

NEOEN

**PRELIMINARY DOCUMENTATION
(2021-9137)**

Mount Hopeful Wind Farm

FINAL

December 2023

NEOEN

PRELIMINARY DOCUMENTATION (2021-9137)

Mount Hopeful Wind Farm

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Neoen Australia Pty Ltd

Project Director: David Gatfield
Project Manager: Sebastian Knight
Report No. 22753/R02
Date: December 2023



Brisbane

Level 7
500 Queen Street
Brisbane City QLD 4000



QMS Certification Services

This report was prepared using
Umwelt's ISO 9001 certified
Quality Management System.

Acknowledgement of Country

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

Disclaimer

This document has been prepared for the sole use of the authorised recipient and this document may not be used, copied or reproduced in whole or part for any purpose other than that for which it was supplied by Umwelt (Australia) Pty Ltd (Umwelt). No other party should rely on this document without the prior written consent of Umwelt.

Umwelt undertakes no duty, nor accepts any responsibility, to any third party who may rely upon or use this document. Umwelt assumes no liability to a third party for any inaccuracies in or omissions to that information.

Where this document indicates that information has been provided by third parties, Umwelt has made no independent verification of this information except as expressly stated.

©Umwelt (Australia) Pty Ltd

Table of Contents

Abbreviations	v
1.0 Introduction	1
1.1 Project Overview	1
1.2 EPBC Act Approval Background	1
1.3 Content and Structure of this Report	2
1.4 MNES Assessment Boundaries and Definitions	3
1.4.1 Study Area	8
1.4.2 Development Corridor	8
1.4.3 Disturbance Footprint	8
2.0 Description of the Action	9
2.1 Mount Hopeful Project Description	13
2.1.1 Study Area	13
2.1.2 Project Drivers and Benefits	14
2.1.3 Existing Infrastructure	16
2.1.4 Proposed Infrastructure	17
2.1.5 Construction Activities	18
3.0 Habitat Assessment	19
3.1 General Habitat Assessment Information Required	21
3.2 Specific Threatened Species Habitat Assessment Information Required	33
3.2.1 Collared Delma (<i>Delma torquata</i>) – Vulnerable	33
3.2.2 <i>Cycas megacarpa</i> – Endangered	38
3.2.3 Greater Glider (<i>Petauroides volans</i>) – Vulnerable	44
3.2.4 Koala (<i>Phascolarctos cinereus</i>) (combined populations of Qld, NSW and the ACT) – Endangered	47
3.2.5 Northern Quoll (<i>Dasyurus hallucatus</i>) – Endangered	52
3.2.6 Squatter Pigeon (Southern) (<i>Geophaps scripta scripta</i>) – Vulnerable	55
3.2.7 White-throated Needletail (<i>Hirundapus caudacutus</i>) – Vulnerable	60
3.3 Migratory Bird and Bat Species Habitat Assessment	64
4.0 Impact Assessment	69
4.1 Listed Threatened Species and Communities Impact Assessment	69
4.2 Specific Threatened Species Information Required for Impact Assessment	80
4.2.1 Collared Delma (<i>Delma torquata</i>)	81
4.2.2 <i>Cycas megacarpa</i>	83

4.2.3	Greater Glider (<i>Petauroides volans</i>)	86
4.2.4	Koala (<i>Phascolarctos cinereus</i>) (combined populations of Qld, NSW and the AC)	86
4.2.5	Northern Quoll (<i>Dasyurus hallucatus</i>)	91
4.2.6	Squatter Pigeon (Southern) (<i>Geophaps scripta scripta</i>)	95
4.2.7	White-throated Needletail (<i>Hirundapus caudacutus</i>)	99
4.3	Migratory Species Impact Assessment	102
4.4	Specific Migratory Species Habitat Assessment Information Required	103
4.4.1	White-throated Needletail (<i>Hirundapus caudacutus</i>)	103
4.5	Collision Risk Assessment for Listed Threatened and Migratory Bird and Bat Species	105
5.0	Avoidance, Mitigation and Management Measures	116
5.1	Specific Threatened Species Avoidance, Mitigation and Management Information Required	137
5.1.1	<i>Cycas megacarpa</i>	137
5.1.2	Greater Glider (<i>Petauroides volans</i>)	140
5.1.3	Northern Quoll (<i>Dasyurus hallucatus</i>)	144
5.1.4	White-throated Needletail (<i>Hirundapus caudacutus</i>)	144
5.2	Translocation Plan for <i>Cycas megacarpa</i>	145
5.3	Specific Migratory Species Avoidance, Mitigation and Management Information Required	156
5.4	Rehabilitation Requirements	158
5.5	Offsets	162
5.6	Ecologically Sustainable Development	166
5.7	Economic and Social Matters	172
5.7.1	Local Economic Challenges	173
5.7.2	Population Characteristics	173
5.7.3	Financial Investment and Economic Activity	174
5.7.4	Costs and Benefits and Scale of Impact	175
5.7.5	General Community and Stakeholder Engagement	180
5.7.6	Local Business and Jobseeker Engagement	185
5.7.7	Indigenous engagement	186
5.8	Environmental Record of the Person Proposing to Take the Action	187
6.0	Conclusion	189
7.0	References	190

Figures

Figure 1.1	Project Layout	4
Figure 1.2	Ecological Study Boundaries	6
Figure 2.1	Comparison of Direct Impacts – Referral Development Corridor vs Current Disturbance Footprint	12
Figure 3.1	Potential Collared Delma Habitat	37
Figure 3.2	<i>Cycas megacarpa</i> populations surrounding the Study Area	41
Figure 3.3	<i>Cycas megacarpa</i> habitat	42
Figure 3.4	<i>Cycas megacarpa</i> records	43
Figure 3.5	Greater glider habitat	45
Figure 3.6	Koala habitat	51
Figure 3.7	Northern quoll habitat	54
Figure 3.8	Squatter Pigeon (southern) Habitat	59
Figure 3.9	White-throated needletail habitat	63
Figure 4.1	Rufous Fantail Habitat with the Study Area	110
Figure 4.2	Spectacled Monarch Habitat within the Study Area	111
Figure 4.3	High-risk Turbines and White-Throated Needletail	115
Figure 5.1	Greater glider fragmentation mitigation measures	143

Tables

Table 2.1	Development Corridor and Disturbance Footprint Areas	9
Table 2.2	Comparison of predicted direct impacts on MNES between current Disturbance Footprint, Development Corridor and referral Development Corridor	10
Table 2.3	Land Parcel Details	13
Table 2.4	Turbine Specifications Used for Assessment	17
Table 2.5	Proposed Project Construction Details	18
Table 3.1	Survey Guideline Requirements and Effort Undertaken for each MNES	24
Table 3.2	Habitat Extent and Justification for Collared Delma	36
Table 3.3	Habitat Extent and Justification for <i>Cycas megacarpa</i>	38
Table 3.4	<i>Cycas megacarpa</i> Individuals	39
Table 3.5	<i>Cycas megacarpa</i> Density Summary	40
Table 3.6	Number of <i>Cycas megacarpa</i> individuals in each development class from James <i>et al.</i> (2018) and across the Study Area	40
Table 3.7	Habitat Extent and Justification for Greater Glider (Southern and Central)	46
Table 3.8	Koala SAT Results	49
Table 3.9	Habitat Extent and Justification for Koala	50
Table 3.10	Habitat Extent and Justification for Northern Quoll	53
Table 3.11	Habitat Extent and Justification for Squatter Pigeon (Southern)	57
Table 3.12	Habitat Extent and Justification for White-throated Needletail	61
Table 3.13	White-Throated Needletail Observations within the Study Area	61
Table 4.1	Description of Required Activities for each Project Phase	70

Table 4.2	Impacts to MNES Species Habitat	71
Table 4.3	MNES at Risk of Indirect Impacts Associated with the Construction Phase	74
Table 4.4	Significant Impact Assessment – Collared Delma	81
Table 4.5	Number of <i>Cycas megacarpa</i> Individuals in each Development Class from James <i>et al.</i> (2018) and Across the Study Area	84
Table 4.6	Habitat Extent and Justification for <i>Cycas megacarpa</i>	85
Table 4.7	<i>Cycas megacarpa</i> Individuals (Projected Count)	86
Table 4.8	Significant Impact Assessment – Koala	87
Table 4.9	Significant Impact Assessment – Northern Quoll	93
Table 4.10	Significant Impact Assessment – Squatter pigeon (southern)	96
Table 4.11	Significant Impact Assessment (Vulnerable Criteria) – White-throated Needletail	100
Table 4.12	Significant Impact Assessment (Migratory Criteria) – White-throated Needletail	104
Table 4.13	Annual Collision Risk Model Results for White-throated Needletail	114
Table 5.1	Comparison of predicted direct impacts on MNES between current Disturbance Footprint, Development Corridor and referral Development Corridor	116
Table 5.2	MNES Specific Measures	120
Table 5.3	<i>Cycas megacarpa</i> Avoidance Summary	138
Table 5.4	Enclosed areas potentially requiring supplementary offsets	142
Table 5.5	Application of the Principles of ESD to the Project	172
Table 5.6	Population Characteristics of the Surrounding Community (Australian Bureau of Statistics 2022)	173
Table 5.7	Potential Costs and Benefits at a State Level	175
Table 5.8	Potential Costs and Benefits at a Local Level	175
Table 5.9	Summary of Benefit Sharing Mechanisms	178
Table 5.10	Community Reported Concerns and Proposed Way Forward	182
Table 5.11	Potential Benefits from the Project to the Community and Wider Region	185

Abbreviations

Abbreviation	Description
AEMO	Australian Energy Market Operator
AGL	above ground level
AHD	Australian Height Datum
APLNG	Australia Pacific Liquefied Natural Gas
BACI	Before-After, Control Impact
BBUS	bird and bat utilisation survey
BESS	battery energy storage system
CBSP	Community Benefit Sharing Program
CEO	Chief Executive Officer
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CRM	Collision Risk Modelling
DAWE	Department of Agriculture Water and the Environment
DBH	diameter at breast height
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DES	Department of Environment and Science
DEWHA	Department of the Environment, Water, Heritage and the Arts
DSEWPaC	Department of Sustainability, Environment, Water, Populations and Communities
EMI	electromagnetic interference
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cwth)
EPC	Engineering and Procurement Contractor
EPM	Exploration Permit for Minerals
ESD	ecologically sustainable development
GHG	greenhouse gases
GLNG	Gladstone Liquefied Natural Gas
GNP	Gaangalu Nation People
ha	hectare
IDW	inverse distance weighted
IECA	International Erosion Control Association
IPCC	Intergovernmental Panel on Climate Change
km	kilometre
kV	kilovolt
LGA	Local Government Area
m	metre

Abbreviation	Description
MW	megawatt
MWh	megawatt-hours
MNES	Matters of National Environmental Significance
NDC	nationally determined contribution
Neoen	Neoen Australia Pty Ltd
OAG	(Commonwealth) Offsets Assessment Guide
O&M	Operations and Maintenance
PMST	Protected Matters Search Tool
Project	Mount Hopeful Wind Farm Project
Proposed Action	Project
QCLNG	Queensland Curtis Liquefied Natural Gas
QFES	Queensland Fire and Emergency Services
QREZ	Queensland Renewable Energy Zone
RFI	Request for Additional Information
RSA	Rotor swept area
SIA	Significant Impact Assessment
SIS	State Infrastructure Strategy
SPRAT	Species Profile and Threats
TPZ	Tree Protection Zone
Umwelt	Umwelt (Australia) Pty Ltd
WTG	wind turbine generator

1.0 Introduction

1.1 Project Overview

1.2 EPBC Act Approval Background

Neoen Australia Pty Ltd (Neoen) referred the Mount Hopeful Wind Farm Project (the Proposed Action) for assessment under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 22 December 2021 (EPBC Ref: 2021/9137). On 7 March 2022 the delegate for the Minister for the Environment determined the Proposed Action was a controlled action requiring assessment and approval under the EPBC Act before it can proceed. The relevant controlling provisions include:

- **Listed threatened species and communities (Section 18 and 18A).**
- **Listed migratory species (Sections 20 and 20A).**

A request for further information to inform the Preliminary Documentation was issued by the Department of Climate Change, Energy, the Environment and Water (DCCEEW) on 6 May 2022. The request for further information has been addressed within this Preliminary Documentation and supporting documents.

As the Project design has progressed since referral lodgement, a variation to the Project was lodged with DCCEEW on 21 December 2022, which details the updated Project Description and how these changes have reduced the quantum of potential impact to Matters of National Environmental Significance (MNES). On 24 January 2023, the variation was approved. The Preliminary Documentation was submitted on 22 December 2022, with the impact assessment accounting for all updates made to the Project Description.

In early 2023, the Preliminary Documentation went through adequacy review and feedback was provided by the Department. Such feedback has been incorporated in this document and the relevant supporting attachments. To facilitate the safe transportation of Project infrastructure, an access road corridor was included as a part of the Project. The access road corridor involves upgrades to approximately 30 km of existing road between the Burnett Highway at Dixalea and Glengowan Road a connection point for the access road between the switching station and South Ulam Road. Additional surveys were undertaken to determine the ecological values and habitat types associated with the access road corridor. Species habitat mapping was applied to the access road corridor following habitat mapping rules that have been developed for the broader Project. The additional habitat areas associated with the access road corridor have been incorporated into the total areas for the Study Area, Development Corridor and Disturbance Footprint (refer **Section 1.4** for MNES assessment boundaries). It was determined by DCCEEW that an additional variation to the Project was required to account for impacts within the access road corridor. The variation was submitted to DCCEEW on 9 May 2023 and was approved on 16 May 2023.

The Preliminary Documentation has been further amended in late 2023 to include an updated micro-siting area around the switching station with an increase of 9.5 ha to the Development Corridor (no change to Study Area or Disturbance Footprint) and a connection point for the access road between the switching station and South Ulam Road (0.2 ha increase to Study Area, Development Corridor and Disturbance Footprint). Although there would be no change in impact to the micro-siting area, the 0.2 ha proposed disturbance for the connection point to South Ulam Road does represent an additional impact to what has been previously presented and this area does intersect mapped potential habitat for a number of MNES.

After consultation with DCCEEW, it was determined that a new variation was not required for these most recent changes given the minor increase in impacts (0.2 ha). The Project layout is shown on **Figure 1.1**.

Two additional threatened species were confirmed as part of ongoing surveys during October 2023. These include a pair of koalas - adult and joey (*Phascolarctos cinereus*), and a small population of quassia (*Samadera bidwillii*). The additional areas and detections have been incorporated throughout the Preliminary Documentation including **Section 3.0** Habitat Assessment, **Section 4.0** Impact Assessment and **Section 5.0** Avoidance, Mitigation and Management Measures. All supporting documentation has also been updated to reflect these findings and changes.

Pursuant to section 95A(3) of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the public were invited to comment on the draft Preliminary Documentation for the Mount Hopeful Wind Farm Project (2021/9137). Public comments were sought over a period of 20 days, with a submission close date of 17 October 2023. A total of 13 submissions were received during the notification period, with each responded to in the Public Comment Response Report provided to DCCEEW. Twelve of the submissions were responded to without necessary updates to the Preliminary Documentation package. One submission raised the concern of construction and operational noise impacts interrupting koala (*Phascolarctos cinereus*) mating calls during the breeding season. This was considered to be relevant to the assessment and a detailed assessment of noise impacts koala (*Phascolarctos cinereus*) and wildlife more generally has been retrospectively undertaken and is included in **Section 8.2.5** of Attachment B4, Assessment of Matters of National Environmental Significance.

The provision of draft Preliminary Documentation was provided online, hard copies were also made available without charge at the Rockhampton Regional Library, Banana Shire Library and State Library of Queensland.

1.3 Content and Structure of this Report

The purpose of this report is to respond to DCCEEW's Request for Additional Information (RFI). In doing so, either a detailed account or a summary of additional assessment has been provided in this document. Where a summary has been provided, the detailed assessment is included within one of the supporting documents. To easily reference where each RFI item has been addressed a cross reference table has been provided in Attachment A.

This Preliminary Documentation is supported by the following technical documentation:

- Attachment A: Additional Information Required – Cross Reference Table.
- Attachment B1–4: Assessment of Matters of National Environmental Significance.
- Attachment C: Preliminary Health, Safety and Environment Management Plan.
- Attachment D: Preliminary Construction Environmental Management Plan.
- Attachment E: Preliminary *Cycas megacarpa* Species Management Plan.
- Attachment F: Preliminary Vegetation Management Plan.
- Attachment G: Preliminary Bird and Bat Adaptive Management Plan (inclusive of Collision Risk Modelling (CRM) outcomes).

