

The indirect impacts to *X. herbacea* as a result of the Proposed Action are detailed in Table 6-51, along with how these impacts will be managed and any residual impact that will affect the MNES. Avoidance, mitigation and management measures are discussed in detail in Section 7.

TABLE 6-51 INDIRECT IMPACTS TO *X. HERBACEA*

Indirect Impact	**Management of Indirect Impact**	**Residual Impact**
Habitat Fragmentation and Patch Isolation	• Areas identified as MNES habitat will be avoided as much as possible at the design and micro-siting stages. • Micro-siting of infrastructure will utilise existing clearance areas and avoid habitat fragmentation and patch isolation, with consideration of whether avoidance areas would still be connected to habitat in the broader landscape. • Prior to construction and detailed design, the incorporation of road pinch points to maximise connectivity will be considered to maintain habitat connectivity. While pinch points have a benefit for habitat they present a technical and logistical barrier to safe and effective construction. Pre-clearance surveys will determine appropriate locations for road pinch points. • Location of infrastructure will prioritise avoiding or minimising edge effects or dissecting tracts of native vegetation. • Where possible, the Proposed Action will implement the use of innovative turbine blade transportation, including methods to minimise necessary clearance widths (e.g. 'Blade Manipulator' trucks). • Turbine placement will maximise the use of areas that are less vegetated to avoid and minimise clearing of key habitat. • All clearing for access corridors will be limited to 40 m in width during the construction phase. • Clear delineation of areas to be cleared, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance.	Habitat fragmentation and patch isolation will be managed to ensure that *X. herbacea* habitat maintains connectivity with the landscape within and surrounding the Study Area. All clearing for access corridors will be limited to 40 m. Additionally, the Proposed Action will not remove or isolate habitat patches altogether, only clearing in the areas necessary for infrastructure. Therefore, this indirect impact will be minimised so as not to cause an indirect residual impact.

Indirect Impact	Management of Indirect Impact	Residual Impact
	Toolbox talks will relay site-specific clearing information to all field staff and contractors. • Rehabilitation of access corridors will occur once construction has been completed. Such rehabilitation will involve planting/natural regeneration of native species that are habitat for MNES.	
Increased Prevalence of Invasive Plants and Animals	• A Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • Staff and contractors will be given information on the location and consequences of biosecurity threats in the Study Area. • Access to a landholder's property will not occur unless authorised under a land use agreement. • WONS and Restrictive Invasive Species will be identified and monitored in the Study Area. Appropriate weed monitoring will occur to ensure new weed species are identified, recorded and controlled. • Weed management and control methods will depend upon the location, weed species identified, the degree of the infestation, relevant landholder agreement or conduct and compensation agreements provisions, and local, state and national regulatory requirements. • Weed loads will be mimimised in high-traffic areas such as roads, easements and yards through regular monitoring and site personnel reporting protocols, with an investigation to be managed to prevent spread of weeds in accordance with the *Biosecurity Act 2014* (Qld). • Imported material able to transport weed seed will be assessed to ensure they are free of contamination, disease and invasive weeds.	Management measures will limit the possibility of the introduction or spread of invasive plant and animal species through relevant biosecurity measures incorporated into the Biosecurity Management Plan. This is such that the indirect impact will be minimised so as not to cause an indirect residual impact to the species.
Increased Vehicle Impacts on Fauna and Habitat	• No driving will occur in unauthorised areas, routes and access tracks will be clearly communicated to all site visitors. All driving will be carried out at safe speeds designated for the site. • Site entry and exit points will be clearly marked to ensure vehicle movements are contained within the approved areas. • Staff and contractors will be made aware through general site induction and training of the potential to impact native flora habitat, reporting requirements and mitigation and management measures that are to be implemented during on-site works. • Weekly site inspections to review flora and fauna control measures during construction. Sightings and incidents reported in daily pre-	Implementation of management measures will ensure operating vehicles on-site during the construction, operation and decommissioning phases will not result in residual impacts to *X. herbacea*.

Indirect Impact	Management of Indirect Impact	Residual Impact
	starts during construction. All near misses and incidents will be investigated to establish root cause. Where necessary corrective actions will be developed to improve existing processes.	
Altered Fire Regimes and Bushfire Risk	• A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES habitat. • Maintenance of an asset protection zone within the Operations Footprint is required to reduce the risk of reduction of habitat due to fire. • Use of industry best practice hazard reduction measures to minimise bushfire risk and environmental impacts, such as on-site controlled burning of cleared vegetation. • Ensuring a 30 m bushfire setback from vegetation around electrical infrastructure. Maintaining safe distances between vegetation and potential fire-starting hazards will increase safety and reduce fire risk. • Weed management and control methods (in line with the requirements of the *Biosecurity Act 2014* (Qld)) will reduce the potential of invasive plants changing species composition on-site and increasing fire risk. • Reduce on-site fuel loads and maintain firebreaks and trails.	Management measures implemented in line with the site-specific Bushfire Management Plan will greatly reduce the potential risk for this species caused by planned or unplanned fires. Therefore, there is no anticipated indirect residual impact.
Altered Hydrology	• The Proposed Action will adopt best practice erosion and sediment control measures, which will implement all relevant State Codes and Guidelines. • Watercourse crossings shall be stabilised to mitigate erosion of pavement and embankment materials during rainfall events up to and including the 10% AEP storm event. • Staff and contractors will be made aware through general site induction and training of the potential to generate runoff and mitigation and management measures that should be implemented. • Construction activities must not interfere or block natural drainage e.g. disturbing channel contours.	Impacts to on-site hydrology will be managed in accordance with the CEMP. Impacts to watercourses will be addressed by stabilising to prevent erosion, and only occur in discrete work areas, such that no increase in sedimentation is overserved affecting habitat. Therefore, there is no anticipated indirect residual impact.
Environmental Pollution and Hazardous Materials	• All hazardous materials bought on-site will be accompanied by an MSDS, all relevant personnel will be trained in their proper use. • Only registered herbicides will be used for weed management by a suitably qualified bush regeneration contractor. • Imported materials that are able to transport hazardous substances will be assessed to ensure they are free of contamination, disease and invasive species. • Ensuring appropriate waste management (lidded bins), to reduce potential for spread of hazardous materials on-site.	The management measures proposed will result in the reduction of the indirect impacts of environmental pollution and hazardous materials. Hazardous materials brought onto the site will be tightly regulated. Dust generation will be minimised such that is it unlikely to damage species habitat. These measures will ensure that the indirect impact is minimised so as to not cause an indirect residual impact to *X. herbacea*.

Indirect Impact	Management of Indirect Impact	Residual Impact
	• Vehicles, plant and machinery will comply with site-specific speed limits to minimise dust generation. • Staff and contractors will be made aware through general site induction and training of the potential to generate dust, light and noise pollution and management measures that should be implemented. • Auditing of the CEMP will occur during construction. • Dust will be minimised through engineering controls on machinery and other available dust suppression controls, such as sprinklers. • Disturbance form blasting will be minimised through engineering controls and other available blasting suppression, such as barrier walls.	

Indirect impacts from the Proposed Action will be mitigated and managed appropriately, such that there is no residual impact on *X. herbacea*. Some indirect impacts have been considered as part of the significant impact assessment for this species but are concluded unlikely to contribute to a significant impact.

6.6.17.3 SIGNIFICANT IMPACT ASSESSMENT

Potential Habitat identified as suitable for *X. herbacea* occurs within the Study Area in association with the BHT of *Brigalow woodlands*. A total of 261.4 ha of Potential Habitat occurs within the Study Area, with 1.7 ha of this habitat expected to be permanently impacted as a result of the Proposed Action.

In the absence of an official description, Potential Habitat described above and mapped to occur within the Study Area has conservatively been considered habitat critical to the survival of *X. herbacea*, though the Study area does not support an important population of the species.

A significant impact assessment based on the guidance provided in the SIG 1.1 is presented in Table 6-52. It has been concluded that the Proposed Action is **unlikely** to have a significant impact on *X. herbacea*. Avoidance, mitigation and management measures are discussed in detail in Section 7.

TABLE 6-52 SIGNIFICANT IMPACT ASSESSMENT FOR THE *XEROTHAMNELLA HERBACEA*

Criteria	Description	Criteria Triggered?
An action is likely to have a significant impact on an endangered species if there is a real chance or possibility that it will:		
Lead to a long-term decrease in the size of a population,	The Proposed Action is expected to disturb 1.7 ha of Potential Habitat for *X. herbacea* (0.7% of total habitat available) within the Study Area, though no known population of the species occurs in the Study Area or Locality.	Unlikely

Criteria	Description	Criteria Triggered?
	Impacts to 1.7 ha of Potential Habitat is not expected to constitute a substantial impact to the species, as this is a small area of habitat to be removed in relation to the larger context of the Study Area, which supports 261.4 ha of Potential Habitat. Therefore, the Proposed Action is unlikely to lead to a long-term decrease in the size of a population.	
Reduce the area of occupancy of the species,	The area of occupancy of the species is poorly understood due to the limited known occurrences of the species. Therefore, substantial impacts to species habitat have the potential to reduce the area of occupancy or fragment a population. However, impacts to 1.7 ha of Potential Habitat is not expected to constitute a substantial impact to the species, as this is a small area of habitat to be removed in relation to the larger context of the Study Area, which supports 261.4 ha of Potential Habitat. Therefore, the Proposed Action is unlikely to reduce the area of occupancy.	Unlikely
Fragment an existing population into two or more populations,	The Proposed Action is expected to disturb 1.7 ha of Potential Habitat for *X. herbacea* (0.7% of total habitat available) within the Study Area, though no known population of the species occurs in the Study Area or Locality. Additionally, disturbances associated with the Proposed Action will largely occur at small, isolated turbine locations, or narrow, linear areas of projected access tracks within the Study Area. This will ensure that effects of fragmentation are minimised at all opportunities. Therefore, the Proposed Action is unlikely to reduce the area of occupancy of the species.	Unlikely
Adversely affect habitat critical to the survival of a species,	Although the species was not identified during survey events and the closest recent record is approximately 30 km from the Study Area, if a population is observed in future surveys, the surrounding habitat may be considered habitat critical to the survival of the species. The Proposed Action's potential impact to 1.7 ha (0.7%) of Potential Habitat within the Study Area is unlikely to adversely affect habitat critical to the survival of this species, as an extensive 259.7 ha of Potential Habitat will remain.	Unlikely

Criteria	Description	Criteria Triggered?
Disrupt the breeding cycle of a population,	Little is known about the breeding cycle of *X. herbacea*. Considering the limited direct impacts to the species' Potential Habitat (1.7 ha) and limited indirect impacts from operation activities, it is unlikely the Proposed Action will disrupt the breeding cycle of *X. herbacea.* Furthermore, mitigation measures such as a biosecurity plan (see Section 7), pre-clearance surveys and micro-siting at areas of planned infrastructure will be implemented to ensure the breeding cycle of a population is not disrupted.	Unlikely
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline,	The Proposed Action will result in the removal of 1.7 ha of potential *X. herbacea* habitat (0.7% of total habitat available). This accounts for a small area of habitat to be removed in relation to the larger context of the Study Area, which supports 261.4 ha of Potential Habitat. It is expected that small scale disturbance in the larger context of the landscape will not remove/isolate or decrease the quality of habitat that would result in species decline.	Unlikely
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Invasive flora such as green panic (*Megathyrsus maximus pubiglumis*) and buffel grass (*Cenchrus ciliaris*) are identified as threats to *X. herbacea* as they can outcompete the species in its microhabitat. Cattle and native macropods are also a threat to the species via trampling and grazing (DEWHA, 2008d). The Proposed Action activities during construction and operation will adopt and follow biosecurity measures to prevent introduction of new invasive species or the spread of those known to the Study Area (see Section 7).	Unlikely
Introduce disease that may cause the species to decline, or	The *X. herbacea* conservation advice does not list any diseases as a threat to the species. There is also no evidence to suggest the proposed disturbance would introduce a disease that would cause the species to decline. Additionally, precautions will be taken to ensure that the spread of disease does not occur. This includes following biosecurity measures as part of a biosecurity plan (see Section 7).	Unlikely
Interfere with the recovery of the species.	There are no formally adopted recovery plans for this species. However, there are *Regional* and *Local Priority Actions* identified by the *Approved Conservation Advice for Xerothamnella herbacea* (DEWHA, 2008d), which determine key management issues of: • Habitat loss, disturbance and modification • Conservation information • Fire • Invasive weeds • Trampling, browsing or grazing • Recovery of additional sites and/or populations	Unlikely

Criteria	Description	Criteria Triggered?
	The Proposed Action will result in 1.7 ha of disturbance to potential *X. herbacea* habitat (0.7% of all habitat within the Study Area). It is unlikely this impact will lead to habitat loss, disturbance or modification of *X. herbacea* habitat to the extent that recovery of the species is interfered with. Additional priority actions will be managed so as not to interfere substantially with the recovery of the species, including control of invasive weeds through a biosecurity plan and mitigation measures such as pre-clearance surveys and micro-siting at areas of planned infrastructure to retain connectivity values and reduce impacts where possible. It is not expected the Proposed Action will lead to an increased fire risk. While the Study Area is used for agricultural purposes, it is not expected the Proposed Action will contribute to further impacts of trampling and grazing. It is therefore considered unlikely the Proposed Action will substantially interfere with the recovery of the species.	
Significant Impact: Unlikely		

6.6.18 FORK-TAILED SWIFT

6.6.18.1 DIRECT IMPACTS

The entire Study Area has been considered Potential Foraging Habitat for the fork-tailed swift, as this species forages aerially. Initial construction-phase clearing of vegetation within the Study Area is only likely to represent a short-term disturbance to the species.

Direct impacts to fork-tailed swift associated with the Proposed Action are therefore considered to be limited to individual mortality and injury from turbine collision. A quantitative risk assessment of direct impact to fork-tailed swift associated with the operational-phase collision risk with wind turbines is presented in the BBMP (Appendix D). In summary:

- The species is listed as migratory under the EPBC Act;
- No records of the species exist within the Study Area or Locality;
- Low abundance of records exist within the broader locality in the last 20 years;
- Large global population estimate of 100,000 (DoE, 2015b);
- The species is known to form large flocks of 1,000s of individuals;
- The species is known to fly within the RSA; and
- Potential aerial foraging habitat over dry open habitats is present within the Study Area.

Based on the CRA methodology and risk matrix detailed within the BBMP (Appendix D), the fork-tailed swift has a 'moderately likely' likelihood of WTG collision due to its flight height and flock flying behaviour, and, as a migratory species, the consequence of an impact event is considered to be 'moderate'. Therefore, the species has been considered to be at a 'low' risk of being impacted by the Proposed Action Through collision with WTGs. Further detail on the CRA is provided in Section 6.11 and within the BBMP (Appendix D).

The BBMP establishes species-specific impact thresholds and associated triggers for turbine-related mortality, along with the decision-making framework and adaptive management responses required when thresholds are reached. These thresholds include an Annual Threshold and a Significant Impact Threshold, the latter comprising an intermediate trigger (Trigger 1) and a significant impact trigger (Trigger 2). Based on an Australian population estimate of 100,000 individuals (DoE, 2015b), the Trigger 2 for fork-tailed swift is 100 mortalities (0.1% of population) over a 5-year period (based on generational time). Adaptive management measures and corrective actions will be implemented proactively to avoid progression toward a Trigger 2 (a significant impact), including actions triggered by exceeding the Annual Threshold and/or Significant Impact Threshold Trigger 1. However, if a significant impact (Trigger 2) is reached for any bird or bat species, the Proponent must cease operation of the WTGs identified as contributing to the MNES mortality during ecologically relevant periods. WTGs must not recommence operation until approval is given from DCCEEW.

6.6.18.2 INDIRECT IMPACTS

The indirect impacts to fork-tailed swift as a result of the Proposed Action are detailed in Table 6-53, along with how these impacts will be managed and any residual impact that will affect the MNES. Avoidance, mitigation and management measures are discussed in detail in Section 7.

TABLE 6-53 INDIRECT IMPACTS TO FORK-TAILED SWIFT

Indirect Impact	Management of Indirect Impact	Residual Impact
Habitat Loss and Individual Mortality from Vegetation Clearing	Initial construction-phase clearing of vegetation within the Study Area is only likely to represent a short-term disturbance to the species, therefore there is no anticipated overall habitat loss. The following points refer to the potential indirect impact of individual mortality during vegetation clearing associated with the Proposed Action. • Areas identified as MNES habitat will be avoided as much as possible at the design and micro-siting stages. • Clear delineation of areas to be cleared, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. • Pre-clearance surveys and fauna spotter catchers will be utilised. Microhabitat features (e.g. hollow bearing trees) will be avoided where sufficient flexibility is enabled by State and Federal approvals. • Staff and contractors will be made aware through general site induction and training of the potential to impact native fauna, reporting requirements and mitigation and management measures that are to be implemented during on-site works. • Vehicles, plant and machinery will comply with site-specific speed limits to minimise the likelihood of collision with fauna. • Where trenching and excavations are created which may entrap fauna, suitable escape	The management measures to mitigate direct fatality or injury during construction and operation will result in the successful avoidance of impact to the species. Fork-tailed swift are anticipated as a flyover visitor only, as no roosting habitat was identified and this species forages aerially.

Indirect Impact	Management of Indirect Impact	Residual Impact
	measures will be put in place, and excavations checked for fauna before backfilling. • Weekly site inspections to review flora and fauna control measures during construction. Sightings and incidents reported in daily pre-starts during construction. All near misses and incidents will be investigated to establish root cause. Where necessary corrective actions will be developed to improve existing processes.	
Habitat Fragmentation and Patch Isolation	• Areas identified as MNES habitat will be avoided as much as possible at the design and micro-siting stages. • Micro-siting of infrastructure will utilise existing clearance areas and avoid habitat fragmentation and patch isolation, with consideration of whether avoidance areas would still be connected to habitat in the broader landscape. • Prior to construction and detailed design, the incorporation of road pinch points to maximise connectivity will be considered to maintain habitat connectivity. While pinch points have a benefit for habitat, they present a technical and logistical barrier to safe and effective construction. Pre-clearance surveys will determine appropriate locations for road pinch points. • Location of infrastructure will prioritise avoiding or minimising edge effects or dissecting tracts of native vegetation. • Where possible, the Proposed Action will implement the use of innovative turbine blade transportation, including methods to minimise necessary clearance widths (e.g. 'Blade Manipulator' trucks). • Turbine placement will maximise the use of areas that are less vegetated to avoid and minimise clearing of key habitat. • All clearing for access corridors will be limited to 40 m in width during the construction phase. • Clear delineation of areas to be cleared, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. Toolbox talks will relay site-specific clearing information to all field staff and contractors. • Rehabilitation of access corridors will occur once construction has been completed. Such rehabilitation will involve planting/natural regeneration of native species that are habitat for MNES.	Habitat fragmentation and patch isolation will be managed to ensure that fork-tailed swift are able to move and disperse throughout the entirety of identified habitat, maintaining connectivity with the landscape within and surrounding the Study Area. Fork-tailed swift are anticipated as a flyover visitor only, as no roosting habitat was identified and this species forages aerially. The entire Study Area has been considered Potential Foraging Habitat for the fork-tailed swift. Therefore, this indirect impact will be minimised so as not to cause an indirect residual impact.

Indirect Impact	Management of Indirect Impact	Residual Impact
Increased Prevalence of Invasive Plants and Animals	• A Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • Staff and contractors will be given information on the location and consequences of biosecurity threats in the Study Area. • Access to a landholder's property will not occur unless authorised under a land use agreement. • WONS and Restrictive Invasive Species will be identified and monitored in the Study Area. Appropriate weed monitoring will occur to ensure new weed species are identified, recorded and controlled. • Weed management and control methods will depend upon the location, weed species identified, the degree of the infestation, relevant landholder agreement or conduct and compensation agreements provisions, and local, state and national regulatory requirements. • Weed loads will be mimimised in high-traffic areas such as roads, easements and yards through regular monitoring and site personnel reporting protocols, with an investigation to be managed to prevent spread of weeds in accordance with the *Biosecurity Act 2014* (Qld). • Imported material able to transport weed seed will be assessed to ensure they are free of contamination, disease and invasive weeds.	Management measures will limit the possibility of the introduction or spread of invasive plant and animal species through relevant biosecurity measures incorporated into the Biosecurity Management Plan. This is such that the indirect impact will be minimised so as not to cause an indirect residual impact to the species.
Increased Vehicle Impacts on Fauna and Habitat	• No driving will occur in unauthorised areas, routes and access tracks will be clearly communicated to all site visitors. All driving will be carried out at safe speeds designated for the site. • Site entry and exit points will be clearly marked to ensure vehicle movements are contained within the approved areas. • Staff and contractors will be made aware through general site induction and training of the potential to impact native fauna, reporting requirements and mitigation and management measures that are to be implemented during on-site works. • Injured, sick or dead fauna will be recorded and reported, during and after the construction and operation phases. This can be carried out by a fauna spotter-catcher during periods where disturbance is expected to occur (primarily construction activities). Where injured or sick fauna is detected, individuals will be taken to the nearest wildlife carer or veterinarian if practical.	Fork-tailed swift are anticipated as a flyover visitor only, as no roosting habitat was identified and this species forages aerially. Therefore, this indirect impact is not expected to lead to an indirect residual impact.

Indirect Impact	Management of Indirect Impact	Residual Impact
Altered Fire Regimes and Bushfire Risk	• A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES habitat. • Maintenance of an asset protection zone within the Operations Footprint is required to reduce the risk of reduction of habitat due to fire. • Use of industry best practice hazard reduction measures to minimise bushfire risk and environmental impacts, such as on-site controlled burning of cleared vegetation. • Ensuring a 30 m bushfire setback from vegetation around electrical infrastructure. Maintaining safe distances between vegetation and potential fire-starting hazards will increase safety and reduce fire risk. • Weed management and control methods (in line with the requirements of the *Biosecurity Act 2014* (Qld)) will reduce the potential of invasive plants changing species composition on-site and increasing fire risk. • Reduce on-site fuel loads and maintain firebreaks and trails.	Fork-tailed swift are anticipated as a flyover visitor only, as no roosting habitat was identified and this species forages aerially. Therefore, this indirect impact is not expected to lead to an indirect residual impact.
Altered Hydrology	• The Proposed Action will adopt best practice erosion and sediment control measures, which will implement all relevant State Codes and Guidelines. • Watercourse crossings shall be stabilised to mitigate erosion of pavement and embankment materials during rainfall events up to and including the 10% AEP storm event. • Staff and contractors will be made aware through general site induction and training of the potential to generate runoff and mitigation and management measures that should be implemented. • Construction activities must not interfere or block natural drainage e.g. disturbing channel contours. • Water barrier works will be designed to minimise impact on fish habitats, stock or movements through compliance with relevant design codes. During the detailed design phase, fish passage elements will be considered in all mapped waterways for fish passage, including compliance with the accepted development requirements for waterway barrier works or an operational works permit under the Planning Act.	Fork-tailed swift are anticipated as a flyover visitor only, as no roosting habitat was identified and this species forages aerially. Therefore, this indirect impact is not expected to lead to an indirect residual impact.

Indirect Impact	Management of Indirect Impact	Residual Impact
Environmental Pollution and Hazardous Materials	• All hazardous materials bought on-site will be accompanied by an MSDS, all relevant personnel will be trained in their proper use. • Only registered herbicides will be used for weed management by a suitably qualified bush regeneration contractor. • Imported materials that are able to transport hazardous substances will be assessed to ensure they are free of contamination, disease and invasive species. • Ensuring appropriate waste management (lidded bins), to reduce potential for spread of hazardous materials on-site. • Vehicles, plant and machinery will comply with site-specific speed limits to minimise noise and dust generation. • Staff and contractors will be made aware through general site induction and training of the potential to generate dust, light and noise pollution and management measures that should be implemented. • Auditing of the CEMP will occur during construction. • Dust will be minimised through engineering controls on machinery and other available dust suppression controls, such as sprinklers. • Light pollution will be minimised through engineering controls on infrastructure and machinery, such as colour selection and timing controls. • Noise will be minimised through engineering controls on infrastructure and machinery, such as noise barriers and timing controls. • Disturbance form blasting will be minimised through engineering controls and other available blasting suppression, such as barrier walls. • Electricity infrastructure designed to allow for safe operations, using buffers between conductors and the ground, and conductors and adjacent vegetation. The transmission line has adopted a design which allows for reduced interference to canopy dwelling species due to minimising impacts to canopy vegetation.	The management measures proposed will result in the reduction of the indirect impacts of environmental pollution and hazardous materials. Hazardous materials brought onto the site will be tightly regulated. Dust, light and noise generation will be minimised such that is it unlikely to adversely affect species or damage species habitat. These measures will ensure that the indirect impact is minimised to not cause an indirect residual impact to fork-tailed swift.
Individual Mortality and Injury from Turbine Collision and Barotrauma	• WTGs will be located away from key bird and bat habitats (such as waterways and drainage lines). • Powerlines will be located so as to avoid fauna obstruction/entanglement and minimise potential perching resources within 200 m of high-risk turbines (identified within the BBMP (Appendix D)). • Turbine selection will incorporate innovative blade design features to minimise potential collision rates. WTG design will include acoustic and visual deterrents (e.g. ultrasound acoustic devices) and detection systems (e.g. IdentiFlight®, Robin Radar Systems) for high-risk turbines (identified within the BBMP (Appendix D)).	Mitigation and management measures outlined for the Proposed Action's WTGs will ensure that the potential impacts are minimised so as to not cause an indirect residual impact to fork-tailed swift. Fork-tailed swift has not been observed within the Study Area, and no suitable roosting habitat has been identified. It is noted that the results of future bird surveys and any evidence of threatened or migratory species in the Study Area, will be incorporated into future risk assessments and CRM

Indirect Impact	Management of Indirect Impact	Residual Impact
	• Development and implementation of a BBMP that considers the impacts that may occur to birds and mitigation measures to address potential impacts to migratory species considered 'potential' to occur within the Study Area. • Sightings and incidents reported in daily pre-starts during construction. • Carry out scientifically robust monitoring program for the detection/quantification of impacts on protected matters, including as a result of turbine strike and barotrauma. The monitoring program must be able to accurately and in a timely manner detect when impact triggers are reached. • All near misses and incidents will be investigated to establish root cause. Where necessary corrective actions will be developed to improve existing processes. • Injured, sick or dead fauna will be recorded and reported, during and after the construction and operation phases.	within the BBMP. Therefore, the principle of adaptive management will be applied to ensure that any future risks identified are adequately reported, analysed and subsequently managed per the framework in the BBMP. The amount of direct impact to fork-tailed swift associated with the operational-phase collision risk with wind turbines is further discussed in Section 6.11.
Site Alienation	• Locating turbines and access corridors away from key habitats where feasible (including remnant vegetation, waterways and drainage lines) reducing disturbance during all phases of the Proposed Action. • Mitigating habitat fragmentation and maintaining connectivity through the measures outlined above. • Development and implementation of a (BBMP that considers the impacts that may occur to birds and mitigation measures to address potential impacts to migratory species considered 'potential' to occur within the Study Area. • Development and implementation of management plans (VFMP, CEMP) outlined above to reduce the potential impact of construction and operation phase activities including introducing invasive species, fire and altered hydrology. • Implementing engineering controls on infrastructure and machinery outlined above, such that dust, light and noise pollution and blasting does not adversely affect species or species habitat.	The potential risk of site alienation will be managed to ensure that species are able to move, disperse and utilise habitat throughout the Study Area for the life of the Proposed Action. Avoidance, mitigation and management measures outlined in this PER and the BBMP will ensure that the potential for site alienation is minimised to not cause an indirect residual impact to fork-tailed swift.

Indirect impacts from the Proposed Action will be mitigated and managed appropriately, such that there is no residual impact on fork-tailed swift. Some indirect impacts have been considered as part of the significant impact assessment for this species but are concluded unlikely to contribute to a significant impact.

6.6.18.3 SIGNIFICANT IMPACT ASSESSMENT

A significant impact assessment based on the guidance provided in the SIG 1.1 is presented in in Table 6-54. It has been concluded that the Proposed Action is **unlikely** to have a significant impact on the fork-tailed swift. Considering the species nature as an aerial species in Australia,

and proclivity to fly at RSA heights and above, there is a risk of turbine collision as a result of the Proposed Action. Therefore, should the species be observed in the Study Area, adaptive management measures will be undertaken to further prevent any impact on this species. Avoidance, mitigation and management measures considered within this assessment are discussed in detail in Section 7.

TABLE 6-54 SIGNIFICANT IMPACT ASSESSMENT FOR THE FORK-TAILED SWIFT

Criteria	Description	Criteria Triggered?
An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:		
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species;	The whole Study Area is considered important habitat for this species but impacts to this habitat will not change its utility for the fork-tailed swift. This is because the species is an aerial forager, and its prey, insects, will not be dissuaded from the Project Area due to the Proposed Actions activities. Additionally, there is no significant impact threshold set out in DoE (2015b) for impacts to important habitat for this species, due to its aerial nature.	Unlikely
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species; or	DoE (2015b) does not identify any invasive species as harmful to the Fork-tailed swift. This said, a biosecurity plan will be implemented for the Proposed Action, as well as other biosecurity measures (see Section 7). With such measures, it is unlikely that harmful invasive species become established in the Study Area.	Unlikely
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	The fork-tailed swift does not breed in Australia, nor is it considered to roost. Therefore, any occurrence of the species in the Study Area is likely to be a strict, flyover, aerial visitor which would not be impacted by the Proposed Action, apart from potential collision risks which will be adaptively managed as outlined in the BBMP. An ecologically significant proportion of fork-tailed swift is 100 individuals (for nationally significant) or 1,000 (for internationally significant) (DoE, 2015b). Considering the lack of observation, and the strict aerial nature of this species, the Study Area is unlikely to be a host to an ecologically significant proportion of this species. The Proposed Action is therefore unlikely to seriously disrupt the lifecycle of an ecologically significant proportion of the fork-tailed swift population.	Unlikely
Significant Impact: Unlikely		

6.7 CUMULATIVE IMPACTS

The above Sections have largely focused on impacts resulting solely from the Proposed Action. The potential impacts of the Proposed Action, when assessed in conjunction with other similar developments in the same region, may contribute to cumulative impacts.

As outlined by an article on the renewable energy transition published by the CSIRO:

> *Cumulative impacts occur when multiple activities are conducted simultaneously, or consecutively, within the same region resulting in a greater level of potential impact to the environment than what would occur from the individual activity alone* (Miller, 2023).

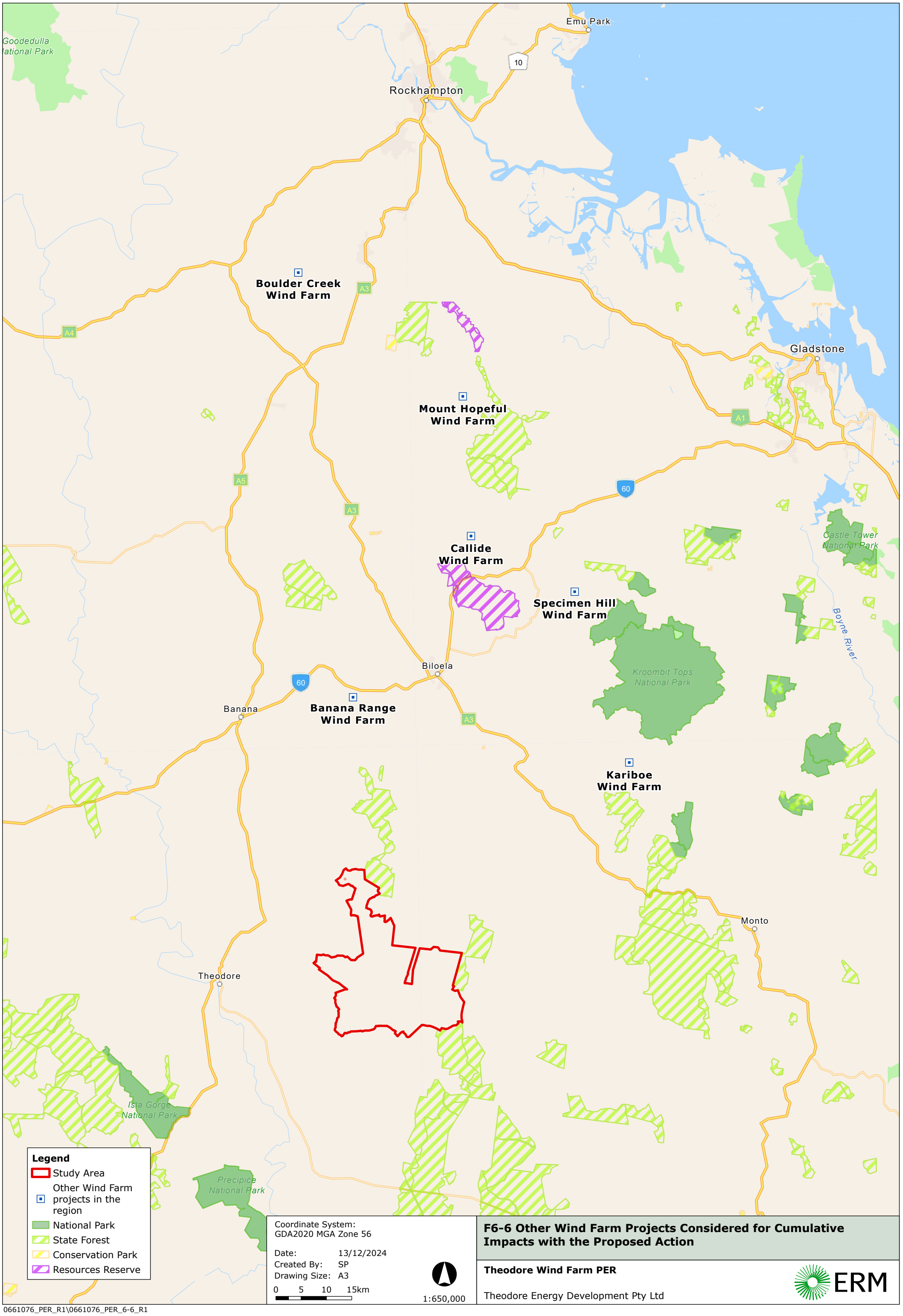
This Section aims to identify the potential cumulative impacts on MNES as a result of the Proposed Action in combination with other similar referred projects and developments (either approved or currently under assessment) in the immediate vicinity and broader region.

6.7.1 OTHER ACTIVITIES IN THE REGION

Table 6-55 summarises other wind farm projects in the vicinity of the Proposed Action that were referred to DCCEEW for assessment. The MNES assessed for these projects (that were also assessed in this PER), including the potential project impacts and mitigation measures proposed in referral information or imposed by the department, are discussed in Table 6-56. The location of these projects, in relation to the Proposed Action, is shown in Figure 6-6.

TABLE 6-55 OTHER PROJECTS AND DEVELOPMENTS IN THE REGION

EPBC Number	Project (Proponent)	Description / Location	Project Status
2019/8503	Banana Range Wind Farm	• Approved renewable energy project with up to 51 wind turbines and associated infrastructure generating 230 MW roughly 20 km west of Biloela.	Approved - not a controlled action
2022/09428	Kariboe Wind Farm Project (Kariboe Wind Farm Pty Ltd/BayWa r.e)	• Proposed wind farm site roughly 40 km southeast of Biloela. • Up to 170 turbines with a generating capacity of up to 1 GW. • Total Project Area 19,423.23 ha • Disturbance Footprint 1,254 ha (6% of Project Area).	Under Assessment - Public Environment Report (Attexo, 2022)
2020/8772	Boulder Creek Wind Farm (Boulder Creek Wind farm Pty Ltd/Ark Energy)	• Wind farm site in Westwood, Queensland (40 km south-west of Rockhampton). • 38 turbines with a nameplate capacity of 228 MW.	Approved with conditions
2021/9137	Mount Hopeful Wind Farm (Neoen Australia Pty Ltd)	• Located near the towns of Mount Morgan and Bajool, roughly 50km south of Rockhampton. • Final project capacity expected to be around 350 MW (around 60 wind turbines).	Approved with conditions
2021/9057	Callide Wind Farm (DP Green Energy Pty Limited)	• Proposed wind farm located in the Calliope Range approximately 75 km west south-west of Gladstone. • Up to 70 wind turbines with a generating capacity of up to 430MW.	Under Assessment - Preliminary Documentation (NGH, 2024)
2020/8864	Specimen Hill Wind Farm (Specimen Hill Wind Farm Pty Ltd/Ark Energy)	• Wind farm site in Dumgree, between Kroombit Tops and the Dawson Highway, roughly 25km north-east of Biloela. • 56 wind turbines with an output of approx. 336 MW.	Approved with conditions



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TABLE 6-56 IMPACTS OF PROJECTS INCLUDED IN CUMULATIVE IMPACT ASSESSMENT

EPBC Number	Project	MNES assessed for impacts (shared with the Proposed Action)	Potential impacts of the project	Significant residual impacts and MNES management measures
2022/09428	Kariboe Wind Farm Project	• Greater glider (southern and central) • Yellow-bellied glider (south-eastern) • Koala • Squatter pigeon (southern) • Black-breasted buttonquail • White-throated needletail • Fork-tailed swift	Potential impacts from the Kariboe Wind Farm Project outlined in the MNES assessment report (Attexo, 2022) include: • Clearing of up to 257.9 ha of potential greater glider habitat • Clearing of up to 2.04 ha of potential critical habitat for the yellow-bellied glider • Clearing of up to 259.6 ha of potential koala habitat • Clearing of up to 261.2 ha of potential dispersal habitat for the squatter pigeon • Removal of up to 1.9 ha of habitat critical to the survival of black-breasted buttonquail • Clearing of up to 1.9 ha of potential roosting habitat for the white-throated needletail • Low turbine collision risk for white-throated needletail and fork-tailed swift, triggers for adaptive management to be implemented.	MNES assessment report states significant residual impacts may occur to the greater glider as a result of the Project. Therefore, offsets will be proposed for this species. MNES assessment report states "*a certified BBMP will be prepared prior to the operation of the wind turbines. The BBMP will outline a monitoring program, identify if any threatened species are significantly impacted and define a strategy that manages and mitigates any significant impacts on these species*" (Attexo, 2022).

2020/8772	Boulder Creek Wind Farm	• Koala
		• Greater glider
		• White-throated needletail
			From the project conditions of approval, dated 30 June 2022:
			• The approval holder must not clear more than 541.9 ha within the project area, including no more than:
			  ◦ 530.8 ha of koala habitat
			  ◦ 54.7 ha of greater glider habitat
			• The approval conditions also include provision of a BBMP with specific triggers relating to impacts from turbine collision on white-throated needletail that, if reached or exceeded, prompt management measures including ceasing operation of all contributing turbines.
				The approval holder must submit an Offset Strategy, which must identify suitable offset sites for the impacts on koala habitat. To manage impacts on MNES species and their habitat, the approval holder must submit a MNES Management Plan.
				