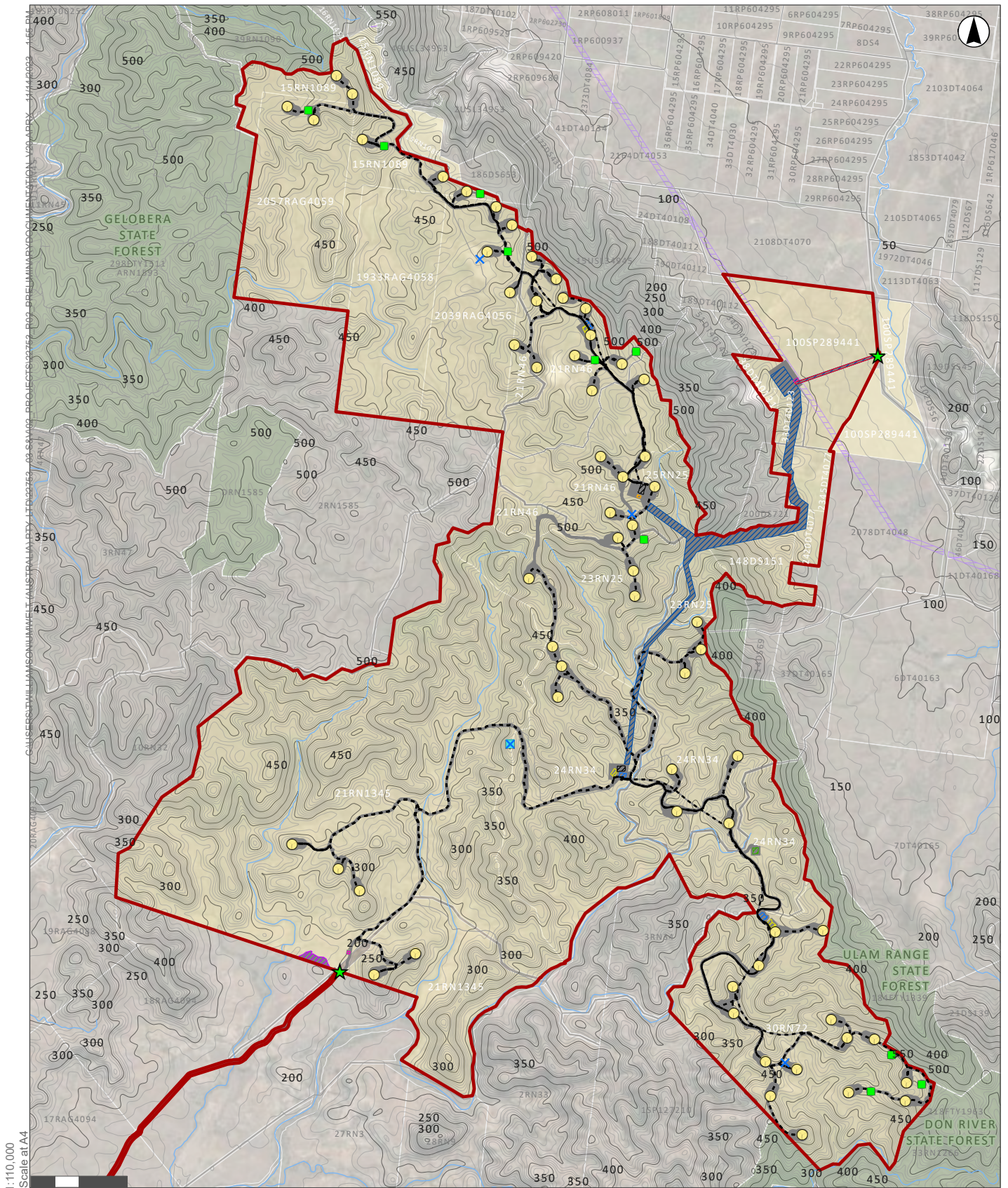
- Attachment H: Preliminary Erosion and Sediment Control Plan.
- Attachment I: Preliminary Decommissioning Management Plan.
- Attachment J: Preliminary Translocation Management Plan for *Cycas megacarpa*.
- Attachment K: Offset Management Strategy.
- Attachment L: Habitat mapping (JPEGs).
- Attachment M: Neoen Sustainability Framework.
- Attachment N: Public Comment Response Report

1.4 MNES Assessment Boundaries and Definitions

The Mount Hopeful Wind Farm Project is the Proposed Action for the purpose of this assessment. The Mount Hopeful Wind Farm Project is herein referred to as 'the Project'. Three distinct boundaries are presented in this assessment and supporting documentation, including:

- **Study Area:** refers to the boundaries of the 17 freehold land parcels which encompass the infrastructure that has been designed for the proposed wind farm, as well as the boundary of the access road corridor (inclusive of the local road reserve for Glengowan Road, Playfields Rd and McDonalds Rd and small area of one additional adjacent land parcel and an area of the road reserve of South Ulam Road (**Section 1.4.1**). The Study Area represents the limit of the vegetation and habitat mapped for the Project
- **Development Corridor:** refers to spatial bounds in which all Project infrastructure would be located (**Section 1.4.3**).
- **Disturbance Footprint:** represents the maximum extent of direct impacts and the indicative location of proposed Project infrastructure (**Section 1.4.4**).

These areas are further described below and depicted in **Figure 1.2**.



0 1,000 2,000 Metres

Legend

- Existing Met Mast
- Contours (10m)
- Contours (50m)
- Property Boundaries
- Study Area
- Easements
- Participating Properties
- Development Corridor

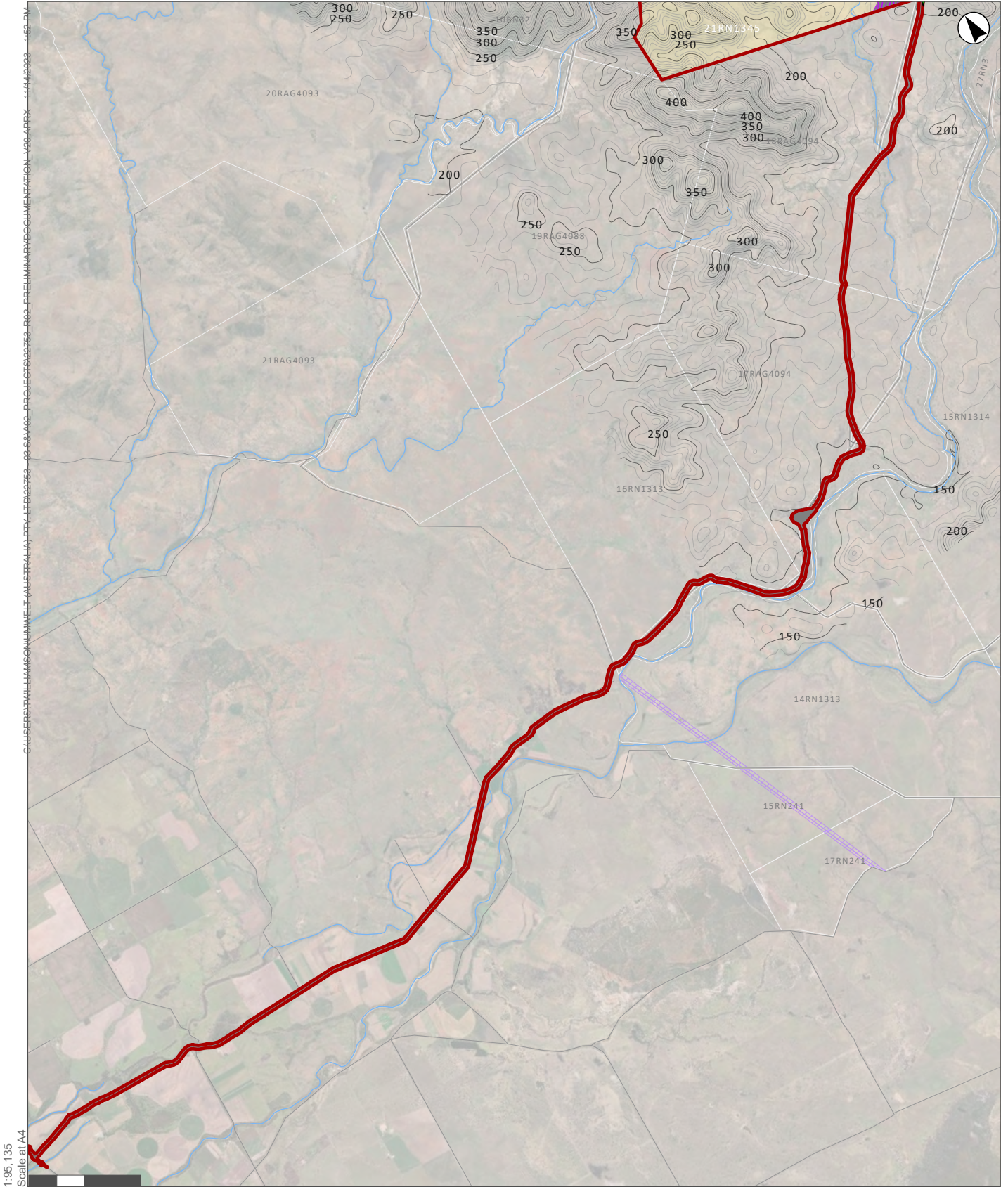
- Proposed Project Infrastructure**
- Permanent MET Masts
- Temporary Met Masts
- Turbines
- Site Access
- Access and Overhead / Underground Cabling
- Grid Connection Easement
- Access
- Compound
- Concrete Batching Plant
- Temporary Accomodation Camp

- Laydown
- Operation and Maintenance Area
- Site Entry
- Substation
- Transmission Infrastructure

FIGURE 1.1A

MOUNT HOPEFUL WIND FARM PROJECT LAYOUT

Image Source: ESRI Basemap (2022) Data source: Department of Resources (2022)
 NB: Layout is Indicative Only



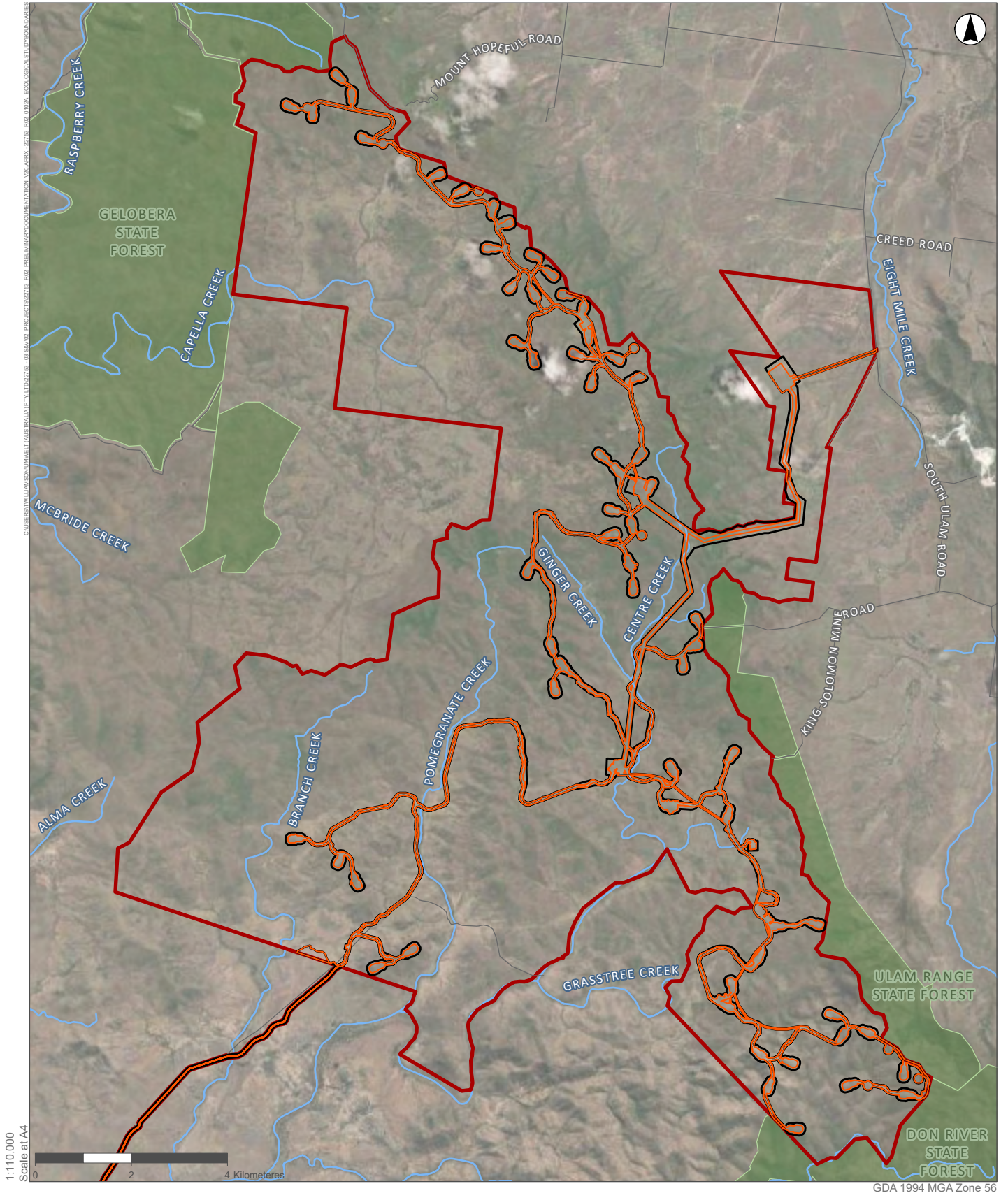
GDA 1994 MGA Zone 56

Legend

- | | | |
|---|--|---|
| <ul style="list-style-type: none"> Existing Met Mast Contours (10m) Contours (50m) Property Boundaries Study Area Easements Participating Properties Development Corridor | <p>Proposed Project Infrastructure</p> <ul style="list-style-type: none"> Permanent MET Masts Temporary Met Masts Turbines Site Access Access and Overhead / Underground Cabling Grid Connection Easement Access Compound Concrete Batching Plant Temporary Accomodation Camp | <ul style="list-style-type: none"> Laydown Operation and Maintenance Area Site Entry Substation Transmission Infrastructure |
|---|--|---|

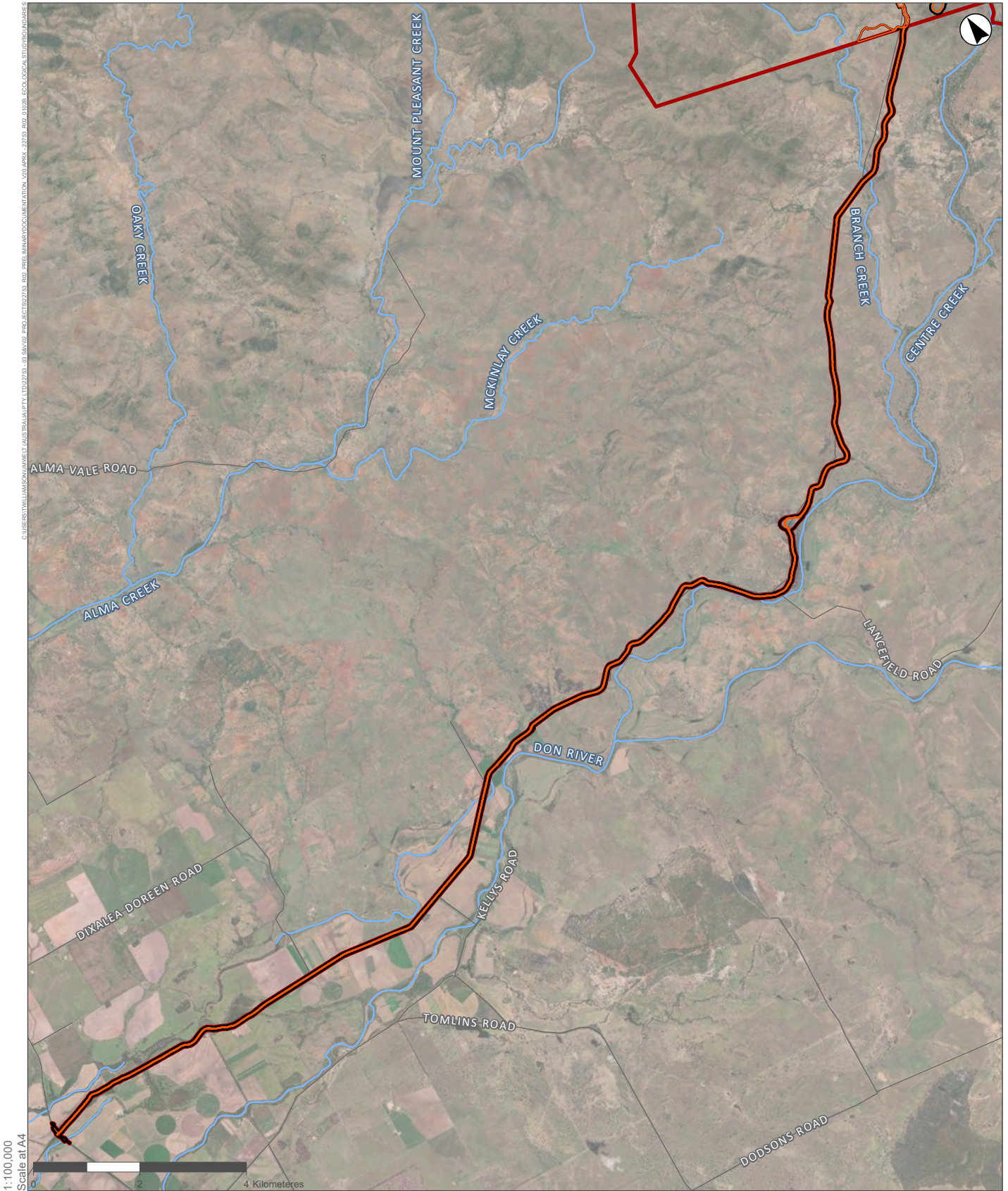
FIGURE 1.1B

**MOUNT HOPEFUL WIND FARM
PROJECT LAYOUT**



- Legend**
- Roads
 - Watercourse
 - Disturbance Footprint
 - Development Corridor
 - Study Area
 - State Forest

FIGURE 1.2A
ECOLOGICAL STUDY
BOUNDARIES



- Legend**
- Roads
 - Watercourse
 - Disturbance Footprint
 - Development Corridor
 - Study Area
 - State Forest

FIGURE 1.2B
ECOLOGICAL STUDY
BOUNDARIES

1.4.1 Study Area

The Study Area refers to the boundaries of the 17 freehold land parcels which encompass the infrastructure that has been designed for the proposed wind farm, as well as the boundary of the access road corridor (inclusive of the local road reserve for Glengowan Road, Playfields Rd and McDonalds Rd and small area of one additional adjacent land parcel) and a connection to the switching station in the road reserve at South Ulam Road. The area covers approximately 16,976 hectares (ha) and extends approximately 25 km north-south at the longest point and 42 km east-west at the widest point (this includes approximately 30 km of access road). The Study Area represents the limit of the vegetation and habitat mapped for the Project. It should be noted however, that this boundary does not represent the spatial bounds in which all Project field surveys have been conducted (this area being larger and including areas outside of the Study Area). Lot and plans relevant to the Study Area include:

- Those relevant to the proposed wind farm:
 - 148/DS151, 2420/DT4077, 21/RN46, 30/RN72, 50/DT40144, 1933/RAG4058, 21/RN1345, 100/SP289441, 33/DT40123, 2039/RAG4056, 23/RN25, 38/DT40131, 2057/RAG4059, 24/RN34, 25/RN25, 15/RN1089 and 2345/DT4077.
- That relevant to the access road corridor:
 - 17/RAG4094.

1.4.2 Development Corridor

The Development Corridor is a ‘buffered’ version of the indicative Project layout, covering approximately 1,564.6 ha. This area represents the maximum spatial extent where disturbance may occur within the Study Area and includes areas required for temporary and permanent Project infrastructure, equipment and materials laydown, installation and access.

The Project has not yet undergone detailed design. This will occur following a competitive tender and contract award for equipment supply and construction. The detailed design process will rely heavily on future technical assessments, including but not limited to, additional ecological field surveys. The process will give certainty to the final positioning of Project infrastructure as well as the final Disturbance Footprint. Allowing for the Disturbance Footprint to be adjusted within the Development Corridor would allow for further avoidance and management of specific on-ground constraints that are identified in future technical assessments.

1.4.3 Disturbance Footprint

The Disturbance Footprint covers approximately 883.6 ha and represents the maximum extent of clearing works and the indicative locations of Project infrastructure. It is a ‘worst-case’ scenario in terms of the extent of clearing works. The impact assessment on MNES values (see **Section 8.1.1** and **Appendix E** of Attachment B4, Assessment of Matters of National Environmental Significance) refers to clearing areas that are based on the Disturbance Footprint. As infrastructure will be micro-sited within the Development Corridor, the final clearing areas are anticipated to be lower than detailed in this assessment (described further in **Section 9.2.2** of Attachment B4, Assessment of Matters of National Environmental Significance).

2.0 Description of the Action

RFI 1.1: Include a refined description of the action and project layout as well as any updated information if changes have been made to the project since the referral documentation was submitted

A variation letter was submitted to DCCEEW on 21 December 2022. This letter outlines Neoen’s request to vary the Proposed Action to construct the Project as it relates to the Project’s assessment under the EPBC Act. In early 2023, the variation was approved.

Following this approval, further variations to the Project were required to ensure the safe transportation of wind turbine infrastructure. This involved widening of the existing Playfields, McDonalds and Glengowan Roads, to the west of the wind farm site (the access road corridor). Through discussion with DCCEEW it was determined that a further variation to the Project was required. This variation was submitted on 9 May 2023 and approved on 16 May 2023.

These letters respond to the variation requirements detailed in Clause 5.08 of the Environment Protection and Biodiversity Conservation Regulations 2000.

The following list provides a summary of key changes to the Project referred to the Department of Agriculture Water and the Environment (DAWE) in December 2021 (EPBC Ref: 2021/9137), which form part of the variation requests:

1. The number of wind turbine generators (WTGs) proposed to be developed for the Project have been reduced from ‘up to 116’ to ‘up to 63’.
2. The Project design has been further refined, with the location of WTGs, transmission lines, access tracks/roads, electrical reticulation, and associated infrastructure and construction facilities amended. This design process has been subject to a multidisciplinary review that has sought to minimise impacts to environmental values, while providing for an economically viable and constructable wind farm.
3. Despite the reduction in the Project scale, the Project exists largely within the footprint of the referred footprint (with the exception of the access road corridor), however, is now smaller and seeks to reduce impacts on MNES. Accordingly, the Project is generally consistent with what was referred to DAWE in December 2021.
4. As a result of Project design refinements the Development Corridor (the assessment unit used for the referral) and the expected Disturbance Footprint (the assessment unit used for this Preliminary Documentation) has changed. The quantum of these changes relevant to the original referral, the first variation and the second variation are outline in **Table 2.1** below.

Table 2.1 Development Corridor and Disturbance Footprint Areas

Assessment Phase	Development Corridor (ha)	Disturbance Footprint (ha)
EPBC Referral	1,973.3	up to 1,184.0
Variation 1	1,349.1	875.3
Variation 2	1,564.6	883.6

Overall, it is considered that the varied action is fundamentally the same as the originally referred action and can be assessed via the current process.

How the Impacts of the Proposed Variation on MNES Compare with those of the Referral

Ecological survey work for the Project has been ongoing since 2019, and accordingly the ecology of the area is well understood. It is not anticipated that the Project changes would introduce any new impacts to MNES values that have not been accounted for in the original referral and decision. However, one species the yellow-bellied glider (south-eastern) (*Petaurus australis australis*) was listed after the referral submission, but prior to the decision. As such impact assessment has been conducted for this species. The variation responds to the requirements detailed in Clause 5.08 of the Environment Protection and Biodiversity Conservation Regulations 2000.

The Project has conducted numerous ecological surveys and subsequent design changes to avoid the potential for impacts on protected listed flora and fauna species and communities to the greatest extent practicable. Further, buffers have been applied to known threatened species habitat and waterways known to, or likely to, host EPBC listed species, as a means of reducing direct impacts of the Project on MNES.

It is noted that the impact areas provided in **Table 2.2** below and in Attachment B1 (Assessment of Matters of National Environmental Significance) reflect a revised habitat mapping approach as directed by the RFI.

As described in **Section 1.2**, since the original controlled action decision and RFI, the Project has now gone through two Project variations. Variation 1 has now been superseded and as such, the approved Variation 2 now represents the Proposed Action. The calculations provided in **Table 2.2** demonstrate the change in impacts between the referral Development Corridor (previous assessment unit for impact) and the Proposed Action Disturbance Footprint (current assessment unit for impact). To demonstrate the nature and extent of the Project changes, the referral Development Corridor and the Proposed Action Disturbance Footprint are shown on **Figure 2.1**.

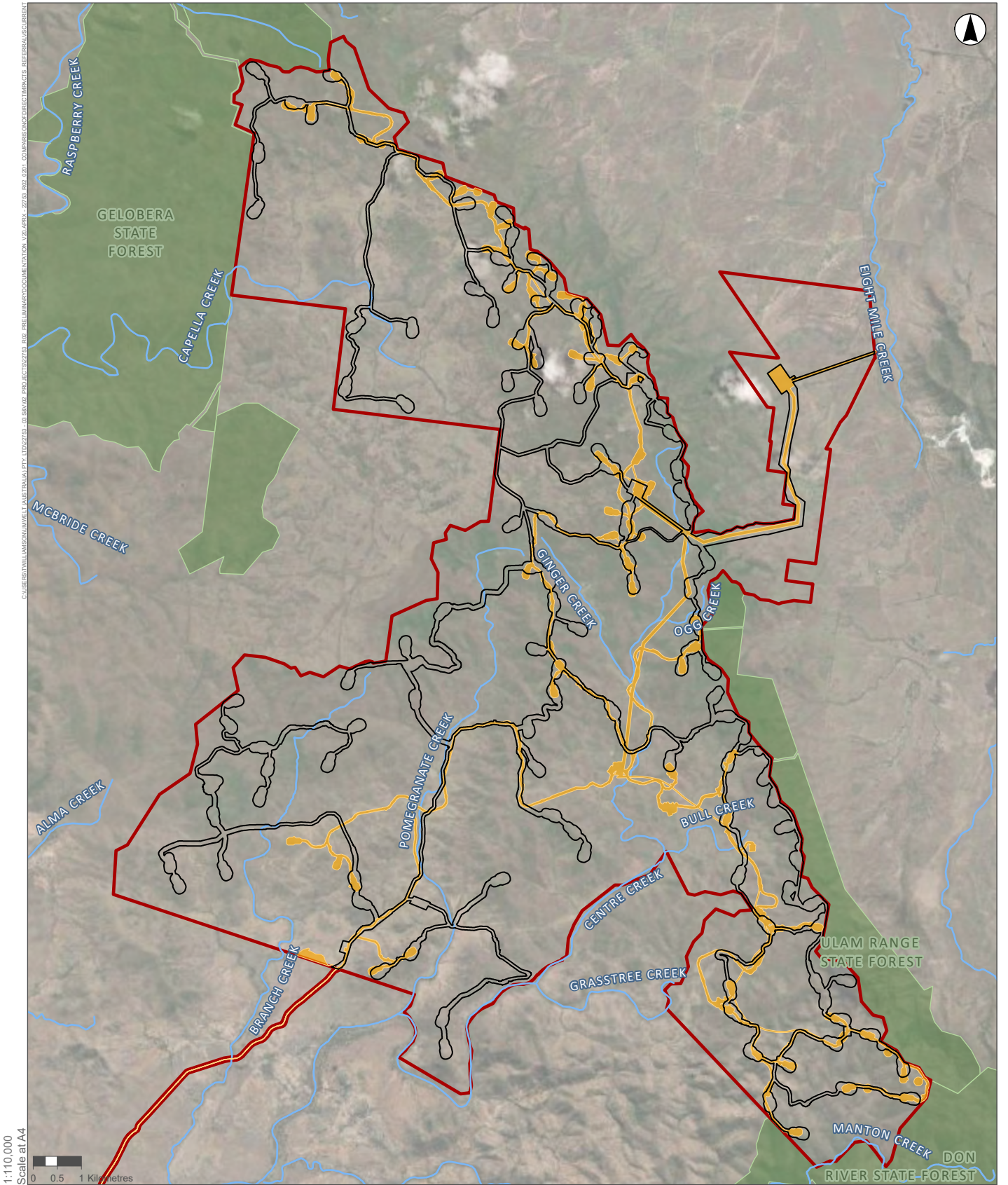
Table 2.2 Comparison of predicted direct impacts on MNES between current Disturbance Footprint, Development Corridor and referral Development Corridor

Threatened Species or Migratory Species		Referral Development Corridor (ha) ¹	Current Development Corridor (ha)	Current Disturbance Footprint (ha)	Area Reduction (ha)	Area Reduction (%)
Threatened Flora						
<i>Cycas megacarpa</i> – density modelling ²	High	4.8	0.9	0.7	4.1	85.4
	Moderate	172.9	21.7	12.4	162.8	92.9
	Low	1,040.7	294.5	191.3	833.7	86.2
	Total	1,218.4	317.1	204.4	1,000.7	83.0
<i>Cossinia australiana</i>		46.1	21.1	8.6	37.5	81.3
<i>Decaspermum struckoiligum</i>		6.2	6.3	2.3	3.9	62.9
<i>Samadera bidwillii</i>		1,042.1	638.9	347.8	694.1	66.4

¹ The impact area for each species will differ from those in the referral as the new habitat rules have been applied, as per the Request for Information (RFI).

² Refer to Section 1.1.1 of Appendix E for descriptions of density categories.

Threatened Species or Migratory Species	Referral Development Corridor (ha) ¹	Current Development Corridor (ha)	Current Disturbance Footprint (ha)	Area Reduction (ha)	Area Reduction (%)
Threatened Fauna					
Northern quoll (<i>Dasyurus hallucatus</i>) – denning/refuge and foraging/dispersal	1,456.1	929.5	596.9	859.2	59.0
Koala (<i>Phascolarctos cinereus</i>) – breeding/foraging/ dispersal and climate refugia	1,587.8	1,095.2	646.9	940.8	59.2
Collared delma (<i>Delma torquata</i>) – breeding/foraging	650.7	448.6	272.8	377.9	58.1
Red goshawk (<i>Erythrotriorchis radiatus</i>) – foraging/dispersal	1,627.4	1,092.4	633.0	994.4	61.1
Squatter pigeon (southern) (<i>Geophaps scripta scripta</i>) – breeding, foraging and dispersal	819.1	641.5	368.5	450.6	55.0
Ghost bat (<i>Macroderma gigas</i>) – seasonal foraging/dispersal only	1,974.7	1,564.6	883.6	1091.1	55.3
White-throated needletail (<i>Hirundapus caudacutus</i>) – roosting/foraging and foraging/dispersal	1,621.5	1,096.7	640.2	981.3	60.5
Greater glider (southern and central) (<i>Petauroides volans</i>) – breeding/denning and foraging/dispersal	1,558.6	1,054	627.9	932.8	59.8
Yellow-bellied glider (south-eastern) (<i>Petaurus australis australis</i>)	913.1	531.6	322.0	591.1	64.7
Grey-headed flying-fox (<i>Pteropus poliocephalus</i>) – foraging/dispersal	901.8	510.4	277.3	624.5	69.3
Migratory Species					
Fork-tailed swift (<i>Apus pacificus</i>) – foraging/dispersal	1,974.7	1,564.6	883.6	1,091.1	55.3
Oriental cuckoo (<i>Cuculus optatus</i>) – foraging/dispersal	1,042.1	639.2	348.1	694.2	66.6
Black-faced monarch (<i>Monarcha melanopsis</i>) – foraging/marginal breeding and foraging/dispersal	1,044.0	639.7	348.4	695.6	66.6
Satin flycatcher (<i>Myiagra cyanoleuca</i>) –foraging/dispersal	995.9	618.3	339.7	656.4	65.9
Rufous fantail (<i>Rhipidura rufifrons</i>) –foraging/dispersal	1,042.1	639.2	348.1	694	66.6
Spectacled monarch (<i>Symposiachrus trivirgatus</i>) – foraging/dispersal	101.6	40.2	17.7	83.9	82.6



Legend

- Watercourse
- Study Area
- Current Disturbance Footprint
- Referred Development Corridor
- State Forest

FIGURE 2.1

**Comparison of Direct Impacts –
Referral Development Corridor
vs Current Disturbance
Footprint**

2.1 Mount Hopeful Project Description

Umwelt is supporting Neoen in seeking project approvals for the Project. The Project is located approximately 45 km south of Rockhampton and 65 km west of Gladstone, within the Central Queensland Region.

The Project involves the development of a wind farm that contains 63 WTGs, ancillary infrastructure including up to ten temporary and ten permanent wind monitoring masts, six substations, battery energy storage systems (BESS), temporary construction compound/laydown areas, three concrete batching plants, one temporary accommodation camp, high voltage (275 kilovolts (kV)) overhead powerlines, as well as overhead and/or underground power and communication cables. The Project includes an access road corridor which aims to upgrade approximately 30 km of existing road between the Burnett Highway at Dixalea and Glengowan Road to ensure the safe transportation of Project infrastructure. The Project is expected to have a maximum generation capacity of approximately 400 megawatts (MW).

2.1.1 Study Area

The Project would be developed on 18 freehold land parcels (see **Table 2.3**) and utilise a number of local road reserves, which would be collectively referred to as the 'Study Area'. The Study Area is within the Rockhampton Regional Council and Banana Shire Council Local Government Areas (LGA) and covers approximately 16,976.0 ha of land. The predominant land use in both LGAs is rural agriculture comprising mostly beef cattle grazing and farmland cropping including cotton and lucerne. Some forestry, coal mining and power generation also occur. Elevations within the Study Area ranges from approximately 500 metres (m) Australian Height Datum (AHD) to 120 m AHD, characterised by varying landform that comprises of peaks and valleys, with areas of lower, generally flatter topography to the east and west.

Major highways in proximity to the Study Area include the Bruce Highway to the east, Burnett Highway to the west, and the Dawson Highway to the south. These major transport corridors link to the cities of Rockhampton and Gladstone, as well as the Port of Gladstone from which the proposed turbine components would be transported. Access to the Study Area is primarily via Burnett Highway located to the east of the Study Area, as well as lower order roads in Banana Shire Council including McDonalds Road and Playfields Road.