				The approval holder must also submit a BBMP. The outcome of implementing the BBMP must be to avoid causing a significant impact from turbine collision and barotrauma on EPBC Act listed bird and bat species, including white-throated needletail.

EPBC Number	Project	MNES assessed for impacts (shared with the Proposed Action)	Potential impacts of the project	Significant residual impacts and MNES management measures

2021/9137	Mount Hopeful Wind Farm	• Greater glider
		• Yellow-bellied glider
		• Koala
		• White-throated needletail
			From the project conditions of approval, dated 19 April 2022:
			• the approval holder must not clear more than:
			  ◦ 244.7 ha of greater glider current denning habitat
			  ◦ 175.8 ha of greater glider potential denning habitat
			  ◦ 207.4 ha of greater glider foraging habitat
			  ◦ 163.3 ha of yellow-bellied glider denning habitat
			  ◦ 158.7 ha of yellow-bellied glider foraging habitat
			  ◦ 641.6 ha of koala dispersal habitat
			  ◦ 5.3 ha of koala climate change refugia habitat
			• The approval conditions also include provision of a BBMP with specific triggers relating to impacts from turbine collision on white-throated needletail that, if reached or exceeded, prompt management measures including ceasing operation of all contributing turbines.
				The approval holder must submit to the department an Offset Area Management Plan (OAMP), proposing environmental offsets for impacts to greater glider current/potential denning habitat and foraging habitat, yellow-bellied glider denning and foraging habitat, and koala dispersal and refugia habitat.
				
				The approval holder must also submit a BBMP. The BBMP must demonstrate how implementation of the BBMP will avoid and mitigate harm to EPBC Act listed bird and bat species during commissioning and operation, including white-throated needletail.

2021/9057	Callide Wind Farm	• Brigalow TEC • Greater glider (southern and central) • Yellow-bellied glider (south-eastern) • Koala • Squatter pigeon (southern)	Potential MNES impacts of the Callide Wind Farm outlined in the Preliminary Documentation (NGH, 2024) include impacts to: • 899.5 ha of potential koala habitat • 400.3 ha of greater glider current (likely) denning, future (potential) denning, and foraging and dispersal, with a further 95.3 ha potentially indirectly impacted through fragmentation	Preliminary Documentation concluded that there is likely to be significant residual impacts to koala, greater glider, and squatter pigeon which will be compensated for through a land-based offset. A Collision Risk Assessment (developed to address an RFI from the department) determined a high risk of collision with operating turbines for white-throated needletail, and a low risk for fork-tailed swift. Risk of indirect

EPBC Number	Project	MNES assessed for impacts (shared with the Proposed Action)	Potential impacts of the project	Significant residual impacts and MNES management measures
		• Australian painted snipe • Cossinia • White-throated needletail • Fork-tailed swift	• 21.06 ha of potential squatter pigeon breeding habitat and 21.8 ha of potential foraging habitat • High risk of impact risk due to potential turbine collision for white-throated needletail • Low risk of impact risk due to potential turbine collision for fork-tailed swift	disturbance including barrier effects was determined to be very low for both species. A Draft BBMP was submitted to DCCEEW with the PD to support assessment of the project by Preliminary Documentation. Environmental outcomes of the BBMP include to "*minimise the impacts from the Callide Wind Farm on threatened and migratory bird and bat species listed under the Commonwealth EPBC Act*" (NGH, 2024).

2020/8864	Specimen Hill Wind Farm	• Greater glider
		• Koala
		• Squatter pigeon
		• White-throated needletail
			From the project conditions of approval, dated 19 April 2022:
			• The approval holder must not clear more than 844.35 ha within the project footprint, including no more than:
			  ◦ 796.76 ha of koala habitat
			  ◦ 339.78 ha of greater glider habitat (208.41 ha greater glider denning habitat and 131.37 ha greater glider foraging habitat)
			  ◦ 101.28 ha squatter pigeon habitat (89.45 ha of squatter pigeon breeding habitat and 11.83 ha of squatter pigeon foraging habitat.
			• The approval conditions also include provision of a BBMP with specific triggers relating to impacts from turbine collision on white-throated needletail that, if reached or exceeded, prompt management measures including ceasing operation of all contributing turbines.
				The approval holder must submit to the department an Offset Area Management Plan, proposing environmental offsets for impacts to greater glider habitat, koala habitat, and squatter pigeon breeding habitat to the satisfaction of the Minister. To manage impacts on MNES species and their habitat, the approval holder must submit a MNES Management Plan.
				
				The approval holder must also submit a BBMP prior to commencement of the action. The environmental outcome of implementing the BBMP must be to minimise the impacts from construction and operation of the action on EPBC Act listed bird and bat species, including white-throated needletail.

6.7.2 ASSESSMENT OF POTENTIAL CUMULATIVE IMPACTS

Table 6-57 presents an assessment of the potential cumulative impacts of the Proposed Action and other wind farm projects in the region discussed above, specifically referencing impacts outlined in the Theodore Wind Farm (EPBC 2024/09842) PER guidelines provided by DCCEEW.

TABLE 6-57 POTENTIAL CUMULATIVE IMPACTS

Impact	Cumulative impacts of the Proposed Action and projects/developments in the region/vicinity	Mitigation measures to be implemented by the Proposed Action
Habitat loss	Based on information presented in referral documents and approval conditions for the above projects, the MNES relevant to the Proposed Action that are likely to be affected by accumulated impacts through habitat loss are: • Greater glider (southern and central) • Yellow-bellied glider (south-eastern) • Koala • Squatter pigeon (southern) • Black-breasted buttonquail The total amount of habitat predicted/allowed to be impacted is outlined above in Table 6-56 for each project. It should be noted that in each of the projects outlined above, mitigation measures proposed/imposed include compensating for impacted MNES habitat through managed offsets.	Various mitigation measures will be implemented for the Proposed Action to manage the potential impacts of habitat loss. This will begin at the design phase, where key habitat areas will be avoided when locating infrastructure wherever possible. During construction phase clearing, mitigation measures such as pre-clearance surveys and micro-siting at areas of planned infrastructure will ensure that impacts to essential microhabitat features (e.g., hollow-bearing trees) are further avoided wherever possible. All residual loss of MNES habitat considered to be significantly impacted by the Proposed Action will be compensated through suitable offsets (subject to approval by the department), as outlined in Section 9 of the PER. These offsets will be managed for the life of the Proposed Action through the Offset Management Plan (OMP, see Appendix F).
Habitat fragmentation	The majority of impacted habitat discussed in Table 6-56 refers to habitat cleared for infrastructure, with the exception of the Callide Wind Farm which indicates 95.3 ha will be potentially indirectly impacted through fragmentation. The linear nature of wind farm development typically means large patches of habitat are not entirely removed, instead clearing occurs in small, isolated patches that do not significantly impact the dispersal ability of most species. These impacts are usually further reduced through revegetation and rehabilitation of the Disturbance Footprint post-construction. Where potential residual impacts of fragmentation are identified, mitigation measures are	Management of potential fragmentation caused by the Proposed Action will ensure that areas of TEC largely remain intact throughout the Study Area. Brigalow TEC observed within the Study Area is in a highly fragmented state at present, and the Proposed Action is not anticipated to exacerbate this. Poplar Box TEC will be retained as much as possible throughout the Study Area, avoiding any whole destruction to an area of TEC and ensuring that any natural expansion of the TEC through natural ecological function is retained. The Proposed Action's potential indirect impact of habitat fragmentation will be minimised so as not to cause a residual impact to any MNES species. Habitat fragmentation will be managed to ensure that all MNES species are able

Impact	Cumulative impacts of the Proposed Action and projects/developments in the region/vicinity	Mitigation measures to be implemented by the Proposed Action
	suggested or imposed to reduce the impact on MNES. For example, the fragmentation of glider habitat has been addressed in the above projects by either narrowing the Disturbance Footprint in certain areas and retaining trees on either side of a clearing (as in the Callide Wind Farm Preliminary Documentation), or provision of glide poles where clearing exceeds a pre-determined distance (as in the Kariboe Wind Farm Project MNES assessment report and approval conditions for the Boulder Creek Wind Farm and Specimen Hill Wind Farm). Measures such as these ensure habitat within the project areas remains connected, and by extension species are still able to disperse throughout the broader landscape.	to move and disperse throughout the entirety of identified habitat, maintaining connectivity with the landscape within and surrounding the Study Area.
Bird and bat turbine strike, including the potential barrier effect of multiple wind farms	Bennun, et al., 2021 indicates migratory bird species and those with extensive foraging ranges may be more at risk of the cumulative impacts of wind farm projects, as they are more likely to encounter a higher number of turbines during their movements. Barrier effects of wind farm projects are also predicted to be more prevalent when considering the cumulative effects of multiple adjacent wind farm sites. Based on information presented in referral documents and approval conditions for the above projects, the MNES relevant to the Proposed Action that are more likely to be affected by the accumulated impacts of multiple wind farm operations are: • White-throated needletail • Fork-tailed swift These species have not been observed within the Study Area, and no suitable roosting habitat has been identified, however both are considered as having the potential to occur. The location of the Theodore Wind Farm site is more isolated in nature compared to other similar projects in the region. It is considered likely that the potential barrier effect of multiple wind farms created between the Proposed Action and other projects in the region is diminished due to this spatial separation.	Various mitigation measures will be implemented for the Proposed Action to manage the potential direct and indirect impacts of turbine operation. These include locating infrastructure to avoid key habitat areas and minimise perching resources close to high risk turbines, innovative turbine design for high risk turbines, including acoustic and visual deterrents, and activity scheduling to avoid ecologically sensitive periods. High-risk turbines have been identified within the BBMP (Appendix D). These measures will ensure that the potential impacts of WTG operation are minimised so as to not cause any indirect residual impact to white-throated needletail and forked-tailed swift. The BBMP submitted with this PER outlines continued monitoring of site utilisation, carcass searches to determine the actual impact of the Proposed Action on birds and bats, and Adaptive Management framework that will have the ability to be adjusted as the Proposed Action progresses to better manage and monitor species that may be impacted.

Impact	Cumulative impacts of the Proposed Action and projects/developments in the region/vicinity	Mitigation measures to be implemented by the Proposed Action
Sedimentation and run-off downstream, including (where relevant) to the Great Barrier Reef	A cumulative increase in erosion as a result of the ongoing wind farm developments within the region has the potential to result in an increase in sediment deposited to the Great Barrier Reef (GBR). The Kariobe, Boulder Creek, Mt Hopeful, Callide, and Specimen Hill Wind Farms are all located downstream of the Proposed Action within the Fitzroy Basin. The Fitzroy Basin has been designated as high management priority for fine sediment loads under the Reef 2050 Water Quality Improvement Plan (WQIP), and achievement of the end-of-catchment targets outlined in the WQIP is dependent on the implementation of appropriate erosion and sedimentation mitigation measures across all projects in the region.	Various mitigation measures will be implemented to manage the potential downstream erosion and sedimentation impacts that may arise as a result of the Proposed Action. Where the avoidance of high-risk areas is not feasible, focus will be placed on the capture of sediment at the source to avoid discharge to the receiving environment. Other general principles to mitigate downstream impacts including the scheduling of potentially high erosion risk activities (such as construction or earthworks) in periods of the year where rainfall and streamflow are at a minimum. Mitigation measures for erosion and sedimentation are detailed in full in Section 7 of the Theodore Wind Farm PER.

6.8 CLIMATE CHANGE

This Section considers predicted future climatic conditions in the region and impacts on MNES, and how changes in climate and the frequency and severity of weather events may interact with, exacerbate or reduce the impacts of the Proposed Action over time.

6.8.1 LOSS, FRAGMENTATION, OR DRYING OF POTENTIAL CLIMATE REFUGIA

Climate change and extreme weather events are well documented as direct drivers of changes to biodiversity in Australian ecosystems (DCCEEW, 2021). Often the impacts of climate change are compounded by other pressures such as land clearing and invasive species, though in some cases changes to biodiversity can be directly attributed to climate change alone (Hughes, Dean, Steffen, & Rice, 2019). Climate change is listed as a key threatening process for many MNES included in this PER Impact Assessment (DCCEEW, 2024a).

For example, increases in temperature, seasonality and intensity of rainfall may affect the resilience of certain plants and animals, which in turn could change the composition of species that make up Poplar Box TEC (DoEE, 2019). The highly specific diet of greater gliders also makes the species vulnerable to changes in temperature and water availability. Reduced water availability can affect growth patterns in eucalypt forests, resulting in a reduction of young, more palatable foliage. A reduction in foraging resources, combined with higher temperatures and extreme heat events, has the potential to lead to heat stress and mortality (DCCEEW, 2022).

Conservation advice states a key threat to koalas is the loss of climatically suitable habitat (DAWE, 2022b). Areas that are currently climatically suitable for koalas are diminishing, and climate change outlooks predict drier, hotter conditions across much of the koala's range.

These changes are predicted to lead to altered dispersal patterns, decreased reproductive rates, and an increase in heat-stress related mortality. Koala populations at the western extent of Queensland and New South Wales distributions are characterised by low densities and a higher level of isolation, and are known as western edge populations. These subpopulations have been identified as a priority for immediate climate-related risk management and conservation efforts, due to them potentially containing genetics that better adapt to environmental stressors (DAWE, 2022b).

The potential impacts of climate change highlight the importance of protecting key habitat elements including retention of larger remnant patches and corridors for dispersal, as well as riparian zones and patches of vegetation that are more resilient to drying conditions due to favourable access to water. Management measures implemented in line with the site-specific CEMP (see Section 7) will ensure key areas and habitat features are retained as much as possible, and the quality of all remaining MNES habitat throughout the Study Area is maintained or improved. This includes avoiding areas identified as MNES habitat as much as possible at the design and micro-siting stages, restoration of a significant portion of habitat cleared during the construction phase, and management of weeds and invasive species through a site-specific Biosecurity Plan to maintain habitat quality.

6.8.2 INCREASED RISK OF FIRE UNDER DRIER CONDITIONS AND PERIODS OF EXTREME HEAT

Studies on the influence of climate change globally have found that the length of fire seasons (when most fires are likely to occur) has increased significantly in many regions since the 1980s. Further, the number of days with extreme fire weather (high temperatures, low recent rainfall, low humidity and high winds) have become 54% more frequent on a global scale (Jones, et al., 2022). Unfavourable fire regimes, including more frequent fires and/or higher-intensity wildfires, are recognized as a key threatening process in the conservation advice or national recovery plans, as outlined in the Species Profile and Threats Database for several species addressed within this PER (DCCEEW, 2024a).

For example, the low density of herbs and ground cover species observed in most brigalow vegetation communities suggests that fire has been a historically rare occurrence. In general, fire-exclusion is the most appropriate regime for remnant patches of brigalow. If climate change leads to higher temperatures and lower rainfall, it is likely that the threat of more frequent, higher-intensity wildfires on Brigalow TEC will increase throughout the Brigalow Belt (DoE, 2013b).

Inappropriate fire regimes are also a key threat to greater glider. Direct mortality can occur during high-severity bushfires as a result of lethal temperatures or suffocation from smoke, or indirectly due to the loss of key habitat features. High fire frequency can change the floristic composition in greater glider habitat, potentially reducing availability of foraging resources (DCCEEW, 2022). Studies in sclerophyll forests in north-eastern New South Wales found just one fire in a ten-year period could reduce greater glider (southern and central) abundance by more than half, when compared to unburnt habitat (McLean, Kavanagh, Penman, & Bradstock, 2018).

Increased intensity/frequency of bushfire is a key threat to koalas listed in the species Conservation Advice (DAWE, 2022b). The wildfires experienced across Queensland, New South Wales and the Australian Capital Territory during the summer of 2019-2020 led to a loss of

over 3.5 million ha of koala habitat. Estimates suggest the koala population experienced a 10% decline one year after the fire events, of which 7.1% was directly attributed to the fires. As the region experiences more intense fire-weather patterns with the onset of climate change, a range of fire-related threats to koala are expected to increase. These include a reduction in availably and diversity of foraging resources, shifts in biological interactions including reproduction and fire-predator relationships, and habitat fragmentation which can be exacerbated by land clearing (DAWE, 2022b).

Management measures implemented in line with the site-specific FMP (see Section 7) will greatly reduce the potential risk for MNES within the Study Area caused by fires. This includes use of industry best practice hazard reduction measures to minimise bushfire risk, weed management and control methods (in line with the Bushfire Management Plan, Biosecurity Management Plan and CEMP) to reduce the potential of invasive plants changing species composition and reducing on-site fuel loads and maintaining firebreaks and trails.

6.8.3 INCREASED EROSION AND RUN-OFF ASSOCIATED WITH PREDICTED INCREASES IN HIGH RAINFALL EVENTS

Increases in the frequency and intensity of rainfall and other extreme weather events would be expected to increase the potential susceptibility of soils to erosion and consequently increase the volume of sediment potentially lost from site through an intensification of the following processes (Queensland Government , 2013);

- Raindrop erosion on bare or exposed soil surfaces;
- Sheet and hill erosion on hillslopes;
- Gully erosion due to an increase in the volume and energy of concentrated flows; and
- Streambank erosion due to high volume and energy streamflows following high intensity rainfall events.

Amplified rates of rainfall induced erosion, and sedimentation may also increase pressure on the erosion and sediment control devices implemented within the Study Area. If devices are not sized or maintained to manage the corresponding increase in intensity and frequency of weather events, increased stresses on the capacity of mitigation devices may cause the failure of these devices thus further amplifying the impact on downstream environments during and following extreme weather events.

Measures to mitigate the impacts induced by intensifying weather events include the rehabilitation and stabilisation of areas disturbed by construction, erosion protection along slopes, drainage controls to capture and dissipate the increased energy of concentrated flows, and implementation of effective stream stabilisation controls at watercourse crossings.

Given that an intensification of extreme weather events is likely to be observed over a gradual timeframe, the greatest impacts would most likely be observed during the late operation through to decommissioning phases of the Proposed Action. Management Plans developed for the decommissioning phase of the Proposed Action will consider changes in the intensity and frequency of weather events relative to the pre-development climate and implement measures to that will sufficiently manage the increased impacts brought about by potentially intensified extreme weather events.

Hydrological modelling will consider potential increases in intensity and frequency of extreme weather events to understand the extent of risk associated with changes in climatic conditions.

The 1% AEP flood modelling completed for the site identified a small region around Castle Creek to be at risk of inundation. Whilst the intensification of future weather events may increase the extent of the 1% AEP flood, it would be considered unlikely for this to impact the Proposed Action, given the distance of the flood zone in the north from the Disturbance Footprint.

6.9 CONSISTENCY WITH AUSTRALIA'S CONSERVATION OBLIGATIONS

MNES considered known, likely or with potential to occur, were considered for the PER impact assessments, as outlined in Section 6.6. Details on the distribution, habitat requirements (including habitat critical to the survival of the species) survey adequacy, and habitat assessment and mapping are outlined within Section 5 of this PER. All summaries and assessments in Section 5 and Section 6, as well as avoidance, mitigation and management measures detailed in Section 7, have taken into careful account all relevant approved conservation advice. This includes, but is not limited to:

- Approved Species Conservation Advice;
- Threat Abatement Plans; and
- Species Recovery Plans.

Reference to these resources can be found throughout Sections 5, 6 and 7. Conservation advice, threats, relevant avoidance, mitigation and management measures and specific and measurable environmental outcomes for all MNES relevant to this PER are presented in detail in Table 7-2.

There are several Conservation Conventions that Australia is committed to and must fulfil its obligations under, particularly regarding impacts on threatened species and protection of biodiversity. Table 6-58 has summarised Australia's commitments under these Conventions relevant to the Proposed Action, and discussed how the Proposed Action will not be inconsistent with such obligations.

TABLE 6-58 COMPLIANCE WITH BIODIVERSITY CONVENTION, APIA CONVENTION, AND CITES

Convention	Relevant Obligations	Proposed Action Compliance
UN Biodiversity Convention	**National Target 4:** By 2015, achieve a national increase of 600,000 km^2 of native habitat managed primarily for biodiversity conservation across terrestrial, aquatic and marine environments. **National Target 5:** By 2015, 1,000 km^2 of fragmented landscapes and aquatic systems are being restored to improve ecological connectivity. **National Target 6:** By 2015, four collaborative continental-scale linkages are established and managed to improve ecological connectivity. **National Target 7:** By 2015, reduce by at least 10 per cent the impacts of invasive species on threatened species and ecological communities in terrestrial, aquatic and marine environments. **National Target 8:** By 2015, nationally agreed science and knowledge priorities for biodiversity conservation are guiding research activities.	The Proposed Action will not result in the complete fragmentation of terrestrial and aquatic landscapes. Vegetation clearing will occur at a local scale, and will mostly include linear, narrow clearing for access and infrastructure. This clearing may temporarily affect some species dispersal ability during construction, however considering revegetation effort and the high mobility of MNES species identified, the Proposed Action is not expected to result in permanent fragmentation of habitat for any MNES within the Study Area or broader landscape. Invasive species will be managed as part of the Proposed Action, and biosecurity measures will be implemented to ensure the impact of invasive species on listed MNES are mitigated.
The Convention on Conservation of Nature in the South Pacific (Apia Convention)	**Article 2:** Undertake to create protected areas to safeguard representative samples of natural ecosystems, superlative scenery, striking geological formations and regions and objects of aesthetic, historic, cultural or scientific value. **Article 3:** Commit to not alter national parks so as to reduce their area except after the fullest investigation; their resources are not to be subject to commercial exploitation; hunting and collection of species are to be prohibited and provision is to be made for visitors.	The Study Area is not a protected area, therefore no direct alteration of any protected areas will occur. MNES within the Study Area will be protected, and impacts to threatened species and communities will be first avoided, and otherwise minimised as much as possible. Any adverse impacts will occur at a small, local scale and will not impact populations in the broader landscape or adjacent protected areas.
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	**Article VIII:** The Parties shall take appropriate measures to enforce the provisions of the present Convention and to prohibit trade in specimens in violation thereof. These shall include measures: (a) to penalize trade in, or possession of, such specimens, or both; and (b) to provide for the confiscation or return to the State of export of such specimens.	The Proposed Action will take appropriate measures (such as employment of certified and accredited ecologists and environmental specialist contractors) to reduce any likelihood of listed threatened fauna being at risk of international or domestic trade. All personnel working on-site will be made aware of their obligations to avoid impacts on or interaction with protected species.

6.10 IMPACTS TO LISTED MIGRATORY SPECIES

The operation of the WTGs has the potential to cause direct mortality or injury to avian fauna such as migratory birds. Risks to birds from wind farm developments are highest in areas where large numbers of birds congregate, such as Tarifa in Spain or Altamont Pass in the USA. At these locations, millions of birds migrate annually and must pass through large wind farm areas. Wind farm development in areas of lower importance to birds and bats record substantially lower impacts (EPHC, 2010). As discussed in Section 6.10.1, the Study Area occurs outside of the flyways of migratory bird species that have the potential, or are likely, to occur. It is anticipated that the risk to birds and bats in the Study Area will be low compared to wind farm developments in other areas where intersection of migratory flight paths occurs.

6.10.1 MIGRATORY FLYWAYS

The East Asia/Australasia Flyway is the most common and frequented flyway travelled by migratory shorebirds *en route* to, and within, Australia (BirdLife International, 2024). This flyway occurs over a total of 84,765,020 km^2 and occurs through 37 countries, including Australia. This flyway extends from Arctic Russia and North America to the southern extents of Australia and New Zealand. This flyway predominantly traverses the coastal extents of Australia, occasionally travelling inward through parts of South Australia and Western Australia (BirdLife International, 2024). When examining the records of the listed migratory shorebirds species from desktop searches, the vast majority of incidental records are consistent with the coastal routes of the East Asia/Australasia Flyway. Additionally, when examining the records of non-shorebird migratory birds, these species also generally traverse coastal areas.

Migratory flyways are known to correspond with the vast majority of Important Bird and Biodiversity Areas (IBAs). Such IBAs are globally known for their importance in bird conservation, particularly due to the number of migratory and/or threatened species that are found there. The East Asia/Australasia Flyway triggers a total of 1,184 migratory IBAs (BirdLife International, 2024), none of which occur within, or in close proximity to, the Study Area. Therefore, it is concluded that the Study Area does not fall within an important flyway or IBA for migratory birds.

6.10.2 CONSISTENCY WITH AUSTRALIA'S OBLIGATIONS UNDER MIGRATORY BIRD CONVENTIONS AND AGREEMENTS

There are several migratory bird Conventions and Agreements, approved under subsection 209 of the EPBC Act, that Australia is committed to and must fulfil its obligations under, particularly regarding impacts on threatened species of migratory birds. Table 6-59 has summarised Australia's commitments under these Agreements relevant to the Proposed Action, and discussed how the Proposed Action will not be inconsistent with such obligations.

TABLE 6-59 COMPLIANCE OF THE PROPOSED ACTION WITH MIGRATORY BIRD CONVENTIONS AND AGREEMENTS

Convention	Relevant Obligations	Proposed Action Compliance
Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)	• Pay special attention to migratory species, the conservation status of which is unfavourable, and taking individually or in co-operation appropriate and necessary steps to conserve such species and their habitat. • Article II, 3b) provides immediate protection for migratory species included in Appendix I. • Article II, 3c) conclude agreements covering the conservation and management of migratory species included in Appendix II. • Maintain favourable conservation status.	• White-throated needletail and fork-tailed swift are not listed under the Bonn Convention. • Neither of these species have been observed within the Study area, however there is suitable foraging habitat present. The Proposed Action will not result in an upgrade of the conservation status of either of these species to unfavourable. This is because there is expected to be very limited impact on habitat, and a negligible risk of turbine collision.

China-Australia Migratory Bird Agreement (CAMBA)	• Each Contracting Party shall encourage the conservation of migratory birds, especially those species in danger of extinction.
	• Endeavour to take appropriate measures to preserve and enhance the environment of migratory birds. In particular:
	  ◦ Seek means to prevent damage to migratory birds and their environment; and
	  ◦ Endeavour to take such measures as may be necessary to restrict or prevent the importation and introduction of animals and plants which are hazardous to the preservation of migratory birds and their environment.
		• White-throated needletail and fork-tailed swift are listed in Annex for this Agreement.
		• The Proposed Action is not likely to significantly impact the conservation of these threatened migratory species.
		• Areas of potential habitat used for foraging purposes will not be significantly impacted by the Proposed Action.
		• A Biosecurity Management Plan will be developed and implemented for the Proposed Action, which will prevent the introduction of hazardous species that may impair migratory bird habitat.

Convention	Relevant Obligations	Proposed Action Compliance
Japan-Australia Migratory Bird Agreement (JAMBA)	• Encourage the conservation of migratory birds and birds in danger of extinction. • Take special protective measures, as appropriate, for the preservation of species or subspecies of birds which are in danger of extinction. • Take appropriate measures to preserve and enhance the environment of birds protected under the provisions of this Agreement. • Seek means to prevent damage to such birds and their environment. • Take such measures as may be necessary to control the importation of animals and plants which determines to be hazardous to the preservation of such birds. • Take such measures as may be necessary to control the introduction of animals and plants which could disturb the ecosystems of unique island environments.	• White-throated needletail and fork-tailed swift are listed in Annex for this Agreement. • The Proposed Action is not likely to significantly impact the conservation of these threatened migratory species. • Areas of potential habitat used for foraging purposes will not be significantly impacted by the Proposed Action. • A Biosecurity Management Plan will be developed and implemented for the Proposed Action, which will prevent the introduction of hazardous species that may impair migratory bird habitat.

International Agreement – Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA)	• Each Party should encourage the conservation of migratory birds.
	• Endeavour to manage and conserve the habitat of migratory birds through activities such as the designation of conservation areas in their territory.
	• Each Party shall endeavour to take the appropriate measures to conserve and improve the environment of birds protected under Article 1 of this Agreement. In particular, it shall:
	  ° Seek means to prevent damage to such birds and their environment.
	  ° Endeavour to take measures to control the impact of invasive animals and plants on the conservation of such birds and their environment.
		• White-throated needletail and fork-tailed swift are listed in Annex for this Agreement.
		• The Proposed Action is not likely to significantly impact the conservation of these threatened migratory species.
		• Areas of potential habitat used for foraging purposes will not be significantly impacted by the Proposed Action.
		• A Biosecurity Management Plan will be developed and implemented for the Proposed Action, which will prevent the introduction of hazardous species that may impair migratory bird habitat.

6.11 IMPACTS ASSOCIATED WITH TURBINE STRIKE AND SITE UTILISATION

A Bird and Bat Management Plan (BBMP) has been developed and will be implemented for the Proposed Action. The BBMP aims to provide a monitoring and adaptive management framework for potential operating impacts on listed bird and bat species known, likely or with potential to occur within the Study Area, including impacts associated with turbine strike and site utilisation. The BBMP has been prepared in accordance with the Queensland *Planning guidance State code 23: Wind farm development* (updated September 2024) (DHLGPPW, 2024) and the DCCEEW *Onshore wind farm guidance - best practice approaches when seeking approval under Australia's national environment law* (DCCEEW, 2024c). The BBMP is attached as Appendix D.

6.11.1 DESKTOP ASSESSMENT

To inform preliminary site characterisation and predict potential site utilisation for at-risk threatened and migratory species, a review of desktop sources was undertaken to identify the ecological values of the Study Area. This review included Commonwealth, State and public information sources, and focused on site characteristics (e.g., landscape features, topography, prevailing wind and weather patterns, location of potential nesting, roosting and foraging resources) and species characteristics (e.g., flight behaviour, likely site use, species presence in the region [permanent, transitory/migratory], migratory flight paths).

The desktop analysis further guided the development of the field survey techniques and effort best suited to the ecological matters identified within the Study Area. Desktop information was utilised to assess and document the likelihood of occurrence (LoO) for at-risk threatened and migratory bird and bat species within the Study Area.

6.11.2 SITE-SPECIFIC ASSESSMENT

Development of the BBMP included a site-specific assessment of how listed threatened and migratory bird and bat species are using, or are likely to use, the Study Area and surrounding landscape. This assessment was informed by site-specific and species-specific site utilisation surveys, which were undertaken by suitably qualified ecologists.

Site utilisation data was obtained over a two-year period to provide sufficient baseline data on relevant species' potential to use the Study Area and surrounds, taking into account the Proposed Action's potential WTG layout. This involved:

- Field surveys to identify potential habitat for birds, as well as bird utilisation surveys (BUS) completed in October 2022, February 2023, March 2023, June 2023, September 2023, October 2023, December 2023, February 2024 and June 2024;
- Field surveys to identify potential habitat for bats, as well as bat surveys (using Anabat recording devices) completed in October 2022 and during the February and March 2023 survey periods.

6.11.3 LONG-TERM IMPACT RISK ASSESSMENT

The BBMP demonstrates how the potential impacts to each relevant species, including their risk of impact and site utilisation, have been analysed as part of the bird and bat CRA. All listed bird and bat species considered known, likely or having the potential to occur within the

Study Area, based on the LoO assessment, have been included within the CRA. Additionally, although assessed as unlikely to occur (see LoO, Appendix C) and no observations were made during seasonal BUS to date, grey falcon (*Falco hypoleucos*) and red goshawk (*Erythrotriorchis radiatus*) are known to have extensive ranges, and the Study Area is within their known distribution. Due to both the species' EPBC Act status and low population size, a collision event would constitute an impact to an ecologically significant proportion of the population, and so conservatively these species have also been assessed. The CRA results for each EPBC Act listed species are summarised in Table 6-60. A total of nine EPBC Act listed species were included within the assessment, with six species considered to be at low or moderate risk of collision. The full CRA, including the assessment of relevant non-listed species is provided within the BBMP.

The DCCEEW *Onshore wind farm guidance* details how Collision Risk Modelling (CRM) needs to be undertaken for listed threatened species (MNES) where risks from the Proposed Action, particularly collision risks, have been identified. Only one listed bird or bat species, squatter pigeon (southern), was recorded within the Study Area, with large-eared pied bat considered likely due to a 'probable' occurrence in the Study Area via Anabat detection equipment. Neither of these species were recorded within the assessed RSA (87 – 250 m) for the Proposed Action and therefore were not included within the CRM. Based on field data restrictions, only non-listed species were run within the CRM, with the full CRM methodology and results detailed within the BBMP.

TABLE 6-60 BIRD AND BAT COLLISION RISK ASSESSMENT RESULTS

Species	Threatened Species Status (EPBC Act)	Likelihood of Event	Consequence of Event	Risk Rating
Threatened or Migratory Bird and Bat Species				
Grey falcon (*Falco hypoleucos*)	V	Less likely	Moderate	**Low***
Red goshawk (*Erythrotriorchis radiatus*)	E	Less likely	Major	**Low**
Large-eared pied bat (*Chalinolobus dwyeri*)	E	Moderately likely	Major	**Moderate**
Southern squatter pigeon (*Geophaps scripta scripta*)	V	Less likely	Moderate	**Negligible**
White-throated needletail (*Hirundapus caudacutus*)	V and Mi	Moderately likely	Moderate	**Low**
Black-breasted buttonquail (*Turnix melanogaster*)	V	Less likely	Moderate	**Negligible**
Australian painted snipe (*Rostratula australis*)	E	Moderately likely	Major	**Moderate**

Species	Threatened Species Status (EPBC Act)	Likelihood of Event	Consequence of Event	Risk Rating
Diamond firetail (*Stagonopleura guttata*)	V	Less likely	Moderate	**Negligible**
Fork-tailed swift (*Apus pacificus*)	Mi	Moderately likely	Moderate	**Low**

Status listing per EPBC Act: E = Endangered; V = Vulnerable; Mi = Migratory.
** Negligible rating upgraded to low due to being a cryptic listed threatened species with large home range*

The BBMP also outlines a monitoring program, to be undertaken during construction and operation of the Proposed Action, to track and manage species that are directly impacted by the Proposed Action. The monitoring program will be informed by the following procedures:

- Baseline (pre-construction), construction and operational phase bird (BUS) and bat (using Anabat devices) surveys;
- Carcass searches for species impacted by the WTGs;
- Measures to check for survey adequacy and to account for bias through scavenger and detectability trials;
- Statistical analysis of the results from such targeted field surveys and carcass searches to determine the mortality rates throughout the Study Area; and
- Subsequent reporting and consultations with the department.

Species-specific thresholds and triggers for listed species with a risk rating of 'low' or above (provided within Table 6-61) will ensure that appropriate adaptive management measures will be implemented before a significant impact is reached.

Monitoring reports will be produced in the first, eighth and last year of operation for submission to the department. Monthly summaries of data from carcass searches and detectability trials will also be provided as attachments to the monitoring reports.

This BBMP is an Adaptive Management framework that will have the ability to be adjusted as the Proposed Action progresses to better manage and monitor species that may be impacted by the WTGs, should it be required.

TABLE 6-61 SIGNIFICANT IMPACT THRESHOLD FOR AT-RISK LISTED SPECIES

At-risk Species	Australian Population Estimate	Annual Threshold	Significant Impact Threshold	
		Evidence of progression towards Trigger 1	Trigger 1	Trigger 2
Cumulative Assessment over 4 years				
Fork-tailed swift	100,000[1]	13 individuals	50 individuals	100 individuals
Grey falcon	<1,000[3]	Detected within the Locality*	2 individuals	5 individuals

At-risk Species	Australian Population Estimate	Annual Threshold	Significant Impact Threshold	
		Evidence of progression towards Trigger 1	Trigger 1	Trigger 2
White-throated needletail	40,000[4]	5 individuals	20 individuals	40 individuals
Australian painted snipe	2,500[6]	Detected within the Locality*	2 individuals	5 individuals
Cumulative Assessment over 6 years				
Large-eared pied bat	20,000[5]	2 individuals	10 individuals	20 individuals
Cumulative Assessment over 8 years				
Red Goshawk	<1,000[2]	Detected within the Locality*	2 individuals	5 individuals

***Records within the Locality will be monitored following the methodology provided within Appendix G (Bird and Bat Monitoring for the Life of the Proposed Action).*

[1] (DoE, 2015)

2 (DCCEEW, 2023c)

3 (TSSC, 2020

4 (Garnett & Crowley, 2000)

5 (DCCEEW, 2023a)

6 (DSEWPC, 2013)

6.12 IMPACTS TO THE GREAT BARRIER REEF

6.12.1 GUIDELINES

6.12.1.1 REEF 2050 LONG-TERM SUSTAINABILITY PLAN

The Reef 2050 Long-Term Sustainability Plan (Reef 2050 Plan) is a joint commitment of the Australian and Queensland Governments and is Australia's long-term strategy for protecting and managing the Reef to support its health and resilience. The plan is supported by the Reef 2050 Objectives and Goals document, which sets out the indicators that form the basis of measuring progress against the objectives and goals that are set out in the Reef 2050 Plan. The full scope of objectives (and indicators for their assessment) are detailed within Table 1 of The Reef 2050 Objectives and Goals document.

6.12.1.2 REEF 2050 WATER QUALITY IMPROVEMENT PLAN

The Reef 2050 Water Quality Improvement Plan 2017-22 (WQIP) is the planning and reporting framework that has been prepared for water quality under the overarching Reef 2050 Plan. The WQIP addresses all land-based sources of water pollution entering the reef, and outlines

nutrients, fine sediments, and pesticides as the greatest water quality risks to the GBR. The WQIP seeks to increase the quality of water flowing to the GBR through outlining how the outcomes of the Reef 2050 Plan will be achieved. Under the WQIP, the Fitzroy River catchment has been listed under high management priority for fine sediment loads. The full suite of Water Quality Objectives (WQOs) specified for the Fitzroy River catchment under the WQIP are listed in Table 2 of the WQIP, and reproduced below in Table 6-62.

TABLE 6-62 END OF CATCHMENT ANTHROPOGENIC WATER QUALITY TARGETS FOR THE FITZROY RIVER CATCHMENT (WQIP)

	Required Reduction	
	Load (as tonnes (t) or kilotonnes (kt))	Percentage (%)
Dissolved Inorganic Nitrogen (DIN)[1]	Maintain current load	Maintain current load
Fine sediment (FS)[2]	390 kt	30
Particulate phosphorus (PP)[2]	380 t	30
Particulate nitrogen (PN)[2]	640 t	30

6.12.1.3 WATER PLAN (FITZROY BASIN) 2011

The outcomes for sustainable management of water are detailed in Chapter 3 of the Water Plan (Fitzroy Basin) 2011, which outlines both general and specific outcomes for surface and groundwater, as well as ecological outcomes for waters within the Fitzroy Basin. Section 14(1)(c) of the Water Plan specifies GBR related outcomes for the basin as follows:

"*14(1) Each of the following is a general ecological outcome for the water in the plan area –*

- *(c) to provide a flow regime that –*
    - *(i) maintains delivery of fresh water to the estuaries of watercourses and the Great Barrier Reef Lagoon; and*
    - *(ii) supports productivity in the receiving waters of the Great Barrier Reef and inshore reefs;"*

Adherence to the GBR related outcomes specified in the Water Plan (Fitzroy Basin) 2011 is expected to be achieved through adherence to the objectives outlined the Reef 2050 Plan and WQIP.