Table 2.3 Land Parcel Details

Lot and Plan	Address	Tenure	Local Government Area
Wind Farm Area			
Lot 21 RN1345	Glengowan Road, Ulogie QLD	Freehold	Banana
Lot 24 RN34	Glengowan Road, Ulogie QLD	Freehold	Banana
Lot 23 RN25	Glengowan Road, Ulogie QLD	Freehold	Banana
Lot 30 RN72	Glengowan Road, Ulogie QLD	Freehold	Banana
Lot 21 RN46	1682A South Ulam Road, Bajool QLD	Freehold	Rockhampton
Lot 25 RN25	1682A South Ulam Road, Bajool QLD	Freehold	Rockhampton
Lot 2039 RAG4056	1682A South Ulam Road, Bajool QLD	Freehold	Rockhampton
Lot 1933 RAG4058	1682A South Ulam Road, Bajool QLD	Freehold	Rockhampton
Lot 2057 RAG4059	1682A South Ulam Road, Bajool QLD	Freehold	Rockhampton

Lot and Plan	Address	Tenure	Local Government Area
Lot 15 RN1089	1682A South Ulam Road, Bajool QLD	Freehold	Rockhampton
Lot 148 DS151	1682 South Ulam Road, Bajool QLD	Freehold	Rockhampton
Lot 2420 DT4077	1682 South Ulam Road, Bajool QLD	Freehold	Rockhampton
Lot 2345 DT4077	1682 South Ulam Road, Bajool QLD	Freehold	Rockhampton
Lot 50 DT40144	1682 South Ulam Road, Bajool QLD	Freehold	Rockhampton
Lot 33 DT40123	1682 South Ulam Road, Bajool QLD	Freehold	Rockhampton
Lot 38 DT40131	1682 South Ulam Road, Bajool QLD	Freehold	Rockhampton
Lot 100 SP28944	1682 South Ulam Road, Bajool QLD	Freehold	Rockhampton
Local road reserve	Not applicable	Road reserve	Rockhampton
Access Road Corridor			
Lot 17 RAG4094	Playfields Road, Ulogie QLD (only a portion of the land parcel including in the Study Area)	Freehold	Banana
Local road reserves	Not Applicable	Road reserve	Banana and Rockhampton

2.1.2 Project Drivers and Benefits

Central Queensland is located at the heart of the State’s electricity network and is an energy powerhouse that currently hosts more than 4,600 MW of coal-fired energy production. The Central Queensland Region is identified to be a critical location for future industrial decarbonisation and renewable energy development. The recent *Queensland Energy and Jobs Plan* (September 2022) (Department of Energy and Public Works 2022) seeks to transform Queensland’s energy system, and deliver clean, reliable and affordable energy that supports the state renewable energy and economic targets.

The Project benefits include:

- Generation of clean energy.
- Support Queensland’s 2030 renewable energy targets for 2030.
- Reliability of generation enhanced by the potential inclusion of a battery energy storage system.
- Supporting agriculture by providing diversified revenue to farmers involved in the Project.
- Community Fund of approximately AUD \$100 k (based on a 500 MW facility) established for local projects and initiatives throughout Project lifespan.
- Revenue for involved landholders over 30-year lifespan of the Project.
- Employment opportunities – both direct and indirect.
- Local materials and skills used wherever possible.

2.1.2.1 Social and Economic

The Project is expected to provide a range of economic benefits to the Central Queensland region, including an investment of approximately \$750 million AUD of capital expenditure (based on a 400 MW facility). The Project is expected to create up to approximately 220 direct jobs during construction and 8 to 12 direct jobs during the 30 years of operation. These numbers are prorated estimates based on Neoen's 194 MW Bulgana Wind Farm, on which a retrospective economic impact assessment was undertaken by Aurecon after construction³.

2.1.2.2 Environmental

The advancement of renewable energy through projects such as the Mount Hopeful Wind Farm demonstrates a commitment to driving climate action, decarbonisation of the state's energy sector, and the health and wellbeing of communities, by reducing emission-related amenity impacts.

The Project also demonstrates a commitment to avoiding and minimising impacts to vegetation communities and threatened species values, as evidenced by the prioritisation of ecological investigations and their consideration throughout the Project's design (**Section 5.0** of this report and **Section 9.0** of Attachment B4 (Assessment of Matters of National Environmental Significance)). Further, throughout the development of the Project, Neoen has engaged closely with key stakeholders, members of the local community, Banana Shire Council, Rockhampton Regional Council, Banana Shire Council, and Queensland Government agencies.

2.1.2.3 Policy Alignment

The Queensland Government has established three Queensland Renewable Energy Zones (QREZ): Northern, Central and Southern. QREZ are areas identified by the Australian Energy Market Operator (AEMO) to be suitable for renewable energy development. The Project is located within the Central QREZ, which is home to significant renewable energy resources. The Project is strongly aligned to existing Queensland Government policy, in particular the State Infrastructure Strategy (SIS) and the establishment of the Central QREZ.

The key areas of alignment include:

- Supporting the establishment of Queensland as a 'renewable energy superpower', which is identified as one of five key focus areas of the SIS that is critical in delivering a zero-carbon future for the state.
- Aiding in the transition from coal fired power generation and contributing to the industrial decarbonisation of the region, including supporting the establishment of Gladstone as a world-leading renewable hydrogen and clean manufacturing hub.

Delivering on priority actions of the SIS, including:

- Delivering on the Queensland Government's target of 50% renewable energy by 2030.
- Establishing the Central QREZ.
- Capturing the benefits of Queensland's renewables and hydrogen transformation.

³ Economic Assessment Report for Bulgana Green Power Hub, Aurecon, 2020

Importantly, the Project would also contribute to the delivery of both the Commonwealth Government and the Queensland Government's emissions commitments, including:

- The Commonwealth Government's commitment to reduce greenhouse gas emissions by 43% below 2005 levels by 2030.

The following Queensland Government commitments:

- The renewable energy target of 50% by 2030, 70% by 2032 and 80% by 2035.
- Reducing emissions by 30% below 2005 levels by 2030.
- Achieving net zero emissions by 2050.
- Delivering 95% of clean energy infrastructure investment in regional Queensland.

2.1.3 Existing Infrastructure

Powerlink electricity towers and associated overhead electricity transmission lines intersect the Study Area in a north-west to south-east direction. An existing telecommunication tower is located approximately 2 km north of the Study Area, and a 120 m guyed lattice meteorological mast was erected over the Study Area in August 2020. A 120 m guyed lattice meteorological mast was erected over the Study Area in August 2020, as well as a 140 m and 110 m guyed lattice meteorological mast in November 2022.

In the western extent of the Study Area (the access road corridor) an existing road reserve is present relating to Playfields, McDonalds and Glengowan Roads. The current clearing for these roads is approximately 4–6 m in width and 30 km in length.

Other rights and encumbrances of note include:

- An easement (A RP612717) for high voltage electricity transmission line intersecting the eastern portion of the Study Area on Lot 100 SP289441.
- A strata for a Profit à Prendre (030 RN72) over Lot 30 RN72 for a Forest Consent Area to the State of Queensland (represented by the Department of Agriculture and Fisheries).
- Three Exploration Permits for Minerals (EPMs) overlap the Study Area, comprising EPM 15810 held by Mount Morgan Exploration Pty Ltd, EPM 27098 held by GBM Resources Limited, and EMP Application area 27105 held by Prophet Resources Pty Ltd.
- An existing local road reserve consisting of McDonalds, Playfields and Glengowan Roads between the Burnett highway at Dixalea and Glengowan Road that would be utilised as an access road corridor.
- An existing local road reserve (South Ulam Road) exists within the eastern extent of the Study Area (switching station access point).

2.1.4 Proposed Infrastructure

The Project would construct 63 WTGs with the turbine specifications used for the assessment shown in **Table 2.4**. These specifications are considered to be an upper limit and are intended to provide flexibility for any innovation in turbine design between now and the time of detailed design and construction.

Table 2.4 Turbine Specifications Used for Assessment

Feature	Maximum Specifications
Project generation capacity	Approximately 400 MW
Turbine electrical output	Approximately 6.5 MW
Maximum number of turbines	63
Tip height	Up to 260 m
Blade length	Up to 90 m

Additionally, the Project would also require the provision of ancillary infrastructure, including the following:

- Up to 10 temporary wind monitoring towers.
- Up to 10 permanent wind monitoring towers.
- Up to six substations, a battery energy storage system and ancillary electrical infrastructure.
- Up to 13 km of high voltage (275 kV) overhead powerlines.
- Overhead and/or underground power and communication cables.
- Up to 175 km of gravel capped roads.
- Two permanent site access points.
- An upgrade to the access road corridor including approximately 30 km of road upgrades along McDonalds, Playfields and Glengowan Roads.
- An access point to the switching station in the road reserve at South Ulam Road.
- Site operational, maintenance and storage areas containing permanent site offices, workshops, warehouses, mobile offices, lunch room, amenities and ablutions.
- A range of temporary infrastructure to facilitate the construction of the Project, including:
 - One construction compound.
 - A temporary worker's accommodation camp to provide for a peak construction workforce of up to approximately 450 people including a water treatment plant, sewage treatment plant and sprayfield.
 - Three concrete batching plants.
- Two laydown areas.

The Project is expected to have a Disturbance Footprint of approximately 894.6 ha within the Study Area, which would be subject to further refinement during the detailed design process.

The Project layout is provided in **Figure 2.1** of Attachment B1 (Assessment of Matters of National Environmental Significance).

2.1.5 Construction Activities

A summary of the anticipated construction works associated with the Project are provided in **Table 2.5**.

Table 2.5 Proposed Project Construction Details

Project Stage/Component	Description
Construction Commencement, Completion and Commissioning of Project	<ul style="list-style-type: none"> • Commencement of construction works: Quarter 1, 2024. • Completion of construction works: Quarter 4, 2025. • Commissioning of the Project: Scheduled in Quarters 1 and 2, 2026.
Duration of Construction Works	Between 22–28 months.
Planned Construction Activities	<ul style="list-style-type: none"> • Site establishment (temporary site facilities, lay down areas, equipment and materials). • Earthworks for access roads and wind turbine hardstands. • Excavations for the foundations. • Construction of wind turbine foundations. • Installation of electrical and communications cabling and equipment. • Installation of wind turbine transformers, in parallel with electrical reticulation works. • Arrival of wind turbine components to the Project Site. • Installation of wind turbines. • Commissioning of wind turbines. • Reliability testing.

3.0 Habitat Assessment

As per the RFI, DCCEEW considers that the listed species and migratory species identified below may be significantly impacted by the Proposed Action:

- *Cycas megacarpa* – Endangered.
- Koala (*Phascolarctos cinereus*) (combined populations of Qld, NSW, and the ACT) – Endangered.
- White-throated needletail (*Hirundapus caudacutus*) – Vulnerable.
- Greater glider (southern and central) (*Petauroides volans*) – Vulnerable.
- Northern quoll (*Dasyurus hallucatus*) – Endangered.
- Ghost bat (*Macroderma gigas*) – Vulnerable.
- Grey-headed flying-fox (*Pteropus poliocephalus*) – Vulnerable.
- Red goshawk (*Erythrorchis radiatus*) – Vulnerable.
- Collared delma (*Delma torquata*) – Vulnerable.
- Squatter pigeon (southern) (*Geophaps scripta scripta*) – Vulnerable.
- Cossinia (*Cossinia australiana*) – Endangered.
- Quassia (*Samadera bidwillii*) – Vulnerable.
- *Decaspermum struckoiligum* – Endangered.

An Assessment of Matters of National Environmental Significance (Attachment B1–4 Assessment of Matters of National Environmental Significance) which presents a detailed ecological assessment for the Project, was provided to support the referral of the Project to DCCEEW. In response to the DCCEEW’s referral decision and request for additional information, this report has been updated with the methodology and outcomes of further ecological investigations undertaken since referral lodgement as well as to specifically address RFI items (Attachment B1–4 Assessment of Matters of National Environmental Significance). In doing so, habitat mapping for each of the aforementioned species has been developed or updated to reflect the information provided by DCCEEW in the RFI and to address any outstanding RFI items relating to habitat assessment.

With consideration of further discussions with DCCEEW, one additional species, the yellow-bellied glider (south-eastern) (*Petaurus australis australis*), may be significantly impacted by the Project. This species was recorded within the Study Area, however it was not impact assessed at the time of the referral as the species was not listed under the EPBC Act. The species was listed as Vulnerable on 2 March 2022, prior to DCCEEW’s referral decision (7 March 2022) and has therefore been considered in this assessment. As this report responds to DCCEEW’s RFIs and no RFIs relate to this species, detailed discussion and impact assessment consistent with the assessment for the aforementioned species is provided in Attachment B1–4 Assessment of Matters of National Environmental Significance.

Habitat assessment for each MNES was conducted based on a review of available desktop resources, scientific literature, departmental guidelines and relevant department documents (Species Profile and Threats (SPRAT) database, Listing Advices, Recovery Plans, Approved Conservation Advices, referral guidelines) in combination with data collected during extensive field surveys.

The presence and extent of potential habitat was delineated by using vegetation community classification and condition as well as information on presence and abundance of microhabitat features necessary for the ecological requirements of each species (i.e. hollow bearing trees, availability of foraging species, complex boulder piles, potential roost sites). The size and condition of vegetation patches, as well as proximity to necessary resources (i.e. water, caves, flying-fox roosts) were also considered in the context of the species mobility capacity. The extent of potential habitat was classified into habitat utilisation for each species (e.g. breeding, foraging, roosting, dispersal).

As per the RFI, an updated Protected Matters Search Tool (PMST) report was generated and considered in this Preliminary Documentation (presented in **Appendix A** of Attachment B4 (Assessment of Matters of National Environmental Significance)). This report was generated on 17 April 2023 and identified the following species not previously assessed in the original assessment:

- Greater sand plover (*Charadrius leschenaultia*) – Vulnerable and Migratory.
- Yellow-bellied glider (south-eastern) (*Petaurus australis australis*) – Vulnerable (listed 2 March 2022).
- Grey snake (*Hemiaspis damelii*) – Endangered.
- Black ironbox (*Eucalyptus raveretiana*) – Vulnerable.
- Three-leaved bosistoa (*Bosistoa transversa*) – Vulnerable.
- King blue-grass (*Dichanthium queenslandicum*) – Endangered.
- Diamond firetail (*Stagonopleura guttata*) – Vulnerable (listed 31 March 2023).

Further, 3 species listings under the EPBC Act have changed since referral submission:

- Koala (*Phascolarctos cinereus*) (uplisted from Vulnerable to Endangered on 12 February 2022).
- Greater glider (*Petauroides volans*) (uplisted from Vulnerable to Endangered on 5 July 2022).
- Red goshawk (*Erythrotriorchis radiatus*) (uplisted from Vulnerable to Endangered on 31 March 2023).

Consistent with section 158A of the EPBC Act, approval process decisions are not affected by listing events that happen after section 75 decision is made. That is, the relevant significant impact on a species is dependent on their listing status at the time of the controlled action decision. As such, red goshawk and greater glider (southern and central) will be assessed as Vulnerable for the purpose of this Preliminary Documentation. However, new Listing Advices, significant impact guidance and Conservation Advices will be considered during impact assessment. The koala was listed as Endangered prior to the controlled action decision and as such koala has been considered as Endangered throughout the Preliminary Documentation and all associated attachments.

The additional species identified in the PMST have been subject to Likelihood of Occurrence assessment (**Appendix C** of Attachment B4 (Assessment of Matters of National Environmental Significance)). With the exception of yellow-bellied glider (south-eastern), all of the remaining species were considered to be unlikely to occur based on available habitat not being suitable to meet their ecological requirements and/or lack of records in the surrounding area. As such no habitat mapping or impact assessment has been undertaken for these species.

As discussed in the section above, habitat mapping and impact assessment has been undertaken for the yellow-bellied glider (south-eastern) and can be found in Attachment B1 and B4 (Assessment of Matters of National Environmental Significance).

3.1 General Habitat Assessment Information Required

RFI 2.1.1 Provide an updated habitat assessment for relevant listed threatened species and communities. Include references to updated species advice from the SPRAT Database

Habitat assessment has been updated for all relevant listed species in Attachment B1–4 (Assessment of Matters of National Environmental Significance). This assessment has considered information garnered from desktop and field assessments and considers departmental guidance and documentation including SPRAT database, Listing Advices, Approved Conservation Advices and referral guidelines. The habitat assessment for each species follows the format below:

- Description and status under the EPBC Act.
- Distribution and habitat requirements.
- Threats.
- Occurrence and potential habitat within the study area. Including:
 - Habitat mapping criteria (including habitat utilisation categories).
 - Justification of mapping extent.
- Area in hectares of potential habitat within:
 - The Study Area.
 - The Development Corridor.
 - The Disturbance Footprint.
- Habitat critical to the survival of the species.
- Important populations (for species listed as Vulnerable).
- Potential Impacts and Key Mitigation Measures.
- Significant Impact Assessment completed in accordance with the *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* (DEWHA 2013).

Habitat assessments for all relevant species can be found in **Appendix E** of Attachment B4 (Assessment of Matters of National Environmental Significance).

RFI 2.1.2 Provide detailed mapping of suitable habitat for all listed threatened species and communities which: is specific to the habitat assessment undertaken for each listed threatened species and ecological community (i.e. does not only illustrate relevant QLD REs); includes an overlay of the updated project disturbance footprint; includes known records of individuals derived from desktop analysis and field surveys; and is provided separately as attachments in JPEG format

For each relevant listed species, detailed habitat mapping has been developed - informed by the outcome of the habitat assessment undertaken as per RFI item 2.1.1. Habitat mapping considers both vegetation community classification as well as availability of required microhabitat features and connectivity within the landscape. Each habitat map displays potential habitat within the Study Area (including habitat utilisation categories), and any known species records identified during field surveys or available via relevant resources or published literature.

Habitat mapping relevant to the wind farm area (i.e. not including the access road corridor) is included in **Section 3.0** and **Section 4.0** of this report where RFIs request information on specific MNES species. The full suite of habitat mapping for all relevant species, including the full map series (i.e. inclusive of the access road corridor) is provided in Attachment B2 and B3 (Assessment of Matters of National Environmental Significance) and is also provided separately in JPEG format in Attachment L.

RFI 2.1.3 Include an assessment of the adequacy of any surveys undertaken (including survey effort and timing). In particular, the extent to which these surveys were appropriate for the listed species or community and undertaken in accordance with relevant departmental survey guidelines

For all listed species assessed as having a moderate or higher likelihood of occurrence (included all relevant listed species identified in the RFI), Attachment B1 (Assessment of Matters of National Environmental Significance) details the desktop and field survey method and effort undertaken to assess presence/absence and habitat suitability. Survey techniques employed to target threatened species were determined based on the DCCEEW survey guidelines for Australia threatened fauna, referral guidelines and Queensland Department of Environment and Science (DES) targeted survey guidelines where appropriate. Surveys were undertaken in accordance with the following resources:

- *Survey Guidelines for Australia's Threatened Mammals* (Department of Sustainability, Environment, Water, Populations and Communities (DSEWPaC) 2011a).
- *Survey Guidelines for Australia's Threatened Bats* (Department of the Environment, Water, Heritage and the Arts (DEWHA) 2010a).
- *Survey Guidelines for Australia's Threatened Birds* (DEWHA 2010b).
- *Survey Guidelines for Australia's Threatened Reptiles* (DSEWPaC 2011b).
- *Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles* (DSEWPaC 2011c).
- *EPBC Act referral guideline for the endangered northern quoll* (Department of the Environment 2016a).
- A Review of Koala Habitat Assessment Criteria and Methods (Australian National University 2021).
- *Referral guideline for the 14 birds listed migratory under the EPBC Act* (Department of the Environment 2015).
- Targeted species survey guidelines: Ghost bat, *Macroderma gigas* (Hourigan 2011).

Survey guideline requirements and the effort undertaken for each relevant species is provided in **Table 3.1** below and **Table 4.3** of **Section 4** of Attachment B1 (Assessment of Matters of National Environmental Significance). The following sections are addressed for each species:

- Relevant guidelines.
- Recommended methodology.
- Effort undertaken.
- Survey adequacy.

Table 3.1 Survey Guideline Requirements and Effort Undertaken for each MNES

Species	Relevant Guidelines	Recommended Methodology	Effort Undertaken	Survey Adequacy
squatter pigeon (southern) (<i>Geophaps scripta scripta</i>)	In lieu of species-specific guidance, surveys were undertaken in consideration of the <i>Survey guidelines for Australia's threatened birds</i> (DEWHA 2010) and <i>Terrestrial Vertebrate Fauna Survey Guidelines for Queensland</i> (Eyre et al. 2018).	<ul style="list-style-type: none"> Area searches for the species in representative habitat or transect surveys. Recommended effort is 15 hours over 3 days within an area of 50 ha. Or six x 5–10 minute searches within an area of 1 ha. Longer surveys may be required in complex habitats. Flushing surveys. Recommended effort is 10 hours over 3 days within an area of 50 ha. Surveys to be undertaken during peak bird activity. 	<ul style="list-style-type: none"> 269 habitat assessments. 65 habitat quality assessments. 115 hours of diurnal bird surveys primarily over Spring and Summer in areas of representative habitat. Three of the four BBUS were conducted during summer and spring, while the fourth BBUS occurred in late Summer/early autumn, equating to 206 hours of vantage point surveys in the summer and spring months. Tracks, watercourses and water bodies (farm dams) were particularly monitored whilst surveying to detect the squatter pigeon (southern). 	<p>Guidelines Met</p> <p>A number of recommended survey methods were employed during peak activity periods to detect these bird species. The combination of diurnal bird surveys, vantage point surveys and incidental records across the field program provide adequate survey effort.</p>
red goshawk (<i>Erythrotriorchis radiatus</i>)	In lieu of species-specific guidance, surveys were undertaken in consideration of the <i>Survey guidelines for Australia's threatened birds</i> (DEWHA 2010) and <i>Terrestrial Vertebrate Fauna Survey Guidelines for Queensland</i> (Eyre et al. 2018).	<ul style="list-style-type: none"> Area searches for the species in representative habitat or transect surveys. Recommended effort is 15 hours over 3 days within an area of 50 ha. Or six x 5–10 minute searches within an area of 1 ha. Longer surveys may be required in complex habitats. Flushing surveys. Recommended effort is 10 hours over 3 days within an area of 50 ha. Surveys to be undertaken during peak bird activity. 	<ul style="list-style-type: none"> 269 habitat assessments, including nest searches in riparian woodlands. 115 hours of diurnal bird surveys primarily over spring and summer in areas of representative habitat. Three of the four BBUS were conducted during summer and spring, while the fourth BBUS occurred in late summer/early autumn, equating to 206 hours of vantage point surveys in the Summer and Spring months. 	<p>Guidelines Met</p> <p>A number of recommended survey methods were employed during peak activity periods to detect these bird species. The combination of diurnal bird surveys, vantage point surveys and incidental records across the field program provide adequate survey effort.</p>

Species	Relevant Guidelines	Recommended Methodology	Effort Undertaken	Survey Adequacy
northern quoll <i>(Dasyurus hallucatus)</i>	The <i>EPBC Act Referral Guideline for the Endangered Northern Quoll</i> (Department of the Environment 2016b) and <i>Survey Guidelines for Australia's Threatened Mammals</i> (DSEWPaC 2011a).	<ul style="list-style-type: none"> • If the Project will occur within the modelled distribution of the species and suitable habitat is likely to occur, initially undertake a reconnaissance survey using remote cameras and latrine searches. • If habitat critical to the survival of the species is present and may be impacted, undertake targeted surveys applying a refined and more targeted use of remote cameras and other supplementary techniques. • Transects of baited cameras, spaced 100 m apart for four nights is recommended. Remote cameras can be used at any time of the year but preferably when northern quolls are likely to be active and more detectable, i.e. before male die-off. • In Queensland, camera trapping is recommended over cage trapping (Eyre <i>et al.</i> 2018). 	<ul style="list-style-type: none"> • 269 habitat assessments, noting the presence of potential denning features including large hollow logs and complex boulder piles. • 81 habitat quality assessments. • Reconnaissance survey undertaken in July 2019 using remote cameras in areas of representative habitat. • Targeted placement of remote cameras undertaken in May – June 2020 and November 2020 in locations of identified potential habitat, baited using a combination of chicken coupled with a bolus of rolled oats, peanut butter, honey and vanilla essence, for a total of 490 trap nights. • Elliot trapping program undertaken in May – June 2020 in locations of representative identified potential habitat, baited using rolled oats, peanut butter, honey and vanilla essence, for a total of 320 trap nights. 	Guidelines Met Significant survey effort has been undertaken using methods recommended by the referral guidelines for Queensland, comprising both a reconnaissance and targeted survey. Habitat assessments were conducted throughout the field survey program to identify potential areas of habitat critical to the survival of the species.

Species	Relevant Guidelines	Recommended Methodology	Effort Undertaken	Survey Adequacy
greater glider (southern and central) (<i>Petauroides volans</i>)	In lieu of species-specific guidance, surveys were undertaken in consideration of <i>Survey Guidelines for Australia's Threatened Mammals</i> (DSEWPaC 2011a) and <i>Terrestrial Vertebrate Fauna Survey Guidelines for Queensland</i> (Eyre <i>et al.</i> 2018).	<ul style="list-style-type: none"> • Arboreal mammal survey methods identified by DSEWPaC (2011a) include: <ul style="list-style-type: none"> ○ 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 ○ call detection and/or call playback surveys for vocal species, in addition to playback of the calls of owl predators that are known to induce a call response ○ Elliot A and cage trapping. • As per (Eyre <i>et al.</i> 2018), spotlighting transects are the most effective method. • Where possible, survey effort should target habitat known to be suitable for listed species. 	<ul style="list-style-type: none"> • 269 habitat assessments which included searches for suitable hollows in trees and stags. • 81 habitat quality assessments • 62 hours of spotlighting across May–June 2020, November 2020 and October 2021. Spotlighting occurred on foot and from vehicles within locations of identified potential habitat (i.e., <i>Eucalyptus moluccana</i> woodland). • 6 hours of call playback to ascertain the presence of predator owls and other glider species including yellow-bellied glider (south-eastern) (<i>Petaurus australis australis</i>), squirrel glider (<i>P. norfolcensis</i>) and sugar glider (<i>P. breviceps</i>) which may influence the presence/abundance of greater gliders. 	Guidelines Met Three recommended methods have been employed to detect greater glider. The presence and abundance of hollow-bearing trees was assessed at each habitat assessment site. Spotlighting, which is reported to be the most effective method at detecting arboreal mammals, has also been conducted extensively during the field survey program. Habitat surveyed was suitable and representative.

Species	Relevant Guidelines	Recommended Methodology	Effort Undertaken	Survey Adequacy
yellow-bellied glider (south-eastern) (<i>Petaurus australis australis</i>)	In lieu of species-specific guidance, surveys were undertaken in consideration of <i>Survey Guidelines for Australia's Threatened Mammals</i> (DSEWPaC 2011a) and <i>Terrestrial Vertebrate Fauna Survey Guidelines for Queensland</i> (Eyre <i>et al.</i> 2018).	<ul style="list-style-type: none"> • Arboreal mammal survey methods identified by DSEWPaC (2011a) include: <ul style="list-style-type: none"> ○ 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 ○ call detection and/or call playback surveys for vocal species, in addition to playback of the calls of owl predators that are known to induce a call response ○ Elliot A and cage trapping. • As per (Eyre <i>et al.</i> 2018), spotlighting transects are the most effective method. • Where possible, survey effort should target habitat known to be suitable for listed species. 	<ul style="list-style-type: none"> • 269 habitat assessments which included searches for suitable hollows in trees and stags. • 81 habitat quality assessments • 62 hours of spotlighting across May–June 2020, November 2020 and October 2021. Spotlighting occurred on foot and from vehicles within locations of identified potential habitat (i.e., <i>Eucalyptus moluccana</i> woodland). • 6 hours of call playback to ascertain the presence of predator owls and other glider species including greater glider (southern and central) (<i>Petauroides volans</i>), squirrel glider (<i>Petaurus norfolcensis</i>) and sugar glider (<i>Petaurus breviceps</i>) which may influence the presence/abundance of yellow-bellied glider (south-eastern). 	Guidelines Met Three recommended methods have been employed to detect yellow-bellied glider. The presence and abundance of hollow-bearing trees was assessed at each habitat assessment site. Spotlighting, which is reported to be the most effective method at detecting arboreal mammals, has also been conducted extensively during the field survey program. Habitat surveyed was suitable and representative.

Species	Relevant Guidelines	Recommended Methodology	Effort Undertaken	Survey Adequacy
koala <i>(Phascolarctos cinereus)</i>	<i>A Review of Koala Habitat Assessment Criteria and Methods</i> (Australian National University 2021) and <i>Survey Guidelines for Australia's Threatened Mammals</i> (DSEWPaC 2011a).	<ul style="list-style-type: none"> No effort standards are prescribed for koala surveys. Direct observation methods include transect and point surveys, spotlighting, camera traps, thermal detection drones, mark-resight and recapture, and detection dogs. Surveys should be undertaken between August and January, when koala activity is generally at a peak, and resident breeding females with back-young are most easily observed. Indirect methods include observation of scratchings, call playback, passive acoustics, landscape nutrition quality surveys, Spot Assessment Technique (SAT) and other scat search methods. Indirect methods are reported to be often the most effective for gathering presence/absence data due to the difficulty in observing koalas and the variable density of koalas across the landscape. 	<ul style="list-style-type: none"> 269 habitat assessments. 81 habitat quality assessments. 20 Spot Assessment Technique (SAT) sites were completed in May–June 2020 and November 2020 within areas of potential habitat, equating to 600 trees searched. 62 hours of spotlighting across May–June 2020, November 2020 and October 2021 on foot and from vehicles within locations of identified potential habitat. 	Guidelines Met As recommended, the field program employed both direct and indirect methods, including within the months when activity is generally highest. Significant spotlighting effort was undertaken in areas of representative habitat. Habitat assessments supplemented survey effort.
ghost bat <i>(Macroderma gigas)</i>	<i>Targeted Species Survey Guidelines – Ghost Bat</i> (Hourigan 2011)	<ul style="list-style-type: none"> Active acoustic detection coupled with spotlighting to rule out observations of similar species such as the yellow-bellied sheath-tailed bat (<i>Saccolaimus flaviventris</i>) and barn owl (<i>Tyto alba</i>). A minimum of 8 detector hours over a minimum of 4 nights. 	<ul style="list-style-type: none"> 269 habitat assessments, including roost searches in steep and rocky terrain. When potential roosts were detected, ecologists investigated on foot or with a drone. Harp trapping was conducted at 5 flyway locations for a total of 14 trap nights. 62 hours of spotlighting across May–June 2020, November 2020 and October 2021 	Guidelines Partially Met Multiple methods were employed to detect the ghost bat including roost searches, unattended bat recorders, spotlighting and harp trapping. Harp trapping effort exceeds what is recommended.

Species	Relevant Guidelines	Recommended Methodology	Effort Undertaken	Survey Adequacy
		<ul style="list-style-type: none"> Harp trapping or mist netting within flyways such as vehicle tracks, walking tracks, watercourses and gullies in a wide variety of habitat types. A minimum of 8 trap nights over a minimum of 4 nights. In areas of potential roosting habitat, conduct roost searches by investigating gorges, gullies, fissures, rocky outcrops, overhangs and cliff lines. Recommended effort is 2 hours per survey day. 	<ul style="list-style-type: none"> on foot and from vehicles within locations of identified potential foraging habitat. Unattended Anabat bat call detectors were deployed in a range of habitat types including woodlands and watercourses for a total of 111 nights. 	<p>Although unattended bat recorders are not the preferred method of acoustic detection according to the State Guideline, this method is recommended by Bat Call WA Pty Ltd (2022).</p>
<p>grey-headed flying-fox (<i>Pteropus poliocephalus</i>)</p>	<p>In lieu of species-specific guidance, surveys were conducted in consideration of the <i>Survey guidelines for Australia's threatened bats</i> (DEWHA 2010) and <i>Terrestrial Vertebrate Fauna Survey Guidelines for Queensland</i> (Eyre et al. 2018).</p>	<ul style="list-style-type: none"> Prior to survey conduct a database search of active and historical flying-fox roosting sites. Diurnal surveys for active flying-fox camps should be undertaken to determine the potential presence of unrecorded roosting sites. Signs of flying-fox presence such as audible calls, odour and droppings should be examined. Dusk surveys can also be conducted to detect roost sites. Surveys of vegetation communities and food plants by a qualified botanist. Night-time, walking transect surveys in search of feeding and flying bats. 	<ul style="list-style-type: none"> 269 habitat assessments were undertaken noting signs of bat activity, food plants and habitat suitability. 7 secondary plots and 341 quaternary plots were completed to determine floristic characteristics and vegetation communities. 60 hours of spotlighting on foot and by vehicle covering a range of habitat types. 	<p>Guidelines Met</p> <p>A review of fly-fox roosting sites (both current and historic) was undertaken to determine the proximity of these sites in relation to the Study Area. Although survey effort is not specified, through the use of both indirect and direct methods in areas of representative habitat, overall effort is considered sufficient.</p>

Species	Relevant Guidelines	Recommended Methodology	Effort Undertaken	Survey Adequacy
Migratory birds	<p><i>Draft referral guideline for 14 birds listed as migratory species under the EPBC Act</i> (Department of the Environment 2015)</p>	<p>For oriental cuckoo (<i>Cuculus optatus</i>), black-faced monarch (<i>Monarcha melanopsis</i>), satin flycatcher (<i>Myiagra cyanoleuca</i>), spectacled monarch (<i>Symposiachrus trivirgatus</i>) and rufous fantail (<i>Rhipidura rufifrons</i>) during migration, it is recommended that surveys be undertaken over standardised timed periods. Surveys and assessments should also consider habitat (and specific locations) that is suitable and important for migration passage.</p> <p>While there are no standard survey techniques for white-throated needletail (<i>Hirundapus caudacutus</i>) and fork-tailed swift (<i>Apus pacificus</i>), they should be counted by an experienced person from elevated viewpoints (if present) during summer. If white-throated needletails are known to occur, observations should be made as late as possible in the evening of birds coming into roost in tall trees along ridgetops.</p>	<ul style="list-style-type: none"> • 269 habitat assessments. • 115 hours of diurnal bird surveys in areas of potential habitat. • Three of the four BBUS were conducted during summer and spring, while the fourth BBUS occurred in late summer/early autumn, equating to 206 hours of vantage point surveys in the summer and spring months. 	<p>Guidelines Met</p> <p>The combination of habitat assessments, diurnal bird surveys, BBUS and incidental sightings provide adequate survey effort to detect migratory species. BBUS surveys were conducted within suitable seasonal timeframes. Vantage points were strategically and appropriately located.</p>

Species	Relevant Guidelines	Recommended Methodology	Effort Undertaken	Survey Adequacy
collared delma <i>(Delma torquata)</i>	In lieu of species-specific guidance, surveys were undertaken in consideration of the <i>Draft referral guidelines for the nationally listed Brigalow Belt reptiles</i> (DSEWPaC 2011c) and <i>Survey Guidelines for Australia's Threatened Reptiles</i> (DSEWPaC 2011b)	<ul style="list-style-type: none"> • Undertake diurnal hand searches in appropriate habitats. <ul style="list-style-type: none"> ○ Search microhabitats, such as carefully turning woody debris and rocks and raking through leaf litter. ○ Survey over a minimum of 1.5 person hours per ha for habitats of average complexity. ○ Survey over a minimum of 3 days. • Undertake pitfall trapping during late spring to summer. <ul style="list-style-type: none"> ○ A series of pitfall trap lines comprising six 4–10 L buckets and funnel traps spread along a 15 m fence would be an appropriate trap design. • As general rule surveys should only be undertaken from late September through to late March when weather conditions are warm, not too dry and maximum temperatures are greater than 25°C on most survey days. • Optimal survey times vary between species, but generally are early morning (within 4 hours of sunrise) and late afternoon to early evening for diurnal species, and into late warm nights for nocturnal species. 	<ul style="list-style-type: none"> • 269 habitat assessments, noting the presence of key microhabitat features. • 65 habitat quality assessments. • 58 hours of diurnal active searches completed in May–June 2020 and November 2020 in locations of identified potential habitat. • Pitfall trapping undertaken at two sites in May–June 2020 in locations of identified potential habitat, for a total of 27 trap nights. As pitfall trapping is considered less effective than active diurnal searches in locating the species (Porter 1998a), only active searches were undertaken in November 2020. Each pitfall site constituted one trap line of three 20 L buckets spread along a fence approximately 20 m long and 30 cm high. Soil hardness inhibited efforts to include more buckets in the trap line. 	Guidelines Met Both recommended methods were employed to maximise the detection of the species including diurnal active searches and pitfall trapping in the recommended seasonal period. Habitat assessments supplement this effort overall. Effort is considered adequate.