[1] "Low" management priority
[2] "High" management priority

6.12.2 POTENTIAL IMPACTS

As the Proposed Action comprises of a windfarm, with no operational water releases, there are no anticipated direct impacts to water quality by wastewater releases. However, the potential for negative contribution to the GBR water quality targets outlined in the Reef 2050 Plan and WQIP may arise from sediment and erosion related to the Proposed Action leading to increases in loading of DIN, FS, PP and PN.

In the case of the Proposed Action, the areas of greatest erosion risk are those characterised by steep slopes and abrupt scarps. The IECA recommends the avoidance of areas with an extreme erosion risk wherever possible. This recommendation is reflected in the layout of the disturbance footprint, of which 0.25% is classified as having an extremely high erosion risk.

Erosion and sedimentation risks to the GBR as detailed in Section 6.2.6 are expected to be most prevalent during the construction and decommissioning phases of the Proposed Action. The potential risk of sediment deposition will be greatest for the duration of works involving the disturbance and exposure of soil as a result of land clearing to support construction. Whilst the complete avoidance of sediment generation will not be feasible, measures will be implemented as per Section 7.2.2 of the Theodore Wind Farm PER to minimise the extent of disturbance (and thus volume of sediment generated) and to capture excess sediment at the source, prior to potential discharge to downstream waterways.

Whilst the designation of certain areas as high to extremely high risk is not diminished once construction reaches completion, activities involved with the operational phase of the Proposed Action are anticipated to present a more manageable level of risk. This will predominantly be achieved through progressive revegetation and stabilisation. Activities with the potential to generate a high volume of sediment (such as cut and fill earthworks for construction) will not be ongoing during the operational phase, and the extent of disturbed or exposed areas in the operational phase will be greatly diminished following the completion of the post construction rehabilitation activities detailed in Section 8 of the Theodore Wind Farm PER.

Specific soil analysis has not been completed for the Proposed Action, however, typical contaminants associated with increased sedimentation can include Dissolved Inorganic Nitrogen (DIN), Fine Sediment (FS) (which can affect Suspended Sediment), and nutrients such as Nitrogen and Phosphorus. The percentages of DIN, FS, PN, and PP within soils will be variable across the Study Area, and is typically dependent on soil types and land uses. The potential increase in the discharge of the above contaminants is anticipated to be proportional to the total amount of sediment lost from the Study Area. The Proposed Action includes the development of erosion and sediment control plans to manage loads of sediment discharge from the site and manage the potential impacts against the specific WQOs detailed in Reef Plan 2050 and WQIP. Reducing soil loss from the Study Area is a leading measure in meeting the targets of the Reef WQIP and the overarching Reef 2050 Plan. As such, the outcomes of the RUSLE assessment can inform the general extent of potential high-risk areas the Proposed Action poses to the GBR. Other potential impacts to GBR water quality values (refer to "Factors that influence the state of objectives" within the Reef 2050 Objectives and Goals document), such as those associated with the discharge of contaminants and concrete pollution are primarily expected to only occur on an incident basis. Measures will be employed, as detailed in Section 7.2.2 of the Theodore Wind Farm PER, to reduce the likelihood of incidents occurring, and to capture potential contaminants in the event of an incident. With the implementation of appropriate erosion and sediment controls, it is anticipated that the

Proposed Action will not negatively affect the contribution to the achievement of the targets outlined for the Fitzroy Basin in the WQIP, and subsequently the Reef 2050 Plan and Water Plan (Fitzroy Basin) 2011. The majority low to moderate erosion risk throughout the Disturbance Footprint presents a manageable level of risk that will be mitigated through implementation of the measures that are detailed in Section 7.2.2 of the Theodore Wind Farm PER. These measures will ensure that discharges of sediment from the Study Area are not elevated about the pre-development baseline.

The implementation of a downstream water quality monitoring program will allow for potential impacts and performance against the GBR WQOs specified in the Reef 2050 Plan and WQIP to be assessed in real time. This will allow for remedial actions to be implemented to ensure adherence to the WQOs and ensure measurable impacts on GBR values as a result of the Proposed Action are not observed.

Through the implementation of avoidance, mitigation, and monitoring strategies, the Proposed Action will not result in an increase of pollutants to GBR catchment waters in line with the objectives specified in the Reef 2050 Plan, WQIP, and Water Plan (Fitzroy Basin) 2011.

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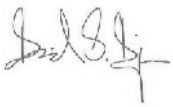
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ACRONYMS AND ABBREVIATIONS

Acronym	Description
BBMP	Bird and Bat Management Plan
BFM	Bonded Fibre Matrix
CEMP	Construction Environmental Management Plan
DCCEEW	Department of Climate Change, Energy, the Environment and Water
Disturbance Footprint	The area whereby the final layout and impacts have been considered and occupies an area of 1,537.4 ha.
ESC	Erosion and Sediment Control

Acronym	Description
ESCPC	Erosion and Sediment Control Plan for Construction
FSC	Fauna Spotter-Catcher
IECA	International Erosions Control Association
MNES	Matters of National Environmental Significance
MSDS	Material Safety Data Sheet
OMP	Offset Management Plan
PER	Public Environment Report
Proposed Action	Theodore Wind Farm
Proponent	Theodore Energy Development Pty Ltd
Project Area	The corridor of land on which the Disturbance Footprint will be located, including a 100 metre buffer for micro-siting.
SARA	State Assessment and Referral Agency
SRI	Significant Residual Impact
Study Area	The 9 land parcels, across 3 properties, and road reserve areas, 46,830 ha, in which the Proposed Action will be located.
TEC	Threatened Ecological Community
VFMP	Vegetation and Fauna Management Plan
WoNS	Weeds of National Significance
WTGs	Wind Turbine Generator

7. PROPOSED AVOIDANCE, MITIGATION AND MANAGEMENT MEASURES

7.1 OVERVIEW

This Section summarises the proposed avoidance, mitigation and management measures based on potential impacts of the Proposed Action outlined in Section 6 of the Theodore Wind Farm PER.

The mitigation hierarchy is a tool that is used to limit the amount of damage an action, such as a development, will have on the environment. The three tiers of the hierarchy, which must be followed preferentially from first to last and explored in full before moving on to the next (DCCEEW, 2024b), are:

1. Avoid
2. Mitigate
3. Offset

The Proponent has endeavored to follow the mitigation hierarchy, and has proposed avoidance and mitigation measures relevant to each phase of the Proposed Action. Broadly, these measures can be grouped as design and construction phase measures, operational phase measures, and maintenance and decommissioning phase measures.

Specific Management Plans have been developed with the aim to manage and mitigate impacts to Matters of National Environmental Significance (MNES). These management plans are attached to this PER and include:

- Bird and Bat Management Plan (BBMP) (Appendix D);
- Preliminary Vegetation and Fauna Management Plan (VFMP) (Appendix G); and
- Preliminary Construction Environmental Management Plan (CEMP) (Appendix H).

More general management plans that will be developed for the Proposed Action and are likely to include relevant measures outlined in species-specific management plans include:

- Construction Environmental Management Plan (CEMP); and
- Operational Environmental Management Plan (OEMP).

Conditions of Approval associated with the Development Permit (2409-41961 SDA), received from the Queensland State Assessment and Referral Agency (SARA), include the development of the following management plans:

- Vegetation and Fauna Management Plan (Condition 3);
- Cleared Vegetation Management Plan (Condition 4);
- Rehabilitation Management Plan (Condition 5);
- Bird and Bat Management Plan (Condition 8);
- Construction Environmental Management Plan (Condition 12);
- Bushfire Management Plan (Condition 13);
- Stormwater Management Plan (Condition 9);
- Site Stabilisation Plan (Condition 11);

- Erosion and Sediment Control (ESC) Plan for Construction (ESCPC) (Condition 10);
- End of Construction Decommissioning Management Plan (Condition 32); and
- End of Operation Decommissioning Management Plan (Condition 33).

7.1.1 SUMMARY OF PROPOSED AVOIDANCE, MITIGATION AND MANAGEMENT MEASURES

Table 7-1 below summarises the proposed avoidance, mitigation and management measures to be employed, responsible parties and their timing. Detailed discussion and evidence to support the efficacy of mitigating potential impacts of the Proposed Action are discussed in the following Sections.

TABLE 7-1 AVOIDANCE, MITIGATION AND MANAGEMENT MEASURES FOR THE PROPOSED ACTION

Measure	Responsibility	Phase(s)
Avoidance Measures		
Avoid disturbing MNES habitat	Proponent	Design, Construction, Operation, Maintenance and Decommissioning
Pre-clearance surveys and micro-siting	Proponent, Lead Construction Contractor, Specialist Environmental Contractors	Construction, Operation, Maintenance and Decommissioning
Avoid locating turbines in key MNES habitat	Proponent	Design and Construction
Mitigation Measures		
Designing layout to reduce habitat fragmentation impacts to MNES	Proponent	Design
Installing fauna crossing infrastructure	Proponent, Specialist Environmental Contractors	Construction and Operation
Fauna spotter-catchers	Proponent, Specialist FSC Contractor	Construction, Operation and Maintenance
Manage invasive plants and animals	Proponent, Specialist Environmental Contractors	Construction, Operation and Maintenance
Manage fire regimes and bushfire risk	Proponent, Specialist Environmental Contractors	Construction, Operation and Maintenance
Manage impacts from altered hydrology	Proponent, Lead Construction Contractor	Construction, Operation and Maintenance
Reduce environmental pollution	Proponent, Lead Construction Contractor	Construction, Operation and Maintenance

Measure	Responsibility	Phase(s)
Site inductions and training	Proponent, Lead Construction Contractor	Construction, Operation and Maintenance
Revegetation and rehabilitation (Type 1 and 2)	Proponent, Specialist Environmental Contractors	Operation and Maintenance
Reduce likelihood of turbine collision and barotrauma impacts	Proponent	Operation
Revegetation and rehabilitation (Type 3)	Proponent, Specialist Environmental Contractors	Decommissioning
Management Measures		
Specific Management Plans have developed to manage and mitigate impacts to listed threatened species known or likely to occur within the Study Area. These management plans include a BBMP and CEMP.	Proponent, Lead Construction Contractor, Specialist Environmental Contractors	Construction, Operation, Maintenance and Decommissioning

7.1.2 DEVELOPMENT TO MEET 'S.M.A.R.T' PRINCIPLE

The measures outlined in Table 7-1, and described in detail in the following Sections, have been developed in order to meet the 'S.M.A.R.T' goal principle as follows:

- **Specific** – this details the specific mitigation measure for the Proposed Action in terms of how it will mitigate the relevant potential impact;
- **Measurable** – this details how the mitigation measure for the Proposed Action will be achieved, through the collection of data during field surveys, or a specific number unit goal for the measure;
- **Achievable** – this details the way in which the measure will be achieved in relation to the timeframe, people involved in achieving the measure and the money or resources required;
- **Relevant** – this details any information for listed species that are relevant to, or addressed by, the specific mitigation measure, for example, how a Biosecurity Management Plan would help to address and adhere to the threat abatement plans for pest reduction for listed threatened species; and
- **Time bound** – this details the specific time frame in which the measure should be implemented for or achieved by.

7.2 DESIGN AND CONSTRUCTION PHASE MEASURES

The following measures are most relevant to the design and construction phases of the Proposed Action. Some measures (e.g., **Avoid locating turbines in key MNES habitat**, outlined under the operational phase) are also relevant to these phases.

7.2.1 AVOIDANCE MEASURES

Avoid disturbing MNES habitat

Mapping and protecting habitat for MNES and avoiding impacts as much as practicable within the Study Area is a key element to impact avoidance. Habitat loss is globally recognised as the greatest threat to threatened species, and land clearing is a primary contributor to this (Neldner, et al., 2017).

The Proponent has evaluated the Study Area and has continued to design a Disturbance Footprint that was feasible from an engineering perspective and minimised the disturbance to MNES wherever possible. Design principles that were adopted included locating infrastructure in already cleared paddocks, and reducing the size and extent of infrastructure. Access tracks, hardstands, laydown areas and other infrastructure have been designed to have the least impact on MNES as technically possible. By limiting the area of habitat to be cleared for the Proposed Action to the minimum required, impacts to threatened species will be avoided as much as practicable.

Since the conception of the Proposed Action, the design of the Disturbance Footprint has evolved with consideration of technical, environmental, social, and commercial constraints. Initial reviews determined that the Study Area has the maximum capacity to host up to 260 WTGs. A Draft Disturbance Footprint was designed to host up to 260 WTGs and associated infrastructure. The design of the Disturbance Footprint was refined to be up to 170 WTGs to minimise impacts to sensitive ecological areas, minimize potential visual impacts to surrounding dwellings and maximise commercial output.

Areas mapped to be impacted by the Proposed Action have been clearly delineated and communicated, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance.

Pre-clearance surveys and micro-siting

A two-stage design process involving initial mapping of ecological constraints completed and pre-clearance micro-siting surveys will be undertaken. Pre-clearance surveys will be undertaken at the 30% and 80% Disturbance Footprint design to search for listed flora species known, likely or with potential to occur and listed fauna species habitat, to define locations of populations and guide micro-siting and additional avoidance measures, such as species translocation, seed collection and propagation. Pre-clearance surveys will be conducted by suitably qualified ecologists as follows:

- Investigation of all habitat strata and fauna habitat types to be directly impacted (e.g. arboreal, terrestrial, leaf litter), inclusive of a 100 m buffer around infrastructure locations;
- The Disturbance Footprint will be traversed on foot to verify the presence of any Threatened Ecological Communities (TEC) or listed fauna or flora species, and identify areas in which suitable habitat for MNES fauna species may be present;
- If listed flora species are identified, the Disturbance Footprint will be refined to avoid these individuals. If they are unavoidably impacted, they will be translocated in line with Guidelines for the Translocation of Threatened Plants in Australia (3rd Edition) (Commander, et al., 2018);

- Habitat features such as hollow-bearing trees, large woody debris, bird nests and water bodies will be flagged with high-visibility tape and their position recorded using GPS or similar. Sightings of MNES fauna and flora will be recorded and these locations will be avoided where micro-siting allows (up to 100 m for wind turbine generators (WTGs));
- The habitat features and their GPS data will be recorded by licensed and suitably qualified fauna spotter catcher team to guide avoidance measures imposed during clearing; and
- A full list of fauna species detected during the pre-clearance inspection, as well as the marking and identification of significant habitat features will be outlined in a pre-clearance report.

This methodology will help in avoiding and mitigating impact to MNES. Ongoing monitoring will help manage impacts and will inform an adaptive management process.

7.2.2 MITIGATION MEASURES

Designing layout to reduce habitat fragmentation impacts to MNES

Prior to final design and construction, the Disturbance Footprint will incorporate design features to further minimise habitat fragmentation and patch isolation.

The incorporation of road pinch points to maximise dispersal between patches of vegetation will be considered to maintain habitat connectivity. While pinch points have a benefit for habitat, they present a technical and logistical barrier to safe and effective construction. Pre-clearance surveys, undertaken at the 30% and 80% Disturbance Footprint design, will determine appropriate locations for road pinch points. The Proponent will consider the use of innovative turbine blade transportation, including methods to minimise necessary clearance widths.

Electricity infrastructure will be designed to allow for safe operations, using buffers between conductors and the ground, and conductors and adjacent vegetation. A significant portion of the 33 kv overhead power has been removed during the most current Proposed Action layout design which will reduce impacts to MNES.

All linear clearing within mapped threatened flora and fauna species habitat will be conducted so as not to exceed the dispersal ability of that species, such that all habitat within the Study Area remaining after the construction phase will still be accessible for the species. All clearing for access corridors will be limited to 40 m in width during the construction phase. Where disturbance to mapped habitat occurs such that any MNES species dispersal ability is likely to be exceeded, adaptive management will be employed to overcome this impact and retain species dispersal ability throughout the entirety of the Study Area and the broader landscape. MNES-specific avoidance, mitigation and management measures, including discussion on retaining species dispersal ability, is outlined in Table 7-2.

Installing fauna crossing infrastructure and glider hollow boxes

Artificial wildlife crossing structures (e.g., glider poles) have been utlised within glider habitat throughout eastern Australia to assist dispersal between areas fragmented by clearing, such as roads and highways (DCCEEW, 2022a). However, only one example of greater gliders using these structures currently exists, at the Sugarloaf Pipeline project in Victoria. Annual monitoring from GHD found greater gliders were occasionally recorded on glider poles at this site, though it was not established whether they were using the structures to cross cleared

areas or to move parallel to gaps (GHD 2017; Dalton 2018 as cited in DCCEEW, 2022). Conservation advice and species-specific guidance suggests further research on greater glider dispersal ability and persistence in fragmented habitat is required (DCCEEW, 2022a; DES, 2022).

Where suitable trees cannot be retained, and linear disturbance within greater glider habitat results in any patch of Likely/Current Denning Habitat and/or Potential/Future Denning Habitat being isolated by a distance greater than the species dispersal ability, glider poles will be installed to re-connect fragmented habitat patches. After an analysis of tree height and greater glider gliding ability, a total of 14 locations has been identified to maintain habitat connectivity throughout the Study Area, requiring approximately 64 poles at 26 m lengths. Locations have been selected by prioritising areas where the footprint intersects denning habitat or creates large, isolated patches, as well as locations with confirmed greater glider records. The design and location selected for this mitigation measure has been guided by requirements outlined within the *Fauna Sensitive Transport Infrastructure Delivery, Chapter 6: Mitigation* (DTMR, 2024). This measure will also include a commitment to undertake monitoring of the glider poles, using non-invasive techniques such as camera traps, to monitor species presence and infrastructure use. This monitoring effort will contribute to the ongoing effort to establish if the species will use fauna-crossing infrastructure, and if glider poles are an effective measure to restore greater glider dispersal in fragmented habitat, particularly in Central Queensland where such information is currently lacking.

Greater gliders have been recorded utilising nest boxes at several projects between Victoria, NSW and Queensland (DCCEEW, 2022a; Wildlife Preservation Society of Queensland, 2025). A NSW study involving artificial denning infrastructure intended to mitigate the loss of tree hollows also made one record of a yellow-bellied glider using a nest box (Goldingay, Rohweder, & Taylor, 2020). If the Disturbance Footprint cannot be refined to avoid hollow bearing trees identified as potential glider denning resources, a fauna spotter-catcher (see below Section) will assess the best course of action. Field-verified hollow bearing trees with suitable greater glider hollows required for removal within the Disturbance Footprint will be replaced with fauna denning infrastructure (e.g., translocated tree hollows or artificial glider nesting boxes), at a 1:1 ratio. Based on an analysis of field survey data, it is estimated that greater glider denning habitat has an average of approximately 12 suitable hollow bearing trees/ha. It is therefore estimated that approximately 238 suitable hollow bearing trees occur within the Disturbance Footprint. Pre-clearance surveys will confirm the actual number of suitable hollow bearing trees to be impacted after micro-sighting. This measure will also include a commitment to undertake monitoring of the hollow boxes, using non-invasive techniques such as camera traps, to monitor species presence and infrastructure use. This monitoring effort will contribute to the ongoing effort to establish if gliders will use nesting boxes as a replacement for lost tree hollows.

Specific guidance on the use of glider poles and glider hollow boxes for the Proposed Action, including evaluating when infrastructure is required, expert consultation, species-specific features and dimensions for optimal utilisation, installation procedures and monitoring will be addressed within the CEMP.

Fauna sensitive fence design

Where fencing is required for linear infrastructure (road corridors or transmission lines) fencing will be designed and installed in accordance with *Koala-sensitive Design Guideline* (DES, 2022).

If additional fencing is required, fencing design will, at a minimum, include the following features:

- No barbed-wire to be used on any level of fencing to avoid entanglement of greater gliders, yellow-bellied gliders, large-eared pied bats and koalas; and
- A minimum gap of 300 mm between the ground and the lowest rail to allow koalas to move underneath the fence.

Fauna spotter-catchers

The Proponent will engage a licensed and suitably qualified fauna spotter-catcher (FSC) to search each infrastructure location for fauna within 48 hours prior to any vegetation clearing. This FSC role will include the detection, capture and removal of wildlife from the Disturbance Footprint. The FSC will have specialised skills and experience sufficient to service this role. Additionally, the FSC will have an understanding of basic ecological principles and knowledge of appropriate local release sites for wildlife. Guidance for FSC work for the Proposed Action will be addressed within the CEMP.

The FSC will visually inspect the vegetation and previously flagged habitat features to locate any fauna. Specific methodology and effort will be employed to detect MNES that are:

- Known or likely to occur;
- Potentially occurring; and
- General roosts or nest sites.

A FSC must be present during vegetation clearing or disturbance to any structures that may serve as wildlife habitat. A clear view of vegetation or habitat features being cleared is important for rapid detection of wildlife that is disturbed or uncovered by the operations. The FSC must remain on site during all vegetation clearing works to minimise direct impacts to MNES.

Where risks are identified from pre-clearance assessments, a qualified FCS will undergo searches immediately prior to clearing of any vegetation for presence of any fauna species. If fauna species or nesting sites are detected, the qualified fauna spotter catcher will assess and conduct the most appropriate method at the time to avoid or minimise impacts from clearing. If relocation is a viable option, considering the impacted species condition, habitat requirements and home range, captured individuals may be released into the Offset Area. Injured, sick or dead fauna will be recorded and reported, for the duration of construction and operation phases. A qualified fauna spotter catcher will carry out impacted fauna reporting during the construction phase. Where injured or sick fauna are detected, individuals will be taken to the nearest wildlife carer or veterinarian if practical.

Where essential microhabitat features are observed within the Disturbance Footprint (e.g. nests, logs, tree hollows), the microhabitat features will be inspected by the FSC for the presence of fauna, eggs or young. Where an absence of fauna, eggs or young can be confirmed, the microhabitat feature will be relocated, if possible, to nearby habitat that will not be disturbed. If the feature cannot be relocated, clearing will occur when no fauna is in the vicinity of the feature. Where fauna, eggs or young are located within the microhabitat feature, the Disturbance Footprint will be refined accordingly.

Where an ecologist conducting the pre-clearance survey and/or a fauna spotter-catcher identifies a tree hollow that is within mapped glider denning habitat and likely to be suitable as a glider denning resource, the Disturbance Footprint will be refined to avoid these habitat features where possible. If the Disturbance Footprint cannot be refined to avoid hollow bearing trees identified as potential glider denning resources, the fauna spotter-catcher will assess the best course of action. Field-verified hollow bearing trees required for removal within the Disturbance Footprint will be replaced with fauna denning infrastructure (e.g., translocated tree hollows or artificial glider nesting boxes). This will be guided by the FSC's on-site assessment and provisions outlined in the CEMP. For placement of fauna denning infrastructure consideration needs to be given to the preferred habitat of the displaced MNES (Goldingay, Quin, & Thomas, 2024). Nest box usage is species dependent but whether a nest box is successful can be enhanced by location as well as a design that has a high thermal buffer, with these considerations colonization of nest boxes can be 100% (Gracanin, et al., 2025).

Immediately after capture, and prior to release, all animals will be identified to species level and examined for signs of injury or illness. A licenced wildlife carer and/or veterinarian will be contactable to take any wildlife requiring further examination or treatment. Where a veterinarian or licenced wildlife carer is not available and the animal is experiencing unnecessary and unjustified suffering, humane euthanasia will be undertaken in appropriate circumstances by an FSC who is suitably experienced, informed and licensed.

Manage invasive plants and animals

Invasive plant and animal management is identified as measures for conservation effort generally for all identified MNES. The management of predatory and invasive species will be addressed within the Biosecurity Management Plan, which will include site-specific biosecurity measures. This Biosecurity Management will be implemented during the construction, operation and decommissioning phases of the Proposed Action.

The Biosecurity Management will include measures such as vehicle wash downs, weed certification (the Biosecurity Management will also include a bio-hygiene declaration that will need to be completed upon entry into the Study Area as required by landowners), and obligations to remain on access tracks throughout the Study Area, particularly within the Disturbance Footprint. Activities will be planned so that movement of vehicles, plant, machinery and equipment avoid moving between properties as much as practicable. Access to a land holder's property will not occur unless authorised under a land use agreement.

Weeds of National Significance (WoNS) listed under the EPBC Act as well as Restrictive and Prohibited Invasive flora and fauna (restricted matters), listed under the Queensland *Biosecurity Act 2014* (Qld), will be identified, monitored and controlled within the Study Area. Weed management and control methods will depend upon the location, weed species identified, the degree of the infestation, relevant landholder agreement or conduct and compensation agreement provisions, and local, state and national regulatory requirements. Weed control will be conducted by a suitably qualified bush regeneration contractor.

Staff and contractors will be given information on the location and consequences of biosecurity threats in the Study Area. Access roads, easements and yards will be kept weed free. Imported materials able to transport weed seeds will be assessed to ensure they are free of contamination, disease and invasive weeds.

Manage fire regimes and bushfire risk

A Bushfire Management Plan will be developed and implemented during construction and operation phase to mitigate the potential impact of fires to MNES habitat. The Bushfire Management Plan is discussed further in Section 7.8.3.

Manage impacts from altered hydrology

The following best-practice measures are to be implemented to manage and mitigate the potential impacts from altered hydrology, in particular risks to the Great Barrier Reef, caused by increased erosion and sedimentation as a result of the Proposed Action:

- The ESCPC explains the adoption of preventative measures to reduce erosion and sediment entering waterways. Rainfall data for the region (refer to Section 5.6.1) indicates a wet season from October to February, with a dry period from April to September;
- Construction to be completed in phases so that the extent/number of disturbance areas at any given time is limited;
- A stabilised entry/exit point (rumble pad) to be established and maintained for each area of the Study Area with all-weather access to a sealed road. The stabilised entry and exit points will include a vehicle cleaning area to mitigate the transportation of dust and dirt;
- Disturbed areas to be temporarily stabilised during periods of inactivity, and permanently stabilised at the conclusion of the disturbance works;
- Vegetation Clearing Plan to be developed, with staging set to occur immediately prior to soil disturbance to minimise soil exposure extent and duration;
- In areas where the slope exceeds 1 in 10 (steeper than a ratio of 1 vertical unit for every 10 horizontal units), hydraulically applied blankets such as bonded fibre matrix (BFM) or compost blankets to be implemented to promote the establishment of a vegetative cover. BFM will also assist in reducing the effect of raindrop impact erosion;
- Access tracks will be constructed in accordance with *Erosion control on property roads and tracks - managing runoff* (Queensland Government, 2018);
- Scour protection to be installed along drainage features to disperse and dissipate the energy of surface water flows. Protection may include features such as rock, concrete, or geo-fabric linings, or the establishment of vegetation and/or jute-matting;
- Flow diversion banks, diversion channels, catch drains, table drains, chutes and clean water diversions to be installed along the high side of each disturbance area to ensure that during and after storm events, clean water upstream flows entering the Study Area are not contaminated with construction material and/or particulates that might enter the downstream system;
- Sediment fences to be placed along the low side of work areas as a means of slowing flows, reducing scour, and capturing some sediment runoff;
- Channel clearing and stabilisation requirements for the work to be established in line with the best practice channel clearing and stabilisation requirements identified in International Erosion Control Association (IECA) (2008) Table I11, as a minimum, for all watercourse crossings identified;
- Channel crossing works to be compliant with the acceptable development outcomes for waterway barrier works (regulated by Queensland Government);
- In-stream works to be undertaken during periods when flows are minimal, if not absent; and

- Regular inspection and maintenance of ESC structures. Following rainfall events sufficient to produce runoff, inspection of erosion control measures and removal of collected material will be undertaken. Replacement of any damaged structures should be performed immediately.

All ESC structures are to be implemented in accordance with the IECA BPESC Book 1 (2008) with sizing of drainage controls undertaken in accordance with the methodology and principles described in the Queensland Urban Drainage Manual.

Other potential water quality related impacts may that arise as a result of the Proposed Action (such as spills and concrete pollution) will be addressed through the following measures:

- Areas for plant and construction material storage are to be designated along with associated diversion drains and spillage holding ponds. The BESS and any chemical storage facilities (such as the O&M Facility) are to be bunded to contain any leaks or spills;
- Site personnel to be made aware of the correct spill response and management procedures that are to be implemented within the Study Area, with spill response kits to be made available on site and in each vehicle;
- Water for earthworks and dust suppression is likely to be locally sourced from groundwater (artesian and sub-artesian), rainwater (sourced from dams or collection ranks), or offsite;
- On-site cement/concrete mixing carried out behind earth bunds (or other such measures) to capture and contain concrete-laden waste and spills;
- All concrete batching and pouring equipment will be rinsed in the designated on-site wash-down areas. Equipment wash-down water will not be diverted into the stormwater system, rather contained on site prior to treatment or disposal; and
- The site manager is to ensure that all sediment controls are in place prior any concrete pouring occurs.

The CEMP and a site-specific ESCPC will be developed to detail the required control measures, engineering drawings, and ongoing maintenance measures and schedules. The persons responsible for the controls and procedures adopted to mitigate surface water impacts should also be identified in these plans. At the operational phase, the CEMP will be transitioned into an OEMP.

A baseline surface water quality monitoring program will be implemented prior to the commencement of construction activities, with the aim to ensure water quality objectives are met and that potential impacts to water quality during can be monitored and mitigated as required.

Recommended sampling locations include upstream and downstream along:

- Dawson River;
- Castle Creek;
- Oxtrack Creek;
- Boam Creek;
- South Creek;
- Keen Creek; and
- Six Mile Creek.

The water quality monitoring program should seek to monitor for the following parameters:

- pH;
- Conductivity;
- Dissolved Oxygen;
- Turbidity;
- Total Suspended Sediment (TSS);
- Ammonia;
- Total nitrogen (TN); and
- Total Kjeldahl Nitrogen (TKN).

Reduce environmental pollution

Risk of environmental pollutants affecting MNES will be managed through the site-specific CEMP. Auditing of the CEMP, led by the Proponent or lead construction contractor, will occur monthly during construction. Staff and contractors will be made aware through general site induction and training of the potential to generate pollution (including through improper handling of hazardous materials and generation of dust, light and noise) and management measures that must be implemented.

All hazardous materials bought on-site will be accompanied by a Material Safety Data Sheet (MSDS), and all relevant personnel will be trained in their proper use. Only registered herbicides will be used for weed management, and only used by a suitably qualified bush regeneration contractor. Imported materials that are able to transport hazardous substances will be assessed by the Proponent or lead construction contractor to ensure they are free of contamination, disease and invasive species. All waste generated on-site will be managed in accordance with the legislation relevant to its classification, with general waste managed under the Waste Reduction and Recycling Act 2011 (QLD) and regulated waste managed under the Environmental Protection Act 1994 (QLD).

Dust will be minimised through engineering controls on machinery and other available dust suppression controls (water carts, sprinklers and covering stockpiles etc). Additionally, vehicles will adhere to speed limits within the Study Area to reduce dust generation. Disturbance from blasting will be minimised through engineering controls and other available blasting suppression, such as barrier walls, to avoid unnecessary ground vibrations, flying rocks, and dust generation that could cause disturbance to fauna and cause damage to vegetation.

Lighting will only be installed where it is necessary (e.g., as a safety or accessibility measure) to reduce light pollution impacts. Light pollution will also be minimised through engineering controls on infrastructure and machinery, such as colour selection to minimise attracting invertebrates, and timing controls to avoid periods of high fauna activity.

Noise protocols in regard to social impacts will be provided in the CEMP. Mitigation measures for ecological impacts from noise may include:

- Utilising hardware that produces the least amount of noise (while maintaining job suitability and performance);
- Idling of machinery, plant and vehicles will occur only when performing tasks necessary for the machinery, plant and vehicles to be idle;

- Sensitive periods and locations where fauna are reliant on vocal behaviour (e.g., dusk for koala during breeding season) will be identified and avoided (e.g., scheduling work during the day, and consideration to take into account placement of machinery, plant and vehicles nearby sensitive receptors (such as water sources)).

Site inductions and training

Site inductions, training, pre-start meetings and inspections will be undertaken according to the site-specific CEMP. All staff and contractors visiting or working on site will be made aware, through general site induction and training and review of management plans, of the potential to impact MNES. All staff and contractors will be aware of their obligations to adhere to mitigation and management measures relevant to their works on site, and reporting requirements for any incidents or near-misses related to MNES.

All staff and contractors operating vehicles, plant and machinery will comply with site-specific road rules and speed limits to minimise the likelihood of impacts to MNES, including collisions with fauna and damage to vegetation. Site entry and exit points and access tracks will be clearly mapped, signed and communicated to ensure vehicle movements are contained within the approved areas. Night-time safe driving controls will also be applied, including additional speed restrictions, providing additional protection for nocturnal animals.

Trenching and excavations have the potential to entrap fauna. Where excavations are required to be left open and unattended, suitable fauna escape measures, such as battered sides or escape ramps, will be installed. Staff and contractors conducting earthworks will check excavations for fauna before backfilling occurs.

All staff and contractors will be aware of their obligations to report any injured, sick or dead fauna. All incidents of fauna mortality will be recorded and reported, during and after the construction and operation phases. This can be carried out by an FSC during periods where disturbance is expected to occur (primarily construction activities). Where injured or sick fauna is detected, individuals will be taken to the nearest wildlife carer or veterinarian if practical. This will be conducted by the FSC.

Daily pre-start meetings or 'toolbox talks', led by the Proponent or lead construction contractor, will be conducted to relay any site-specific clearing information to all staff and contractors. Sightings, incidents and near-misses will be discussed in daily pre-starts during the construction phase. Where reasonable and practicable, all near misses and incidents will be investigated to establish root cause. Where necessary, corrective actions will be developed to improve existing processes.

Site inspections will be undertaken monthly at a minimum to review the efficacy of MNES control measures during construction. This inspection will be led by the Proponent or lead construction contractor with guidance from a suitably qualified ecologist (where necessary). Where necessary, corrective actions will be developed to improve existing processes.

Revegetation and rehabilitation (Type 1 and 2)

Rehabilitation of disturbed areas will be undertaken for the Proposed Action post-construction as well at the end-of-life decommissioning phase. In both cases, the intention is to progressively stabilise areas of disturbance, making them resilient to erosion and weed infestation, and to re-establish appropriate vegetation cover. Following the completion of construction, areas not required for ongoing operational disturbance will be rehabilitated and or regenerated in accordance with the Post-Construction Rehabilitation Plan established in Section 8 of the PER and where not required for ongoing grazing or agricultural practices.

Construction laydown areas and widened access tracks not required for operation will be rehabilitated in accordance with good practice at the time and where not required for ongoing grazing or agricultural practices.

Post-construction rehabilitation will aim to improve 400.7 ha of Type 1 rehabilitation/ revegetation areas, which includes low shrubbery and grass. These areas are identified as not being required during the operational phase of the Proposed Action, but full rehabilitation and planting of tree species cannot occur due to the likelihood of re-disturbance during any maintenance requirements and decommissioning of infrastructure. Therefore, the key objective of Type 1 areas is to restore natural ground cover providing stabilisation and the ability for ground-dwelling species to forage.

Post-construction rehabilitation will also aim to improve 599.5 ha of Type 2 rehabilitation/ revegetation areas, which includes rehabilitation of vegetation without height restrictions.

Details on revegetation and rehabilitation, including objectives, timing and area-specific rehabilitation effort to be employed, are presented in Section 8 of the Theodore Wind Farm PER.

7.3 OPERATIONAL PHASE MEASURES

The following measures are most relevant to the operational phase of the Proposed Action. As outlined in Table 7-1, some measures outlined under the design and construction phases (e.g., **Reduce environmental pollution** (including light and noise), **Manage fire regimes and bushfire risk, Manage impacts from altered hydrology, Site inductions and training**, **Manage invasive plants and animals and Revegetation and rehabilitation (Type 1 and 2)**), are also relevant to this phase.

7.3.1 AVOIDANCE MEASURES

Avoid locating turbines in key MNES habitat

WTG locations have been thoroughly considered during the design phase, with turbines and access corridors located away from key habitats where feasible. This includes avoiding remnant vegetation, waterways and drainage lines and areas likely to provide thermals and updrafts, reducing potential impacts to MNES during the operational phase of the Proposed Action.

Prominent thermals and updrafts are more likely to be present in the north of the Study Area, where landscape features (extending to the north and east outside of the Study Area) contain higher slope gradients that may present a terrain which promotes the occurrence of suitable air currents to support foraging (see Figure 5-16). The Disturbance Footprint avoids the majority of this northern section, reducing the risk of collision of species that use updrafts to enable energy-efficient soaring (i.e. white-throated needletail, fork-tailed swift and raptor species).

Further, the Proposed Action uses turbines with a Rotor Swept Area >40 m above ground level, to provide a collision-free foraging zone within the canopy and 20 m above the canopy, reducing operational disturbance to terrestrial species.

7.3.2 MITIGATION MEASURES

Reduce likelihood of turbine collision and barotrauma impacts

The measures to mitigate bird and bat collision risk with WTGs are detailed in the BBMP (Appendix D). May et al. (2015) notes that species may be discouraged from using WTG occupied areas by making this area less attractive or by making the area outside of that occupied by the WTG more attractive. Some of the mitigation and management measures included in the BBMP for the Proposed Action use this ideology, such as reducing resources in WTG areas to make these regions less attractive to birds and bats. These measures include:

- Reducing WTG lighting (to reduce invertebrate density) where other factors (e.g., aeronautical safety obligations) are not compromised, and considering the use of red or yellow light (generally less attractive to invertebrates than white light); and
- Reducing food, water and perching resources for birds around WTGs.

The Proponent will incorporate the use of innovative blade design features at the "higher risk" turbines outlined in Section 3.3, reducing the risk to soaring bird species. To minimise potential collision rates, innovative blade design may include:

- Acoustic and visual deterrents (e.g., ultrasound acoustic devices, painted blades); and
- Detection systems (e.g., IdentiFlight®, Robin Radar Systems).

The Proposed Action may also implement measures, such as curtailment and acoustic and visual deterrents outlined above, as a corrective action in response to the Significant Residual Impact (SRI) trigger process (see Section 7.8.2 below). Implementation will involve appropriate research and consultation before adopting these measures.

7.4 MAINTENANCE AND DECOMMISSIONING PHASE MEASURES

The following measures are most relevant to the maintenance and decommissioning phases of the Proposed Action.

Maintenance phase impacts are likely to relate to construction/operation traffic movements and plant operation, vegetation clearing within existing access tracks and work areas, and management of invasive species, fire, hydrology and pollution. In general, potential impacts as a result of the decommissioning phase relate to habitat loss and disturbance. Decommissioning phase impacts are therefore similar to those that might occur during the construction phase but likely to be of lower magnitude. Therefore, all measures outlined under the design and construction phases are also relevant to the maintenance and decommissioning phases.

7.4.1 MITIGATION MEASURES

Revegetation and rehabilitation (Type 3)

At the end of the Proposed Action's expected operational timeline, and in the absence of a repowering or extension of asset life agreement being established, the Proposed Action and all associated infrastructure will reach an end-of-life stage.

End-of-life rehabilitation will include 537.3 ha of Type 3 rehabilitation/revegetation areas, which includes returning areas to a pre-development state based on broad habitat types within the nominated footprint. It is noted, access tracks have not been included due to the potential continued use of landholders for rural purposes, however, the Proponent is committed to analysing any potential areas of roads to be rehabilitated.

Type 3 refers to the rehabilitation/ revegetation efforts that will be undertaken after the decommissioning and end-of-life of the Proposed Action, including all areas of disturbance with the exception of those areas to be used for on-going rural activities such as formed access tracks under agreement by the landowner

Details on revegetation and rehabilitation, including objectives, timing and area-specific rehabilitation effort to be employed, are presented in Section 8 of the Theodore Wind Farm PER.

7.5 ENVIRONMENTAL OFFSETS

The Proposed Action has endeavored to avoid and reduce impacts to MNES as much as practicable. As a result of the Impact Assessment (Section 6 of the Theodore Wind Farm PER), it was determined that the Proposed Action is likely to have a SRI on the following MNES:

- Poplar Box Grassy Woodland on Alluvial Plains Threatened Ecological Community (TEC);
- Greater glider (southern and central) (*Petauroides volans*);
- Koala (*Phascolarctos cinereus*); and
- Southern squatter pigeon (*Geophaps scripta scripta*).

Additionally, is was concluded that the Proposed Action has the potential to significantly impact diamond firetail.

As such, the Proponent is required to offset the removal of habitat for the above species. An Offset Management Plan (OMP) has been developed, outlining proposed offsets for impacts to MNES, developed in accordance with the EPBC Act Environmental Offsets Policy (DSEWPC, 2012) and the Proposed Action-specific requirements outlined in the Theodore Wind Farm (EPBC 2024/09842) PER guidelines provided by Department of Climate Change, Environment, Energy and Water (DCCEEW). Environmental offsets for the Proposed Action are further discussed in Section 9 of the Theodore Wind Farm PER. The OMP is attached as Appendix F.

7.6 MNES-SPECIFIC AVOIDANCE, MITIGATION AND MANAGEMENT MEASURES

Conservation advice, threats, relevant measures and specific and measurable environmental outcomes for listed TECs, threatened and migratory species that have been identified as known, likely or potentially occurring within the Study Area are detailed in Table 7-2.

The Proposed Action will result in some disturbance to habitat for those MNES assessed as known, likely or having potential to occur, but will not exceed the maximum disturbance limits listed below. It should be noted that portions of these cleared areas will be subject to rehabilitation, which lowers the permanent impact to some MNES (depending on specific habitat requirements).

The dispersal ability of each MNES, potential high risk areas for habitat fragmentation and the adaptive management that will be employed if dispersal limits are exceeded is further discussed within Table 7-2.

TABLE 7-2 MNES SPECIFIC AVOIDANCE, MITIGATION AND MANAGEMENT MEASURES

MNES	Relevant Conservation Advice and Policy Objectives	Threats	Avoidance, Mitigation and Management Measures	Corrective Action	Environmental Outcome

Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC (Endangered under the EPBC Act)	*Approved Conservation Advice for the Brigalow (Acacia harpophylla dominant and co-dominant) ecological community* (DoE, Approved Conservation Advice for the Brigalow (Acacia harpophylla dominant and co-dominant) ecological community, 2013)
	
	Objectives (with specific actions to be taken that are relevant to the Proposed Action):
	• Protect and conserve remnant and regrowth areas of the ecological community. Prevent clearance of this endangered ecological community and of nearby native vegetation including buffer zones and connecting corridors.
	• Where further clearance is unavoidable:
	  ◦ mitigate the severity of impacts (e.g. avoid higher quality areas, avoid dissection of patches, act to minimise hydrological disruption and the spread of weeds); and,
	  ◦ offsetting should consider the location and emulate qualities of affected patches.
	• Manage areas of the Brigalow ecological community to reduce threats, including through:
	  ◦ fire management that considers Brigalow conservation, protection, and ecological heterogeneity; and
	  ◦ targeted weed and feral animal control with a particular focus on high biomass exotic grasses (buffel grass, Rhodes grass, green panic grass) and feral pigs.
	• Manage all weeds appropriately within and close to the Brigalow ecological community; e.g.:
	  ◦ spot application of herbicides, rather than aerial spraying;
	  ◦ avoid fertiliser application;
	• Minimise tree thinning and soil disturbance.
		Key threats include (DoE, Approved Conservation Advice for the Brigalow (Acacia harpophylla dominant and co-dominant) ecological community, 2013):
		• Clearing
		• Fire
		• Invasive Species:
		  ◦ Weeds
		  ◦ Pest animals
		• Inappropriate grazing regimes
		• Climate change
			• TECs have been mapped and the Proponent has continued to design a Disturbance Footprint that minimises disturbance to TEC wherever possible, with particular focus on avoided areas of higher quality TEC.
			• Areas mapped to be impacted by the Proposed Action will be clearly delineated and communicated, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance.
			• Pre-clearance surveys will be undertaken at the 30% and 80% Disturbance Footprint design to search for MNES, to define locations of populations, and guide micro-siting and additional avoidance measures.
			• Prior to final design and construction, the Proposed Action layout will incorporate design features to further minimise habitat fragmentation and patch isolation, such as road pinch points.
			• Invasive plant and animals will be managed in accordance with a Biosecurity Management Plan in accordance with the *Biosecurity Act 2014 (Qld).*
			• This Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors.
			• A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES and their habitat.
			• Best-practice measures will be implemented to manage and mitigate the potential impacts from altered hydrology, such as habitat degradation, caused by increased erosion and sedimentation as a result of the Proposed Action.
			• Environmental pollutants affecting MNES will be managed through the site-specific CEMP. Staff and contractors will be made aware through general site induction and training of the potential to generate pollution (including through improper handling of hazardous materials and generation of dust, light and noise) and management measures that must be implemented.
			• Site inductions, training, pre-start meetings and inspections will be undertaken according to the CEMP. All staff and contractors visiting or working on site will be made aware of the potential to impact MNES and measures to be followed, such as safe driving speeds, and their obligations to report any damaged vegetation.
				Where reasonable and practicable, all near misses and incidents will be investigated to establish root cause.
				
				Where necessary, corrective actions will be developed to improve existing processes.
					No more than 1.3 ha (or 0.6%) of the TEC will be subject to long-term disturbance as a result of the Proposed Action.
					
					The functional value of all remaining TEC within the Study Area will be maintained.

MNES	Relevant Conservation Advice and Policy Objectives	Threats	Avoidance, Mitigation and Management Measures	Corrective Action	Environmental Outcome
	• Manage foxes and cats (as well as feral pigs) using a coordinated approach, preferably among groups of neighbours and across regions. • Help woodland birds to avoid aggression from noisy miners by: encouraging and protecting shrubby understorey; managing grazing pressure so that it does not degrade native vegetation; and retaining dense stands of trees and regrowth.				
Poplar Box Grassy Woodlands on Alluvial Plains TEC (Endangered under the EPBC Act)	*Conservation Advice (including listing advice) for the Poplar Box Grassy Woodland on Alluvial Plains* (DoEE, 2019) Objectives (with specific actions to be taken that are relevant to the Proposed Action): • Prevent further clearance, fragmentation or detrimental modification of remnants of the ecological community and of surrounding native vegetation. • Recognise the landscape position of remnants of the ecological community and ensure that planning supports increased resilience within the landscape. • Prevent impacts to native vegetation, native fauna, hydrology or soil structure from any developments and activities adjacent to or near patches of the ecological community by planning for and appropriately avoiding or mitigating off-site effects. • Protect mature trees, particularly with hollows, even if they are dead. Large and old trees may have numerous fissures that provide shelter. • Avoid significant changes to water table levels and /or run-off, salinity, pollution and water flow patterns arising from developments. • Manage access to remnants to prevent, for example, disturbance and spread of weeds and plant pathogens. • Protect the native soil seed bank by minimising soil disturbance and removal.	Key threats include (DoEE, 2019): • Clearance and fragmentation • Weed invasion • Inappropriate fire and grazing regimes • Dieback • Chemical impact and spray drift • Hydrological changes • Salinization • Nutrient enrichment • Invasive fauna • Climate change	• TECs have been mapped and the Proponent has continued to design a Disturbance Footprint that minimises disturbance to TEC wherever possible, with particular focus on avoided areas of higher quality TEC. • Areas mapped to be impacted by the Proposed Action will be clearly delineated and communicated, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. • Pre-clearance surveys will be undertaken at the 30% and 80% Disturbance Footprint design to search for MNES, to define locations of populations, and guide micro-siting and additional avoidance measures. • Prior to final design and construction, the Proposed Action layout will incorporate design features to further minimise habitat fragmentation and patch isolation, such as road pinch points. • Invasive plant and animals will be managed in accordance with a Biosecurity Management Plan in accordance with the *Biosecurity Act 2014 (Qld).* • This Biosecurity Management Plan will be implemented for the Study Area which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES and their habitat. • Best-practice measures will be implemented to manage and mitigate the potential impacts from altered hydrology, such as habitat degradation, caused by increased erosion and sedimentation as a result of the Proposed Action. • Environmental pollutants affecting MNES will be managed through the site-specific CEMP. Staff and contractors will be made aware through general site induction and training of the potential to generate pollution (including through improper handling of hazardous materials and generation of dust, light and noise) and management measures that must be implemented. • Site inductions, training, pre-start meetings and inspections will be undertaken according to the CEMP. All staff and contractors visiting or working on site will be made aware of the potential to impact MNES and measures to be followed, such as safe driving speeds, and their obligations to report any damaged vegetation. • As a result of the Impact Assessment (see Section 6 of the Theodore Wind Farm PER), it was determined that the Proposed Action is likely to have a SRI on Poplar Box Grassy Woodlands on Alluvial Plains TEC. As such, the Proponent is required to offset the removal of TEC, which will be managed in line with the OMP (see Section 9 of the Theodore Wind Farm PER).	Where reasonable and practicable, all near misses and incidents will be investigated to establish root cause. Where necessary, corrective actions will be developed to improve existing processes.	No more than 6.6 ha (or 1.4%) of the TEC will be subject to long-term disturbance as a result of the Proposed Action. The functional value of all remaining TEC within the Study Area will be maintained.

MNES	Relevant Conservation Advice and Policy Objectives	Threats	Avoidance, Mitigation and Management Measures	Corrective Action	Environmental Outcome
	• Retain habitat features for fauna, noting species requirements (e.g. fallen timber) or particular vegetation structure. • Prior to removal of any trees, or use of heavy machinery that may also damage the understorey, ensure comprehensive flora and fauna surveys have identified threatened species on site and their potential shelter and nesting sites. • Following disturbances, implement a weed control program that responds to weed establishment, particularly in the following 1–2 years after disturbance. • Implement effective control and management techniques for invasive grasses, such as *Cenchus ciliaris* (buffel grass). • Monitor for signs of new disease such as myrtle rust or incursions by new weeds (for example, African boxthorn or blackberry), or pest animals, (for example goats, rabbits and deer) and manage early for local eradication. • Use appropriate hygiene to minimise the introduction or spread of weeds and diseases at susceptible sites. For example, keep vehicles and machinery to dedicated roads and out of remnants wherever possible. If vehicles must be taken into remnants ensure vehicles are washed first to remove soil, potential fungal pathogens and weed seeds. • Implement appropriate fire management regimes for the ecological community that take into account results from research. • Enhance the resilience of the ecological community to the impacts of climate change by relieving other pressures, in particular by implementing actions in this advice regarding vegetation clearance, invasive species and fire.				

MNES	Relevant Conservation Advice and Policy Objectives	Threats	Avoidance, Mitigation and Management Measures	Corrective Action	Environmental Outcome
Greater glider (southern and central) (Endangered under the EPBC Act)	*Conservation Advice for Petauroides volans (Greater Glider (southern and central)* (DCCEEW, 2022a) Conservation and management priorities (that are relevant to the Proposed Action) include: • Implement and enforce measures to reduce direct mortality and loss of hollow-bearing trees during site preparation and execution of prescribed burns. • Protect and maintain sufficient areas of suitable habitat, including denning and foraging resources and habitat connectivity, to sustain viable subpopulations throughout the species' range. • Protect hollow-bearing trees on private property, roadside reserves, and along the edges of roads/tracks. Prior to removing trees identified to be a 'hazard', undertake a risk assessment by a suitably qualified person to determine whether their removal is necessary, including a consideration of the potential impacts of removal on the greater glider. Incorporate measures to ensure ongoing recruitment of hollow-bearing trees into planning processes. • Avoid fragmentation and loss of habitat due to development of new transport corridors. Include consideration of the species in planning processes, and re-locate recreational activities and roads away from habitat. • Revise mitigation and offset guidelines for development and linear infrastructure (e.g. pipelines, transport corridors) to reflect the limited effectiveness of artificial structures (nest boxes, glider poles) as mitigation actions for loss, degradation or fragmentation of greater glider habitat. • Protect all habitat likely to be climate change refuges, including sites buffered against desiccating conditions (e.g. sheltered and/or on south-facing aspects), under future climate change scenarios. Maintain or establish connectivity with other habitat in order to facilitate movement.	Threats include (DCCEEW, 2022a): • Frequent and intense bushfires • Inappropriate prescribed burning • Climate change – increased temperature and changes in rainfall patterns • Habitat loss by land clearing (including timber harvesting) Other threats with minor consequences are: • Mortality from barbed wire fencing • Hyper predation by owls • Competition by sulphur-crested cockatoos • Predation by feral cats • Predation by European red foxes	• Species habitat has been mapped and the Proponent has continued to design a Disturbance Footprint that minimises disturbance to habitat wherever possible, with particular focus on avoided areas of higher value denning habitat. • Areas mapped to be impacted by the Proposed Action will be clearly delineated and communicated, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. • Pre-clearance surveys will be undertaken at the 30% and 80% Disturbance Footprint design to search for MNES, to define locations of populations, and guide micro-siting and additional avoidance measures, such as species translocation. • Prior to final design and construction, the Proposed Action layout will incorporate design features to further minimise habitat fragmentation and patch isolation, such as road pinch points. • Greater gliders usually glide no further than 30 m and tend to have a steeper glide trajectory compared to other gliding mammals (NSW Scientific Committee, 2024). However, they can reportedly cover distances up to 100 m (NSW Scientific Committee, 2024), and observations have been made of individuals gliding over distances of 75 m from a tree canopy 45 m high (Taylor & Goldingay, 2009). Glider poles will be installed at identified locations impacted by the Proposed Action to maintain greater glider habitat connectivity. • Where required, a licensed and suitably qualified FSC will search each infrastructure location for fauna within 48 hours prior to any vegetation clearing, to further avoid identified MNES and key habitat features, and relocate MNES and key habitat features where not. • Invasive plant and animals will be managed in accordance with a Biosecurity Management Plan in accordance with the *Biosecurity Act 2014 (Qld).* • This Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES and their habitat. • Best-practice measures will be implemented to manage and mitigate the potential impacts from altered hydrology, such as habitat degradation, caused by increased erosion and sedimentation as a result of the Proposed Action. • Environmental pollutants affecting MNES will be managed through the site-specific CEMP. Staff and contractors will be made aware through general site induction and training of the potential to generate pollution (including through improper handling of hazardous materials and generation of dust, light and noise) and management measures that must be implemented. • Site inductions, training, pre-start meetings and inspections will be undertaken according to the CEMP. All staff and contractors visiting or working on site will be made aware of the potential to impact MNES and measures to be followed, such as safe driving speeds, fauna-safe excavation practices, and their obligations to report any injured, sick or dead fauna. • Rehabilitation of disturbed areas will be undertaken post-construction, as well at the end-of life decommissioning phase, restoring erosion and weed resilience and to re-establishing vegetation cover for ground-dwelling species to forage and disperse.	Where reasonable and practicable, all near misses and incidents will be investigated to establish root cause. 7.2.2	No more than 19.8 ha (or 1.2%) of Likely/Current Denning Habitat, 1.1 ha (or 0.3%) of Potential/Future Denning Habitat and 607.3 ha (or 3.0%) of Foraging and Dispersal Habitat will be subject to long-term disturbance as a result of the Proposed Action. The functional value of all remaining habitat within the Study Area will be maintained. Linear clearing will not permanently impact the dispersal ability of the species and therefore will not fragment habitat for the species.

MNES	Relevant Conservation Advice and Policy Objectives	Threats	Avoidance, Mitigation and Management Measures	Corrective Action	Environmental Outcome
			• As a result of the Impact Assessment (see Section 6 of the Theodore Wind Farm PER), it was determined that the Proposed Action is likely to have a SRI on greater glider. As such, the Proponent is required to offset the removal of greater glider habitat, which will be managed in line with the OMP (see Section 9 of the Theodore Wind Farm PER).		
Yellow-bellied glider (south-eastern) (Vulnerable under the EPBC Act)	*Conservation Advice for Petaurus australis australis (Yellow-bellied Glider (south-eastern))* (DAWE, 2022a) Conservation and management priorities (that are relevant to the Proposed Action) include: • Ensure suitable habitat is maintained and protected from known threats (such as high severity bushfires) around important subpopulations, as well as in areas where subpopulations have already declined through loss of habitat. When protecting an area, retain sufficient suitable habitat for subpopulation viability. • Avoid planned burns, clearing, timber harvesting or other disturbance in a 65 ha zone around habitat which has been burnt in the past 10 years. • If possible, avoid the use of barbed wire and modify existing barbed wire by replacing the top strand of barbed wire with plain or plastic-coated wire. • Protect all habitat projected to be suitable as refuge sites under future climate change scenarios (as informed by research) and maintain and establish connectivity to facilitate movement.	Threats include (DAWE, 2022a): • Climate change • Altered fire regimes • Land clearing and fragmentation (including timber harvesting) Other threats with less severe consequences are: • Predation by invasive species • Mortality by barbed wire fence • Habitat degradation by feral deer • Habitat degradation by *Phytophthora cinnamon*	• Species habitat has been mapped and the Proponent has continued to design a Disturbance Footprint that minimises disturbance to habitat wherever possible, with particular focus on avoided areas of higher value denning habitat. • Areas mapped to be impacted by the Proposed Action will be clearly delineated and communicated, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. • Pre-clearance surveys will be undertaken at the 30% and 80% Disturbance Footprint design to search for MNES, to define locations of populations, and guide micro-siting and additional avoidance measures, such as species translocation. • Prior to final design and construction, the Proposed Action layout will incorporate design features to further minimise habitat fragmentation and patch isolation, such as road pinch points. • Yellow-bellied glider has a glide ratio of around 2.0 and a maximum glide distance that could be as high as 120 m–140 m (DAWE, 2022a). All clearing for access corridors will not exceed the dispersal ability of the species, such that all habitat within the Study Area remaining after the construction phase will still be accessible for the species. • Where required, a licensed and suitably qualified FSC will search each infrastructure location for fauna within 48 hours prior to any vegetation clearing, to further avoid identified MNES and key habitat features, and relocate MNES and key habitat features where not. • Invasive plant and animals will be managed in accordance with a Biosecurity Management Plan in accordance with the *Biosecurity Act 2014 (Qld).* • This Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES and their habitat. • Best-practice measures will be implemented to manage and mitigate the potential impacts from altered hydrology, such as habitat degradation, caused by increased erosion and sedimentation as a result of the Proposed Action. • Environmental pollutants affecting MNES will be managed through the site-specific CEMP. Staff and contractors will be made aware through general site induction and training of the potential to generate pollution (including through improper handling of hazardous materials and generation of dust, light and noise) and management measures that must be implemented. • Site inductions, training, pre-start meetings and inspections will be undertaken according to the CEMP. All staff and contractors visiting or working on site will be made aware of the potential to impact MNES and measures to be followed, such as safe driving speeds, fauna-safe excavation practices, and their obligations to report any injured, sick or dead fauna.	If species is identified within Study Area, re-mapping of habitat will occur as required, and additional mitigation measures will be implemented. Where reasonable and practicable, all near misses and incidents will be investigated to establish root cause. Where necessary, corrective actions will be developed to improve existing processes. This may include installation of glider poles or hollow boxes to restore habitat connectivity and denning resources, under guidance addressed within the CEMP (see Section 7.2.2 for further detail).	No more than 0.3 ha (or 1.6%) of Potential Denning Habitat and 5.4 ha (or 4.9%) of Potential Foraging Habitat will be subject to long-term disturbance as a result of the Proposed Action. The functional value of all remaining habitat within the Study Area will be maintained. Linear clearing will not permanently impact the dispersal ability of the species and therefore will not fragment habitat for the species.

MNES	Relevant Conservation Advice and Policy Objectives	Threats	Avoidance, Mitigation and Management Measures	Corrective Action	Environmental Outcome
			• Rehabilitation of disturbed areas will be undertaken post-construction, as well at the end-of life decommissioning phase, restoring erosion and weed resilience and to re-establishing vegetation cover for ground-dwelling species to forage and disperse.		
Koala (Endangered under EPBC Act)	*Conservation Advice for Phascolarctos cinereus (Koala) combined populations of Queensland, New South Wales and the Australian Capital Territory* (DAWE, 2022b). Conservation and management priorities (that are relevant to the Proposed Action) include: • Building and sharing knowledge. • Strong community engagement. • Increase habitat protection. • Conservation integrated into policy, statutory and land-use plans. • Strategic habitat restoration. • Active metapopulation management. *National Recovery Plan for the Koala Phascolarctos cinereus (combined populations of Queensland, New South Wales and the Australian Capital Territory)* (DAWE, 2022c) Objectives: • Stabilise and increase areas of occupancy that are declining or predicted to decline. • Maintain or increase areas of occupancy that are or are predicted to be stable. • Maintain or improve metapopulation processes. • Give partners, communities, individuals a greater role in listed koala monitoring, conservation, and management.	Threats include (DAWE, 2022b): • Habitat loss and fragmentation • Increased intensity and frequency of drought • Decreased nutritional value of foliage • Heat stress, climate change, bushfire • Wild dog predation • Direct vehicle mortality • Disease	• Species habitat has been mapped and the Proponent has continued to design a Disturbance Footprint that minimises disturbance to habitat wherever possible, with particular focus on avoided areas of higher value breeding and foraging habitat. • Areas mapped to be impacted by the Proposed Action will be clearly delineated and communicated, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. • Pre-clearance surveys will be undertaken at the 30% and 80% Disturbance Footprint design to search for MNES, to define locations of populations, and guide micro-siting and additional avoidance measures, such as species translocation. • Prior to final design and construction, the Proposed Action layout will incorporate design features to further minimise habitat fragmentation and patch isolation, such as road pinch points. • Koalas are known to disperse across distances of 1 to 3 km or more (over 10 km), typically traveling between trees by walking on the ground (Youngentob, Marsh, & Skewes, 2021). Project infrastructure will not inhibit the dispersal ability of koalas across the landscape. • Where required, a licensed and suitably qualified FSC will search each infrastructure location for fauna within 48 hours prior to any vegetation clearing, to further avoid identified MNES and key habitat features where possible, and relocate MNES and key habitat features where not. • Invasive plant and animals will be managed in accordance with a Biosecurity Management Plan in accordance with the *Biosecurity Act 2014 (Qld).* • This Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES and their habitat. • Best-practice measures will be implemented to manage and mitigate the potential impacts from altered hydrology, such as habitat degradation, caused by increased erosion and sedimentation as a result of the Proposed Action. • Environmental pollutants affecting MNES will be managed through the site-specific CEMP. Staff and contractors will be made aware through general site induction and training of the potential to generate pollution (including through improper handling of hazardous materials and generation of dust, light and noise) and management measures that must be implemented. • Site inductions, training, pre-start meetings and inspections will be undertaken according to the CEMP. All staff and contractors visiting or working on site will be made aware of the potential to impact MNES and measures to be followed, such as safe driving speeds, fauna-safe excavation practices, and their obligations to report any injured, sick or dead fauna.	Where reasonable and practicable, all near misses and incidents will be investigated to establish root cause. Where necessary, corrective actions will be developed to improve existing processes.	No more than 8.1 ha (or 0.5%) of Preferred Breeding and Foraging Habitat and 640.2 ha (or 3.0%) of General Breeding and Foraging Habitat will be subject to long-term disturbance as a result of the Proposed Action. The functional value of all remaining habitat within the Study Area will be maintained. Linear clearing will not exceed the dispersal ability of the species and therefore will not fragment habitat for the species.

MNES	Relevant Conservation Advice and Policy Objectives	Threats	Avoidance, Mitigation and Management Measures	Corrective Action	Environmental Outcome
			• Rehabilitation of disturbed areas will be undertaken post-construction, as well at the end-of life decommissioning phase, restoring erosion and weed resilience and to re-establishing vegetation cover for ground-dwelling species to forage and disperse. • As a result of the Impact Assessment (see Section 6 of the Theodore Wind Farm PER), it was determined that the Proposed Action is likely to have a SRI on koala. As such, the Proponent is required to offset the removal of koala habitat, which will be managed in line with the OMP (see Section 9 of the Theodore Wind farm PER).		
Large-eared pied bat (Endangered under the EPBC Act)	*Conservation Advice for Chalinolobus dwyeri (large-eared pied bat)* (DCCEEW, 2023a) Conservation and management priorities (that are relevant to the Proposed Action) include: • Continue to protect, and prevent adverse impacts to, habitat that is important to the survival of the species in the planning, construction and post construction phases of residential and commercial developments, dam-building, energy production and mining operations. • Reduce the use of pesticides and consider available alternatives in the vicinity of known roosting and foraging habitat. • Establish fire control measures in areas that are burnt by prescribed fire to ensure that vegetation and foraging habitat have an appropriate interval to recover from fire events. *National recovery plan for the large-eared pied bat Chalinolobus dwyeri* (DERM, 2011) Objectives: • Identify priority roost and maternity sites for protection. • Implement conservation and management strategies for priority sites. • Educate the community and industry to understand and participate in the conservation of the large-eared pied bat. • Research the large eared pied bat to augment biological and ecological data to enable conservation management.	Threats include (DCCEEW, 2023a): • Agricultural, residential and commercial development and associated land clearing. • Dam construction and waterway management. • Energy production and mining. • Fires within foraging distance of roosts. • Climate change. • Habitat disturbance by feral goats. • Predation by introduced species. • Impact of disease. • Disturbance from human recreational activities. • Use of pesticides.	• Species habitat has been mapped and the Proponent has continued to design a Disturbance Footprint that minimises disturbance to habitat wherever possible, with particular focus on avoided areas of higher value foraging habitat. • Areas mapped to be impacted by the Proposed Action will be clearly delineated and communicated, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. • Pre-clearance surveys will be undertaken at the 30% and 80% Disturbance Footprint design to search for MNES, to define locations of populations, and guide micro-siting and additional avoidance measures, such as species translocation. • Prior to final design and construction, the Proposed Action layout will incorporate design features to further minimise habitat fragmentation and patch isolation, such as road pinch points. • Where required, a licensed and suitably qualified FSC will search each infrastructure location for fauna within 48 hours prior to any vegetation clearing, to further avoid identified MNES and key habitat features where possible, and relocate MNES and key habitat features where not. • Invasive plant and animals will be managed in accordance with a Biosecurity Management Plan in accordance with the *Biosecurity Act 2014 (Qld).* • This Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES and their habitat. • Best-practice measures will be implemented to manage and mitigate the potential impacts from altered hydrology, such as habitat degradation, caused by increased erosion and sedimentation as a result of the Proposed Action. • Environmental pollutants affecting MNES will be managed through the site-specific CEMP. Staff and contractors will be made aware through general site induction and training of the potential to generate pollution (including through improper handling of hazardous materials and generation of dust, light and noise) and management measures that must be implemented. • Site inductions, training, pre-start meetings and inspections will be undertaken according to the CEMP. All staff and contractors visiting or working on site will be made aware of the potential to impact MNES and measures to be followed, such as safe driving speeds, fauna-safe excavation practices, and their obligations to report any injured, sick or dead fauna.	Where reasonable and practicable, all near misses and incidents will be investigated to establish root cause. Where necessary, corrective actions will be developed to improve existing processes. Corrective actions with respect to collision risk are outlined in the BBMP (Appendix D), but involve establishment of impact triggers that if met, will trigger adaptive management. The Proposed Action may implement measures, such as curtailment and acoustic and visual deterrents outlined above, as a corrective action in response to the SRI trigger process.	No more than 8.3 ha (or 0.3%) of Foraging Habitat will be subject to long-term disturbance as a result of the Proposed Action. The functional value of habitat within the Study Area will be maintained. Linear clearing will not exceed the dispersal ability of the species and therefore will not fragment habitat for the species. Development of management and corrective actions to minimise risk of turbine collision (significant impact threshold for large-eared pied bat: WTG mortality or injury to 20 individuals).

MNES	Relevant Conservation Advice and Policy Objectives	Threats	Avoidance, Mitigation and Management Measures	Corrective Action	Environmental Outcome
	• Determine the meta-population dynamics.		• Rehabilitation of disturbed areas will be undertaken post-construction, as well at the end-of life decommissioning phase, restoring erosion and weed resilience and to re-establishing vegetation cover for ground-dwelling species to forage and disperse. • Mitigation and management measures included in the BBMP will reduce likelihood of turbine collision and barotrauma impacts, such as reducing resources in WTG areas to make these regions less attractive to birds and bats. • The Proponent will use of innovative blade design features for high-risk turbines (identified within the BBMP (Appendix D), to minimise potential collision rates.		
Southern squatter pigeon (Vulnerable under the EPBC Act)	*Conservation Advice for Geophaps scripta scripta (Squatter Pigeon (Southern))* (TSSC, 2015) Conservation and management priorities (that are relevant to the Proposed Action) include: • Identify high-conservation priority populations, especially in the species' southern range. • Protect and rehabilitate areas of vegetation that support important populations. • Develop conservation agreements and stock management plans. • Eradicate feral herbivores in regions of known populations. • Monitor selected sub-populations to observe rates of population change.	Threats include (TSSC, 2015): • Overgrazing, specifically by sheep, though other livestock can be harmful too, specifically trampling of nests from cattle. • Drought. • Vegetation clearing and habitat fragmentation. • Feral herbivores such as rabbits. • Predation by cats and foxes. • Introduction of weeds and understory vegetation thickening. • Inappropriate fire regimes. • Illegal shooting.	• Species habitat has been mapped and the Proponent has continued to design a Disturbance Footprint that minimises disturbance to habitat wherever possible, with particular focus on avoided areas of higher value breeding habitat. • Areas mapped to be impacted by the Proposed Action will be clearly delineated and communicated, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. • Pre-clearance surveys will be undertaken at the 30% and 80% Disturbance Footprint design to search for MNES, to define locations of populations, and guide micro-siting and additional avoidance measures, such as species translocation. • Prior to final design and construction, the Proposed Action layout will incorporate design features to further minimise habitat fragmentation and patch isolation, such as road pinch points. • Squatter pigeon are a highly mobile species, commonly observed utilising habitat near roads and access tracks (DCCEEW, 2024a). Therefore, clearing within squatter pigeon habitat will not disrupt the dispersal ability of the species, such that all habitat within the Study Area remaining after the construction phase will still be accessible for the species. • Where required, a licensed and suitably qualified FSC will search each infrastructure location for fauna within 48 hours prior to any vegetation clearing, to further avoid identified MNES and key habitat features , and relocate MNES and key habitat features where not. • Invasive plant and animals will be managed in accordance with a Biosecurity Management Plan in accordance with the *Biosecurity Act 2014 (Qld).* • This Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES and their habitat. • Best-practice measures will be implemented to manage and mitigate the potential impacts from altered hydrology, such as habitat degradation, caused by increased erosion and sedimentation as a result of the Proposed Action. • Environmental pollutants affecting MNES will be managed through the site-specific CEMP. Staff and contractors will be made aware through general site induction and training of the potential to generate pollution (including through improper handling of hazardous materials and generation of dust, light and noise) and management measures that must be implemented.	Where reasonable and practicable, all near misses and incidents will be investigated to establish root cause. Where necessary, corrective actions will be developed to improve existing processes.	No more than 123.0 ha (or 1.3%) of Breeding Habitat and 22.5 ha (or 1.0%) of Foraging and Dispersal Habitat will be subject to long-term disturbance as a result of the Proposed Action. The functional value of all remaining habitat within the Study Area will be maintained. Linear clearing will not exceed the dispersal ability of the species and therefore will not fragment habitat for the species.

MNES	Relevant Conservation Advice and Policy Objectives	Threats	Avoidance, Mitigation and Management Measures	Corrective Action	Environmental Outcome
			• Site inductions, training, pre-start meetings and inspections will be undertaken according to the CEMP. All staff and contractors visiting or working on site will be made aware of the potential to impact MNES and measures to be followed, such as safe driving speeds, fauna-safe excavation practices, and their obligations to report any injured, sick or dead fauna. • Rehabilitation of disturbed areas will be undertaken post-construction, as well at the end-of life decommissioning phase, restoring erosion and weed resilience and to re-establishing vegetation cover for ground-dwelling species to forage and disperse. • As a result of the Impact Assessment (see Section 6 of the Theodore Wind Farm PER), it was determined that the Proposed Action is likely to have a SRI on squatter pigeon. As such, the Proponent is required to offset the removal of squatter pigeon habitat, which will be managed in line with the OMP (see Section 9 of the Theodore Wind Farm PER).		
White-throated needletail (Vulnerable under the EPBC Act)	*Conservation Advice Hirundapus caudacutus white-throated Needletail* (TSSC, 2019) Conservation and management priorities (that are relevant to the Proposed Action) include: • Seek the support of governments in East Asia to protect remaining old growth forests within the breeding range of the species. • Identify requirements of important habitat in Australia. • Support initiatives to improve habitat management at key sites in Australia.	Threats include (TSSC, 2019): • Habitat loss and fragmentation. • Direct mortality (via wind turbines and overhead wires). • Poisoning (by organochlorides).	• Species habitat has been mapped and the Proponent has continued to design a Disturbance Footprint that minimises disturbance to habitat wherever possible, with particular focus on avoided areas of higher value foraging habitat in the north of the Study Area. • Invasive plant and animals will be managed in accordance with a Biosecurity Management Plan in accordance with the *Biosecurity Act 2014 (Qld).* • This Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES and their habitat. • Best-practice measures will be implemented to manage and mitigate the potential impacts from altered hydrology, such as habitat degradation, caused by increased erosion and sedimentation as a result of the Proposed Action. • Environmental pollutants affecting MNES will be managed through the site-specific CEMP. Staff and contractors will be made aware through general site induction and training of the potential to generate pollution (including through improper handling of hazardous materials and generation of dust, light and noise) and management measures that must be implemented. • Site inductions, training, pre-start meetings and inspections will be undertaken according to the CEMP. All staff and contractors visiting or working on site will be made aware of the potential to impact MNES and measures to be followed, such as safe driving speeds, fauna-safe excavation practices, and their obligations to report any injured, sick or dead fauna. • Mitigation and management measures included in the BBMP will reduce likelihood of turbine collision and barotrauma impacts, such as reducing resources in WTG areas to make these regions less attractive to birds and bats. • The Proponent may use innovative blade design features for high-risk turbines (identified within the BBMP (Appendix D).	If species is identified within Study Area, re-mapping of habitat will occur as required, and additional mitigation measures will be implemented. Where reasonable and practicable, all near misses and incidents will be investigated to establish root cause. Where necessary, corrective actions will be developed to improve existing processes. Corrective actions with respect to collision risk are outlined in the BBMP (Appendix D), but involve establishment of impact triggers that if met, will trigger adaptive management. The Proposed Action may implement measures, such as curtailment and acoustic and visual deterrents outlined above, as a corrective action in response to the Significant Residual Impact (SRI) trigger process.	The functional value of habitat within the Study Area will be maintained. Development of management and corrective actions to minimise risk of turbine collision (significant impact threshold for White-throated needletail: WTG mortality or injury to 40 individuals).

MNES	Relevant Conservation Advice and Policy Objectives	Threats	Avoidance, Mitigation and Management Measures	Corrective Action	Environmental Outcome
Black-breasted buttonquail (Vulnerable under the EPBC Act)	*Conservation Advice Turnix melanogaster black-breasted button-quail* (DoE, 2015a) Conservation and management priorities (that are relevant to the Proposed Action) include: • Protect key ecosystems/habitat that support button-quail populations. • Maintain or improve extent, condition and connectivity of habitat. • Where necessary, reduce the impacts of introduced predators and competitors. *National Recovery Plan for the Black-Breasted Button-Quail (Turnix melanogaster)* (Mathieson & Smith, 2009) Objectives: • By 2032, maintain and improve the extent, condition and connectivity of habitat of the black-breasted button-quail. • By 2032, demonstrably reduce the severity of identified anthropogenic threats across the extent of the species' range. • By 2032, achieve, measure and sustain a stable or positive trend in area of occupancy and population size (assessed by new baseline counts) in the number of mature individuals of the black-breasted button-quail.	Threats include (DoE, 2015a): • Habitat degradation as a result of domestic livestock and feral pigs. • Habitat loss or degradation from fires of increasing intensity or frequency; • Predation by feral animals such as feral cats and foxes.	• Species habitat has been mapped and the Proponent has continued to design a Disturbance Footprint that minimises disturbance to habitat wherever possible, with particular focus on avoided areas of higher value foraging and roosting habitat. • Areas mapped to be impacted by the Proposed Action will be clearly delineated and communicated, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. • Pre-clearance surveys will be undertaken at the 30% and 80% Disturbance Footprint design to search for MNES, to define locations of populations, and guide micro-siting and additional avoidance measures, such as species translocation. • Prior to final design and construction, the Proposed Action layout will incorporate design features to further minimise habitat fragmentation and patch isolation, such as road pinch points. The Proponent will also consider the use of innovative turbine blade transportation, such as 'Blade Manipulator' trucks. • Where required, a licensed and suitably qualified FSC will search each infrastructure location for fauna within 48 hours prior to any vegetation clearing, to further avoid identified MNES and key habitat features, and relocate MNES and key habitat features where not. • Invasive plant and animals will be managed in accordance with a Biosecurity Management Plan in accordance with the *Biosecurity Act 2014 (Qld).* • This Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES and their habitat. • Best-practice measures will be implemented to manage and mitigate the potential impacts from altered hydrology, such as habitat degradation, caused by increased erosion and sedimentation as a result of the Proposed Action. • Environmental pollutants affecting MNES will be managed through the site-specific CEMP. Staff and contractors will be made aware through general site induction and training of the potential to generate pollution (including through improper handling of hazardous materials and generation of dust, light and noise) and management measures that must be implemented. • Site inductions, training, pre-start meetings and inspections will be undertaken according to the CEMP. All staff and contractors visiting or working on site will be made aware of the potential to impact MNES and measures to be followed, such as safe driving speeds, fauna-safe excavation practices, and their obligations to report any injured, sick or dead fauna. • Rehabilitation of disturbed areas will be undertaken post-construction, as well at the end-of life decommissioning phase, restoring erosion and weed resilience and to re-establishing vegetation cover for ground-dwelling species to forage and disperse.	If species is identified within Study Area, re-mapping of habitat will occur as required, and additional mitigation measures will be implemented. Where reasonable and practicable, all near misses and incidents will be investigated to establish root cause. Where necessary, corrective actions will be developed to improve existing processes.	No more than 4.4 ha (or 1.6%) of Potential Foraging and Roosting Habitat will be subject to long-term disturbance as a result of the Proposed Action. The functional value of all remaining habitat within the Study Area will be maintained. Linear clearing will not exceed the dispersal ability of the species and therefore will not fragment habitat for the species.