Species	Relevant Guidelines	Recommended Methodology	Effort Undertaken	Survey Adequacy
<i>Cycas megacarpa</i>	There are no Commonwealth-approved species-specific survey guidelines	<ul style="list-style-type: none"> • <i>Cycas megacarpa</i> is easily distinguished from other cycad species by its large glaucous seeds as well as its green leaves with moderate broad leaflets (DCCEEW 2022). • Fruiting cones are produced between May and February. Seeds become ripe from March onwards and drop from the tree. 	<ul style="list-style-type: none"> • Opportunistic searches for <i>Cycas megacarpa</i> were undertaken throughout the survey program, including during the fruiting period, to assess the extent of its occurrence and relative densities within the Study Area. • In October 2022, a targeted <i>Cycas megacarpa</i> field survey was conducted across the Development Corridor to increase the understanding of presence and abundance in this area. • Survey methods utilised for all <i>Cycas megacarpa</i> assessments include individual point counts, visual counts within a 25 m radius, visual counts within a 50 m x 50 m plot, and detailed counts within a 50 m x 10 m plot. 	Effort Considered Adequate Although there is no guideline specifying appropriate survey techniques or effort for <i>Cycas megacarpa</i> , survey effort undertaken is considered significant and includes surveys within the species' fruiting period.
<i>Cossinia australiana</i> , <i>Decaspermum struckoiligum</i> and <i>Samadera bidwillii</i>	There are no Commonwealth-approved species-specific survey guidelines	<ul style="list-style-type: none"> • Flowering of <i>Cossinia australiana</i> has been recorded from October to January, with fruiting recorded in February. • Flowering of <i>Decaspermum struckoiligum</i> has been recorded in October and November and fruiting from November to February. • <i>Samadera bidwillii</i> flowers from December to March and fruits from February to May. 	<ul style="list-style-type: none"> • Targeted searches for the species were completed throughout the field survey program, including during the flowering and fruiting periods for each species. • Searches generally comprised opportunistic and random walking meanders in areas of suitable habitat. • Searches were undertaken across all survey days throughout the program including at the 7 secondary plots and 341 quaternary plots. • Protected plant surveys and pre-clearance surveys within suitable habitat occurring within the Disturbance Footprint. 	Effort Considered Adequate Although there are no guidelines specifying appropriate survey techniques or effort for the listed species, survey effort undertaken is considered sufficient and included sampling within the species' fruiting period. It is considered reasonable that any populations present within the Study Area would be detected given the effort undertaken.

3.2 Specific Threatened Species Habitat Assessment Information Required

3.2.1 Collared Delma (*Delma torquata*) – Vulnerable

RFI 2.2.1 Discuss the habitat features, including ground cover composition, across the project footprint. Provide a map of habitat features including location of diurnal survey sites

A detailed assessment of habitat within the Disturbance Footprint and the Study Area has been undertaken for collared delma which is presented in **Section 2.2.1** of **Appendix E** of Attachment B4 (Assessment of Matters of National Environmental Significance) and is summarised below. This includes the delineation of land zones associated with the species as well as the presence and abundance of microhabitat features referred to in RFI, *Survey Guidelines for Australia's Threatened Reptiles* (DSEWPac 2011b) and *Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles* (DSEWPac 2011c).

This species was the subject of targeted field assessment which included recommended survey methods as outlined in the *Draft Referral Guidelines for the nationally listed Brigalow Belt reptiles* (DSEWPac, 2011). Active diurnal searches, the survey method considered most effective in detecting the species, were completed extensively throughout the field survey program including within the ideal seasonal period (late September to late March).

The collared delma was not recorded during the field survey program but is conservatively considered to have a moderate likelihood of occurrence. One historical record from 1989 exists within the Study Area; however there is a very high degree of spatial uncertainty associated with this record (100 km). The Study Area occurs within the north-east of the species distribution within an area mapped as 'species may occur' (DSEWPC, 2011) as per the *Draft Referral Guidelines for the Nationally Listed Brigalow Belt reptiles* (DSEWPac, 2011) and 'species or species habitat may occur' as per the SPRAT profile (DCCEEW, 2023).

While Land Zone mapping may present a useful metric when characterising collared delma habitat, records from Land Zones not described in the species conservation advice exist, indicating that the species may be more reliant on the presence of suitable microhabitat features (surface rocks, coarse woody debris, leaf litter and native grass) than on the specific geology of an area. The occurrence of microhabitat features within the Study Area have been used to inform mapping of collared delma habitat.

Recorded micro-habitat features relevant to collared delma include:

- Coarse woody debris and ground timber.
- Fine and coarse litter.
- Native grasses including *Themeda triandra*, *Cymbopogon refractus* and *Aristida spp.*
- Stones >20 cm in diameter.

Across the Study Area, potential collared delma habitat was identified on rocky hills and slopes as well as on alluvial soils, often in association with a watercourse. Potential habitat was found to support varying levels of required microhabitat features. Potential habitat was considered present where the above microhabitat features were identified in suitable abundance to provide shelter from predation and habitat for activities such as breeding and foraging.

In eucalypt woodland on hills and slopes, areas that were associated with suitable habitat were those which presented moderate to high abundance of loose surface stones (>20 cm diameter) in combination with other microhabitat features including native grass, litter and woody debris. Across the assessment sites, fine and coarse litter was generally present and in varying abundance with most sites located within suitable habitat recording moderate to high abundance of these features. Native grasses were common to abundant across most of the hills and slopes of the Study Area, however, where weed incursion was high, native grass abundance was generally lower than other areas.

Within the Study Area, riparian eucalypt woodlands generally occur adjacent to steep hillslopes with exposed rocky boulders and other microhabitat features. In select patches of these communities, ground timber and woody debris was recorded as being common to abundant across a range of sizes from less than 10 cm to greater than 30 cm. Leaf litter was also abundant in places but generally comprised a single thin layer and did not form 'mats'. Outcrops of stones consisted of sizes that were generally less than 20 cm in diameter. Native grass cover was largely absent in these areas.

In the absence of field verified records of collared delma within the Study Area and due to the deficiency of records from the Project region, a conservative approach to mapping suitable habitat was used based on the abundance, composition and quality of microhabitat features.

Areas considered suitable habitat for collared delma include vegetation communities containing all suitable microhabitat features occurring in moderate to high abundances. Across the Study Area, potential collared delma habitat was identified on rocky hills and slopes as well as on alluvial soils. Primary microhabitat indicators including coarse woody debris, fine and coarse litter, native grass and surface rock were used to guide mapping efforts. The extent of modelled habitat within the Study Area, Development Corridor and Disturbance Footprint is provided in **Table 3.2**.

The full map series of potential habitat for the species, which also shows location of diurnal survey sites and desktop records, is provided in **Figure 7.12** in Attachment B2 (Assessment of Matters of National Environmental Significance) and also as a JPEG in Attachment L. The first map in this series which shows the majority of the Study Area, which is relevant to the wind farm development, is provided below in **Figure 3.1**.

RFI 2.2.2 Discussion of habitat use requirements, including consideration of known important habitat and suitable habitats

Habitat use requirements are described above and are provided in **Section 2.2.1 of Appendix E** of Attachment B4 (Assessment of Matters of National Environmental Significance). Habitat use requirements have been discussed in consideration of numerous literature references including departmental guidance documents (i.e. SPRAT; *Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles* (DSEWPaC 2011c)). The concepts of known important habitat and suitable habitat as defined in the *Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles* (DSEWPaC 2011c) have been discussed in the context of the Project below.

Known important habitat for the collared delma includes:

- Suitable habitat within the Known / Likely-to occur distribution of the species and the Toowoomba Range.
- Suitable habitat between grazed or cropped areas, along road reserves, and travelling stock routes, especially the Donnybrook Stock Route region.

For all brigalow belt reptile species, suitable habitat may comprise important habitat if one or more of the following applies:

- Habitat where the species has been identified during a survey.
- Habitat near the limits of the species' known range.
- Large patches of contiguous, suitable habitat and viable landscape corridors (necessary for the purposes of breeding, dispersal or maintaining the genetic diversity of the species over generations).
- A habitat type where the species has been identified during a survey, but which was previously thought not to support the species.

The Study Area does not occur at the limit of the species range, nor is not located within known/likely to occur species distribution. The single record in the south of the Study Area indicates the potential capacity for habitat to have supported the species historically. However, this record is not recent (dated 1989) and due to the sensitive conservation status of the species, has a very high degree of spatial uncertainty (100 km) making its location unreliable.

Habitat mapped within the Study Area extends primarily along the Ulam Range and exists in large, connected corridors along the ridges, slopes and gullies. The extent of habitat is such that it may be necessary for the purposes of maintaining genetic diversity and providing movement and breeding opportunities at a landscape scale, should the species be present. As such, suitable habitat within the Study Area broadly meets the definition of important habitat and therefore is also considered as habitat critical to the survival of the species.

RFI 2.2.3 Total area (in hectares) of each identified habitat type (e.g. known important habitat, suitable habitats etc.)

Table 3.1 below defines the extent of potential habitat within the Study Area, Development Corridor and Disturbance Footprint (also provided as **Table 2.1** of **Appendix E** of Attachment B4 (Assessment of Matters of National Environmental Significance)). This table also defines the habitat mapping criteria and the justification for the mapping extent. Known important and suitable habitat has been discussed above and in the **Section 2.2.1** of **Appendix E** of Attachment B4 (Assessment of Matters of National Environmental Significance)). The habitat assessment determined that no known important habitat exists, based on the broad definition in the *Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles* (DSEWPaC 2011c). Suitable habitat has been mapped with consideration of these guidelines however the habitat criteria has been refined to include relevant land zones and presence of suitable microhabitat features. Suitable habitat which meets these criteria has been mapped as breeding and foraging habitat (See **Figure 3.1**).

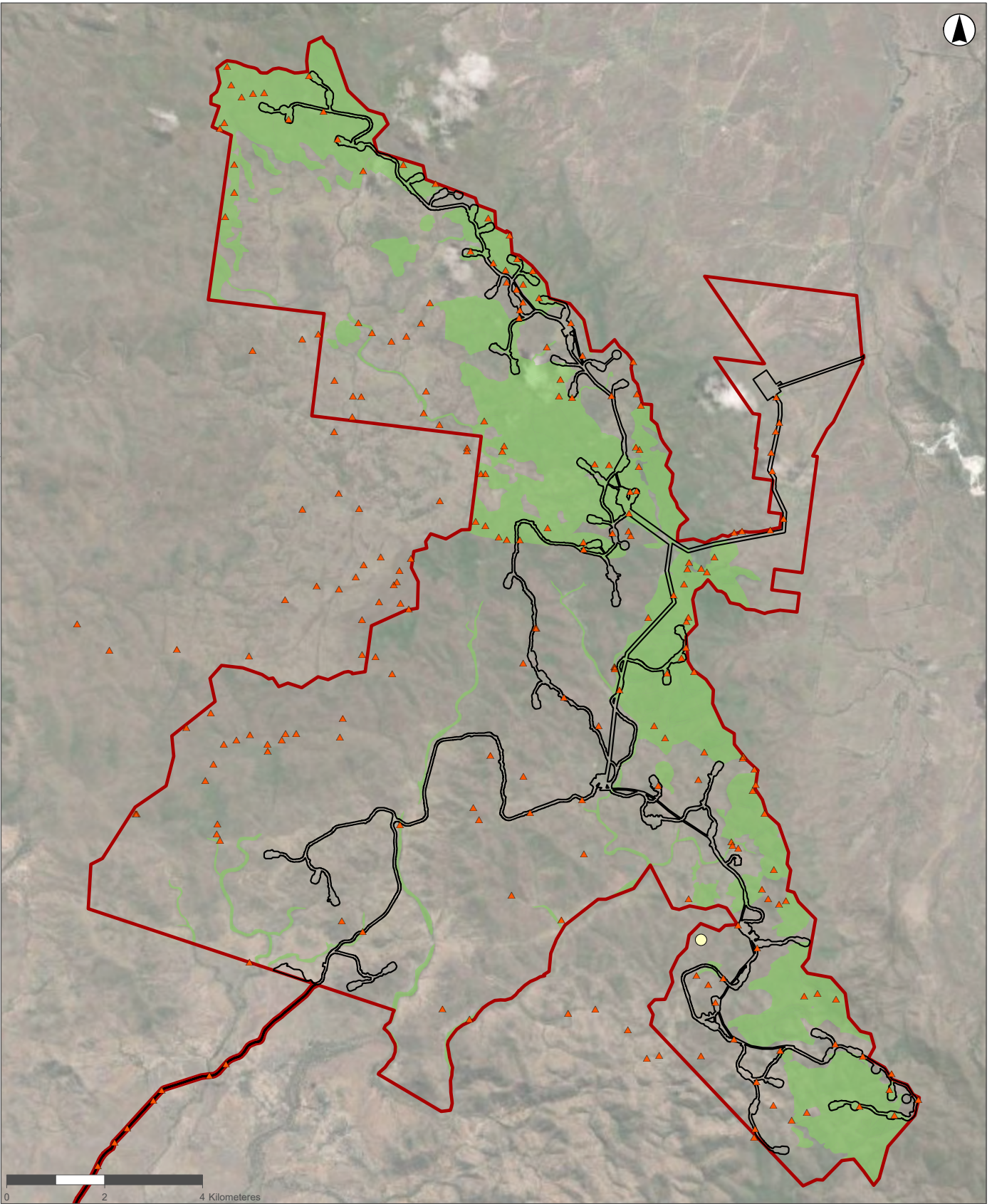
Table 3.2 Habitat Extent and Justification for Collared Delma

Habitat Criteria	Mapping Justification	Area (ha)		
		Within the Study Area	Within the Development Corridor	Within the Disturbance Footprint
Breeding and Foraging				
Open eucalypt forest to woodland with exposed rocky areas. Must be associated with suitable microhabitat (rocks, logs, coarse woody debris and leaf litter) where ground cover is predominantly native grasses.	Remnant and mature regrowth open eucalypt forest to woodland on hilltops, slopes and alluvial soils where loose surface rocks are present in combination with coarse woody debris, fine and coarse litter to support breeding and foraging.	4,109.3	448.6	272.8
Total		4,109.3	448.6	272.8



C:\USERS\SVL\LABE\CONV\MELT_AUSTRALIA\PTV_LTD\2023-10\85609_PROJECT\CTS\2753_802_PRR_MNABV\DOC\MEVATION_VQA\SRK_2753_802_001_CCLABELFELMARTIN\HABITAT

1:110,000
Scale at A4



GDA 1994 MGA Zone 56

Legend

- Collared Delma Record (ALA)
- ▲ Active Diurnal Search Sites
- Disturbance Footprint
- Study Area
- Potential Collared Delma Habitat**
- Breeding and foraging

FIGURE 3.1

POTENTIAL COLLARED DELMA HABITAT

3.2.2 *Cycas megacarpa* – Endangered

RFI 2.2.4 Discussion of habitat and number of individuals in the project footprint, project area and broader region

Cycas megacarpa, including a discussion of habitat and number of individuals projected within the Disturbance Footprint and Study Area, is provided in the following locations:

- Attachment B4: Assessment of Matters of National Environmental Significance (Appendix E).
- Attachment E: Preliminary *Cycas megacarpa* Species Management Plan.
- Attachment J: Preliminary Translocation Management Plan for *Cycas megacarpa*.

Detailed in **Section 3.2.2** of Attachment E, several existing populations occur within proximity to the Study Area. These are described below and shown on **Figure 3.2**:

- Population 5 (Dee Range) with an estimated population of 5,600 individuals. This population adjoins and potentially overlaps the northern extent of the Study Area.
- Population 6 (Mount McCamley) with an estimated population of 28 individuals. This population is located 2.7 km east of the Study Area.
- Population 7, 8 and 9 (Don River State Forest) with an estimated population of 115,200 individuals. These populations are located in the southern section of the Don River State Forest, between 10 and 15 km south of the Study Area.