MNES	Relevant Conservation Advice and Policy Objectives	Threats	Avoidance, Mitigation and Management Measures	Corrective Action	Environmental Outcome
Australian painted snipe (Endangered under the EPBC Act)	*Approved Conservation Advice for Rostratula australis (Australian painted snipe)* (DSEWPC, 2013) Conservation and management priorities (that are relevant to the Proposed Action) include: • Suitably control and manage access on private land and other land tenure. • Manage any changes to hydrology that may result in changes to water table levels, run-off, salinity, algal blooms, sedimentation or pollution. • Manage any disruptions to water flows. • Manage any other known, potential or emerging threats including inappropriate fire regimes and coastal port/infrastructure development. • Identify and remove weeds in wetland areas that could become a threat to the Australian painted snipe, using appropriate methods. • Implement the national threat abatement plans for the European red fox and feral cats. • Develop and implement a suitable fire management strategy for the habitat of the Australian painted snipe. *National Recovery Plan for the Australian Painted Snipe (Rostratula australis)* (DCCEEW, 2022b) Objectives: By 2032, sustain a positive population trend (compared to 2020 baseline counts) in the number of mature individuals of the Australian painted snipe.	Threats include (DSEWPC, 2013): • Loss and degradation of wetlands, through drainage and the diversion of water for agriculture and reservoirs. • Grazing and the associated trampling of wetland vegetation/nests, nutrient enrichment and disturbance to substrate by livestock may threaten the Australian painted snipe in certain regions. • Predation by feral animals (e.g. foxes and cats) may be a threat to the Australian painted snipe, however there is no evidence for this.	• Species habitat has been mapped and the Proponent has continued to design a Disturbance Footprint that minimises disturbance to habitat wherever possible, with particular focus on avoided areas of higher value foraging habitat. • Areas mapped to be impacted by the Proposed Action will be clearly delineated and communicated, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. • Pre-clearance surveys will be undertaken at the 30% and 80% Disturbance Footprint design to search for MNES, to define locations of populations, and guide micro-siting and additional avoidance measures, such as species translocation. • Prior to final design and construction, the Proposed Action layout will incorporate design features to further minimise habitat fragmentation and patch isolation, such as road pinch points. The Proponent will also consider the use of innovative turbine blade transportation, such as 'Blade Manipulator' trucks. • Where required, a licensed and suitably qualified FSC will search each infrastructure location for fauna within 48 hours prior to any vegetation clearing, to further avoid identified MNES and key habitat features, and relocate MNES and key habitat features where not possible to avoid. • Invasive plant and animals will be managed in accordance with a Biosecurity Management Plan in accordance with the *Biosecurity Act 2014 (Qld).* • This Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES and their habitat. • Best-practice measures will be implemented to manage and mitigate the potential impacts from altered hydrology, such as habitat degradation, caused by increased erosion and sedimentation as a result of the Proposed Action. • Environmental pollutants affecting MNES will be managed through the site-specific CEMP. Staff and contractors will be made aware through general site induction and training of the potential to generate pollution (including through improper handling of hazardous materials and generation of dust, light and noise) and management measures that must be implemented. • Site inductions, training, pre-start meetings and inspections will be undertaken according to the CEMP. All staff and contractors visiting or working on site will be made aware of the potential to impact MNES and measures to be followed, such as safe driving speeds, fauna-safe excavation practices, and their obligations to report any injured, sick or dead fauna. • Rehabilitation of disturbed areas will be undertaken post-construction, as well at the end-of life decommissioning phase, restoring erosion and weed resilience and to re-establishing vegetation cover for ground-dwelling species to forage and disperse.	If species is identified within Study Area, re-mapping of habitat will occur as required, and additional mitigation measures will be implemented. Where reasonable and practicable, all near misses and incidents will be investigated to establish root cause. Where necessary, corrective actions will be developed to improve existing processes.	No more than 1.3 ha (or 2.4%) of Potential Foraging Habitat will be subject to long-term disturbance as a result of the Proposed Action. The functional value of all remaining habitat within the Study Area will be maintained. Linear clearing will not exceed the dispersal ability of the species and therefore will not fragment habitat for the species.

MNES	Relevant Conservation Advice and Policy Objectives	Threats	Avoidance, Mitigation and Management Measures	Corrective Action	Environmental Outcome
Diamond firetail (Vulnerable under the EPBC Act)	*Conservation Advice for Stagonopleura guttata (diamond firetail)* (DCCEEW, 2023b) Conservation and management priorities (that are relevant to the Proposed Action) include: • Retain and protect woodland, open forest, grassland and mallee habitat from clearing, fragmentation and disturbance (areas of 200 ha or greater within woody vegetation are particularly significant). • Protect and maintain areas of high-quality habitat, which includes open forest, woodland, mallee and grasslands with a diverse ground layer dominated by a mixture of grass species which seed at different times of year (providing a year-round food supply) and provides scattered shrubs for shelter. Areas with access to water, especially riparian areas, are especially important. • Undertake revegetation using a diverse mix of locally appropriate native species, which will produce high quality habitat. • Restore native perennial grasses and casuarinas to habitat fragments. • Retain mistletoe and scattered patches of dense shrubs for nesting habitat, particularly in areas close to water. • Expand and reconnect smaller fragments of habitat by fencing and encouraging natural regeneration or applying revegetation techniques where regeneration fails. • Targeted removal of weeds significantly compromising habitat values (e.g., invasive perennial grasses) and restore native vegetation) in conjunction with restoration of native perennial grasses, ideally in a landscape mosaic, ensuring that large areas of exotic food plants (such as *Ehrharta longiflora*, or abundant annual grasses) are not removed at once without provision of an alternative, native food source.	Threats include (DCCEEW, 2023b): • Habitat loss, degradation and fragmentation. • Weeds. • Introduced pest species (rabbits). • Fire and inappropriate fire regimes. • Climate change. • Predation by pied currawongs. • Competition from noisy miners.	• Species habitat has been mapped and the Proponent has continued to design a Disturbance Footprint that minimises disturbance to habitat wherever possible, with particular focus on avoided areas of higher value breeding and foraging habitat. • Areas mapped to be impacted by the Proposed Action will be clearly delineated and communicated, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. • Pre-clearance surveys will be undertaken at the 30% and 80% Disturbance Footprint design to search for MNES, to define locations of populations, and guide micro-siting and additional avoidance measures, such as species translocation. • Prior to final design and construction, the Proposed Action layout will incorporate design features to further minimise habitat fragmentation and patch isolation, such as road pinch points. The Proponent will also consider the use of innovative turbine blade transportation, such as 'Blade Manipulator' trucks. • Where required, a licensed and suitably qualified FSC will search each infrastructure location for fauna within 48 hours prior to any vegetation clearing, to further avoid identified MNES and key habitat features, and relocate MNES and key habitat features where not. • Invasive plant and animals will be managed in accordance with a Biosecurity Management Plan in accordance with the *Biosecurity Act 2014 (Qld).* • This Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES and their habitat. • Best-practice measures will be implemented to manage and mitigate the potential impacts from altered hydrology, such as habitat degradation, caused by increased erosion and sedimentation as a result of the Proposed Action. • Environmental pollutants affecting MNES will be managed through the site-specific CEMP. Staff and contractors will be made aware through general site induction and training of the potential to generate pollution (including through improper handling of hazardous materials and generation of dust, light and noise) and management measures that must be implemented. • Site inductions, training, pre-start meetings and inspections will be undertaken according to the CEMP. All staff and contractors visiting or working on site will be made aware of the potential to impact MNES and measures to be followed, such as safe driving speeds, fauna-safe excavation practices, and their obligations to report any injured, sick or dead fauna. • Rehabilitation of disturbed areas will be undertaken post-construction, as well at the end-of life decommissioning phase, restoring erosion and weed resilience and to re-establishing vegetation cover for ground-dwelling species to forage and disperse.	If species is identified within Study Area, re-mapping of habitat will occur as required, and additional mitigation measures will be implemented. Where reasonable and practicable, all near misses and incidents will be investigated to establish root cause. Where necessary, corrective actions will be developed to improve existing processes.	No more than 95.3 ha (or 1.2%) of Potential Breeding and Foraging Habitat will be subject to long-term disturbance as a result of the Proposed Action. The functional value of all remaining habitat within the Study Area will be maintained. Linear clearing will not exceed the dispersal ability of the species and therefore will not fragment habitat for the species.

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Ooline (Vulnerable under the EPBC Act)	*Approved Conservation Advice for Cadellia pentastylis (Ooline)* (DEWHA, 2008a) Conservation and management priorities (that are relevant to the Proposed Action) include: • Suitably control and manage access on private land. • Minimise adverse impacts from land use at known sites. • Prepare advice and assist in the removal weed species within ooline habitat, such as tiger pear. • Identify and remove weeds in the local area, which could become a threat to ooline, using appropriate methods. • Ensure chemicals or other mechanisms used to eradicate weeds do not have a significant adverse impact on ooline. • Manage sites to prevent introduction of invasive weeds, which could become a threat to ooline, using appropriate methods. • Manage known sites to ensure appropriate grazing regimes occur. • Implement threat abatement plans for the control and eradication of feral goats and pigs in the region.	Threats include (DEWHA, 2008a): • Localised extinction due to small and scattered populations. • Inbreeding which threatens genetic diversity in small populations. • Low seed viability which threatens breeding success. • Clearing for agriculture. • Grazing and soil compaction by domestic stock, feral goats and pigs. • Invasion of habitat by weeds, such as tiger pear (*Opuntia aurantiaca*). • Frequent fires. • Tunnel and sheet erosion. • Damage to roadside populations during roadworks. • High insect attack.	• Species habitat has been mapped and the Proponent has continued to design a Disturbance Footprint that minimises disturbance to habitat wherever possible. • Areas mapped to be impacted by the Proposed Action will be clearly delineated and communicated, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. • Pre-clearance surveys will be undertaken at the 30% and 80% Disturbance Footprint design to search for MNES, to define locations of populations, and guide micro-siting and additional avoidance measures, such as species translocation. • Prior to final design and construction, the Proposed Action layout will incorporate design features to further minimise habitat fragmentation and patch isolation, such as road pinch points. • Invasive plant and animals will be managed in accordance with a Biosecurity Management Plan in accordance with the *Biosecurity Act 2014 (Qld).* • This Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES and their habitat. • Best-practice measures will be implemented to manage and mitigate the potential impacts from altered hydrology, such as habitat degradation, caused by increased erosion and sedimentation as a result of the Proposed Action. • Environmental pollutants affecting MNES will be managed through the site-specific CEMP. Staff and contractors will be made aware through general site induction and training of the potential to generate pollution (including through improper handling of hazardous materials and generation of dust, light and noise) and management measures that must be implemented. • Site inductions, training, pre-start meetings and inspections will be undertaken according to the CEMP. All staff and contractors visiting or working on site will be made aware of the potential to impact MNES and measures to be followed, such as safe driving speeds, and their obligations to report any damaged vegetation. • Rehabilitation of disturbed areas will be undertaken post-construction, as well at the end-of life decommissioning phase, restoring erosion and weed resilience and to re-establishing vegetation cover for potential flora habitat.	If species is identified within Study Area, re-mapping of habitat will occur as required, and additional mitigation measures will be implemented. Where reasonable and practicable, all near misses and incidents will be investigated to establish root cause. Where necessary, corrective actions will be developed to improve existing processes.	No more than 4.4 ha (or 1.6%) of potential habitat will be subject to long-term disturbance as a result of the Proposed Action. The functional value of all remaining habitat within the Study Area will be maintained. Linear clearing will not exceed the dispersal ability of the species and therefore will not fragment habitat for the species.

MNES	Relevant Conservation Advice and Policy Objectives	Threats	Avoidance, Mitigation and Management Measures	Corrective Action	Environmental Outcome
Cossinia (Endangered under the EPBC Act)	*Approved Conservation Advice for Cossinia australiana (Cossinia)* (DEWHA, 2008b) Conservation and management priorities (that are relevant to the Proposed Action) include: • Identify populations of high conservation priority. • Ensure road widening and maintenance activities involving substrate or vegetation disturbance in areas where cossinia occurs do not adversely impact on known populations. • Identify and remove weeds in the local area, which could become a threat to cossinia, using appropriate methods. • Manage sites to prevent introduction of invasive weeds, which could become a threat to cossinia, using appropriate methods. • Develop and implement a management plan for the control of invasive weeds, especially Lantana, dutchman's pipe, madeira vine, cat's claw creeper and climbing asparagus in the region. • Ensure chemicals or other mechanisms used to eradicate weeds do not have a significant adverse impact on cossinia.	Threats include (DEWHA, 2008b): • Exotic weeds, including lantana, dutchman's pipe, madeira vine, cat's claw creeper and climbing asparagus. • Invasion of vine forest margins by weeds also increases fuel loads and leads to fire incursion.	• Species habitat has been mapped and the Proponent has continued to design a Disturbance Footprint that minimises disturbance to habitat wherever possible. • Areas mapped to be impacted by the Proposed Action will be clearly delineated and communicated, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. • Pre-clearance surveys will be undertaken at the 30% and 80% Disturbance Footprint design to search for MNES, to define locations of populations, and guide micro-siting and additional avoidance measures, such as species translocation. • Prior to final design and construction, the Proposed Action layout will incorporate design features to further minimise habitat fragmentation and patch isolation, such as road pinch points. • Invasive plant and animals will be managed in accordance with a Biosecurity Management Plan in accordance with the *Biosecurity Act 2014 (Qld).* • This Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES and their habitat. • Best-practice measures will be implemented to manage and mitigate the potential impacts from altered hydrology, such as habitat degradation, caused by increased erosion and sedimentation as a result of the Proposed Action. • Environmental pollutants affecting MNES will be managed through the site-specific CEMP. Staff and contractors will be made aware through general site induction and training of the potential to generate pollution (including through improper handling of hazardous materials and generation of dust, light and noise) and management measures that must be implemented. • Site inductions, training, pre-start meetings and inspections will be undertaken according to the CEMP. All staff and contractors visiting or working on site will be made aware of the potential to impact MNES and measures to be followed, such as safe driving speeds, and their obligations to report any damaged vegetation. • Rehabilitation of disturbed areas will be undertaken post-construction, as well at the end-of life decommissioning phase, restoring erosion and weed resilience and to re-establishing vegetation cover for potential flora habitat.	If species is identified within Study Area, re-mapping of habitat will occur as required, and additional mitigation measures will be implemented. If threatened flora are identified during pre-clearance surveys, additional measures, such as species translocation, seed collection and propagation, may be utilised to ensure species dispersal between all remaining available habitat is maintained. Where reasonable and practicable, all near misses and incidents will be investigated to establish root cause. Where necessary, corrective actions will be developed to improve existing processes.	No more than 4.4 ha (or 1.6%) of potential habitat will be subject to long-term disturbance as a result of the Proposed Action. The functional value of all remaining habitat within the Study Area will be maintained.

MNES	Relevant Conservation Advice and Policy Objectives	Threats	Avoidance, Mitigation and Management Measures	Corrective Action	Environmental Outcome
Austral cornflower (Vulnerable under the EPBC Act)	*Approved Conservation Advice for Stemmacantha australis (Austral Cornflower)* (DEWHA, 2008c) Conservation and management priorities (that are relevant to the Proposed Action) include: • Identify populations of high conservation priority. • Ensure road widening and maintenance activities (or other infrastructure or development activities) involving substrate and vegetation disturbance in areas where austral cornflower occurs do not adversely impact on known populations. • Suitably control and manage access on private land. • Minimise adverse impacts from land use at known sites. • Ensure chemicals or other mechanisms used to eradicate weeds do not have a significant adverse impact on austral cornflower. • Identify and remove weeds in the local area, which could become a threat to Austral Cornflower, using appropriate methods. • Manage sites to prevent introduction of invasive weeds, which could become a threat to austral cornflower, using appropriate methods.	Threats include (DEWHA, 2008c): • Broad-scale vegetation clearing. • Invasion by exotic weeds. • Grazing pressure. • Roadworks.	• Species habitat has been mapped and the Proponent has continued to design a Disturbance Footprint that minimises disturbance to habitat wherever possible. • Areas mapped to be impacted by the Proposed Action will be clearly delineated and communicated, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. • Pre-clearance surveys will be undertaken at the 30% and 80% Disturbance Footprint design to search for MNES, to define locations of populations, and guide micro-siting and additional avoidance measures, such as species translocation. • Prior to final design and construction, the Proposed Action layout will incorporate design features to further minimise habitat fragmentation and patch isolation, such as road pinch points. • The species exhibits a specialised structure called a pappus, which aids in wind dispersal of seeds (characteristic of wind-dispersed species in the Asteraceae family) (DEWHA, 2008c). All clearing for access corridors will be limited to 40 m, which is not expected to disrupt the dispersal ability of austral cornflower, such that all habitat within the Study Area remaining after the construction phase will still be accessible for the species. • All linear clearing within mapped threatened flora species habitat will be conducted so as not to exceed the dispersal ability of that species, such that all habitat within the Study Area remaining after the construction phase will still be functional for the species. • Invasive plant and animals will be managed in accordance with a Biosecurity Management Plan in accordance with the *Biosecurity Act 2014 (Qld).* • This Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES and their habitat. • Best-practice measures will be implemented to manage and mitigate the potential impacts from altered hydrology, such as habitat degradation, caused by increased erosion and sedimentation as a result of the Proposed Action. • Environmental pollutants affecting MNES will be managed through the site-specific CEMP. Staff and contractors will be made aware through general site induction and training of the potential to generate pollution (including through improper handling of hazardous materials and generation of dust, light and noise) and management measures that must be implemented. • Site inductions, training, pre-start meetings and inspections will be undertaken according to the CEMP. All staff and contractors visiting or working on site will be made aware of the potential to impact MNES and measures to be followed, such as safe driving speeds, and their obligations to report any damaged vegetation. • Rehabilitation of disturbed areas will be undertaken post-construction, as well at the end-of life decommissioning phase, restoring erosion and weed resilience and to re-establishing vegetation cover for potential flora habitat.	If species is identified within Study Area, re-mapping of habitat will occur as required, and additional mitigation measures will be implemented. Where reasonable and practicable, all near misses and incidents will be investigated to establish root cause. Where necessary, corrective actions will be developed to improve existing processes.	No more than 232.9 ha (or 1.1%) of potential habitat will be subject to long-term disturbance as a result of the Proposed Action. The functional value of all remaining habitat within the Study Area will be maintained. Linear clearing will not exceed the dispersal ability of the species and therefore will not fragment habitat for the species.

MNES	Relevant Conservation Advice and Policy Objectives	Threats	Avoidance, Mitigation and Management Measures	Corrective Action	Environmental Outcome
Solanum dissectum (Endangered under the EPBC Act)	*Conservation Advice Solanum dissectum* (TSSC, 2016a) Conservation and management priorities (that are relevant to the Proposed Action) include: • Maintain and protect existing populations, and protect and enhance habitat to provide potential for reproduction of plants within existing populations. • Consult with private landowners with *Solanum dissectum* on their properties and develop site-specific management actions and the implementation of conservation agreements. • Manage sites to identify, control and reduce the spread of invasive species such as introduced grasses, especially buffel grass (*Cenchrus ciliaris*).	Threats include (TSSC, 2016a): • Continuing land clearance of areas too small to be mapped as remnant under the Queensland Vegetation Management Act 1999. • Invasion of habitats by exotic grass species (especially buffel grass (*Cenchrus ciliaris*) and Guinea grass (*Megathyrsus maximus*)).	• Species habitat has been mapped and the Proponent has continued to design a Disturbance Footprint that minimises disturbance to habitat wherever possible. • Areas mapped to be impacted by the Proposed Action will be clearly delineated and communicated, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. • Pre-clearance surveys will be undertaken at the 30% and 80% Disturbance Footprint design to search for MNES, to define locations of populations, and guide micro-siting and additional avoidance measures, such as species translocation. • Invasive plant and animals will be managed in accordance with a Biosecurity Management Plan in accordance with the *Biosecurity Act 2014 (Qld).* • This Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES and their habitat. • Best-practice measures will be implemented to manage and mitigate the potential impacts from altered hydrology, such as habitat degradation, caused by increased erosion and sedimentation as a result of the Proposed Action. • Environmental pollutants affecting MNES will be managed through the site-specific CEMP. Staff and contractors will be made aware through general site induction and training of the potential to generate pollution (including through improper handling of hazardous materials and generation of dust, light and noise) and management measures that must be implemented. • Site inductions, training, pre-start meetings and inspections will be undertaken according to the CEMP. All staff and contractors visiting or working on site will be made aware of the potential to impact MNES and measures to be followed, such as safe driving speeds, and their obligations to report any damaged vegetation. • Rehabilitation of disturbed areas will be undertaken post-construction, as well at the end-of life decommissioning phase, restoring erosion and weed resilience and to re-establishing vegetation cover for potential flora habitat.	If species is identified within Study Area, re-mapping of habitat will occur as required, and additional mitigation measures will be implemented. Where reasonable and practicable, all near misses and incidents will be investigated to establish root cause. Where necessary, corrective actions will be developed to improve existing processes.	No more than 0.2 ha (or 0.1%) of potential habitat will be subject to long-term disturbance as a result of the Proposed Action. The functional value of all remaining habitat within the Study Area will be maintained. Linear clearing will not exceed the dispersal ability of the species and therefore will not fragment habitat for the species.

MNES	Relevant Conservation Advice and Policy Objectives	Threats	Avoidance, Mitigation and Management Measures	Corrective Action	Environmental Outcome
Solanum johnsonianum (Endangered under the EPBC Act)	*Conservation Advice Solanum johnsonianum* (TSSC, 2016b) Conservation and management priorities (that are relevant to the Proposed Action) include: • Maintain and protect existing populations, and protect and enhance habitat to provide potential for reproduction of plants within existing populations. • Consult with private landowners with *Solanum johnsonianum* on their properties and develop site-specific management actions and the implementation of conservation agreements. • Manage sites to identify, control and reduce the spread of invasive species such as introduced grasses.	Threats include (TSSC, 2016b): • Continuing land clearance. • Invasion of habitats by exotic grass species introduced for pasture for livestock.	• Species habitat has been mapped and the Proponent has continued to design a Disturbance Footprint that minimises disturbance to habitat wherever possible. • Areas mapped to be impacted by the Proposed Action will be clearly delineated and communicated, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. • Pre-clearance surveys will be undertaken at the 30% and 80% Disturbance Footprint design to search for MNES, to define locations of populations, and guide micro-siting and additional avoidance measures, such as species translocation. • Invasive plant and animals will be managed in accordance with a Biosecurity Management Plan in accordance with the *Biosecurity Act 2014 (Qld).* • This Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES and their habitat. • Best-practice measures will be implemented to manage and mitigate the potential impacts from altered hydrology, such as habitat degradation, caused by increased erosion and sedimentation as a result of the Proposed Action. • Environmental pollutants affecting MNES will be managed through the site-specific CEMP. Staff and contractors will be made aware through general site induction and training of the potential to generate pollution (including through improper handling of hazardous materials and generation of dust, light and noise) and management measures that must be implemented. • Site inductions, training, pre-start meetings and inspections will be undertaken according to the CEMP. All staff and contractors visiting or working on site will be made aware of the potential to impact MNES and measures to be followed, such as safe driving speeds, and their obligations to report any damaged vegetation. • Rehabilitation of disturbed areas will be undertaken post-construction, as well at the end-of life decommissioning phase, restoring erosion and weed resilience and to re-establishing vegetation cover for potential flora habitat.	If species is identified within Study Area, re-mapping of habitat will occur as required, and additional mitigation measures will be implemented. Where reasonable and practicable, all near misses and incidents will be investigated to establish root cause. Where necessary, corrective actions will be developed to improve existing processes.	No more than 0.2 ha (or 0.1%) of potential habitat will be subject to long-term disturbance as a result of the Proposed Action. The functional value of all remaining habitat within the Study Area will be maintained. Linear clearing will not exceed the dispersal ability of the species and therefore will not fragment habitat for the species.

MNES	Relevant Conservation Advice and Policy Objectives	Threats	Avoidance, Mitigation and Management Measures	Corrective Action	Environmental Outcome
Xerothamnella herbacea (Endangered under the EPBC Act)	*Approved Conservation Advice for Xerothamnella herbacea* (DEWHA, 2008d) Conservation and management priorities (that are relevant to the Proposed Action) include: • Ensure road widening and maintenance activities (or other infrastructure or development activities) involving substrate or vegetation disturbance in areas where *X. herbacea* occurs do not adversely impact on known populations. • Ensure chemicals or other mechanisms used to eradicate weeds do not have a significant adverse impact on *Xerothamnella herbacea.* • Manage sites to prevent introduction of invasive weeds, which could become a threat to *X. herbacea*, using appropriate methods. • Develop and implement a suitable fire management strategy to minimise the intensity and frequency of fires in remnant Brigalow and Semi-evergreen vine thicket communities.	Threats include (DEWHA, 2008d): • Competition from invasive plant species as it occurs in a niche with few other ground layer species. Green panic (*Megathyrsus maximus* var. *pubiglumis*) and to a lesser extent buffel grass are species that tolerate shade and colonise these habitats. • Both of these introduced grasses threaten *X. herbacea* either by direct competition or by increasing the fuel load and altering fire regimes.	• Species habitat has been mapped and the Proponent has continued to design a Disturbance Footprint that minimises disturbance to habitat wherever possible. • Areas mapped to be impacted by the Proposed Action will be clearly delineated and communicated, ensuring that the Disturbance Footprint does not extend further than planned to create unnecessary fragmentation or disturbance. • Pre-clearance surveys will be undertaken at the 30% and 80% Disturbance Footprint design to search for MNES, to define locations of populations, and guide micro-siting and additional avoidance measures, such as species translocation. • Invasive plant and animals will be managed in accordance with a Biosecurity Management Plan in accordance with the *Biosecurity Act 2014 (Qld).* • This Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES and their habitat. • Best-practice measures will be implemented to manage and mitigate the potential impacts from altered hydrology, such as habitat degradation, caused by increased erosion and sedimentation as a result of the Proposed Action. • Environmental pollutants affecting MNES will be managed through the site-specific CEMP. Staff and contractors will be made aware through general site induction and training of the potential to generate pollution (including through improper handling of hazardous materials and generation of dust, light and noise) and management measures that must be implemented. • Site inductions, training, pre-start meetings and inspections will be undertaken according to the CEMP. All staff and contractors visiting or working on site will be made aware of the potential to impact MNES and measures to be followed, such as safe driving speeds, and their obligations to report any damaged vegetation. • Rehabilitation of disturbed areas will be undertaken post-construction, as well at the end-of life decommissioning phase, restoring erosion and weed resilience and to re-establishing vegetation cover for potential flora habitat.	If species is identified within Study Area, re-mapping of habitat will occur as required, and additional mitigation measures will be implemented. If threatened flora are identified during pre-clearance surveys, additional measures, such as species translocation, seed collection and propagation, may be utilised to ensure species dispersal between all remaining available habitat is maintained. Where reasonable and practicable, all near misses and incidents will be investigated to establish root cause. Where necessary, corrective actions will be developed to improve existing processes.	No more than 1.7 ha (or 0.7%) of potential habitat will be subject to long-term disturbance as a result of the Proposed Action. The functional value of all remaining habitat within the Study Area will be maintained.

MNES	Relevant Conservation Advice and Policy Objectives	Threats	Avoidance, Mitigation and Management Measures	Corrective Action	Environmental Outcome
Fork-tailed swift (listed as migratory under the EPBC Act)	*Referral Guideline for 14 Birds Listed as Migratory Under the EPBC Act* (DoE, 2015b) Conservation and management priorities (that are relevant to the Proposed Action) include: • Retain habitat and resources necessary for this species to successfully migrate throughout their natural range in Australia. • Provide guidance on significant impact threshold for fork-tailed swift.	There are no significant threats in Australia (DoE, 2015b). Potential threats include habitat destruction and predation by feral animals.	• Species habitat has been mapped and the Proponent has continued to design a Disturbance Footprint that minimises disturbance to habitat wherever possible, with particular focus on avoided areas of higher value foraging habitat in the north of the Study Area. • Invasive plant and animals will be managed in accordance with a Biosecurity Management Plan in accordance with the *Biosecurity Act 2014 (Qld).* • This Biosecurity Management Plan will be implemented for the site which includes requirements for vehicle washdowns and protocols to ensure activities are planned to minimise movement of vehicles, equipment and machinery outside of designated access corridors. • A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires to MNES and their habitat. • Best-practice measures will be implemented to manage and mitigate the potential impacts from altered hydrology, such as habitat degradation, caused by increased erosion and sedimentation as a result of the Proposed Action. • Environmental pollutants affecting MNES will be managed through the site-specific CEMP. Staff and contractors will be made aware through general site induction and training of the potential to generate pollution (including through improper handling of hazardous materials and generation of dust, light and noise) and management measures that must be implemented. • Site inductions, training, pre-start meetings and inspections will be undertaken according to the CEMP. All staff and contractors visiting or working on site will be made aware of the potential to impact MNES and measures to be followed, such as safe driving speeds, fauna-safe excavation practices, and their obligations to report any injured, sick or dead fauna. • Mitigation and management measures included in the BBMP will reduce likelihood of turbine collision and barotrauma impacts, such as reducing resources in WTG areas to make these regions less attractive to birds and bats. • The Proponent may use innovative blade design features for high-risk turbines (identified within the BBMP (Appendix D).	If species is identified within Study Area, re-mapping of habitat will occur as required, and additional mitigation measures will be implemented. Where reasonable and practicable, all near misses and incidents will be investigated to establish root cause. Where necessary, corrective actions will be developed to improve existing processes. Corrective actions with respect to collision risk are outlined in the BBMP (Appendix D), but involve establishment of impact triggers that if met, will trigger adaptive management. The Proposed Action may implement measures, such as curtailment and acoustic and visual deterrents outlined above, as a corrective action in response to the SRI trigger process.	The functional value of habitat within the Study Area will be maintained. Development of management and corrective actions to minimise risk of turbine collision (significant impact threshold for fork-tailed swift: WTG mortality or injury to 100 individuals).

7.7 EFFECTIVENESS OF PROPOSED MEASURES

Each proposed avoidance and mitigation measure has been assessed for their likely effectiveness when implemented for the Proposed Action. The criteria for assessment are detailed in Table 7-3.

TABLE 7-3 CRITERIA FOR ASSESSMENT OF PROPOSED MITIGATION MEASURES

Effective Rating	Effective Rating Criteria Description
High Effectiveness	No impact to species and/or habitats due to prevention and/or avoidance.
Moderate Effectiveness	Direct and indirect impacts are minimised, no substantial recurring impact (often related to engineering changes).
Low Effectiveness	Minimal reduction in impact through control, survey and observation measures (often to do with PPE or administrative changes).
No Effect	There is no reduction in the impact.

Evaluation and examples/evidence of each proposed avoidance and mitigation measure and effectiveness are outlined in Table 7-4 below.

TABLE 7-4 EVALUATION OF PROPOSED AVOIDANCE AND MITIGATION MEASURES

Mitigation Measures for Proposed Action	Effectiveness Rating	Justification for Rating
Design and Construction Phase Measures		
Avoid disturbing MNES habitat	Moderate Effectiveness	Habitat for MNES has been identified within the Study Area and, subject to design and construction constraints, this habitat will be avoided. Constraints may include safety, buildability and connectivity of WTGs. Impacts to higher value habitat (such as watercourses and riparian areas) have been avoided as much as possible during the design of the Proposed Action, avoiding important habitat for multiple MNES species. However, MNES habitat is still located within the Disturbance Footprint, and the Proposed Action has been deemed 'likely' to have a significant impact on several MNES.
Pre-clearance surveys and micro-siting	Moderate Effectiveness	At the 30% and 80% Disturbance Footprint design, habitat for MNES will be further identified during pre-clearance ecological surveys, and infrastructure locations will be refined to minimise impacts. Micro-siting during the construction phase will minimise impacts by identifying MNES habitat and habitat features within the Disturbance Footprint before clearance begins, allowing for the avoidance of these features.

Mitigation Measures for Proposed Action	Effectiveness Rating	Justification for Rating
Designing layout to reduce habitat fragmentation impacts to MNES	Moderate Effectiveness	Indirect impacts to species through creating barriers to movement and dispersal will be minimised using detailed layout design features and Study Area habitat mapping. All linear clearing within mapped threatened flora and fauna species habitat will be conducted so as not to exceed the dispersal ability of that species, such that all habitat within the Study Area remaining after the construction phase will still be accessible for the species.
Installing fauna crossing infrastructure	Low Effectiveness	Adaptive management measures will include a commitment to install glider poles to re-connect fragmented greater glider denning habitat patches, and undertake monitoring of the glider poles to monitor species presence and infrastructure use. However, only one example of greater gliders using these structures currently exists, and conservation advice and species-specific guidance suggests further research on glide pole use by greater gliders, dispersal ability and persistence in fragmented habitat is required.
Fauna spotter-catchers	Low Effectiveness	FSC will minimise impact by identifying, catching and relocating species. Although impacts to MNES while clearing will be minimised through this mitigation measure, they will not be completely avoided. Alternatively, works will be postponed until the species migrates out of the work zones on their own accord. Presence of a spotter catcher will minimise direct mortality or injury to native fauna during construction.
Manage invasive plants and animals	Moderate Effectiveness	This measure will reduce the risk of introduction and establishment of invasive plant and animal species that may impact MNES. Moreover, it will reduce the risk of spreading existing WoNS and Restrictive Invasive weed species. The development of the Biosecurity Management Plan minimises biosecurity risk through a series of procedures used in pre-construction, construction and operation phases.
Manage fire regimes and bushfire risk	Moderate Effectiveness	This measure will reduce the risk of reduction of MNES habitat outside of the Operation Footprint due to fire. Moreover, it will reduce the overall fire risk within the Project Area and increase safety for on-site workers. The development of the Bushfire Management Plan will include outlining best-practice hazard reduction measures to minimise bushfire risk and environmental impacts.

Mitigation Measures for Proposed Action	Effectiveness Rating	Justification for Rating
Manage impacts from altered hydrology	High Effectiveness	Erosion and sediment control during construction will be managed in accordance with a Best Practice Erosion and Sediment Control (BPESC) guidelines for Australia (International Erosion Control Association). An ESCPC will be prepared which includes details of how measures will be implemented to prevent increased sediment runoff as a result of vegetation clearing, from entering into watercourses, drainage features, wetlands and/or surrounding landscapes during all construction phases from vegetation clearing, undertaking civil works and during the construction of wind turbines and ancillary infrastructure. The ESCPC will include recommended measures and devices to prevent accelerated soil erosion and instability; or where prevention is not possible, minimise and mitigate accelerated soil erosion and instability. A monitoring program will be implemented during construction that is responsive to the seasonal erosion risks of the site, and is adaptive to rectifying negative monitoring results, and includes an emergency erosion management response protocol that must be enacted ahead of forecast weather events that will substantially increase the likelihood of accelerated erosion. Compliance auditing and water monitoring will ensure standards are met to minimise adverse impacts to sediment and erosion processes, and potential downstream impacts to the Great Barrier Reef.
Reduce environmental pollution	High Effectiveness	Risk of impacts from environmental pollution will be reduced once the construction phase has been completed. Environmental pollutants will be effectively managed through the site-specific CEMP, which will be audited monthly during construction. Staff and contractors will be aware through general site induction and training of the potential to generate pollution, and relevant measures to reduce potential impacts.
Site inductions and training	High Effectiveness	Awareness of site-specific management plans and obligations will ensure prompt action by staff and contractors working within the Study Area. Awareness of MNES and habitat will prompt reporting of listed threatened species within the Disturbance Footprint. Inclusion of MNES information at inductions and pre-start meetings will minimise direct impacts of the proposed works and improve detection within the Study Area.

Mitigation Measures for Proposed Action	Effectiveness Rating	Justification for Rating
Revegetation and rehabilitation (Type 1 and 2)	Moderate Effectiveness	Direct impacts will be reduced once the construction phase has been completed. Type 1 and 2 rehabilitation of vegetation adjacent to the access tracks will mitigate the effects of erosion, sedimentation and the establishment of weed species. Clearing for access corridors (40 m maximum) will be rehabilitated and reduced down to 30 m in width. This measure will also act in providing regrowth habitat for listed threatened species within the Study Area.
Operational Phase Measures		
Avoid locating turbines in key MNES habitat	Moderate Effectiveness	Habitat and resources for MNES have been identified within the Study Area and this habitat will be avoided during the design and construction phases. Impacts to higher value habitat (such as areas likely to provide prominent thermals and updraughts in the north of the Study Area) have been avoided as much as possible during the design of the Proposed Action, avoiding important resources for multiple MNES species. However, one migratory species, white-throated needletail, is still considered likely to be impacted by the Proposed Action in terms of collision risk and changes in site utilisation due to records in the wider Locality.
Reduce likelihood of turbine collision and barotrauma impacts	Moderate Effectiveness	Impacts to bird and bat species will be minimised through the implementation of the BBMP. This will enable the Proponent to respond to potential impacts throughout the life of the Proposed Action, including future potential significant impacts, through continuous monitoring and adaptive management. It is expected that impacts to bird and bat species will be minimised, but not completely avoided, by considering innovative turbine design features for high-risk turbines and reducing resources in the vicinity of WTGs.
Manage impacts from altered hydrology	High Effectiveness	Erosion and sediment control will be managed in accordance with BPESC guidelines for Australia (International Erosion Control Association). A Site Stabilisation Plan will be prepared which will detail how erosion and sediment control devices are to be incorporated into finished profiles in conjunction with revegetation measures included in the Rehabilitation Management Plan to: • Prevent increased sediment runoff, including increased sediment runoff as a result of vegetation clearing and/or civil works, from entering into watercourses, drainage features, wetlands and/or surrounding landscapes;

Mitigation Measures for Proposed Action	Effectiveness Rating	Justification for Rating
		• Prevent accelerated soil erosion and instability or where prevention is not possible, minimise and mitigate accelerated soil erosion and instability; and • Detail a monitoring plan and program that is responsive to the seasonal erosion risks of the site and is adaptive to rectifying negative monitoring results.
Maintenance and Decommissioning Phase Measures		
Revegetation and rehabilitation (Type 3)	Moderate Effectiveness	Long-term impacts to MNES habitat will be reduced once the end-of-life stage of the Proposed Action is reached (approximately 35 years). Type 3 rehabilitation of vegetation will act in providing regrowth habitat for listed threatened species within the Study Area.
Management Plans		
Specific Management Plans have been developed to manage and mitigate impacts to listed threatened species known or likely to occur within the Study Area. These management plans include a BBMP and CEMP.	Moderate Effectiveness	Designated Management Plans, including a BBMP and CEMP, will inform workers on how to mitigate impacts to threatened species known or likely to occur within the Study Area. These plans are being developed to be specific and effective, however 'zero impact' to MNES cannot be guaranteed.