Within the Study Area, the primary habitat for this species (i.e. where the species was most consistently recorded and abundant) was woodland to open forest on upper slopes and crests consisting of *Corymbia citriodora*, *Eucalyptus crebra*, *Eucalyptus melanophloia*, *Corymbia intermedia* and *Eucalyptus tereticornis* on metamorphosed sediments and volcanic geologies at altitudes of between 200 and 500 m.

The extent that habitat has been mapped throughout the Development Corridor is provided in **Table 3.2** and also shown on **Figure 3.3** and also on **Figure 7.1A** of Attachment B2 (Assessment of Matters of National Environmental Significance).

Table 3.3 Habitat Extent and Justification for *Cycas megacarpa*

Habitat Criteria	Mapping Justification	Extent within Development Corridor (ha)	Extent within Disturbance Footprint (ha)
Known habitat (confirmed)	An 80 m buffer on confirmed <i>Cycas megacarpa</i> records, to reflect the latest population research which indicates most individuals disperse within 80 m of mature female plants (Etherington et al. 2018; James 2016). Mapping has not been limited to certain REs noting the species was also recorded within non-remnant vegetation within the Study Area.	209.5	145.1

Habitat Criteria	Mapping Justification	Extent within Development Corridor (ha)	Extent within Disturbance Footprint (ha)
Known habitat (suspected)	Includes areas of the Development Corridor for which known habitat (confirmed) does not overlap, however based on adjacent records and connective habitat, <i>Cycas megacarpa</i> presence is presumed or reasonably suspected.	131.8	79.3
Known habitat (total)	Combined areas of confirmed and suspected habitat	341.3	224.4
Nil detected	Includes areas of the Development Corridor which have been confirmed (via field survey) to not support <i>Cycas megacarpa</i> . Nil recorded habitat also includes areas where reasonable extrapolation to edges of the Development Corridor has been applied, based on nearby 'absence' records, absence of connective habitat and field derived opinions of ecologists.	1,004.8	642.2

Cycas megacarpa was recorded in various densities within the Study Area, as detailed in **Section 1.1 of Appendix E** of Attachment B4 (Assessment of Matters of National Environmental Significance). The species is also largely absent from the northern portions of the Project. Where present, the field surveys and subsequent distribution modelling of *Cycas megacarpa* across the Study Area indicates the species exists, largely, in a scattered to low density. Total projections for the Study Area put the population at approximately 141,392 individuals.

The field surveys targeted habitat for *Cycas megacarpa* and conducted plot-based counts of individuals as well as rapid density visual estimates. Using this approach, an actual count of individuals is obtained (recognised as lower bound) and allows for an estimation of distribution, undertaken spatially using an inverse distance weighted (IDW) interpolation algorithm. A detailed description of the IDW interpolation algorithm method and how it has been applied is provided in **Section 4.2.1.3** of Attachment B1 (Assessment of Matters of National Environmental Significance).

The results of this assessment are summarised below in **Table 3.3** and **Table 3.4**. Desktop and field survey *Cycas megacarpa* records are shown on **Figure 3.4** below and also on **Figure 6.2** of Attachment B1 (Assessment of Matters of National Environmental Significance), while the results of the IDW are shown on **Figure 7.1B** (of Attachment B2).

Within the Disturbance Footprint, high density areas are mostly avoided (high density areas account for 0.3% of mapped habitat) with potential impacts primarily within low density areas (93.6%) and moderate density areas (6.1%). The projected population within the Disturbance Footprint is 3,727 individuals.

Table 3.4 *Cycas megacarpa* Individuals

Item	Study Area	Development Corridor	Disturbance Footprint
Individual records of <i>Cycas megacarpa</i>	141,392	6,021	3,727

Table 3.5 *Cycas megacarpa* Density Summary

Density Categories	Study Area ¹	Development Corridor ²	Disturbance Footprint
High (25–50 plants per 0.25 ha)	74.9 ha	0.9 ha	0.7 ha
Moderate (10–25 plants per 0.25 ha)	711.2 ha	21.7 ha	12.4 ha
Low (1–10 plants per 0.25 ha)	5,389.0 ha	294.5 ha	191.3 ha

¹ Study Area values have been corrected to provide contextual comparison with development corridor, for which IDW outputs have been clipped to the known (confirmed) and known (suspected) habitat area.

² IDW outputs clipped to areas of mapped known (confirmed) and known (suspected) habitat area.

RFI 2.2.5 Include a further assessment and understanding of the local population

Cycas megacarpa, including a discussion of habitat and number of individuals projected within the Disturbance Footprint and Study Area, is provided in the following locations:

- Attachment B4: Assessment of Matters of National Environmental Significance (Appendix E).
- Attachment E: Preliminary *Cycas megacarpa* Species Management Plan.
- Attachment J: Preliminary Translocation Management Plan for *Cycas megacarpa*.

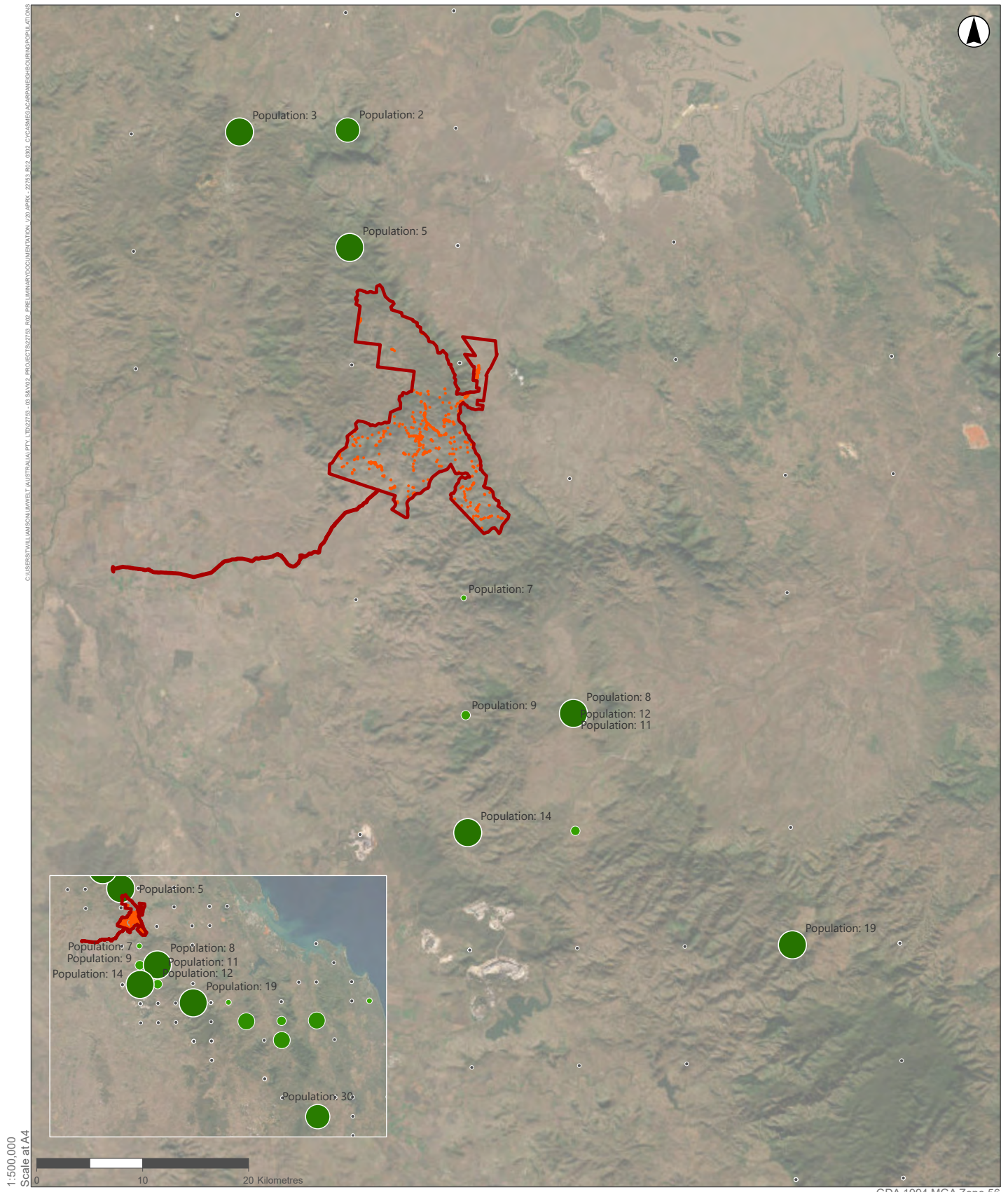
As per RFI 2.2.4, the number of individuals of *Cycas megacarpa* that are projected to occur within the Study Area is 141,392 individuals across an area of 16,976 ha. The development class distribution of the population within the Study Area generally mirrors the overall proportions of a regional study of *Cycas megacarpa* across all surveyed populations identified in *Conservation Genetics and Demographic Analysis of the Endangered Cycad Species Cycas megacarpa and the Impacts of Past Habitat Fragmentation* (James et al. 2018). **Table 3.5** below displays the number of *Cycas megacarpa* individuals in each development class taken from James et al. (2018) with respect to the Study Area. To provide an accurate comparison to James et al. (2018), development classes have been aligned where possible. **Table 3.5** shows a range of individuals from large adults through to seedlings, with a large number of reproductive age adults (> 1 m), required to maintain a viable population.

Table 3.6 Number of *Cycas megacarpa* individuals in each development class from James et al. (2018) and across the Study Area

Development Class	James et al., (2018) Individual Numbers	James et al., (2018) Percentage in Population	Study Area Individual Numbers	Study Area Percentage in Population
Seedlings (≤ 0.49 m, non trunked)	Approximately 450	16%	262	21%
Juveniles (≥ 0.5 m, not trunked; ≤ 0.49 m, trunked)	Approximately 900	33%	368	30%
Sub adults (<1 m, trunked)	Approximately 550	20%	- ¹	- ¹
Adults (≥ 1 m, trunked)	Approximately 500	18%	572 ²	47%
Total	2,668 Individuals	-	1,202	-

¹ Juvenile and sub adults have been different classifications for the Umwelt surveys, as a result these have been captured as 'Juveniles' to compare to James et al., (2018).

² Adults have been separated into adult and large adults for the Umwelt surveys. Adults and large adults have been captured as 'Adults' to compare to James et al., (2018). The data collected during the Umwelt surveys shows that a larger proportion of 'Adults' were identified within the Study Area. Further work will need to be done to characterise population in line with James et al., (2018).

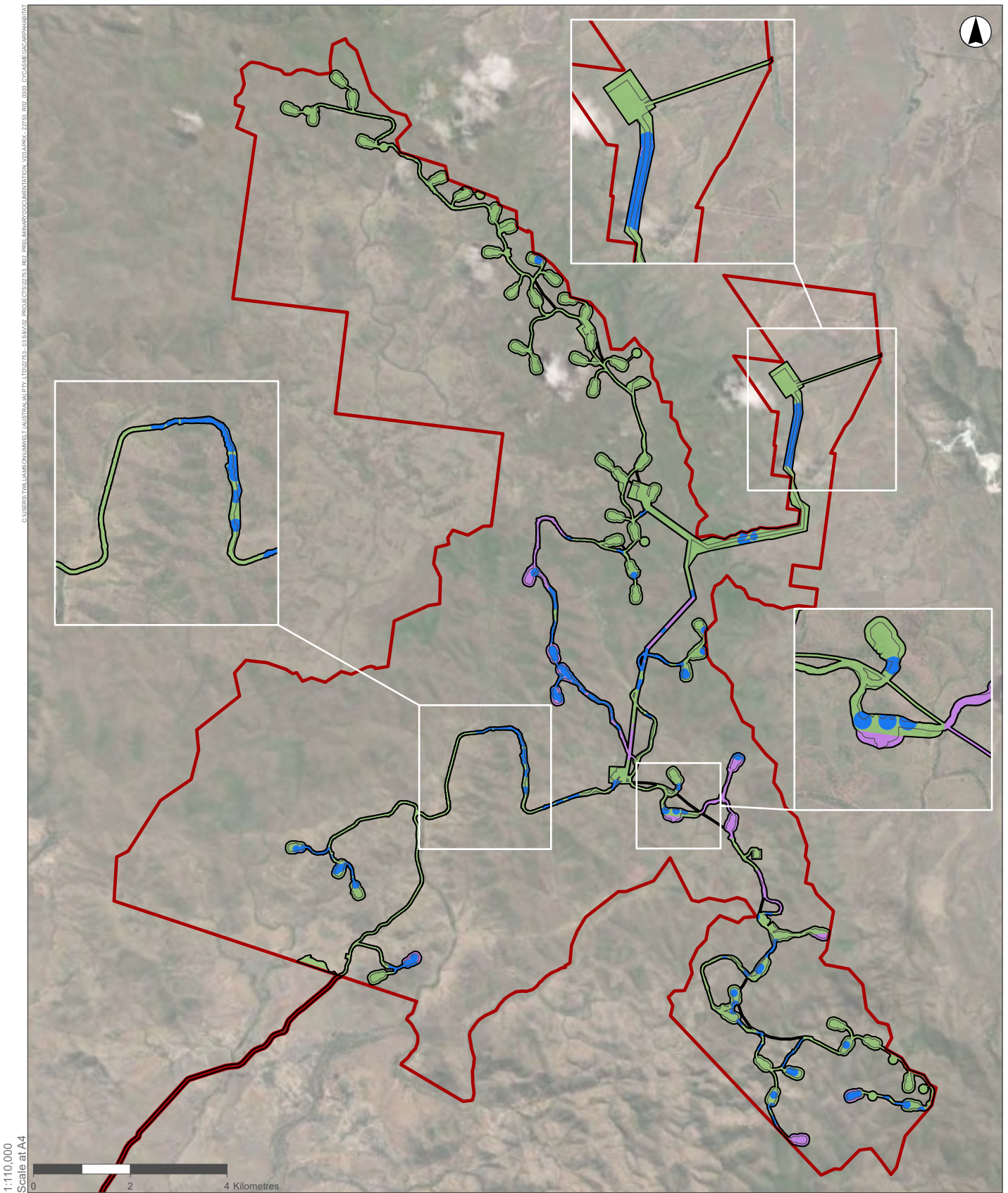


Legend

- Study Area
- *Cycas megacarpa* within Study Area (Umwelt)
- >3500
- Cycas megacarpa* Record (ALA) (+/- 2km)**
- Unknown
- ≤10
- >10≤50
- >10≤150
- >50≤150
- >150≤300
- >500≤3500

FIGURE 3.2
CYCAS MEGACARPA
NEIGHBOURING POPULATIONS

C:\USER\STW\LAAS\CON\UMWELT\AUSTRALIA\PTV_LTD\2023-03\SA\02_PROJECTS\2023_R02_PBE\UNARY\DOCUMENTION\VOI\APK-22703_R02_008_CYCASMEGACARPANIBITAT



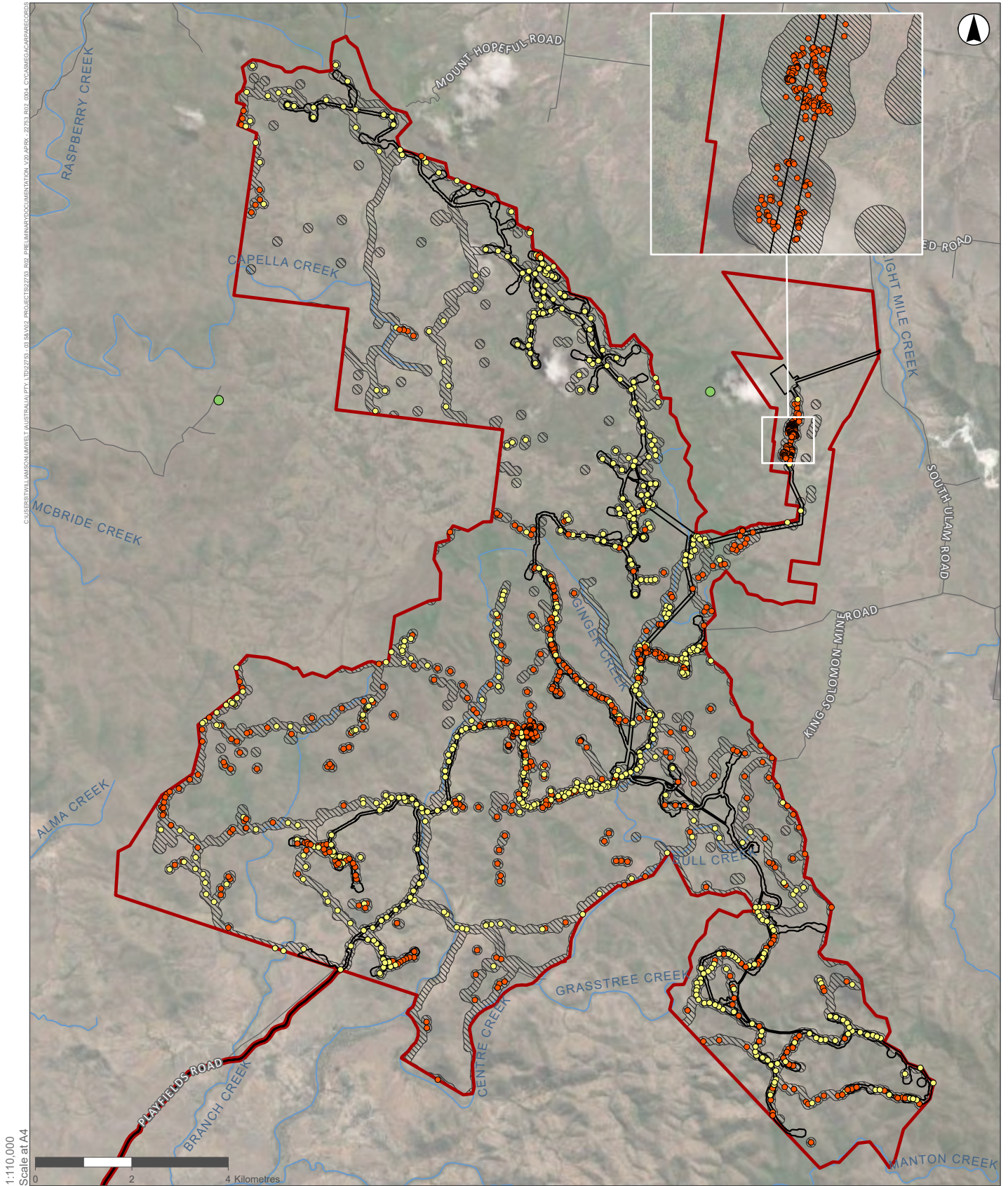
GDA 1994 MGA Zone 56

Legend

- Disturbance Footprint
- Development Corridor
- Study Area
- Cycas megacarpa Habitat**
- Known (confirmed)
- Known (suspected)
- Nil Recorded