7.8 ONGOING MANAGEMENT

Once the operational phase of the Proposed Action begins, ongoing mitigation and management measures will include the implementation of the following management plans.

7.8.1 CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

A site-specific CEMP will be developed for the Proposed Action. The purpose of the CEMP will be to provide a structured approach to the management of potential environmental impacts during the construction phase of the Proposed Action so that all appropriate management measures and corrective actions are implemented. All required construction phase control measures, site maps, and ongoing monitoring activities and schedules will be outlined in the CEMP, including but not limited to:

- Site inductions, training requirements and pre-start meeting schedules;
- Site-specific road rules and speed limits for personnel operating vehicles and machinery;
- Control measures for potential environmental pollutants (light, noise, dust, hazardous materials);
- A site-specific ESCPC; and
- Requirements for ongoing monthly site inspections.

The parties responsible for the controls and procedures adopted to mitigate construction phase environmental impacts will also be clearly identified. Auditing of the CEMP will occur quarterly to ensure that the Proposed Action continually meets all relevant regulatory requirements, and improves systems where necessary. At the operational phase, the CEMP will be transitioned into an OEMP.

7.8.2 BIRD AND BAT MANAGEMENT PLAN

A BBMP (Appendix D) has been developed and will be implemented for the Proposed Action. The BBMP aims to provide a monitoring and adaptive management framework for potential operating impacts on bird and bat species known, likely or with potential to occur within the Study Area.

The BBMP identifies certain monitoring protocols to track and manage species that are directly impacted by wind turbines, through the following procedure:

- Baseline (pre-construction), construction and operational phase bird and bat (using Anabat devices) surveys;
- Carcass searches for species impacted by the WTGs;
- Measures to check for survey adequacy and to account for bias through scavenger and detectability trials;
- Statistical analysis of the results from such targeted field surveys and carcass searches to determine the mortality rates throughout the Study Area; and
- Subsequent reporting and consultations with the Department.

Species triggers will be implemented so that if impacts reach or exceed an indicative significant impact threshold, appropriate adaptive management measures can be implemented. This BBMP is an adaptive management framework that will have the ability to be adjusted as the Proposed Action progresses to better manage and monitor species that may be impacted by the WTGs, should it occur.

7.8.3 BUSHFIRE MANAGEMENT PLAN

A Bushfire Management Plan will be developed and implemented during construction and operation to mitigate the potential impact of fires on the MNES habitat.

The Bushfire Management Plan will outline the use of industry best-practice hazard reduction measures to minimise bushfire risk and environmental impacts, such as:

- Controlled burning of cleared vegetation;
- Reducing on-site fuel loads; and
- Maintenance of firebreaks and trails.

Maintenance of an asset protection zone within the Operations Footprint will be required to reduce the risk of reduction of MNES habitat outside of the Operation Footprint due to fire. This includes establishing a 30 m bushfire setback from vegetation around electrical infrastructure. Maintaining safe distances between vegetation and potential fire-starting hazards will increase safety and reduce fire risk.

Weed management and control methods (in line with the EMP) will also reduce the potential of invasive plants changing species composition on-site and increasing fire risk.

7.8.4 CORRECTIVE ACTIONS

The mitigation measures described above and those presented in site-specific management plans will be reviewed as part of the respective monitoring plans, with corrective actions identified to respond to any defined impact triggers. The relevant management plans are:

- CEMP (to be provided prior to commencement of construction of the Proposed Action);
- BBMP (Appendix D); and
- Bushfire Management Plan (to be provided prior to commencement of construction of the Proposed Action).

These plans will be monitored for success throughout all phases of the Proposed Action, and if any impact triggers are identified, then the corrective actions will be applied to manage these impacts. MNES-specific corrective actions for each avoidance and mitigation measure are described in Section 7.6.

SECTION 7 REFERENCES

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Theodore Wind Farm

Public Environment Report – Rehabilitation (Section 8)

PREPARED FOR

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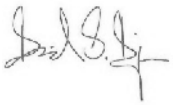


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ACRONYMS AND ABBREVIATIONS

Acronym	Description
DCCEEW	Department of Climate Change, Energy, the Environment and Water
Disturbance Footprint	The area whereby the final layout and impacts have been considered and occupies an area of 1,537.4 ha
ESCPC	Erosion and Sediment Control Plan for Construction
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EP Act	*Environmental Protection Act 1994*
Ha	Hectares
MNES	Matters of National Environmental Significance
Planning Act	*Planning Act 2016*
Project Area	The corridor of land on which the Proposed Action will be located, including a 100-metre buffer for micro-siting
Proposed Action	Theodore Wind Farm
RE	Regional Ecosystem
Study Area	The 9 land parcels, across 3 properties, and road reserve areas, 46,830 ha, in which the Proposed Action will be located.
Type 1 natural regeneration	Natural regeneration restricted to low shrubbery and grass post-construction
Type 2 rehabilitation/ revegetation	Revegetation reinstated of equivalent pre-construction vegetation without height restrictions post-construction
Type 3 rehabilitation / revegetation	Revegetation reinstated of equivalent pre-construction vegetation at end-of-life
VM Act	*Vegetation Management Act 1999*
WTG	Wind turbine generator

8. REHABILITATION

Rehabilitation of disturbed areas will be undertaken for the Proposed Action post-construction as well at the end-of life decommissioning phase. In both cases, the intention is to progressively stabilise areas of disturbance, making them resilient to erosion and weed infestation, and to re-establish appropriate vegetation cover. Rehabilitation of on-ground vegetation will be managed through adaptive management to ensure rehabilitation acceptance criteria are met, as outlined in the following Sections. Rehabilitation and revegetation are to continue until all proposed rehabilitation/ rehabilitation areas as outlined within this chapter and identified in Figure 8-1 and Figure 8-2 are self-sustaining and meet the benchmarks for the relevant areas outlined within the final rehabilitation management plan, post-approval and prior to construction. The final rehabilitation management plan will incorporate, at a minimum, all aspects relating to the objectives, management measures and completion criteria outlined in this section (8. Rehabilitation) of the PER.

8.1 POST-CONSTRUCTION REHABILITATION

Following the completion of construction, areas not required for ongoing operational disturbance will be rehabilitated and or regenerated in accordance with rehabilitation management practices in this Section of the PER and where not required for ongoing grazing or agricultural practices.

The approximate rehabilitation / revegetation opportunities encompass up to 1,000.1 ha, representing 65.1% of the total Disturbance Footprint required to facilitate construction.

Post-construction rehabilitation/revegetation has been separated into two types:

- Type 1 – Natural regeneration restricted to low shrubbery and grass; and
- Type 2 – Rehabilitation by reinstating equivalent pre-construction vegetation without height restrictions.

The extent of Type 1 and 2 rehabilitation/revegetation will be as per the required bushfire setback and minimum offset requirement for electrical cabling.

Preliminary rehabilitation objectives have been developed in consideration of the existing condition, potential ongoing direct and indirect impacts, the need to maintain setbacks to reduce bushfire risk, and any disturbance during the end-of-life decommissioning phase. Post-construction rehabilitation areas available for rehabilitation to pre-disturbance functionality are outlined in Figure 8-1.

Legend

- Study Area
- Operational Footprint
- Electrical Reticulation
- Type 2 revegetation/rehabilitation
- Type 1 natural regeneration
- Road
- Track and Path

Coordinate System:
GDA2020 MGA Zone 56

Date: 28/05/2026

Created By: MB

Drawing Size: A3

0 2 4Km

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F8-1 Post-Construction Rehabilitation

Theodore Wind Farm PER

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8.1.1 TYPE 1 NATURAL REGENERATION

Post-construction there is an opportunity to naturally regenerate 400.7 ha of Type 1, which includes low shrubbery and grass. These areas are identified as not being required within the Permanent Footprint of the Proposed Action, but full rehabilitation and planting of tree species cannot occur due to the likelihood of re-disturbance during any maintenance requirements and decommissioning of infrastructure. Therefore, the key object of Type 1 areas is to restore natural ground cover providing stabilisation and the ability for ground-dwelling species to forage.

8.1.1.1 OBJECTIVES

Natural regeneration efforts will focus on the return of a predominantly natural grassland cover, through minimising the disturbance and revegetation having consideration for bushfire setbacks and minimum offset requirements for electrical cabling.

Key revegetation objectives will:

- Ensure that the vegetation post-construction is appropriately planned in a manner that promotes self-sustaining ecosystems;
- Ensure revegetation areas can develop into a viable ecological system where functionality for impacted MNES is returned (typically where functionality is retained in a low shrubbery and grass state);
- Ensure revegetation continues until all impacted areas are self-sustaining (i.e. do not require interference to flourish);
- Re-planting will be consistent with the groundcover composition of broad vegetation communities where disturbance has occurred;
- Ensure connectivity for native wildlife through species-specific management practices, this will include at a minimum:
    - Groundcover revegetation is focused on establishing a diverse grassy understorey suitable for foraging, to provide for small native mammals;
    - Maintenance of connectivity for dispersal habitat;
    - Larger logs (>10 cm diameter and 0.5 m in length) that are cleared from the Disturbance Footprint will be placed within the revegetation area to provide additional habitat features; and
    - The presence of a fauna spotter-catcher(s) on-site to relocate fauna from designated areas to be cleared into retained vegetation or habitat;
- Reusing topsoil and utilising mulch made from cleared vegetation;
- Preventing erosion of soil, particularly on sloped terrain; and
- Ensure exotic plant species do not take hold and dominate regrowth vegetation.

8.1.2 TYPE 2 REHABILITATION

Post-construction there is an opportunity to rehabilitate 599.5 ha of Type 2 rehabilitation/ revegetation areas, which includes vegetation without height restrictions. Type 2 rehabilitation will be undertaken to return areas to a pre-development state based on broad habitat types within the nominated footprint.

8.1.2.1 OBJECTIVES

Rehabilitation/ revegetation efforts will focus on maintaining ecosystem functionality by minimising the disturbance and rehabilitating these areas in accordance with pre-clearance vegetation, bushfire setbacks and minimum offset requirements for electrical cabling.

Key rehabilitation objectives will at a minimum:

- Ensure that the rehabilitation of vegetation post-construction is properly planned in a manner that promotes self-sustaining ecosystems;
- Ensure rehabilitation of native vegetation is able to develop into a viable ecological system, comparable to pre-clearing native vegetation;
- Ensure rehabilitation continues until the ecosystem and all impacted areas are self-sustaining (i.e. do not require interference to flourish);
- Restore pre-clearance levels of biodiversity and ecosystem functionality;
- Re-planting to be consistent with the composition of broad vegetation communities where disturbance is planned;
- Ensure connectivity for native wildlife through species-specific management practices, including:
    - Revegetation would focus on replicating canopy diversity observed within the pre-construction broad vegetation communities the without height restrictions, suitable for foraging and providing habitat for fauna;
    - Larger logs (>10 cm diameter and 0.5 m in length) that are cleared from the Disturbance Footprint would be placed within the revegetation area to provide additional habitat features; and
    - The presence of a fauna spotter-catcher(s) on-site to relocate fauna from designated areas to be cleared into retained vegetation or habitat;
- Reusing topsoil and utilising mulch made from cleared vegetation;
- Preventing erosion of soil, particularly on sloped terrain; and
- Ensuring exotic plant species do not take hold and dominate regrowth vegetation.

8.1.3 MANAGEMENT MEASURES FOR POST-CONSTRUCTION REHABILITATION

Rehabilitation aims to implement environmental management practices and procedures, that will:

- Restore and improve areas disturbed during the construction phase;
- Reinstate connectivity of fauna habits, thus improving ecological processes;
- Minimise soil erosion and sedimentation;
- Prevent/minimise the outbreak of exotic species within the area of rehabilitation;
- Ensure that topsoil is managed effectively; and
- Monitor, inspect, and maintain the revegetated areas.

Rehabilitation as described in Section 8.2 will occur in a rolling manner following practical completion of each portion of the wind farm during the construction phase.

8.2 END-OF-LIFE REHABILITATION

Following the completion of construction, areas not required for ongoing operational disturbance will be rehabilitated and or regenerated in accordance with rehabilitation management practices established in this Section of the PER and where not required for ongoing grazing or agricultural practices.

Each WTG generally has a useful life of approximately 35 years, after which the WTG, footings (down to 0.5 m below natural ground surface) and any overhead transmission lines may be removed and the area returned to pre-disturbance conditions, in consultation with the relevant landowner. End-of-life rehabilitation areas available for rehabilitation to pre-disturbance functionality are outlined in Figure 8-2. It is noted, access tracks have not been included due to the potential continued use of landholders for rural purposes, however, the Proponent is committed to analysing any potential areas of roads to be rehabilitated.

Legend

- Study Area
- Operational Footprint
- Electrical Reticulation
- Type 3 revegetation/rehabilitation
- Road
- Track and Path

Coordinate System:
GDA2020 MGA Zone 56

Date: 28/05/2026

Created By: MB

Drawing Size: A3

0 2 4Km

1:120,000

F8-2 End-of-Life Rehabilitation

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8.2.1 TYPE 3 REHABILITATION

End-of-life there is an opportunity to rehabilitate 537.3 ha of Type 3 rehabilitation/ revegetation areas, which includes returning areas to a pre-development state based on broad habitat types within the nominated footprint. It is noted, access tracks have not been included due to the potential continued use of landholders for rural purposes, however, the Proponent is committed to analysing any potential areas of roads to be rehabilitated.

Type 3 refers to the rehabilitation/ revegetation efforts that will be undertaken after the decommissioning and end-of-life of the Proposed Action, including all areas of disturbance with the exception of those areas to be used for on-going rural activities such as formed access tracks under agreement by the landowner.

8.2.1.1 OBJECTIVES

Rehabilitation efforts for flora and fauna will focus on maintaining ecosystem functionality through minimising the disturbance and rehabilitating in accordance with pre-clearance vegetation, bushfire setbacks and minimum offset requirements for electrical cabling.

Key rehabilitation objectives at a minimum will:

- Ensure rehabilitation continues until the ecosystem and all impacted areas are self-sustaining (i.e. do not require interference to flourish);
- Ensure rehabilitation of native vegetation able to develop into a viable ecological system, comparable to pre-clearing native vegetation and its land uses;
- Ensure rehabilitation continues until the ecosystem and all impacted areas are self-sustaining;
- Restore pre-clearance levels of biodiversity and ecosystem functionality;
- Re-plant and re-establish vegetation consistent with the species and structural composition of broad vegetation communities where disturbance has occurred;
- Ensure connectivity for native wildlife through species-specific management practices, including:
    - Groundcover revegetation would be focused on establishing a diverse grassy understorey suitable for foraging, to provide for small native fauna;
    - Ensuring clearances to potential habitat are rehabilitated, where possible, to no further than 50 m apart, to allow for viable connectivity;
    - Larger logs (>10 cm diameter and 0.5 m in length) that are cleared from the Disturbance Footprint would be placed within the revegetation area to provide additional habitat features; and
    - The presence of a fauna spotter-catcher(s) on-site to relocate fauna from designated areas to be cleared into retained vegetation or habitat;
- Reusing topsoil and utilising mulch made from cleared vegetation;
- Preventing erosion of soil, particularly on sloped terrain; and
- Ensuring exotic plant species do not take hold and dominate regrowth vegetation.

8.2.1.2 MANAGEMENT

Rehabilitation aims to implement environmental management practices and procedures, that:

- Restore and improve areas disturbed during the construction phase;
- Reinstate connectivity of fauna habitats, thus improving ecological processes;
- Minimise soil erosion and sedimentation;
- Prevent/minimise the outbreak of exotic species within the area of rehabilitation;
- Ensure that topsoil is managed effectively; and
- Monitor, inspect, and maintain the revegetated areas.

It is important to note that the principles and methods detailed in Table 8-2, despite their focus on post-construction rehabilitation, should be implemented at the earliest possible opportunity.

8.3 REHABILITATION METHODS

Table 8-1 provides an overview of the rehabilitation methods for all infrastructure associated with the Proposed Action. Table 8-2 provides a more detailed and focused rehabilitation methodology for rehabilitation around areas cleared for infrastructure.

TABLE 8-1 REHABILITATION METHODS FOR INFRASTRUCTURE

Infrastructure	Rehabilitation Methods
Access Tracks	• Determine rehabilitation availability post-construction based on rehabilitation opportunity areas. • Roads and access tracks are to be constructed with a suitable gravel road base and will remain unsealed. In sections where the access tracks will be remediated, gravel will be removed from the access tracks and treated. • Cleared areas for access tracks are to be backfilled with compatible and certifiably clean sub-grade material, aerated and graded in accordance with the slope of the surrounding area, and seeded with appropriate vegetation. • Every possible attempt made to avoid vegetation in habitat crossings. Where this is unavoidable, cleared wooden vegetation will be placed within, or near to the cleared area, where possible, to encourage fauna habitat continuation.
Turbine Location	• After construction, disturbed areas not covered by infrastructure are to be naturally regenerated. • Ensure the Bushfire Protection Zone is maintained. • Monitor for weeds post-construction and treat them accordingly. • Consider potential future uses for maintenance and observation activities.
Watercourse Crossings	• After construction, disturbed areas of the bed and banks of the waterway outside the permanent Disturbance Footprint are returned to their original profile and stabilised to promote the regeneration of natural fish habitats. • Rehabilitation criteria for watercourse crossings are to be consistent with the Erosion and Sediment Control Plan for Construction (ESCPC). • Fertiliser and sedimentation management are required when working close to watercourses. • Installed crossings and culverts would likely be retained after rehabilitation of the Study Area, at the discretion of host landowners.
Transmission Corridor	• Cleared areas for the transmission corridor are to be backfilled with compatible and certifiably clean sub-grade material. • Respread topsoil and cleared vegetation across the corridor. • Monitor for weeds post-construction and treat them accordingly. This will be rehabilitated through a combination of methods described in this table and Table 8-2.

Infrastructure	Rehabilitation Methods
Construction & Laydown Compounds (areas not required post-construction)	• Avoid sealing temporary construction laydown areas, unless necessary for Health and Safety purposes. • Monitor for weeds post-construction and treat them accordingly. • Clear infrastructure is not required for future O&M and is rehabilitated in accordance with Table 8-2.
Construction & Laydown Compounds (areas that are required post-construction)	• Consider potential future uses for operations and maintenance activities. • Identify and progressively and partially rehabilitate areas surrounding required infrastructure.

The design of the rehabilitation program and inclusive monitoring will be facilitated by a suitably qualified person.

TABLE 8-2 REHABILITATION PRINCIPLES, METHODS AND PERFORMANCE OUTCOMES

Principles	Rehabilitation Methods	Performance Outcome	Monitoring
Rehabilitation in accordance with pre-clearance vegetation	• The use of tube-stock containing native species that reflects the surrounding environment will assist in speeding up the rehabilitation process in areas outside of the corridor. • Matting also helps to conserve soil moisture, improves water infiltration and soil structure, and moderates soil temperatures, thereby improving plant growth. • Plastic tree guards, held away from a seedling by 3 stakes, to protect against grazing by feral pests, and provide protection from dying winds. • Revegetation will range from grassing areas with species that were common on the site before construction, planting trees, and/ or allowing for natural regrowth. • Approximately 70% understory cover to be successfully established with a successful establishment of native species representative of the existing Regional Ecosystem or neighbouring vegetation. This serves to protect and cover soils and vegetation, to minimise the risk of erosion and provide homogeneity with the surrounding vegetation. • Provide areas of newly rehabilitated areas with pre-clearance values and ecological secondary succession through planting and regenerating native species in line with pre-existing Regional Ecosystem values • Replacement of native trees along the second order streams within the Study Area to increase the vegetation density along the creek-lines and enhance its value as a linking corridor with remnant vegetation fragments. • Strong focus and ongoing management of rehabilitation of koala and greater glider eucalypt feed species.	Progressing towards 70% height and 50% cover in accordance with the *Vegetation Management Act 1999* for defining remnant vegetation with a successful establishment of native species representative of the existing Regional Ecosystem or neighbouring vegetation; Rehabilitated vegetation will reflect pre-existing Regional Ecosystem; and Post-construction, there will be no loss of ecosystem function.	• Completion of rehabilitation task sheets; • Visual and monitoring assessment; • Quantitative vegetation monitoring; and • Chronological photographic documentation.
Progressive Restoration of Temporary Disturbance Areas	• In areas identified for progressive restoration, it will likely be appropriate to regenerate the cleared area with grass species, with weed management processes in place. This weed management may involve the use of mulch formed from vegetation cleared from the Study Area.	Land stability and grass cover with a successful establishment of 70% neighbouring grass species.	Visual and monitoring assessment for a 12–24-month period.
Topsoil Management	• Topsoil to be replaced before seeding takes place. • Topsoil to be stockpiled where appropriate (not in areas of high weed seed) and used in the rehabilitation process. • Topsoil from similar vegetation communities to be respread at similar depths (~5cm) to those originally removed.	Appropriate topsoil stockpiled and re-used where appropriate.	Completion of topsoil records; soil testing.

Principles	Rehabilitation Methods	Performance Outcome	Monitoring
Erosion and Sedimentation Management	• Sloping areas around the hardstand used for construction will be revegetated post-construction, through natural revegetation, planting of tube-stock, hydro-seeding and direct seeding. • Hydroseeding from seed mixes that reflect pre-existing vegetation should be implemented within 24 months of the completion of construction, where seasonally appropriate. • Soil stabilisation involving the use of mulch formed from vegetation cleared from the Study Area, geotextiles or mulch from an appropriately certified provider. • Approximately two-thirds understory cover to be successfully established with a successful establishment of native species. This serves to protect and cover soils and vegetation, to minimise the risk of erosion.	Sloped areas to be appropriately revegetated as soon as disturbance period is finalised.	Visual inspection and documentation of any erosion, particularly on slopes.
Biosecurity Management	• Weeds within the Study Area and access areas will be controlled in accordance with the Biosecurity Management Plan. • Presence of weeds and pests listed under the *Biosecurity Act 2014* (Qld) is controlled regularly throughout a 24-month period post-construction, and where possible, regularly throughout the operational phase in areas within the rehabilitation opportunity area. • An annual weed monitoring program will be implemented within areas of natural regeneration ensure weed infestation is not preventing the natural regeneration of ground cover.	Weeds will not be allowed to establish in rehabilitated areas	Weed and pest monitoring

8.4 REHABILITATION ACCEPTANCE CRITERIA

The proposed rehabilitation activities outlined in this Section aim to restore areas of disturbance to pre-disturbance conditions, subject to the appropriate safety and bushfire vegetation setbacks required. This process is a continuous one, beginning immediately post-construction, with areas of temporary disturbance not required for the operational and maintenance phases (such as linear assets i.e., access tracks) to be revegetated through natural regeneration and areas of permanent disturbance to be subject to active rehabilitation (restoration) measures such as direct seeding of native plant and grass species where it aligns with pre-disturbance vegetation and ecosystem types. Tube stock will be considered when assessing the best rehabilitation methods for the rehabbed areas. Rehabilitation and revegetation are to continue until all proposed areas are self-sustaining and meet the benchmarks for the relevant areas outlined within the final rehabilitation management plan to be completed post-approval.

Following construction, the rehabilitation and revegetation areas will be restored or managed in accordance with pre-disturbance vegetation communities' composition or an altered acceptable state. The use of endemic native species appropriate to the rehabilitation and revegetation areas will be used to meet objectives and management outcomes. Monitoring is undertaken to confirm and assess the effectiveness of the rehabilitation outcomes.

Effective rehabilitation will ensure that the final landform meets the following completion criteria, outlined in Table 8-3.

TABLE 8-3 COMPLETION CRITERIA

Goal	Objective	Completion Criteria	Indicator of Completion Criteria Success
Return to Pre-Disturbance State (without canopy for areas of revegetation)	Vegetation is homogenous and blends in with surrounding pre-disturbance vegetation.	Secondary succession occurs through the establishment of revegetated species.	Visual assessment of rehabilitated areas compared to pre-disturbance site.
		Vegetation of similar species richness and species diversity is established and self-sustaining.	Visual assessment of rehabilitated areas compared to pre-disturbance site
		No discernible difference in rehabilitated vegetation from surrounding pre-disturbance vegetation.	Aerial / drone photography.
	Establishment of functionally important native vegetation species and communities.	Vegetation type and density are of topologically and geographically appropriate species.	Ground cover assessment.
	Ensure rehabilitated land can be used for pre-disturbance grazing purposes.	Monitoring results show that rehabilitation is achieving a sustainable agreed post land use standard.	Rehabilitated landforms are capable of supporting post land use agreements.

Goal	Objective	Completion Criteria	Indicator of Completion Criteria Success
Stable Landform	Ensure native vegetation cover is adequate to minimise erosion.	Native ground cover increases throughout the remediation phase, is self-sustaining and forms the predominant ground cover.	Ground cover assessment.
		Weeds have not established and formed ground cover in areas of rehabilitation.	Ground cover assessment.
	Ensure quality soil structure and fertility.	No rills or erosion is identified and the landform of areas of previous disturbance is considered stable. Areas of erosion or soil compaction are managed under an Erosion and Sediment Control Plan.	Visual and progressive assessment of erosion.
		Topsoil from similar vegetation communities has been spread at ~5cm depth from where it has been originally removed.	Soil testing and completion of topsoil records.
Safety & Pollution	Ensure that the site is safe for, and accessible to humans and animals.	A risk assessment has been completed and hazards relative to accessibility and grazing purposes are appropriately addressed.	Safety assessment of decommissioned and rehabilitated areas.
		Access to rehabilitated areas for humans and animals is to a level the same as, or better than pre-disturbance.	Safety assessment of decommissioned and rehabilitated areas.
		Contaminated land resulting from transportation, construction, operation and decommissioning is remediated and rehabilitated.	Contaminated land assessment report.
		Certification by a suitably qualified person in the final rehabilitation report that infrastructure has been decommissioned and demolished with no remaining unsafe infrastructure.	Safety assessment of decommissioned and rehabilitated areas.

The rehabilitation principles outlined in Table 8-1 apply broadly to all infrastructure. Table 8-2 provides a more detailed and focused rehabilitation methodology for rehabilitation around areas cleared for infrastructure. Table 8-3 expands on the completion criteria and provides further guidance as to how to successfully meet the criteria outlined above. As such, it is expected that the proposed rehabilitation activities will be an effective means to establishing secondary succession and meeting the completion criteria.

In accordance with best practice, final detailed engineering will inform the final rehabilitation requirement for a safe and stable final landform.

8.5 REHABILITATION TIMING, FREQUENCY, DURATION AND ONGOING MANAGEMENT

The facilitation of the proposed rehabilitation activities will occur immediately post-construction and focus on areas not required for ongoing operational disturbance. Such areas will be rehabilitated and or regenerated in accordance with rehabilitation management practices established in Section 8 of the PER and where not required for ongoing grazing or agricultural practices.

The monitoring objectives for the Proposed Action aim to:

- Measure the effectiveness of rehabilitation and identify areas that need improving to meet acceptance criteria;
- Measure the effectiveness of mitigation measures imposed;
- Measure the effectiveness of plan growth and secondary succession;
- Measure the effectiveness of weed management and control measures; and
- Identify areas of erosion and compaction.

Rehabilitation activities will be undertaken in accordance with Table 8-1 and Table 8-2, will be continuous, and carried out contemporaneously with frequent monitoring, photographic documentation and quantitative vegetation monitoring and assessments throughout the post-construction and decommissioning phases.

A key component in achieving the above objectives is the frequency of monitoring. Monitoring will occur at the following intervals:

- A rehabilitation or revegetation monitoring report, including (but not limited to) native vegetation regeneration progress, week presence, plant survival rates, plant losses and causes, weed control measures and their effectiveness, maintenance and water regimes and plant replacement will be prepared for the first five operational years of the Proposed Action.
- Every 5 years after the submission of the fifth monitoring report, for the remainder of the Proposed Action operating lifespan.
- Annual weed and pest monitoring will occur.

All of the following documentation and records relating to rehabilitation activities and monitoring programs will be retained:

- Proposed Action checklists;
- Audit reports;
- Monitoring records;
- Aerial photographs;
- Incident investigation reports;
- Rehabilitation failure notes; and
- Records of training and induction.

8.6 CORRECTIVE ACTIONS

Corrective action and maintenance will be required to be undertaken where rehabilitated areas have not met or are failing to meet rehabilitation objectives and criteria. Some of these on-ground corrective actions include:

- **Supplementary seeding:** the causes of poor vegetation growth should be determined. If necessary, maintenance will be undertaken to repair eroded or compacted soil. Supplementary seeding can be used to increase ground cover and minimise soil erosion, as well as seeding of native vegetation that has failed to be established. The use of tube stock will be considered when assessing the best rehabilitation methods for these areas.
- **Erosion and sediment control:** Erosion will be managed in accordance with the ESCPC. Where downstream sedimentation, decline in soil fertility, stream bank erosion and poor rehabilitation outcomes occur, corrective actions guided by the ESCP will occur.
- **Weed treatment:** Weed infestation will, once identified in areas of rehabilitation, require treatment to an appropriate standard, guided by the Biosecurity Management Plan. Feral animal control will also be conducted where appropriate, in accordance with the Biosecurity Management Plan.
- **Safety:** Maintenance work will be required where there is an identified risk to human or animal health, because of landform stability, soil contamination or sedimentation. Safety work will be conducted in accordance with a property management plan, to be developed throughout the operational phase.

8.7 REHABILITATION OF MNES HABITAT

Areas of rehabilitated MNES habitat, that have been impacted by the Proposed Action, are not considered part of the residual impact to a species if rehabilitation is expected to restore the habitat's previous functionality. As outlined in Section 6, the rehabilitation process outlined above is considered to return habitat functionally for six species. This habitat includes:

- 247.2 ha of dispersal habitat for koala;
- 31.7 ha of foraging and dispersal habitat for squatter pigeon;
- 158.5 ha of breeding and foraging habitat for diamond firetail;
- 415.2 ha of Austral cornflower habitat;
- 1.5 ha of *Solanum dissectum* habitat; and
- 1.5 ha of *Solanum johnsonianum* habitat.

The three flora species have shown evidence of responding positively to disturbance and therefore are expected to have habitat functionality return immediately post-construction in areas no longer required for the Proposed Action (DEWHA, 2008; TSSC, 2016a; TSSC, 2016b). Alternatively, the three fauna species are expected to have habitat functionality restored due to their habitat requirements for areas of grasslands with scattered trees (further discussed in Section 6 of the Theodore Wind Farm PER). Therefore, it is expected that the functionality of these habitat types will be restored once the ground cover is re-established post-construction.

Given the defined habitat functions for each species, habitat functionality may be reinstated within one to two years through the successful establishment of native groundcover and grass cover. For each species, the primary short-term requirement is the presence of continuous or patchy native ground-layer vegetation to support movement, foraging, and landscape connectivity.

Koalas can use early-stage regenerating areas for movement where groundcover vegetation has been established and contributes to broader landscape connectivity. Dispersal functionality can begin to be reinstated within one to two years where native grasses and regenerating seedlings are present, even in the absence of mature trees.

Functional habitat for southern squatter pigeon can be re-established within one to two years through the development of open native grass cover with low weed competition. These areas provide critical foraging resources, particularly where seed-producing grasses are present.

Foraging habitat for diamond firetail can become functional within one to two years following the establishment of native grasses that provide seed and low structural cover. While breeding habitat may require longer for shrub development, the re-establishment of native groundcover allows the species to return and use the area for feeding relatively early in the rehabilitation process.

As the rehabilitation of these three habitat types do not require any additional habitat features other than ground cover, the management measures, completion criteria, interim targets and corrective actions outlined in the previous section above are also relevant to the rehabilitation of koala dispersal habitat, squatter pigeon foraging and dispersal habitat and diamond firetail breeding and foraging habitat.

8.8 LEGISLATIVE REQUIREMENTS

The primary responsibility for rehabilitation management resides with state and local governments in accordance with their respective legislative frameworks, policies, and guidelines. The Commonwealth Government is responsible for legislation, strategies and policy frameworks for rehabilitation at the national level.

Table 8-4 provides a summary of relevant legislation and best practice guidelines that may be applicable during the rehabilitation process. It is to be noted that this summary is not intended to be exhaustive but rather is tailored to reflect the current context.

TABLE 8-4 REHABILITATION LEGISLATIVE REQUIREMENTS

Legislation	Applicability
Commonwealth	
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	The EPBC Act provides a legal framework to safeguard and manage flora, fauna, ecological communities, and heritage places of national and international significance, collectively referred to as Matters of National Environmental Significance (MNES). The Proposed Action has been referred to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) under the EPBC Act and a 'controlled action' decision received. The rehabilitation of listed threatened species habitat temporarily impacted by the Proposed Action is a requirement of the Public Environment Report Guidelines.

Legislation	Applicability
State	
Environmental Protection Act 1994 (EP Act)	The key legislation governing environmental protection in Queensland is the EP Act, which establishes effective management strategies to safeguard the environment and promote ecologically sustainable development. The EP Act is the primary legislative framework for protecting and managing environmental values within Queensland. Its overarching objective is to preserve the natural environment and associated ecological systems and processes while facilitating sustainable development. The EP Act imposes a 'general environmental duty' (s319) on any individual or entity engaged in activities that could cause environmental harm to "take all responsible care and practicable measures to prevent or minimise environmental harm". Additionally, the EP Act imposes a 'duty to notify' (s320) of any person who becomes aware of their activities, or those of their associates, causing or threatening to cause environmental harm.
Environmental Protection Regulation 2008 (EP Regulation)	The EP Regulation outlines the regulatory framework for managing the environmental impacts of industrial, agricultural, and resource development projects. The EP Regulation defines Environmentally Relevant Activities (ERAs), which are activities that may potentially cause environmental harm and necessitate approval.
Vegetation Management Act 1999 (VM Act)	The VM Act governs the lawful clearing of vegetation in Queensland. The VM Act establishes a regulatory framework that permits certain low-risk clearing activities and routine maintenance tasks to proceed without requiring development approval. However, all other clearing activities necessitate the acquisition of a development approval. The Proposed Action is seeking Operational Works approval for the clearing of native vegetation within Regional Ecosystems and certain regulated vegetation situated near watercourses.
Planning Act 2016 (Planning Act)	The Planning Act is the primary planning legislation administered by the Queensland Government. The Proposed Action is seeking a Material Change of Use approval pursuant to State Code 23. A Post-Construction Rehabilitation Plan and an End-of-Life Rehabilitation Plan are likely to be required as a condition of the Development Permit.
Local	
Banana Shire Planning Scheme 2021	The management of vegetation (including clearing) may be subject to regulation by local governments through their respective planning schemes and/or local laws. In instances where vegetation management requirements are not explicitly specified within these local instruments, such requirements must continue to be addressed in accordance with applicable state legislation. The Banana Shire Planning Scheme 2021's Performance Outcome 38 for assessable developments in the Rural zone stipulates that rehabilitation of the site must not lead to an increase in waste deposited at a Council landfill facility.

SECTION 8 REFERENCES

DEWHA. (2008). *Approved Conservation Advice for Stemmacantha australis (Austral Cornflower).* Canberra: Department of the Environment, Water, Heritage and the Arts. Retrieved from http://www.environment.gov.au/biodiversity/threatened/species/pubs/23949-conservation-advice.pdf

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Theodore Wind Farm

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Theodore Wind Farm

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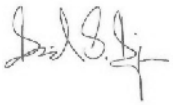


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ACRONYMS AND ABBREVIATIONS

Acronym	Description
BBMP	Bird and Bat Management Plan
dbh	Diameter at breast height
DCCEEW	Department of Climate Change, Energy, the Environment and Water
Disturbance Footprint	The area whereby the final layout and impacts have been considered and occupies an area of 1,537.4 ha.
OMP	Offset Management Plan
DMY	Dry matter yield
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
MHQA	Modelled Habitat Quality Assessment
MNES	Matters of National Environmental Significance
OAG	Offset Assessment Guide
PER	Public Environment Report
Proposed Action	Theodore Wind Farm
Proponent	Theodore Energy Development Pty Ltd
Project Area	The corridor of land on which the Disturbance Footprint will be located, including a 100 metre buffer for micro-siting.
RE	Regional ecosystem
SIG 1.1	Significant Impact Guidelines 1.1 – Matters of National Environmental Significance
Study Area	The 9 land parcels and road reserve areas, 46,830 ha, in which the Proposed Action will be located.
TEC	Threatened Ecological Community
WTG	Wind Turbine Generator

1. OFFSETS

1.1 SUMMARY OF RESIDUAL IMPACTS

An assessment was undertaken for relevant listed species against the *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* (SIG 1.1) as part of Section 6 of the Theodore Wind Farm Public Environment Report (PER). This assessment concluded that the Proposed Action is likely or has the potential to result in a residual significant impact to one Threatened Ecological Community (TEC), Poplar Box Grassy Woodlands on Alluvial Plains TEC (Poplar Box TEC), and four threatened species, southern squatter pigeon, greater glider, koala and diamond firetail.

Additionally, if a significant impact is to occur from Wind Turbine Generator (WTG) collision over the course of the life of the Proposed Action, after adaptive management has been implemented (outlined within the Bird and Bat Management Plan (BBMP) (Appendix D)), an offset for that species may be required. Further information on potential offsets for collision risk impacts is provided in Section 1.2.4.

1.1.1 RESIDUAL IMPACTS TO POPLAR BOX TEC

The potential significant impact conclusions for the Poplar Box TEC are based on the direct impact to 6.6 ha of the Poplar Box TEC.

Permanent impact to 6.6 ha of the Poplar Box TEC will result in a reduction of approximately 1.4% of the Poplar Box TEC within the Study Area. Although this is a relatively low percent, an impact to 6.6 ha is considered likely to constitute a reduction in the extent of the Poplar Box TEC. Additionally, as the Proposed Action will result in an impact to Condition Class B Poplar Box TEC (which may be considered habitat critical to the survival of the TEC), the Proposed Action has the potential to adversely affect habitat critical to the survival of the TEC. Therefore, it is considered likely that the Proposed Action will have a significant residual impact on Poplar Box TEC.

1.1.2 RESIDUAL IMPACTS TO SOUTHERN SQUATTER PIGEON

The potential significant impact conclusions for the southern squatter pigeon are based on direct impact during construction of the Proposed Action that would result in the removal of 123.0 ha of Breeding Habitat and 54.2 ha of Foraging and Dispersal Habitat. Revegetation associated with the Proposed Action (refer to Section 8 of the Theodore Wind Farm PER) is expected to return the functionality required for southern squatter pigeon in Foraging and Dispersal Habitat and therefore this impact is considered temporary. Based on the assumed post-construction rehabilitation, there will be a permanent impact (residual impact) to 123.0 ha of Breeding Habitat and 22.5 ha of Foraging and Dispersal Habitat (145.5 ha total) within the Study Area.

Southern squatter pigeon habitat within the Study Area has been considered habitat critical to the survival of the species. The projected permanent impact to 123.0 ha (or 1.3%) of available Breeding Habitat and 22.5 ha (or 1.0%) of available Foraging and Dispersal Habitat is considered likely to adversely affect habitat critical to the survival of the species. Therefore, it is considered likely that the Proposed Action will have a significant residual impact on the southern squatter pigeon.

1.1.3 RESIDUAL IMPACT TO GREATER GLIDER

The potential significant impact conclusions for the greater glider are based on direct impact during construction of the Proposed Action that would result in the removal of 19.8 ha of Likely/Current Denning Habitat, 1.1 ha of Potential Denning Habitat and 607.3 ha of Foraging and Dispersal Habitat (628.3 ha total).

All greater glider habitat within the Study Area has been considered habitat critical to the survival of the species due to the observation of 24 individuals within the Study Area during field surveys. As a result, it has been considered likely that the Proposed Action will adversely affect habitat critical to the survival of the species, even with mitigation measures such as micro-siting at areas of proposed infrastructure. Therefore, it is considered likely that the Proposed Action will have a significant residual impact on the greater glider.

1.1.4 RESIDUAL IMPACT TO KOALA

The potential significant impact conclusions for the koala are based on direct impact during construction of the Proposed Action that would result in the removal of 8.1 ha of Preferred Breeding and Foraging Habitat, 640.2 ha of General Breeding and Foraging Habitat and 247.2 ha of Dispersal Habitat. Revegetation associated with the Proposed Action (Section 8) is expected to return the functionality required for koala dispersal habitat and therefore, impacts to this habitat type are considered temporary. Based on the assumed post-construction rehabilitation, there will be a permanent impact (residual impact) to 648.3 ha of koala habitat within the Study Area (8.1 ha of Preferred Breeding and Foraging Habitat, 640.2 ha of General Breeding and Foraging Habitat and 0 ha of dispersal habitat).

All habitat within the Study Area has been considered habitat critical to the survival of the species. Despite the implementation of mitigation measures, including pre-clearance surveys and micro-siting of planned infrastructure, avoidance of high-value habitat and retention of movement and dispersal function through linear WTG design (see Section 7 of the Theodore Wind Farm PER for further detail), it is considered likely that the Proposed Action will adversely affect habitat critical to the survival of the species. Therefore, it is considered likely that the Proposed Action will have a significant residual impact on the koala.

1.1.5 RESIDUAL IMPACT TO DIAMOND FIRETAIL

The potential significant impact conclusions for diamond firetail are based on direct impact during construction of the Proposed Action that would result in the removal of 253.8 ha of Potential Breeding and Foraging Habitat. Revegetation associated with the Proposed Action (refer to Section 8 of the Theodore Wind Farm PER) is expected to return the functionality required for diamond firetail habitat and therefore the impact is considered temporary. Based on the assumed post-construction rehabilitation, there will be a permanent impact (residual impact) to 95.3 ha of Potential Breeding and Foraging Habitat within the Study Area.

Diamond firetail potential habitat within the Study Area has been considered habitat critical to the survival of the species. The projected permanent impact to 95.3 ha (or 1.2%) of Potential Breeding and Foraging Habitat is considered to have the potential to adversely affect habitat critical to the survival of the species. Therefore, it is considered potential that the Proposed Action will have a significant residual impact on the diamond firetail.

1.2 OFFSET SUMMARY

1.2.1 OFFSET REQUIREMENTS

Suitable offsets must deliver an overall conservation outcome that improves or maintains the viability of the protected matter (DSEWPC, 2012). The overall objective of managing the Proposed Actions offset is to improve the quality of habitat for the identified MNES so that it reaches a higher MHQA habitat quality score, than has been measured for the existing baseline condition, within a 20-year period and continues for the life of the approval. A baseline condition assessment has been undertaken and is presented in the Draft Offset Management Plan (OMP) (Appendix F).

Under the *EPBC Act Offsets Policy* (for land-based offsets) (Offsets Policy) (DSEWPC, 2012), affected threatened species require a like for like replacement of impacted vegetation communities and offsets are required to consider the risk of loss to potential offset areas when considering an appropriate offset areas size. Surveys conducted for the Proposed Action undertook 19 MHQAs to provide an indication of potential offset liability and habitat condition for the five Matters of National Environmental Significance (MNES) identified.

MHQAs were undertaken and subsequently scored in accordance with Queensland's the *Guide to determining terrestrial habitat quality* (DES, 2020). Habitat quality scores derive for each MNES are shown in Table 1-3.

1.2.2 OFFSET AREA

The Offset Area is located in the southwest of the Study Area and has an area of 5,268.9 ha (see Figure 1-1). Relevant details of the Offset Area are described in Table 1-1. The Offset Area occurs entirely within the Study Area and has therefore been classified and mapped into broad habitat types as classified in Section 4.2 of the Theodore Wind Farm PER.

TABLE 1-1 OFFSET AREA DETAILS

Offset Area	Land owner	Lot on Plan	Lot Size (ha)	Proposed Area for Offset (ha)
Offset Area	Land owner	[redacted]	19,594	5,268.9

Offset delivery will be undertaken by the Proponent in collaboration with land owner/land manager. It is important to note that the contractual agreement with the potential land owner of the Offset Area must be confirmed to ensure that the management actions, monitoring plan, interim performance targets, and Offset Area environmental objectives outlined in the Final OMP are achievable. In this light, the boundaries of the Offset Area is currently flexible and may vary slightly following the confirmation of the contractual agreement with the potential land owner.

In addition to this, additional offset areas are currently under consideration to support the delivery of these direct, land-based offsets. These areas have been further discussed in the OMP (Appendix F).

1.2.3 MEETING OFFSET AREA REQUIREMENTS

To assess the suitability of the Offset Area at meeting the offset requirements for each MNES, habitat quality scores for both the habitat impacted by the Proposed Action (Impact Area) and the Offset Area were used within the OAG calculator. MHQA habitat scores within the Offset Area will look to be improved by an integer of one for Poplar Box TEC, southern squatter pigeon and diamond firetail, and an integer of two for koala and greater glider within 20 years. Based on the OAG calculator, the Offset Area will sufficiently cover the offsets required for all MNES. This process is discussed in detailed within the Draft Offset Management Plan (OMP) (Appendix F) (including the additional parameters entered into the calculator tool), with the results summarised within Table 1-2.

TABLE 1-2 MNES OFFSET SUMMARY REQUIREMENTS

MNES	Residual Impact (ha)	Habitat quality score (Impact area)	Habitat quality score (Offset area)	Offset Area (ha)	Target habitat quality score (Offset area)	Percent of Residual Impacts Offset
TECs						
Poplar Box TEC	6.6	6	7	114.3	8	136.42%
Fauna						
Southern squatter pigeon	145.5	7	7	4,112	8	329.70%
Greater glider	628.3	8	6	5,068.2	8	135.03%
Koala	648.3	7	5	5,268.9	7	155.48%
Diamond firetail	95.3	6	6	1,226	7	175.14%

1.2.4 POTENTIAL OFFSET REQUIREMENTS FOR BIRD AND BAT SPECIES AS A RESULT OF TURBINE COLLISION

The above sections discuss the offset requirements for MNES due to significant residual impacts to the species resulting from the Proposed Action. The significant impact assessments conducted in Section 6 of the Theodore Wind Farm PER determined that, additional to southern squatter pigeon, a significant residual impact to any listed threatened and/or migratory bird or bat species in the Study Area was unlikely.

Based on the assessments completed as part of this PER, there is unlikely to be any significant residual impacts from WTG strike. The risk assessments and Collision Risk Model (as detailed in Section 6.11 of the Theodore Wind Farm PER) have been conducted and show no significant residual impact to listed threatened or migratory bird and bat species as a result of the Proposed Action.

The BBMP (Appendix D) lists the relevant management measures to be undertaken during construction and operation to mitigate impact to listed threatened or migratory species across the lifetime of the Proposed Action. Of particular consideration is the implementation of an adaptive management approach, in which potential impact to listed threatened or migratory bird or bat species will be monitored throughout the life of the Proposed Action. Should the potential for significant residual impact be triggered as a result of monitoring during the operational phase for any listed bird or bat species, financial or other indirect offsets will be adopted by the Proponent.

It is acknowledged that mitigation, rather than offsetting, will form the primary approach for managing collision and barotrauma mortality, given the difficulty in quantifying and offsetting such impacts under the current Offsets Policy. Therefore, to guide corrective action implementation, species-specific impact thresholds have been defined in the BBMP (Appendix D), based on relevant Commonwealth and State guidelines and ecological literature. This BBMP and the adaptive management framework are intended to ensure that any mortality remains within ecologically acceptable limits, with timely corrective actions implemented where required to mitigation for any impacts.

FIGURE 1-1 OFFSET AREA

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1.3 OFFSET MANAGEMENT PLAN

1.3.1 OMP PURPOSE

A OMP (Appendix F) has been prepared that specifically outlines the requirements to deliver and manage the offset, per the conditions of the approvals for the Proposed Action and developed in accordance with the Offsets Policy (DSEWPC, 2012). The OMP outlines the preliminary *Offset Assessment Guide* (OAG) calculator for the required MNES offsets and outlines the potential offset area and its suitability in providing the offsets required.

The purpose of the OMP is to:

- Summarise the Proposed Action impacts to the Poplar Box TEC, southern squatter pigeon, greater glider, koala, and diamond firetail;
- Identify and describe the Offset Area;
- Outline the regulatory framework guiding the development of the OMP, and demonstrate compliance with requirements;
- Provide objectives of the offset and site-specific management actions to be implemented within the Offset Area, including specific timing and outcomes to be achieved;
- Establish the requirements for monitoring, reporting and corrective actions;
- Demonstrates complete acquittal of the calculated offset requirement; and
- Assess the risks associated with achieving the offset.

It is important to note that the contractual agreement with the potential land owner of the Offset Area must be confirmed to ensure that the management actions, monitoring plan, interim performance targets, and Offset Area environmental objectives outlined in the OMP are achievable. In this light, the boundaries of the Offset Area is currently flexible and may vary slightly following the confirmation of the contractual agreement with the potential land owner. The OMP presents the current opportunities for available land for offsets and management measures that are workable to meet the objectives of the Offset Area onsite (within the Study Area of the Proposed Action). There is currently a preference for onsite offsetting, however, there may be the opportunity to offsite the Offset Area if required. Additionally, the management actions presented within the OMP are desirable management actions, however they may be subject to change following offset negotiation with land owners. A Final OMP will be for the implementation and ongoing management of the Offset Area prepared following the contractual agreement with the potential land owner.

This OMP has been prepared in accordance with *The Environmental Management Plan Guidelines* (DCCEEW, 2024), and has been reviewed and approved by Dr David Dique, a Commonwealth Approved Ecologist with 30 years' experience (Suitably Qualified Ecologist).

1.3.2 OFFSET AREA MANAGEMENT ACTIONS

Management actions have been designed to ensure that the completion criteria for the offset area are supported and achieved. Management actions have been designed to achieve the predicted gains in vegetation integrity and habitat quality scoring required to deliver the offset for the five MNES.

The focus of the management actions will be to increase the MHQA metrics most associated with improving habitat quality for the five MNES outlined above. These MHQA metrics primarily relate to aspects such as large tree canopy and cover, shrub and grass cover, flora species diversity and abundance, but some MNES have specific targets that are also measurable outside of standard BioCondition inputs for the MHQA (i.e., related to species or TEC context). These include metrics such as increases in food trees for greater glider (i.e., over the >30cm diameter at breast height (dbh) benchmark), juvenile food trees for koala, recruitment and progression to mature trees for Poplar Box TEC, and bare ground coverage for southern squatter pigeon.

Management actions have been divided into five categories which have been detailed within Table 1-3.

Furthermore, management actions will be implemented through a zoned approach that integrates enhancement of existing remnant vegetation with active regeneration and revegetation of regrowth and previously cleared/disturbed areas.

- The zoned management framework applies two management zones that represent different levels of intervention linked to ecological condition and limiting factors:Baseline zone: MNES habitat where vegetation structure and function are present and recoverable using protection and maintenance measures. Management focuses on weed suppression, pest control, appropriate fire, managed grazing, and protection of existing structure to maintain or improve BioCondition attributes and reduce threats.
- Active Regeneration zone: MNES habitat where natural recruitment and structural development are constrained by one or more limiting factors and require intensified intervention to deliver timely recovery. Management adds assisted regeneration and targeted revegetation to the baseline measures and applies stronger threat abatement and stock exclusion to restore vegetation structure, floristic diversity and microhabitat.

The zoning differentiates where protection and maintenance alone are sufficient compared to where intensified management is required to restore vegetation structure and improve MHQA attributes. Baseline zone actions include habitat, weed, pest, fire, grazing and general management as described in the following Section. Active regeneration zone actions include all baseline actions plus assisted regeneration measures such as propagation or planting to accelerate canopy and mid-story development, intensified weed suppression in priority locations, temporary total stock exclusion where needed to protect recruitment, and increased monitoring to confirm response.

TABLE 1-3 ZONED MANAGEMENT STRATEGY FOR IMPACTED MNES

Management zones	Management Areas	Proposed Management Actions
Baseline zone	• Areas where MNES habitat occurs in locations defined as 'remnant' by VM Act RE mapping 13.1 (DES, 2024)	The proposed management actions for the Baseline zone include the following: • Habitat management; • Targeted weed management; • Pest animal management; • Fire management; • Grazing management; and • General management.

Management zones	Management Areas	Proposed Management Actions
Active Regeneration zone	• Areas where MNES habitat occurs in locations defined as 'non-remnant' VM Act RE mapping 13.1 (DES, 2024)	Additional to the baseline management ties: • Habitat management – propagation of source material in selected areas to increase speed of canopy regeneration; • Weed management – more frequent and intensified removal of woods and management of burgeoning infestations; • Grazing management – total cattle exclusion in selected locations to enable enhanced and more successful canopy recruitment; and • General management – increased monitoring to ensure sufficient barrier maintenance and species utilization.

This zoned approach will support the HQS improvement required for each MNES. Offset management is designed to achieve a two point HQS gain for koala and greater glider habitat. This will require areas of habitat for these species to be managed inline with Baseline Zone management action and for habitat to created and uplifted. A one point gain for Poplar Box TEC, southern squatter pigeon and diamond firetail habitat is proposed. These gains apply at the Offset Area scale and are achieved through the combined effect of baseline and active regeneration zone actions over the 20 year time horizon of the offset.

TABLE 1-4 MANAGEMENT CATEGORIES AND ACTIONS TO MEET MNES OFFSET LIABILITY

Management Categories	Management Actions
Habitat Management	Implementation of the management actions and adaptive management framework as outlined in the OMP. Maintaining and promoting eucalypt growth to support natural recruitment and regeneration (pest, weed, fire and grazing management as per the routine outlined in the OMP). No unapproved and/or intentional clearing of vegetation within the offset area will be completed, except for clearing that is required for fencing, access tracks, firebreaks and public safety.
Weed Management	Baseline weed mapping will be undertaken for WoNS and locally significant weeds relevant to the threatened species within the Offset Area. The following management actions will be implemented to manage the establishment and spread of non-native weeds: • Low intensity grazing by cattle (stock management); • Herbicide, mechanical and Biological control; and • Fire. • All machinery and vehicles required to access the Offset Area for construction or maintenance will be certified to be weed free upon arrival.
Pest Management	Undertake surveys to establish pest animal occurrence and detailed mapping of targeted pest animals within the Offset Area, prior to active management. Surveys will determine presence and densities of identified targeted pest animals. Noting that feral animal management currently occur by land owner, the OMP commitment formalises that ongoing control will remain. Where an unplanned or uncontrolled fire affects the Offset Area, an assessment will be undertaken to determine the extent and severity of impact to habitat quality. This assessment will determine if the impact of the unplanned fire is likely to result in changes in the number of pest animals present.

Management Categories	Management Actions
	A review of the management actions will be carried out to ensure targeted pest animal species are adequately monitored. Where targeted pest animal densities are found to increase after a fire event, immediate application of corrective actions will be carried out. For example, where an increase in the number of feral cats or foxes are observed post-fire event, additional control programs (baiting, trapping) will be immediately implemented to reduce risk to MNES.
Fire Management	If there are one or more bushfires that are current in the region and they are considered threatening to the Offset Area, then coordinate with all relevant fire authorities to determine an appropriate method to protect the Offset Area. The approval holder will maintain firebreaks along boundaries of the Lots within which the Offset Area is defined. These breaks must be inspected periodically and have maintenance occur once every three years at a minimum. Important note: if there is fire damage to the Offset Area then it must be reported by the land owner. The approval holder is required to report any damage to the Offset Area to the Commonwealth. Surveys will be undertaken by suitably qualified professionals to re-establish a baseline of fuel loads within the Offset Area prior to active management, which can be monitored against for implementation of corrective actions. Management activities to reduce fuel loads will be undertaken within the Offset Area and include: • Low intensity grazing by livestock; and • Cool controlled burns. • Controlled burns must follow the fire management guidelines specific for the REs within the Offset Area (Queensland Government, 2024).
Grazing Management	Management actions associated with minimising the pressure and habitat impacts of grazing include: • Monitor stocking rates within the Offset Area; and • Reduce current stocking rates (to be negotiated with land owner property to property). • Stock will be grazed only when required to reduce dry matter yield (DMY), and only during the dry season. A specific DMY lower limit will be determined after negotiation with land owners to avoid overgrazing the Offset Area.
General Offset Management	Selective logging practices will be excluded from the Offset Area to maintain the extent of mature trees within the Offset Area. Gates at the entrance of Offset Area will be maintained to: • Prevent the entry of unauthorised large domestic animals; and • Remove vehicle access and limit any potential harvesting of timber. Vehicle access is limited to authorised contractors undertaking offset area management in accordance with this plan. A speed limit within the Offset Area will also be imposed.

1.3.3 MONITORING AND REPORTING

A monitoring program, described within the OMP (Appendix F), details the monitoring actions that will occur within the Offset Area. The OMP will continue monitoring actions for the life of the approval to ensure corrective actions are undertaken when required and the Offset Area continues to meet criteria set by the approval. The monitoring program has been developed to assess success of the management actions, to improve the overall habitat quality scores for MNES. Monitoring data will be submitted electronically to DCCEEW in accordance with the Guidelines for biological survey and mapped data.

The monitoring actions described in the OMP will be managed by the Offset Provider and will be completed by a suitably qualified expert, as required by the conditions of approval. The placement of permanent MHQA transects and photo monitoring locations will correspond to the same locations used for the calculation of the start habitat quality scores used in the assessment of the Offset Area suitability.

Thirteen field-based ecological condition indicators used in the MHQA will be monitored to track the effectiveness and success of the OMP:

- Recruitment of woody perennial species – includes koala and greater glider canopy feed and shelter tree species, canopy and indicator species for TEC classification.
- Native plant species richness (trees, shrubs and grasses) – as an indicator of ecological succession and regeneration progress after mitigating ecosystem threats as well as improvement to potential condition class and structure of TEC.
- Tree canopy height – indicates progress towards ecological maturity and increases in habitat availability and TEC quality progression.
- Tree canopy cover – indicates progress towards ecological maturity and increases in habitat availability and TEC quality progression.
- Shrub canopy cover – indicates progress towards ecological maturity, composition of ground cover for southern squatter pigeon.
- Native perennial grass cover – which suppresses weeds and thereby encourages recruitment of juvenile eucalypt foraging and shelter trees and creates open composition of woodlands, indicates foraging capacity for southern squatter pigeon.
- Organic litter cover – important for surface soil moisture retention, cycling of nutrients and providing interstitial spaces to enhance tree seed germination and growth and recruitment of canopy species including actively-growing species that support MNES and foraging activity.
- Large trees per hectare – includes koala and greater glider canopy feed and shelter tree species, canopy and indicator species for TEC classification.
- Coarse woody debris per hectare – habitat surrogate for ground-dwelling fauna and an indicator of management disturbance.
- Non-native plant cover – which can compete with native plants for light, moisture and nutrients, especially recruiting koala and greater glider food and shelter tree canopy species, TEC condition, microhabitat reference. Invasive plants can increase fuel load and change fire regimes and susceptibility to unplanned fires.
- Quality and availability of food and foraging – e.g. number, size and health of foraging trees, available foraging space in ground cover, richness and density of grass species.
- Quality and availability of shelter – e.g. density and health of denning trees.
- Threats to species and ecosystems – e.g. pest animals, weed species, vehicle strike.

These attributes will be put through the MHQA to assess the progress of the Offset Area towards the completion criteria. The location of the monitoring transects will be decided upon completion of the Final OMP.

1.3.4 PERFORMANCE OBJECTIVES AND COMPLETION CRITERIA

The overall objective of managing the offset is to improve the quality of habitat so that it reaches a higher MHQA habitat quality score than has been measured for the existing baseline condition within a 20-year period and continues for the life of the approval.

A demonstrated increase in measurable habitat criteria (see Table 1-5), as defined in the MHQA, will be provided against the baseline condition assessments, to be finalised on selection of a final Offset Area.

Monitoring results will be analysed against performance targets to determine whether performance objectives are met prior to the completion criteria being achieved. Monitoring against the targets and the criteria will provide an indication of the success of the management and monitoring actions being implemented to improve the quality of MNES habitat and TECs. They will also serve to trigger implementation of corrective actions where targets and criteria are not being met.

TABLE 1-5 MNES SPECIFIC COMPLETION CRITERIA

MNES	Completion criteria metric	Measured by
Koala	1. Increase available foraging tree species diversity and available juvenile tree species. 2. Increase baseline scores to number of large canopy tree species known to be koala trees (as compared to regional ecosystem benchmark; 75% or greater than RE benchmark). 3. Increase of baseline scores to canopy height (as compared to RE benchmark; 75% or greater than RE benchmark). 4. Decrease of shrub cover (with a focus on any invasive shrubs that may restrict movement such as lantana) to <200% of the RE benchmark.	5. Native plant species richness – Trees 6. Juvenile tree count per ha (as per koala habitat methodology within MHA guidelines) 7. Number of large eucalypt trees; 8. Tree canopy height (average of emergent, canopy and sub-canopy); and 9. Shrub canopy cover. 10.
Greater glider (southern and central)	11. >75% of RE benchmark for species diversity. 12. Increase of baseline scores to canopy height (as compared to RE benchmark; 75% or greater than RE benchmark) 13. Increase of baseline scores to canopy cover (as compared to RE benchmark; 75% or greater than RE benchmark). 14. Increase abundance of large trees suitable for current denning (as per the *Greater Glider Guides* large hollow-bearing tree dbh proxy the Brigalow Belt Bioregion >46 cm). 15. Increase abundance of large trees suitable for potential denning (as per the *Greater Glider Guides* foraging tree dbh proxy the Brigalow Belt Bioregion (>30 cm). 16. >75% of large trees as a % of RE benchmark. 17. Species presence.	18. Tree canopy height (average of emergent, canopy and sub-canopy); 19. Tree canopy cover (average of emergent, canopy and sub-canopy); 20. Large trees per ha; 21. Suitable habitat trees >30 22. cm dbh per ha; and 23. Species confirmed utilisation of regenerated areas.

MNES	Completion criteria metric	Measured by
◦ Southern squatter pigeon	24. Native grass richness 6 or above (relevant to RE baseline scored for current impact area). 25. Native grass cover maintained between 34-50% to ensure correct bare ground and structural preferences for the species. 26. Shrub cover <50%.	27. Native plant species richness – grasses; 28. Native perennial grass cover (%); 29. Bare ground (%); 30. Litter (%); 31. Shrub cover (%); and 32. Canopy cover (%).
Diamond firetail	• Increase native grass ground cover and richness (>60% native grass species cover and species richness consistent with reference RE). • Tree and shrub density consistent with reference RE. • Management of non-native grass species (non-native ground cover <5%). 33. Decrease rabbit density (threat from rabbit degrading habitat decreased to negligible).	• Native plant species richness – grasses; • Native plant species richness – forbs; • Native perennial grass cover (%); • Shrub cover (%); • Large trees; • Non-native plant cover (%); and • Rabbit abundance.
Poplar Box TEC	34. Improvement of RE condition. 35. Increased abundance of diagnostic species already present TEC (as per Appendix A1 of the Conservation Advice). 36. Increased diversity of diagnostic species not yet present within the TEC (as per Appendix A1 of the Conservation Advice). 37. Increased number of large canopy trees (*Eucalyptus populnea*) relative to baseline conditions. 38. Increased number of native ground layer species per ha. 39. Increased connectivity between fragmented patches.	40. Native plant species richness – grasses; 41. Native plant species richness – forbs; 42. Native plant species richness – low shrubs; 43. Weed cover; and 44. Recruitment.

1.4 OFFSETS POLICY

The Offsets Policy (DSEWPC, 2012), provides guidance on the role of offsets in environmental impact assessments of MNES and the suitability of any proposed offsets for those MNES. If significant impacts to MNES are considered likely, and the Proposed Action is determined a 'controlled action' under the EPBC Act (such as this Proposed Action has), the Offsets Policy will apply.

The Offsets Policy has five key aims, being to:

- Ensure the efficient, effective, timely, transparent, proportionate, scientifically robust and reasonable use of offsets under the EPBC Act;
- Provide proponents, the community, and other stakeholders with greater certainty and guidance on how offsets are determined, and when they may be considered under the EPBC Act;
- Deliver improved environmental outcomes by consistently applying the policy;
- Outline the appropriate nature and scale of offsets and how they are determined; and
- Provide guidance on acceptable delivery mechanisms for offsets.

1.4.1 CORE PRINCIPLES OF THE EPBC ACT OFFSETS POLICY

Table 1-6 details how the Proposed Action, through the Offset Area, will aim to meet the core principles of the Offsets Policy (DSEWPC, 2012).

TABLE 1-6 OFFSETS POLICY APPLICATION TO THE PROPOSED ACTION

Offsets Policy Principles (DSEWPC, 2012)	Proposed Offset Anticipated Compliance
Must deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environment law and affected by the Proposed Action	The offset includes a direct, land-based offset that will result in the protection and improvement of Poplar Box TEC, southern squatter pigeon, greater glider, koala and diamond firetail habitat. The offset is like-for-like, comprising habitat values commensurate with the habitat impacted. Management actions will be undertaken across six broad categories (habitat management, weed management, pest animal management, fire management, grazing management and general Offset Area management), to ensure the Offset Area's habitat quality is improved throughout the lifetime of the offset. The Offset Area will be managed exclusively for conservation purposes and will be protected and managed under the OMP for the life of the approval.
Must be built around direct offsets but may include other compensatory measures	The Offset Area for the Poplar Box TEC, southern squatter pigeon, greater glider, koala and diamond firetail is a direct land-based offset. The offset secures a land-based offset that meets the offset obligation and will be managed in accordance with the OMP.
Must be in proportion to the level of statutory protection that applies to the protected matter	The Offset Area calculation has been informed by the EPBC Act threat status for all TECs and impacted species, through the use of the EPBC Act Offsets Assessment Guide (OAG).
Must be of a size and scale proportionate to the residual impacts on the protected matter	The size and scale of the offset has been assessed using the EPBC Act OAG, with the following percent of impact offset for each MNES: • 136.42% for Poplar Box TEC; • 329.70% for southern squatter pigeon habitat; • 135.03% for greater glider habitat; • 155.48% for koala habitat; and • 175.14% for diamond firetail habitat. Refer to Section 4.5.2 and Appendix C of the OMP (Appendix F) for full OAG assessments. It should be noted that this OMP has been developed based on a maximum significant residual impact for each MNES. Therefore, the offset for MNES values will provide protection for above the required offset amount.
Must effectively account for and manage the risks of the offset not succeeding.	A detailed risk assessment has been provided in the OMP, which details the relevant mitigation measures and residual risk rating in accordance with the *Environmental Management Plan Guidelines* (DCCEEW, 2024). Key threats to the Offset Area will be actively managed in accordance with this OMP. The risk of the offsets not succeeding has been factored into the EPBC Act OAG calculator, with 'confidence in result' set at: • 60% for Poplar Box TEC; • 85% for southern squatter pigeon offset; • 85% for greater glider offset; • 85% for koala offset; and • 85% for diamond firetail.

Offsets Policy Principles (DSEWPC, 2012)	Proposed Offset Anticipated Compliance
	Adaptive management will be implemented as part of the OMP and will ensure that changes and updates can be made to Management Actions, if circumstances in the Offset Area change.
Must be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs (this does not preclude the recognition of state or territory offsets that may be suitable as offsets under the EPBC Act for the same action, see Section 7.6)	The Offset Area is not protected through a State or Commonwealth mechanism. By designating the Offset Area as a Category A (offset area) under the *Vegetation Management Act 1999* (VM Act), additional protection is placed over the vegetation so that existing pressures on the condition can be removed. The Offset Area has not previously been used as part of a recovery plan or conservation outcome. Thus, the Offset Area offers additional protection to what is already in place under planning regulations/schemes.
Must be efficient, effective, timely, transparent, scientifically robust and reasonable	The Offset Area will be governed by the OMP, which includes a management, monitoring, and reporting program. The OMP provides transparency around offset delivery and clear requirements around timing and required outcomes. The management actions have been informed by species-specific requirements and technical knowledge regarding key threats and effective control measures. Therefore, the offset is considered to be efficient, effective, timely, transparent, scientifically robust and reasonable.
Must have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced	The OMP includes clear and detailed objectives, as well as the specific timelines that will be in place to ensure management of the Offset Area are followed and implemented. The responsibilities of the Proponent and land owner, as well as monitoring and auditing measures, are detailed in Section 2.3 and Section 6 within the OMP.

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Theodore Wind Farm

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ACRONYMS AND ABBREVIATIONS

Acronym	Description
AoI	Area of Influence
BBMP	Bird and Bat Management Plan
CEC	Community Engagement Committee
CEMP	Construction Environmental Management Plan
CVMP	Cleared Vegetation Management Plan
Disturbance Footprint	The area whereby the final layout and impacts have been considered and occupies an area of 1,537.4 ha.
DMP	Decommissioning Management Plan
ESCP	Erosion and Sediment Control Plan
MNES	Matters of National Environmental Significance
PER	Public Environment Report
Proposed Action	Theodore Wind Farm
Project Area	The corridor of land on which the Disturbance Footprint will be located, including a 100 metre buffer for micro-siting.
RWE	RWE Renewables Australia Pty Ltd
SEIA	Socio-Economic Impact Analysis
Study Area	The 9 land parcels, across 3 properties, and road reserve areas, 46,830 ha, in which the Proposed Action will be located.
SWMP	Stormwater Management Plan
The Proponent	Theodore Energy Development Pty Ltd
VFMP	Vegetation and Fauna Management Plan
WTG	Wind Turbine Generator

10. OTHER APPROVALS AND CONDITIONS

On 20 June 2025, a Development Permit for a Material Change of Use (Wind Farm) and Operational Works (Native Vegetation Clearing) was granted by the Queensland State Assessment Referral Agency.

The following State Development Assessment Provisions State Codes have conditions imposed as part of the Queensland State Development Approval:

- State Code 16: Native vegetation clearing;
- State Code 23: Wind farm development.

Table 10-1 identifies relevant conditions applied to the Proposed Action.

TABLE 10-1 ANTICIPATED MODEL CONDITIONS

Condition Number	Condition	Description
3	Prepare a Vegetation and Fauna Management Plan (VFMP)	The VFMP must be prepared by a suitable qualified ecologist and include: • The location and extent of all vegetation clearing and subsequent site works including areas to be used for soil and felled vegetation stockpiles; • Outline the proposed approach to the staging of vegetation clearing and how it will be managed to respond to the requirements of this condition (for example whether clearing will occur simultaneously over multiple parts of the site or on a single clearing front); • Outline measures to be used to ensure that vegetation that is not approved for clearing is not affected by clearing activities and subsequent site works; • Outline a detailed strategy to be deployed to ensure that important flora (that is not approved for clearing) and fauna is not unduly harmed during clearing activities. This strategy should include but not be limited to: ◦ how and when qualified fauna spotters/wildlife officers will be used during clearing operations (particularly if clearing is to occur on multiple areas of the site simultaneously); ◦ protection, recovery and relocation procedures to be used by fauna spotters/wildlife officers in the course of their duties.
4	Prepare a Cleared Vegetation Management Plan	The Cleared Vegetation Management Plan must be prepared by a suitability qualified person and include: • The overall strategy to be deployed for the felling an managing of vegetation approved for clearing; • the location and extent of storage and stockpile areas for cleared vegetation and mulch; • outline how cleared vegetation is to be treated and managed through a combination of: ◦ strategies for the on-site reuse of felled, non-mulched logs as part of the Rehabilitation Management Plan including how timbers will be stored and managed prior ot being relocated during rehabilitation activities; ◦ ensuring that felled timber logs that are pushed into permanent rows do not exceed approximately three (3) metres in height; ◦ any removal off-site of salvaged logs; ◦ use of mulched material both on-site and mulched material to be removed off-site.

Condition Number	Condition	Description
		• Measures to manage bushfire risks of all on-site cleared vegetation including managing risk of spontaneous combustion of mulch piles. • Industry best practice measures to be used to minimize bush fire risks and environmental impacts of any on-site burning of cleared vegetation. • Measures to ensure that cleared vegetation is not pushed, stacked or in any way damages habitat or vegetation not approved to be cleared.
5	Prepare a Rehabilitation Management Plan	The Rehabilitation Management Plan must outline how areas cleared of vegetation will be replanted, revegetation, and management after construction. It must be prepared by a suitability qualified person and: • Be in accordance with the Post-Construction Rehabilitation Plan prepared for the Proposed Action; • Detail all activities, actions and measures to demonstrate how all Type 2 Rehabilitation Area, will be rehabilitated to the pre-clear state; • Ensure the proposed timing of the rehabilitation activities minimizes to the greatest extent practicable the time the disturbance footprint is left unvegetated; • Include requirement o undertake adaptive management responses to rectify any negative results to ensure that over time compliance is achieved; • Include strategies and measures that may be deployed as adaptive management responses if monitoring highlights negative results.
6	Prepare Rehabilitation Monitoring Reports	Rehabilitation Monitoring Reports must be completed for the first five years following commencement of export of electricity and include: • Details of the implementation of the Rehabilitation Management Plan, including: ◦ Plant growth; ◦ % cover and survival rates; ◦ Estimated plan losses through herbivores, disease, vandalism, storm damage, etc.; ◦ Weed regrowth and control measures; ◦ Plant replacement; ◦ Guard repair and weeding inside guards; ◦ Maintenance watering regime; • Report on any adaptive management responses to rectify negative results from monitoring undertake.
8	Prepare a finalised Bird and Bat Management Plan (BBMP)	The BBMP must: • Be prepared by a suitably qualified ecologist • Be based on the final location of WTG • Identify all 'at risk' bird and bat species (i.e. all threatened and common species), seasons, and areas within the project site which may attract high levels of mortality • Incorporate baseline data, including where relevant, additional pre-operational surveys, Collision Risk Modelling and Population Viability Analysis • Identify threshold (trigger) levels for all species • Identify mitigation measures and implementation strategies to reduce impacts on bird and bat species • Include a decision-making framework and adaptive management approach, including triggers for mitigation measures such as operational shut-down of relevant turbines during certain periods.

Condition Number	Condition	Description
8	Prepare a first-year postconstruction report.	The report must: • Be prepared by suitably qualified ecologist • Demonstrate whether the site continues to be utilised by the range of species identified during surveys conducted before the full commencement of the use and asses any changes in abundance or behaviour • Include a recommendation on the need for additional surveys • The BACI sampling design will be tested using the data collected in baseline and post-construction bird utilisation surveys.
9	Prepare a Stormwater Management Plan (SWMP)	The SWMP must: • Be certified by a Registered Professional Engineer of Queensland • Relate to the operational phase of the wind farm • Be prepared in accordance with section 2.3 of the Queensland Urban Drainage Manual and demonstrate all stormwater, wastewater, discharges and overland flows leaving the site during the operational phase are of the same quality and quantity of receiving waters prior to development • Have regard to erosion management and site stabilisation.
10	Prepare an Erosion and Sediment Control Plan	The Erosion and Sediment Control Plan must: • Be prepared by an appropriately qualified professional; • Incorporate mitigation measures as identified in the Stormwater Assessment prepared for the Proposed Action; • Be prepared in accordance with the Best Practice Erosion and Sediment Control guidelines for Australia; • Prevent increased sediment runoff, including sediment runoff as a result of vegetation clearing, from entering into watercourses, drainage features, wetlands and/or surrounding landscapes during all construction phases from vegetation clearing, undertaking civil works and during the construction of wind turbines and ancillary infrastructure; • Recommend measures and devices to prevent accelerated soil erosion and instability or where prevention is not possible, minimize and mitigate; • Include a monitoring plan and program that is responsive to the seasonal erosion risks of the site, and is adaptive to rectifying negative monitoring results; • Include an emergency erosion management response protocol that must be enacted ahead of forecast weather events that will substantially increase the likelihood of accelerated erosion.
12	Prepare a Construction Environmental Management Plan (CEMP)	The CEMP must: • Be prepared by a suitably qualified person • Include measures necessary to minimise impacts to agricultural or active including stock routes and cattle movements • Identity activities necessary to ensure the removal and disposal of waste and details of the nominated waste facilities (waste, except for vegetation must not be burnt or allowed to be burnt onsite) • Ensure the location of infrastructure required for construction is within the final Project Layout Plan • provide appropriate weed and pest management in accordance with the Department of Agriculture and Fisheries' principles of pest management • include measures to manage construction noise, dust and vibration, including:

Condition Number	Condition	Description
		◦ construction noise in accordance with the Environmental Protection (Noise) Policy 2019 ◦ construction vibration to meet the construction vibration criteria in the Department of Transport and Main Roads' Transport Noise Management Code of Practice dated March 2016 ◦ the activities and equipment likely to generate noise and vibration ◦ identification of the proposed hours of work and what work will be undertaken during those hours, including where works are proposed outside of the hours and days specified in the default noise standards within Chapter 8, Part 3B, Division 3 of the Environmental Protection Act 1994 ◦ the identification of the sensitive receptor locations that may be affected by noise, vibration, and dust emissions from the construction work activities ◦ assessment of potential noise and vibration impacts at sensitive receptors (i.e. via noise modelling) with respect to the relevant criteria ◦ mitigation measures to reduce noise, vibration and dust impacts at sensitive receptors, including: ◦ scheduling of activities ◦ consultation with relevant sensitive receptors ◦ an effective complaints resolution process per Condition 30 ◦ a blasting plan • include erosion and sediment control measures in accordance with the Best Practice Erosion and Sediment Control guidelines for Australia (International Erosion Control Association) and includes measures to: ◦ prevent accelerated soil erosion ◦ where prevention is not possible, minimise, and mitigate accelerated soil erosion ◦ monitor and respond accelerated soil erosion events • achieve no net worsening of stormwater management in accordance with the Queensland Urban Drainage Manual, certified by a Registered Professional Engineer of Queensland • geotechnical and slope stability risk assessment, certified by a Registered Professional Engineer of Queensland.
13	Prepare a Bushfire Management Plan	The Bushfire Management Plan must: • Be prepared by a suitability qualified person; • Be prepared in consultation with the Rural Fire Service Queensland and all host land owners; • Provide evidence of consultation; • Include a fire hazard analysis; • Include mitigation strategies to achieve the development outcomes in Part E of the Queensland State Planning Policy 2017.
32	Prepare an End of Construction Decommissioning Management Plan (DMP)	The End of Construction DMP must: • be prepared by a suitably qualified person • Address the actions to be undertaken to remove all construction facilities and infrastructure not required for the ongoing operation of the wind farm, including: ◦ Removal of above ground non-operational equipment, such as storage areas, site offices, construction areas, access tracks, construction laydown areas. ◦ Removal and clean up of any contamination caused by the development as defined in the *Environmental Protection Act 1994.*

Condition Number	Condition	Description
30	Prepare an End of Operation Decommissioning Management Plan (DMP)	The End of Operation DMP must: • be prepared by a suitably qualified person • demonstrate how all wind turbine components and ancillary infrastructure will be reused and/or recycled to the maximum extent possible; • address the actions to be undertaken where any or all turbines have permanently ceased operating including: ° removal of above ground non-operational equipment ° removal and clean-up of any contamination caused by the development as defined in the Environmental Protection Act 1994 ° rehabilitation/regeneration of storage areas, construction areas, access tracks and other areas affected by the decommissioning of the turbines if those areas are not otherwise useful to the ongoing use of the land ° a consultation program with relevant parties including surrounding landowners.

Table 10-2 below details the potential secondary approvals that may be required for the Proposed Action.

TABLE 10-2 SUMMARY OF POTENTIAL SECONDARY APPROVALS

Legislation	Approval Requirement
Aboriginal Cultural Heritage Act 2003 (Qld)	Cultural Heritage Management Plan or Other Agreement to satisfy Cultural Heritage Duty of Care Guidelines
Planning Act 2016	Secondary approvals are required under the *Planning Act 2016* for accommodation facilities, concrete batching, quarrying, and earthworks associated with the Proposed Action.
Environmental Protection Act 1994	General Environmental Duty - Construction will need to comply with general environmental duty not to cause environmental harm, and to notify of environmental incidents if they occur.
Fisheries Act 1994	Approvals under the *Fisheries Act 1994* are required for waterway barrier works associated with impacts to waterways within the Proposed Action.
Water Act 2000	A Riverine Protection Permit is required if vegetation clearing associated with watercourse crossings does not comply with the exemption requirements for Riverine Protection A Water Licence is required if the Proposed Action takes or interferes with water in a watercourse, lake or spring.
Transport Infrastructure Act 1994	Upgrades to the road network trigger approvals under the *Transport Infrastructure Act 1994.*
Nature Conservation Act 1992	Approvals under the *Nature Conservation Act 1992* required for impacts to animal breeding places and the clearing of protected plants

Legislation	Approval Requirement
Banana Shire Council Planning Scheme	A number of secondary approvals may need to be sought from the Banana Shire Council in accordance with the Planning Scheme. These secondary approvals may include: • Development Permit for Reconfiguring a lot (for the purpose of a lease) for the establishment of a lease for a term greater than 10 years • Development Permit for a Material Change of Use (medium or high impact industry) for the establishment of a concrete batching plant • Development Permit for a Material Change of Use (extractive industry) for the establishment of a quarry / borrow pit • Development Permit for Operational Work (filling and excavation & waterway barrier works) over the site. • Development Permit for Building Works • Development Permit for Plumbing and Drainage

11. CONSULTATION

Theodore Energy Development Pty Ltd (the Proponent) has engaged with stakeholders regarding the Theodore Wind Farm (Proposed Action) since 2021. The focus has been on building transparent and constructive relationships with landholders, neighbours, the community, Traditional Owners, and other interested parties. Further information is included in Appendix L.

Public drop-in sessions have provided valuable forums for community feedback. Key topics of interest have included:

- Noise;
- Visual amenity;
- Local housing;
- Biodiversity;
- Cultural heritage;
- Traffic;
- Workforce accommodation;
- Potential demands on Council infrastructure; and
- Servies and materials.

11.1 IDENTIFICATION OF AFFECTED PARTIES

A Community and Stakeholder Engagement Plan has been prepared to guide stakeholder engagement for the Proposed Action, and establishes the overarching guidelines, principles, objectives, and approach to delivering stakeholder engagement during the Development Phase of the Proposed Action.

The Proponent undertook a mapping exercise to identify affected parties located near the Study Area who were most likely to directly benefit or be impacted by the Proposed Action. The purpose of this mapping exercise was to understand the community context in which the Proposed Action sits, and to ensure that appropriate attention and communication was made to address concerns and/or queries.

The affected parties identified via the mapping as potentially impacted by the Proposed Action, are outlined in Table 11-1.

TABLE 11-1 AFFECTED PARTIES

Parties	Specific Parties
Landowners	Landowners hosting Proposed Action infrastructure for the proposed Theodore Wind Farm.
Fenceline Neighbours	Fencline neighbours are identified as neighbours share a fence line or property boundary with the host landowner(s)/Study Area.
Near Neighbours	Neighbours with a dwelling within 10 km of the proposed Theodore Wind Farm site boundary.

Parties	Specific Parties
Traditional Owners and First Nations People	• Wulli Wulli People • Wulli Wulli Nation Aboriginal Corporation RNTBC • Wulli Wulli Ranger program • Wulli Wulli Elder Group
Opponents (no active opponents identified)	Individuals and organised groups actively opposed to the proposal in proximity to the proposed Study Area.
Wider Community	Residents of the local geographic area hosting the Proposed Action, as well as local interest groups not defined in any previous categories, including: • Residents outside of the boundary determined for neighbours; • Aged care and healthcare organisations; • Business organisations, including but not limited to farmer associations, local progress associations, chambers of commerce or local business structures; • Churches and faith-based organisations; • Conservation and environmental organisations; • Local climate action and sustainability groups; • Not-for-profit organisations; • Primary, secondary, or tertiary educational institutions; and • Recreational groups and clubs.
Local Government	Councillors and staff employed by: • Banana Shire Council • Gladstone Regional Council
Infrastructure owners / operators	• Australia Pacific LNG Pty Limited • Bureau of Meteorology • Geoscience Australia • Telstra • Optus
Aviation Industry	• Airservices Australia • Department of Defence • IDS Australia (procedure designer for Theodore Airport instrument flight procedures) • Queensland Royal Flying Doctor Servies
Industry Bodies	• Clean Energy Council • Re-Alliance • Gladstone Ports Corporation • Stanwell Corporation • Barfield Road Producers Group
Government and Associated Agencies	• Federal Department of Climate Change, Energy, the Environment, and Water • State Assessment and Referral Agency • Queensland Department of Environment, Technology, Science and Innovation • Queensland Department of Natural Resources, Mines, Manufacturing and Regional and Rural Development • Queensland Department of Transport and Main Roads • Australian Energy Infrastructure Commissioner
Emergency Services	• Queensland Fire Department • Camboon Rural Fire Brigade • Moura Rural Fire Brigade • Rural Fire Service Gladstone • Queensland Ambulance Service • Queensland Police Service

Parties	Specific Parties
State and Federal Members of Parliament (MPs)	Federal Member for Flynn Colin Boyce MP (Liberal National Party) State Member for Callide Bryson Head MP (Liberal National Party)
Media	Print and online media: • The Focus Magazine • The Gladstone Observer • The Courier Mail • CQ Today • Biloela Beacon Broadcast media (radio and TV): • ABC 4CC • Hot FM • Triple M Central Queensland • Fresh FM • Win News • Channel 7 • Nine News

A variety of consultation activities have been carried out for the Proposed Action since 2021 and will continue through the construction and operation of the Proposed Action. Engagement with affected parties undertaken by the Proponent has provided feedback from local residents, local Councils, and the wider community, helping to determine the sentiment of those likely to be impacted by the Proposed Action.

Engagement undertaken by the Proponent to-date, has included:

- Meetings with landowners, near neighbours, the community and other interested parties;
- Meetings with and site visits by Traditional Owners;
- Letterbox drops to all homes within 10 kilometres (km) of the Proposed Action in 2023 and 2024;
- A newsletter to introduce the Proposed Action and the Proponent to the community in 2023 and 2024;
- Five two-day community drop-in sessions attended by about 90 community and other key stakeholders in August 2023, February 2024, May 2025, June 2025 and July 2025;
- Formal presentations to Banana Shire Council;
- Eight ‘shopfronts’ at the Theodore Community Hall for two consecutive days;
- Four café sessions; and
- A dedicated website that includes Proposed Action information, news, updates and engagement opportunities.

The Community Engagement Drop-In Sessions were conducted in the towns of Theodore and Banana, with a turnout of approximately 90 attendees. The key takeaways and feedback from the sessions included the following:

- The Proponent is to remain as the primary point of contact for stakeholders;
- Technical information being readily disseminated by the Proponent was appreciated by the community; and
- The level of transparency that the Proponent has given in relation to the Proposed Action is generally higher than other developers in the region.

Actions arising from the Community Engagement Drop-In Sessions included the following:

- The Proponent to investigate a 'shopfront' to foster local relationships;
- The potential for the Proponent to sponsor local events was highly desired by the community; and
- Future Community Engagement Sessions are to be conducted to foster community feedback.

A summary of the outcomes of engagement undertaken with these affected groups to date is described in Table 11-2.

TABLE 11-2 KEY MATTERS RAISED IN ENGAGEMENT

Key Matters Raised	Detail
Workforce Accommodation	Stakeholders expressed an interest in understanding the Proposed Action's workforce accommodation arrangements for construction and if there would be an impact on the local housing market. This is a particular topic of interest for the Theodore community due to the significant number of mining camps and FIFO workers in the area. A Workforce Accommodation and Infrastructure Report has been prepared for the Proposed Action and attached as Appendix M.
Grid Connection	The community was generally not supportive of the proposed multiple grid route options and had expressed concerns about transmission lines crossing strategic cropping land. It is noted that Powerlink is responsible for the grid connection engagement with landowners and community as part of the Theodore Wind Farm Connection Project.
Road Network	Stakeholders expressed concerns about potential impacts on the road network and traffic safety during construction. The community also raised concerns about potential impacts on school bus routes.
Aerial Operations	Graziers in the local area use helicopter mustering as part of their grazing operations. Some graziers queried if the Project would impact on their ability to muster using helicopters.
Noise	Stakeholders expressed concerns about potential noise impacts on nearby sensitive land uses, including residential dwellings.
Biodiversity	Stakeholders expressed concerns about the potential impacts of the Project on matters of state environmental significance and matters of national environmental significance.
Fire Risk and Mitigation	The local Rural Fire Services (RFS) Brigades indicated that they would like to see firebreaks incorporated into the Proposed Action design. Their preference is that the Project actively manages and mitigates bushfire risk.
Visual Amenity	Stakeholders queried the potential impacts of the Proposed Action on the landscape.

Key Matters Raised	Detail
Wind farm preference	Generally, the local community expressed a preference for wind farms over solar farms. In their experience, solar proponents have not properly engaged with or considered the community in project design or layout. The community also feels that solar farms take up high quality agricultural land (cropping) whereas wind farms can coexist with grazing.
Local employment and procurement	There is a lack of interest from locals in working on the wind farm, however there is interest from local businesses to provide services and supplies for construction and operation of workforce accommodation and wind farm development.

11.2 COUNCIL CONSULTATION

The Proponent has been undertaking bi-annual briefing sessions for the Proposed Action with the Banana Shire Council since 2023. The Briefing Sessions centred on the Proposed Action location and outlined consultation undertaken to-date, and generally considered the following:

- Community input/benefit will be discussed with the local community in order to understand how a Community Benefit Fund would be most useful;
- The Proponent is committed to seeking employment within the region where possible;
- Potential jobs generated during construction;
- Potential jobs generated during operation;
- Community and stakeholder engagement;
- Workforce management;
- Local business procurement; and
- Housing and accommodation.

11.3 FUTURE ENGAGEMENT

The Stakeholder Engagement Tools set out in Table 11-3 have been developed as part of the Proponent's commitment to genuine dialogue with affected parties and will be employed as part of ongoing engagement for the Proposed Action, including when engaging with the local community in relation to workforce accommodation opportunities and/or impacts.

TABLE 11-3 ENGAGEMENT TOOLS

Engagement Tool	Objective
Personal phone calls	• Personal phone calls will be a significant aspect of stakeholder engagement, particularly with those stakeholder groups most interested in a Proposed Action. Direct phone calls are a deliberative engagement tool to facilitate immediate and direct conversations.
Meetings	• Personal meetings with individuals and sometimes groups will be a key avenue of personalised engagement. These may be one-on-one meetings with landowners or near neighbours, or meetings with a local community groups. Meetings provide an opportunity to educate, inform, and listen to issues and concerns.

Engagement Tool	Objective
Emails/letters	• Emails and letters will be used to provide notification of important information, such as works, surveys or other activities, or provide stakeholder-specific information and engagement.
Briefings	• Briefings will take place as and when required with representatives of stakeholder groups including local Councillors and Council executives, Members of Parliament and government departments. Briefings allow stakeholders to stay informed about a Proposed Actions progress.
Door knocks	• Door knocks can be used to speak personally with neighbours within a pre-determined distance band of the Proposed Action. Direct outreach allows community members to engage and interact in their own environment.
Letterbox drops	• Letterbox drops provide the opportunity to directly contact residents and/or ratepayers within a certain geographical boundary depending on the delivery method employed. Letterbox drops can be used to distribute newsletters, flyers, FAQs, and other Proposed Action information.
Shopfront (permanent or 'pop up')	• A shopfront in a Study Area can take on a variety of forms. It can be a fixed space that is open one or multiple days per fortnight. Another option is a temporary 'pop up' venue which could include a stall in a public space such as a Council office, shopping centre or public library. This option is usually more informal and may occur as a one-off or for shorter periods.
Drop-in sessions/ pop-ups	• Drop-in sessions provide an opportunity for stakeholders to meet with members of the Proposed Action team and Subject Matter Experts about the Proposed Action. Drop-in sessions are advertised in the local community and generally held over multiple days (often two consecutive days) in a local hall or halls. These drop-in sessions do not have a formal structure, but usually incorporate Proposed Action poster and fact sheets, industry materials, and catering. Subject materials should be selected in response to the community's interests.
Attendance at community events	• This may include information stands at agricultural shows, sporting, and other events, providing a platform for community members to ask questions and provide feedback.
Workshops	• Workshops can create a space for affected parties to discuss any questions or concerns with the Proposed Action team and/or subject matter experts, as well as positively contribute to the development of the Proposed Action by brainstorming ideas and community-led problem solving.
Focus groups	• Create an opportunity for key parties, selected by the Proposed Action team, the Proposed Action team, to provide detailed community feedback in a group setting, as well as raise Proposed Action-related concerns, considerations, or issues with the Proponent team and/or subject matter experts.
Free call 1800 number	• A free call 1800 number, 1800 879 435, has been established for the Proposed Action.
Electronic direct mail	• Electronic direct mail will be an important part of communications and could be used to share information such as newsletters, flyers, invitations to upcoming events, fact sheets and more. A sign-up list will be made available on the Proposed Action website and at community events.
SMS notifications	• SMS notifications can be used for time critical notifications, such as works and deadlines for public submissions.
RWE website	• The RWE Renewables Australia Pty Ltd (RWE) website is live and can be found at www.au.rwe.com. This site contains information about RWE globally, RWE Renewables Australia and Australian projects, as well as links to Project-specific sites.

Engagement Tool	Objective
Proposed Action website	• A Proposed Action website has been established at theodorewindfarm.com.au and will be regularly updated to provide more information, as well as digital versions of Proposed Action collateral. The website URL is included on printed and digital collateral.
Media releases and advertisements	• Media releases will be prepared and shared with media outlets based on communications objectives throughout the Proposed Action timeline. Advertisements will be booked when required.
Proposed Action email address	• A Proposed Action-specific email address, theodorewindfarm@rwe.com has been created and will be used as a central point of obtaining community feedback.
Newsletters	• Proposed Action newsletters should be developed and distributed regularly. These should provide Proposed Action updates and be posted to all landowners within a pre-determined Proposed Action radius (suggested to be 10 kilometres from the Study Area). They can also be delivered electronically.
Flyers	• Flyers can be used to promote information sessions or events. Flyers can reach community members who may not have access to digital communications or online platforms.
Information packs	• Information packs can include a combination of Proposed Action collateral, such as newsletters, fact sheets, maps, information on upcoming events, photo montages, independent third-party studies and more. These can be tailored to the specific needs of the community or individual stakeholders and can include information on topics of particular focus for the Proposed Action community. These could be posted to individuals as required or left at key locations, such as Council offices.
Surveys	• Surveys are a useful data collection tool to understand community issues, needs and preferences. Surveys can help gauge public opinion on a variety of topics, including framing of benefit sharing initiatives, the Proposed Action, and renewable energy in general.

In addition, the Proponent has committed to the following stakeholder engagement initiatives:

- Community Engagement Committee (CEC): It is the Proponents intention to establish a CEC, assuming there is interest from Theodore and surrounding communities to do so. The CEC's purpose would be to capture the voice and sentiments of the community, to help to inform the Proposed Action, and direct how the Proponent engages with the community as well as the content of such engagement. The CEC will provide a tool to share information with the community and to build a sense of trust. It is anticipated the CEC would be established in 2025 and run beyond the Planning Phase, into construction, operations and potentially decommissioning.
- Community Benefit Fund: Development of a Community Benefit Fund of at least $500,000 per year ($17.5 million over the operation life of the Proposed Action).
- Complaints Management: Development and implementation of a Theodore Wind Farm Complaints and Grievance Management System (in accordance with the Australian Standard AS/NZS 10002:2014 – Guidelines for Complaint Management in Organisations). The Proponent Complaints Handling Procedure will ensure that complaints are dealt with in a timely and effective manner, and includes the below:
    - Stage One: Receiving;

- Stage Two: Responding;
- Stage Three: Managing;
- Stage Four: Closing; and
- Stage Five: Continuous Improvement.
- All instances are recorded within TED's internal SET, with the intent to archive, allocate, monitor, action, resolve, close and analyse all relevant enquiries. The Proponent aims to resolve complaints within 10 working days. If this is not possible the Proponent commits to continued engagement with the stakeholder.

11.4 INDIGENOUS ENGAGEMENT

The Proponent has undertaken engagement with the Traditional Owners of the Study Area in line with the *Interim Engaging with First Nations People and Communities on Assessments and Approvals* under the EPBC Act.

There are no distinguished Native Title rights held over the Study Area, however the Proponents have acknowledged Indigenous consultation is required with the Wulli Wulli People, the Traditional Owners of the Study Area. The Proponent is committed to ensuring areas and objects that are of particular significance to Indigenous peoples and communities are identified and potential impacts managed.

The Proponents commitment to working closely with the Wulli Wulli People, has been demonstrated through regular meetings since 2022 and is proposed to continue throughout the life of the project. The Proponent have signed an early works agreement, and various site visits have been undertaken by Wulli Wulli Elders, WWNAC board members and cultural heritage monitors to understand and influence the detailed design phase of the Proposed Action and indicate areas of cultural significant across the Project Area. The Proponent have also agreed to undertake additional survey works in collaboration with the Wulli Wulli People and agreed to a Cultural Heritage Management Plan under Part 7 of the *Aboriginal Cultural Heritage Act 2003* (Qld).

The details of the engagements, including meeting minutes, Shared Benefits and Project Services Agreement, early works agreements, site reports and pro-forma documents for investigations are covered by confidentiality clauses and therefore cannot be disclosed.

A summary of engagement is provided below.

TABLE 11-4 DETAILS OF INDIGENOUS ENGAGEMENT

Type of Engagement	Number of Engagements	Details
Meetings	7	• Initial engagement meeting, including introductions and Project overview. Understanding of how WWNAC like to be engaged and agreed steps going forward. • Meetings to discuss and agree early works agreement, arrange site visits. • Meetings to discuss and agree Shared Benefit and Project Services Agreement. • Meetings to discuss CHMP and agree terms.

Type of Engagement	Number of Engagements	Details
Site Visits	2	• Site visit to understand proposed Project layout, cultural values and reconnaissance for met mast locations. • Monitoring of agreed met mast locations and visitation to areas of interest to Wulli Wulli People.
Field work	15 weeks total	• Rolling schedule of ongoing inspections and monitoring of early works program.
Workshop	1	• Classroom and fieldwork training on artefact identification and site recording, use of GPS and field methods

In response to the feedback received from WWNAC, a Shared Benefits and Project Services Agreement was developed and presented to WWNAC for consideration. Discussions and engagement are still ongoing.

12. ENVIRONMENTAL RECORD OF THE PERSON PROPOSING TO TAKE THE ACTION

Theodore Energy Development Pty Ltd is a wholly owned subsidiary of RWE Renewables Europe & Australia GmbH (RWE), a specialised renewable energy company. The Proponent is a new special purpose vehicle incorporated for the Proposed Action. Therefore, the Proponent has not been subject to any proceedings against it under Commonwealth, State or Territory law for protection of the environment or the conservation and sustainable use of natural resources.

RWE owns and operates the Limondale Sun Farm through its wholly owned subsidiary RWE Limondale Sun Farm Holding Pty Ltd. RWE and RWE Limondale Sun Farm Holding Pty Ltd have no current or historical proceedings under Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources.

RWE is committed to protection of the environment, conservation of natural resources and reducing emissions evidenced through the RWE Biodiversity Policy. RWE ensures compliance through environmental policies to ensure that environmental protection is implemented responsibly according to operator obligations and in line with RWE's sustainability practices to prevent serious adverse effects on the environment.

RWE has a suite of policies and guidelines surrounding environmental protection, biodiversity and sustainability.

An environmental protection policy was implemented by RWE in January 2024 and remains in force and available for public view (environmental-protection.pdf (rwe.com). This directive outlines that in the context of environmental protection, RWE fulfils its responsibility and ensures that the business-related environmental aspects are identified and considered throughout all Proposed Action phases. RWE are investing heavily in the expansion of renewable energies and are consistently reducing CO2 emissions with the intention of reaching climate- neutral by 2040. RWE is also working towards implementing strategies to achieve net positive impact on biodiversity.

RWE published a biodiversity policy in December 2022 that is intended to establish a reference framework for integrating the protection and promotion of biodiversity within the scope of our business activities (RWE Biodiversity Policy). The biodiversity framework encompasses principles such as choosing asset locations, minimising impacts during construction, monitoring impacts during operation as well as taking into account end-of-life solutions years prior to decommissioning requirements.

Finally, and as of January 2024, RWE committed to start making nature-related disclosures based on the recommendations made by the Taskforce on Nature-related Financial Disclosures. As an early adopter of this scheme, RWE are supporting broader climate-related sustainability reporting and policies.

RWE communicate all environmental and biodiversity activities on the website and in the annual sustainability reporting.

13. ECOLOGICALLY SUSTAINABLE DEVELOPMENT

The Proposed Action has been designed with a thorough investigation of the short- and long-term socio-economic benefits and potential impacts to environmental values of conducting the Proposed Action. With a projected lifespan of 35 years, the Proposed Action will add both economic and social benefits by contributing to the employment and energy markets with a renewable wind resource and creating jobs. This is further discussed in Section 14.

There are no expected threats of serious or irreversible environmental damage arising from the Proposed Action. The Proposed Action has been designed to minimize environmental degradation and any potential adverse impacts to environmental values at the location.

The principle of inter-generational equity has been applied to the Proposed Action that will contribute to ensuring Queensland has a renewable source of energy and the next generation has access to wind resource benefits. The health, diversity and productivity of the environment is expected to be maintained for the benefit of future generations due to the Proposed Action.

The Proposed Action supports the ecological sustainable development principle of inter-generational equity through its extended design process, design iterations, and secondary high resolution pre-clearance surveys prior to construction, alongside required management plans and processes as determined by relevant regulations. Cumulatively, these efforts aim to reduce immediate environmental impacts as much as possible. Significant effort has been taken to ensure works do not fragment sections of vegetation or impede the effectiveness of wildlife corridors and general wildlife movement patterns. These considerations are to allow continued connectivity and dispersion of fauna and flora in the immediate area. Maintaining movement and avoiding fragmentation has significant environmental benefits that contribute to the wellbeing of fauna and flora in the specific area, and generally into the future. Thus, allowing the present and future generations to benefit from the health, diversity and productivity of the environment.

Additionally, the impact area of the infrastructure is inherently and intentionally designed to be minimal. Often, these lands and lifestyles are inherited by younger generations. The low impact of the Proposed Action allows the land use to continue with minimal disturbance.

Inherently, a renewable energy project supports the principle of inter-generational equality by providing an energy source that seeks to reduce greenhouse gas emissions and reliance on fossil-fuelled energy production. By contributing to low emission energy production, the health diversity, and productivity of the environment is improved which benefits both the environment and future generations.

An extensive ecological assessment has been undertaken as part of the detailed design process. The conservation of biological diversity has been prioritised throughout the development and design process.

The construction of the proposed wind farm will improve the valuation and pricing of the current energy market and incentivise wind resources as a renewable energy. The Proposed Action will contribute renewable energy that promotes reliable and cost-effective electricity to the market and reduced greenhouse gas emissions.

Further, the Proposed Action will contribute to the Queensland Government’s target to achieve 50% renewable energy by 2030. Additionally, the Proposed Action also allows for the continuation of farming activities across the Study Area and provides supplementary income for involved landowners.

14. ECONOMIC AND SOCIAL MATTERS

Once operational the Proposed Action will have the capacity to provide, clean, renewable electricity to approximately 500,000 Queensland homes. The Proposed Action progress time-critical, national decarbonisation objectives which include the 82% renewable energy generation target set by the Australian Government required to achieve its global carbon reduction commitments (Australian Government, 2024). Additionally, the Proposed Action demonstrates action towards addressing the critical shortage of supply expected by retailers from 2025 supporting reliability and security of supply, and downward pressure on costs for consumers.

A Socio-Economic Impact Analysis (SEIA) (see Appendix I) was undertaken to provide a high-level understanding of the socio-economic context of the surrounding local communities of relevant to the Proposed Action, including the potential social and economic impacts that may be experienced. The SEIA determined a Proposed Action Area of Influence (AoI) based on identified affected parties (described in Table 11-1) and involved two components:

- Primary AoI: The Study Area and immediate surrounding areas comprising an area 5 km from the Study Area Boundary, including ABS SA1 No. 30804152801, ABS SA1 No. 31902150815 and the Urban Centres and Localities of Theodore, Banana, Moura, and Biloela.
- Secondary AoI: The Local Government Areas of the Banana Shire LGA and Gladstone Region LGA are included as the Secondary AoI. There are several possible transportation and haulage routes to the Study Area.

The Primary and Secondary AoI is depicted in Figure 14-1.

The following sections provide an overview of the economic and social impacts/benefits expected from the Proposed Action.

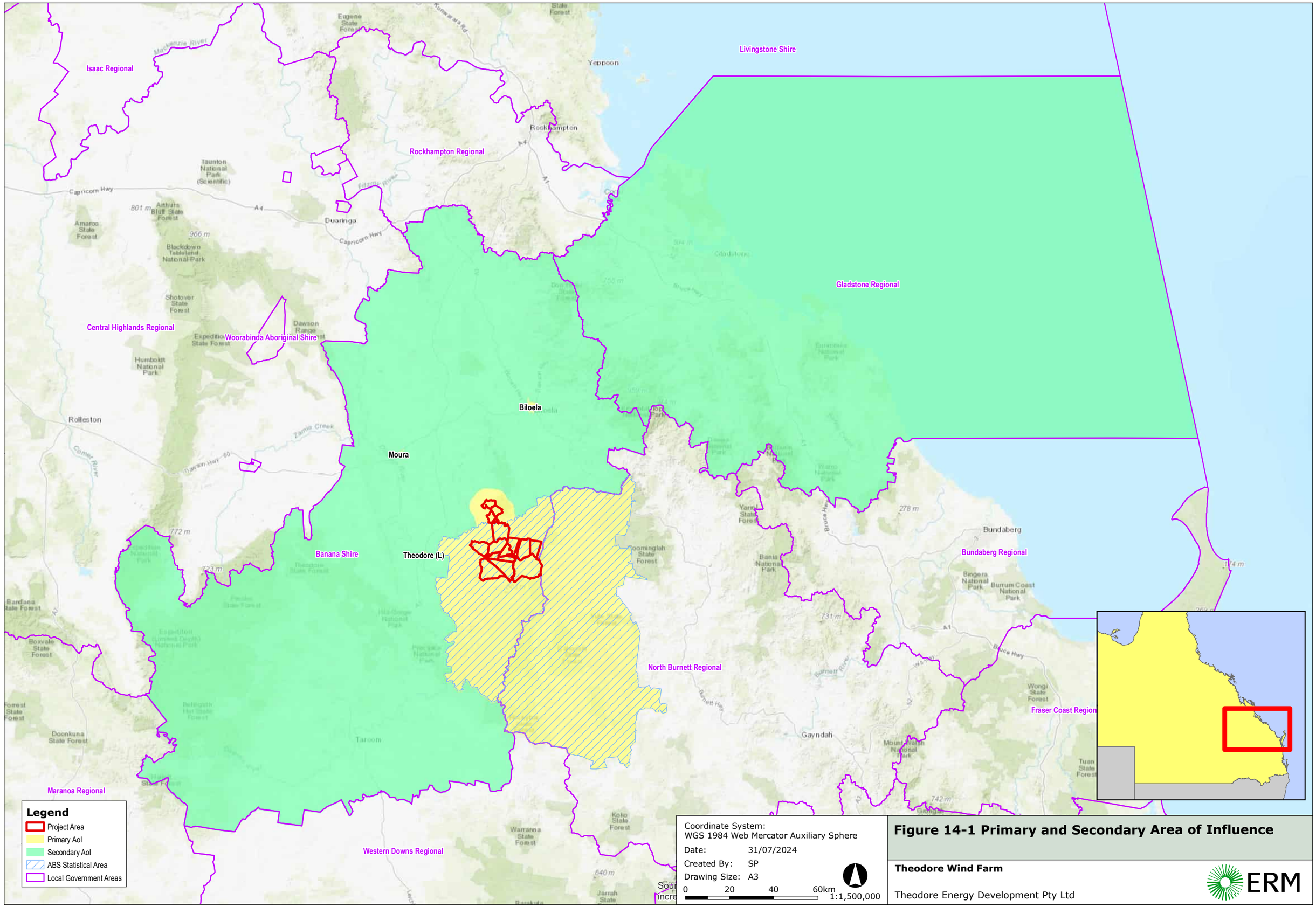


Figure 14-1 Primary and Secondary Area of Influence

Theodore Wind Farm

Theodore Energy Development Pty Ltd

ERM

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14.1 ECONOMIC AND EMPLOYMENT COSTS AND BENEFITS

The direct and indirect economic impacts of the Proposed Action during the construction and operation phases were considered as part of the analysis.

The anticipated construction phase economic impacts/benefits assumes:

- Direct employment of 500 employees, including:
- 100 local workers, across roles such as skilled labour (e.g. electricians), plant/machinery drivers, civil workers, site maintenance and cleaning workers, and truck drivers.
- 325 workers from Queensland, across specialised roles, such as crane operators, over-dimensional truck drivers, project management, concrete batch plan operators, and IT and communication specialists.
- 75 workers from across Australia, across roles such as senior management, specialised workers, wind turbine specialists and other technical engineering specialists.
- An anticipated total local spend of approximately $1 billion AUD on various aspects of the Proposed Action, such as plant, materials, and labour. In addition, there is a further approximate spend of $800 million AUD in Queensland, and $500 million AUD Australia-wide.
- A Community Benefit Fund has been set up which will contribute $500,000 per annum to selected community groups through the construction phase.
- The Proponent will develop and implement Local Business and Industry Procurement Plan to seek local industry involvement in the Proposed Action and will provide training and upskilling.

The anticipated operational phase economic impacts/benefits assumes:

- Direct employment of 25 workers in roles such as maintenance technicians, operations management staff, and facility management staff.
- The anticipated total local spend of approximately $33 million AUD mainly on wages, maintenance, landowner payments, community benefit fund. In addition, there is a further approximate $8 million AUD in Queensland, and $5 million AUD Australia-wide.
- A Community Benefit Fund has been set up which will contribute $500,000 per annum to selected community groups through the operation phase.

The main indirect economic impacts/benefits of the Proposed Action were determined to include:

- A greater spend by workers in the local economy;
- The upskilling of the local workforce;
- Reduced electricity cost;
- Potential impacts on tourism associated with the Isla Gorge National Park; and
- Disruption to cattle grazing capacity during the construction phase, however, co-existence of cattle grazing with the Proposed Action during operation diversifying landowner income streams.

14.2 SOCIAL IMPACTS AND BENEFITS

The potential social impacts and/or benefits associated with the Proposed Action were analysed through a methodology based on the Queensland Social Impact Assessment Guidelines and the New South Wales Social Impact Assessment Guidelines. Impacts and benefits were analysed to determine their level of significance, based on the likelihood of an impact/benefit occurring, the magnitude of the impact/benefit, and prior to the application of any mitigation or management measures.

The key social impacts and benefits that may affect communities in the Proposed Action AoI resulting from the Proposed Action relate to:

- Procurement opportunities from local businesses and employment opportunities for the local workforce (including Theodore, Banana, Moura, Biloela and Gladstone);
- Opportunities for diversification of income streams for host landowners;
- Financial benefits for local community economies, and the potential for indirect benefits such as workforce upskilling and increased localised spend;
- Disruptions due to construction related activities (noise, dust, transportation of materials and workers, etc);
- Amenity (e.g. visual) and other land use and landscape changes due to altered landscapes; and
- Accommodation arrangements for construction workforce.

It should be noted that the only impact to remain at a high level of significance post the implementation of management and mitigation measures, was the disruption due to construction relation activities, specifically the transportation of materials and workers. This remains at a high level of significance due to the sheer magnitude of material and workers travelling to the Study Area during the construction phase. A Traffic Management Plan will be developed and implemented for the Proposed Action and will include recommendations made by the local community and Banana Shire Council.

A range of mitigation and management measures have been devised to either enhance benefits or mitigate impacts and are included in the Socio-Economic Impact Analysis (refer to Appendix I).

15. INFORMATION SOURCES PROVIDED IN THE PER

The Public Environment Report (PER) was informed by technical studies carried out to understand the existing environmental value of the Study Area and the potential impacts from the Proposed Action. Ecological surveys were undertaken by flora and fauna specialists and involved reviewing literature, undertaking desktop assessments, and conducting field surveys. Additionally, a number of technical assessments including a Landscape and Visual Impact Assessment, Traffic Impact Assessment and Socio-Economic Impact Analysis were undertaken to inform the design of the Proposed Action.

All technical studies used and reference a large number of existing sources. Information sources referenced throughout the PER and appendices. A list of references is provided for each PER section. Each appendix also includes a list of all referenced material.

The reliability and accuracy of the information sources in the PER has been tested via technical review from recognised specialists in their field. The PER has used data sources widely accepted in the environmental industry, where these data sources have been used, referencing has been included for accuracy. The PER utilised DCCEEW listed threatened species guidelines and recovery plans to inform field survey design, impact assessment and reporting. The accuracy of information available from sources was considered adequate for the purposes of identifying potential impacts from the Proposed Action, as data sources are consistently being updated as new information becomes available. Where data sources have been used, referencing including the year published has been included.

Notwithstanding, the precautionary principle has been applied to uncertainties regarding impact. While extensive areas of the Study Area have been surveyed, some areas of habitat mapping have been extrapolated from field knowledge and understanding of species habitat requirements, including Species Profile and Threat Database and Conservation Advices.

16. CONCLUSION

Theodore Energy Development Pty Ltd is developing the Proposed Action approximately 22 km east of the township of Theodore, 50 km west of Biloela and 150 km south-west of Gladstone, in the Banana Shire Council Local Government Area. The Proposed Action consists of up to 170 WTG, and ancillary infrastructure including, foundations and hardstands, temporary infrastructure such as concrete batching plants, laydown areas, construction offices, parking and on-site accommodation, access tracks and electrical reticulation, switching stations and substations, Battery Energy Storage Systems, meteorological masts, and operation and maintenance facilities. The Proposed Action is located across three properties and road reserve areas, totaling 46,830 hectares (ha) (Study Area), with a Development Footprint of 1,537.4 ha within a corridor of land including a 100 meter micro-siting buffer (the Project Area).

Detailed ecological investigations have been undertaken between October 2022 and February 2026. Desktop and field assessments involved a review of both State and Commonwealth databases as well as targeted field surveys, to determine presence/absence of Matters of National Environmental Significance (MNES) and habitat availability.

An impact assessment has been undertaken to identify potential impacts to MNES against the *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* (Department of Environment, Water, Heritage and the Arts , 2013). A number of minimisation, management and mitigation measures have been discussed to reduce the potential impacts to MNES. Impacts to MNES have been avoided where possible during the design phase of the Proposed Action, and mitigation and management measures put in place to minimise both direct and indirect impacts, including implementing specific management plans. Additionally, cleared areas not required for the operation of the Proposed Action will be subject to natural regeneration and rehabilitation, with approximately 68% of the Disturbance Footprint having the potential to regain habitat function for certain species.

Based on the above, it is considered that the Proposed Action is likely to have a significant residual impact on Poplar Box TEC, greater glider, koala, squatter pigeon (southern) and has the potential to have a significant residual impact on diamond firetail. Impacts from the Proposed Impact will be contained within the Study Area and are considered unlikely to be of significant impact to the Great Barrier Reef.

In summary, the Proposed Action will result in the following potential permanent impacts:

- 6.6 ha of Poplar Box TEC;
- 19.8 ha of likely/current denning habitat, 1.1 ha of potential/future denning habitat and 607.3 ha of foraging and dispersal habitat for greater glider (southern and central);
- 8.1 ha of preferred foraging and breeding habitat and 640.2 ha of general foraging and breeding habitat for koala;
- 123.0 ha of breeding habitat, and 22.5 ha of foraging and dispersal habitat for squatter pigeon (southern); and
- 95.3 ha of potential breeding and foraging habitat for diamond firetail.

A draft Offset Management Plan has been provided outlining the proposed offset areas and management to improve the quality of habitat for the identified MNES.

SECTION 10-16 REFERENCES

Australian Government. (2024). *Net Zero*. Retrieved from Department of Climate Change, Energy, the Environment and Water : https://www.dcceew.gov.au/climate-change/emissions-reduction/net-zero

Department of Environment, Water, Heritage and the Arts . (2013). *Significant Impact Guidelines 1.1 - Matters of National Environmental Significance .*

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