FIGURE 3.3

CYCAS MEGACARPA HABITAT



Legend

- Roads
- Watercourse
- ▭ Disturbance Footprint
- ▭ Study Area
- ▨ Field Survey Extent
- *Cycas megacarpa* Record (ALA)
- Cycas megacarpa* Records (Umwelt)**
- Yes
- No

FIGURE 3.4

CYCAS MEGACARPA RECORDS

3.2.3 Greater Glider (*Petauroides volans*) – Vulnerable

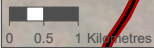
RFI 2.2.6 Include a map of potential denning and foraging habitat in Eucalypt forest and woodland adjacent to areas of Eucalypt forest and woodland which contain tree hollows

Potential habitat for greater glider has been categorised into ‘likely or current denning’, ‘potential or future denning’ and ‘foraging and dispersal’ based on vegetation community classification, microhabitat availability and connectivity to areas containing suitable microhabitat. Habitat criteria and justification for the extent of mapping are provided in **Table 3.7** below, with a detailed habitat assessment provided in **Section 2.2.6 of Appendix E** of Attachment B4 (Assessment of Matters of National Environmental Significance). To provide context for the availability of suitable habitat, habitat mapping has been completed for the various Study boundaries, including the Study Area. The full map series is provided as **Figure 7.9** of Attachment B2 (Assessment of Matters of National Environmental Significance) as well as in JPEG format in Attachment L. The first map in this series which displays potential habitat within the wind farm area (excluding the access road corridor) is presented in **Figure 3.5** below.



C:\USER\STWILLIAMS\Umwelt\AUSTRALIA\CTY_LTD\27263_03_SBU\03_PROD\ECTS\27263_03_PROD_MINI\WV\COCLINE\UW\UW_APRX_27263_03_0301_GREATGLIDER\DEFIN\BAT

1:110,000
Scale at A4



GDA 1994 MGA Zone 56

Legend

- ▲ Greater Glider (Southern and Central) Record (Umwelt)
- Greater Glider (Southern and Central) Record (ALA)
- Disturbance Footprint
- Study Area
- Greater Glider (Southern and Central) Habitat**
- Foraging and dispersal
- Likely / current denning
- Potential future / denning

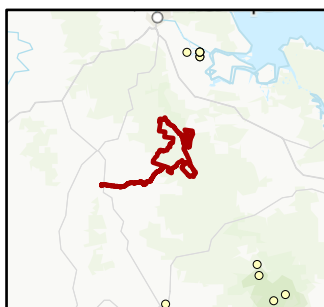


FIGURE 3.5
GREATER GLIDER HABITAT

RFI 2.2.7 Include the total area (in hectares) of greater glider habitat, including breeding and foraging habitat

Table 3.6 defines the extent of potential habitat within the Study Area, Development Corridor and Disturbance Footprint. This table also defines the habitat mapping criteria and the justification for the mapping extent. It is also provided as **Table 2.14** of **Appendix E** of Attachment B4 (Assessment of Matters of National Environmental Significance).

Table 3.7 Habitat Extent and Justification for Greater Glider (Southern and Central)

Habitat Criteria	Mapping Justification	Area (ha)			
		Within the Study Area	Within the Development Corridor	Within the Disturbance Footprint	Within Enclosed Areas without Mitigation
Likely or Current Denning Habitat					
Eucalypt forests and woodlands in Queensland REs considered habitat or potential habitat as per the Species Specific Guidance – Greater Glider habitats in Queensland (DES, 2022) containing appropriate tree species with a diameter at breast height greater than the RE threshold for large trees.	All areas of the following REs which contained trees that met the DBH threshold for large trees in the BioCondition benchmark: 11.3.25; 11.3.4, 11.3.4a, 11.11.3, 11.11.3c, 11.11.4, 11.11.4a, 11.11.4b, 11.11.4c, 11.11.15, 11.12.1, 11.12.6, 11.12.6a.	2,713	454.7	244.7	-
Likely or Current Denning Habitat Impact				244.7	
Potential or Future Denning Habitat					
Eucalypt forest and woodlands in Queensland REs considered habitat or potential habitat as per the Species Specific Guidance – Greater Glider habitats in Queensland (DES, 2022) containing appropriate tree species with a diameter at breast height greater than 30cm, but less than the RE threshold for large trees.	All areas of the following REs which contained trees that had a DBH of 30cm or greater but less than the DBH threshold for large trees in the BioCondition benchmark: 11.3.25; 11.3.4, 11.3.4a, 11.11.3, 11.11.3c, 11.11.4, 11.11.4a, 11.11.4b, 11.11.4c, 11.11.15, 11.12.1, 11.12.6, 11.12.6a.	4,359.0	266.1	175.1	0.7
Potential or Future Denning Habitat Impact				175.8	

Habitat Criteria	Mapping Justification	Area (ha)			
		Within the Study Area	Within the Development Corridor	Within the Disturbance Footprint	Within Enclosed Areas without Mitigation
Foraging and Dispersal Habitat					
Eucalypt forest and woodlands where locally important tree species for foraging are dominant/co-dominant AND in Queensland REs considered habitat or potential habitat as per the Species Specific Guidance – Greater Glider habitats in Queensland (DES, 2022).	All areas of the following REs where trees present did not have a DBH greater than 30cm and/or did not meet the DBH threshold for large trees in the BioCondition benchmark: 11.3.25; 11.3.4, 11.3.4a, 11.11.3, 11.11.3c, 11.11.4, 11.11.4a, 11.11.4b, 11.11.4c, 11.11.15, 11.12.1, 11.12.6, 11.12.6a	5,653.7	333.2	206.0	1.4
Foraging and Dispersal Habitat Impact				207.4	
Total Impact Area		12,725.5	1,054	627.9	

3.2.4 Koala (*Phascolarctos cinereus*) (combined populations of Qld, NSW and the ACT) – Endangered

RFI 2.2.8 A discussion of habitat and habitat use requirements (e.g. foraging, dispersal, shelter, etc.) in line with the updated Conservation Advice

The distribution and habitat requirements of the species, including occurrence and habitat within the Study Area, has been provided in detail in **Section 1.2.2 of Appendix E** of Attachment B4 (Assessment of Matters of National Environmental Significance). This discussion includes information on the foraging, dispersal and shelter requirements of the species as described in the *Conservation Advice for Phascolarctos cinereus (Koala) Combined Populations of QLD, NSW and the ACT* (DAWE 2022a). Information presented in this document has also been used to determine whether the site contains suitable climate refugia, habitat critical to the survival of the species and/or an important population of koala. This discussion on habitat has informed the mapping of habitat extent within the Study Area, the Development Corridor and the Disturbance Footprint (**Figure 7.5** of Attachment B2 (Assessment of Matters of National Environmental Significance); Attachment L).

A summary of habitat requirements and potential habitat within the Study Area is provided below. The first map in the potential habitat map series which shows potential habitat in the wind farm area (excluding the access road corridor) is provided below in **Figure 3.6** below.

Distribution and Habitat Requirements

Koalas are reported to be widespread across Queensland, occurring in patchy and often low-density populations across the different bioregions (Department of Agriculture Water and the Environment 2022a).

As per the modelled species distribution in the Conservation Advice, koala is 'known or likely' to occur in the wider Rockhampton region.

Koalas occur in coastal and inland locations and inhabit eucalypt forests and woodlands. The koala's diet is defined by the availability and palatability of a limited variety of *Eucalyptus*, *Corymbia* and *Angophora* species (Department of Agriculture Water and the Environment 2022a). They are nocturnal and spend significant periods of time moving across the ground between food and shelter trees. Movement increases in the breeding season (typically September to February). Home ranges across the species' distribution are highly variable; in Queensland and New South Wales individual home ranges are reported to vary between 3 and 500 ha (Wilmott 2020, cited by DAWE 2022a).

As described in the *National Recovery Plan for the Koala* (Department of Agriculture Water and the Environment 2022b), the species uses shelter trees to thermoregulate, especially during hot days and to avoid predators. Koalas appear to prefer larger and more shady trees and use a wide range of tree species for shelter. Based on known use, recorded shelter tree species in Queensland include rainforest trees (Pfeiffer et al. 2005), *Callitris columellaris* (Cristescu et al. 2011; Woodward et al. 2008), *Acacia harpophylla* and *Melaleuca bracteata* (Ellis et al. 2002).

Koala habitat suitability is based on the availability of the total set of attributes (i.e. presence of feed and shelter trees, connectivity, proximity to other populations) required by the species to meet its' survival and reproduction requirements (Department of Agriculture Water and the Environment 2022c). In consideration of this, koala habitat will often include:

- Forests or woodlands, especially with a higher proportion of feed tree species, and may include remnant or non-remnant vegetation.
- Roadside and railway vegetation and paddock trees.
- Safe intervening ground for travelling between trees and patches to forage, shelter and reproduce.
- Access to vegetated corridors or paddock trees to facilitate movement between patches.

As per DCCEEW (2022), climate refugia such as drainage lines, riparian zones and patches can also be important attributes as they contribute to a location's resilience to drying conditions and are likely to provide a cooler refuge during periods of bushfire and heatwaves.

Occurrence and Potential Habitat within the Study Area

Following an extensive field survey program which employed a range of recommended field survey methods, this species was recorded incidentally on one occasion within the Disturbance Footprint indicating that the population of this species within the Study Area is likely to be of low density. The single observation of the species was of an adult female with a joey, occupying a narrow-leaved ironbark (*Eucalyptus crebra*) within RE 11.11.3.

The closest desktop records are both from 1940 and occur east of the Study Area within 14 km. Undated desktop records also occur west (approximately 28 km away) near Wowan, and south (approximately 21 km away) near Round Mountain.

Historical accounts indicate that in the early 1900s, widespread pelt hunting practices within the Rockhampton region severely reduced and fragmented the regional koala population. Since then, there have been very few sightings in the area suggesting population numbers are likely low and still recovering.

Field survey methods employed to detect this species including spotlighting (62 person-hours), camera trapping (490 nights) and Spot Assessment Technique (SAT) assessments (20 sites). The results of the SAT assessments are provided in below in **Table 3.8**.

The SAT methodology (Phillips & Callaghan 2011) uses activity levels to quantify the use of an area by koalas by calculating the percentage of scat trees relative to the total number of trees searched per site. Due to the absence of any scat trees, activity levels for all sites in the assessment was 0%. It is noted that the absence of scats does not preclude the persistence of koala, i.e. the detection of scats amongst a low density population and over a large area, coupled with the deterioration of scats over time can lead to false negatives.

Table 3.8 Koala SAT Results

RE ID	Short Description	Sites	Scat Trees
11.3.25b	<i>Melaleuca leucadendra</i> and/or <i>M. fluviatilis</i> , <i>Nauclea orientalis</i> open forest	1	0
11.3.26	<i>Eucalyptus moluccana</i> or <i>Eucalyptus microcarpa</i> woodland to open forest on margins of alluvial plains	1	0
11.11.3	<i>Corymbia citriodora</i> , <i>Eucalyptus crebra</i> , <i>Eucalyptus acmenoides</i> open forest on old sedimentary rocks with varying degrees of metamorphism and folding. Coastal ranges	3	0
11.11.4b	<i>Corymbia trachyphloia</i> or <i>Eucalyptus acmenoides</i> , <i>Eucalyptus crebra</i> woodland +/- <i>Acacia leiocalyx</i>	2	0
11.12.1	<i>Eucalyptus crebra</i> woodland on igneous rocks	1	0
11.12.6	<i>Corymbia citriodora</i> open forest on igneous rocks (granite)	12	0
Total		20	0

Suitable habitat for the species is widely available across the Study Area. The Study Area is dominated by large tracts of *Eucalyptus* and/or *Corymbia* forest, which are functionally connected to tracts of suitable habitat outside of the Study Area at a landscape scale. The access road corridor is within an area which has experienced broadscale clearing for cropping and agricultural purposes. Habitat within this area is limited to narrow strips of retained vegetation woodland vegetation within the road reserve. This habitat is connected to larger areas of woodland habitat at a landscape scale via networks of narrow riparian vegetation which may act as dispersal conduits.

The habitat that falls within the Disturbance Footprint is suitable to support the ecological requirements of the species including breeding, foraging and dispersal. Riparian forests and woodlands are also present in low-lying, alluvial areas and may provide climate refugia during extreme weather conditions. However, it is noted that water availability within the Study Area is generally limited due to the limited extent of perennial watercourses and large watercourses (i.e. stream order 4 or higher – noting that the access road corridor does intersect one stream or 4 and one stream order 5 watercourse). Based on this, more valuable areas of refugia are likely to occur outside of the Study Area associated with riverine and floodplain communities to the east.

The extent of koala habitat within the Study Area, Development Corridor and Disturbance Footprint is provided in **Table 3.9** below. Desktop records and modelled habitat for the species within the Study Area is shown on **Figure 7.5**.

Table 3.9 Habitat Extent and Justification for Koala

Habitat Criteria	Mapping Justification	Area (ha)		
		Within the Study Area	Within the Development Corridor	Within the Disturbance Footprint
Breeding, Foraging and Dispersal				
Any forest or woodland (remnant, regrowth and modified vegetation communities) containing species that are koala food trees (trees of the genus <i>Eucalyptus</i> , <i>Corymbia</i> and <i>Angophora</i>) or any shrubland or grassland with emergent koala food trees or paddock trees.	All vegetation communities except SEVT in remnant or regrowth condition included.	12,819.8	1,085.1	641.6
Climate Refugia				
Forests or woodlands on drainage lines or riparian zones likely to provide a cooler refuge during periods of bushfire and heatwaves, including but not limited to regional ecosystems on land zone 3.	All eucalypt woodlands on land zone 3 are considered potential climate refugia.	359.5	10	5.3
Total		3,179.1	1,094.9	646.9

3.2.5 Northern Quoll (*Dasyurus hallucatus*) – Endangered

RFI 2.2.9 The referral states that breeding habitat for this species is remnant rocky woodland within 100 meters of a mapped creek or gully. Provide justification for this definition (include peer reviewed scientific articles)

AND

RFI 2.2.10 Provide the total area (in hectares of Northern Quoll habitat that will be impacted by the development (include breeding, dispersal and foraging habitat as part of habitat calculations)

A discussion on the habitat requirements of the species and the suitability of the Study Area for supporting the species ecological requirements is provided below and in **Section 1.2.1** of **Appendix E** of Attachment B4 (Assessment of Matters of National Environmental Significance). This discussion includes information on the denning, refuge, foraging and dispersal requirements of the species as described in the SPRAT database and the *EPBC Act referral guidelines for the northern quoll* (Department of the Environment 2016a).

Since the referral submission, further detailed habitat assessment has been conducted for the northern quoll. This habitat assessment has been the result of further investigation into microhabitat availability through data collection, aerial imagery and contour interpretation as well as literature review. The outcome of this habitat assessment is that habitat criteria were redefined and categorised into ‘denning and refuge’ and ‘foraging and dispersal’. The habitat criteria used to define each category are presented in **Table 3.7** below and the area within the Study Area, Development Corridor and Disturbance Footprint are also provided. Habitat mapping is provided in **Figure 3.7** below and **Figure 7.6** of Attachment B2 (Assessment of Matters of National Environmental Significance) and in JPEG format in Attachment L.

Updated Habitat Assessment

The distribution of the northern quoll is discontinuous across northern Australia with core populations in rocky and/or high rainfall areas (Hill & Ward 2010). In Queensland, the species is known to occur as far south as Brisbane and Toowoomba in the south, as far north as Cape York and extends as far west into central Queensland to the Carnarvon Range National Park. The species’ distribution is highly fragmented in Queensland and surveys by Woinarski et al. (2008) indicate severe reductions from the species’ former distribution (Department of the Environment 2016a).

The northern quoll occupies a diversity of habitats including rocky areas, eucalypt forest and woodlands, rainforests, sandy lowlands and beaches, shrubland, grasslands and desert. Habitat generally encompasses some form of rocky area for denning purposes with surrounding vegetated habitats used for foraging and dispersal. Eucalypt forest or woodland habitats usually have a high structural diversity containing large diameter trees, termite mounds or hollow logs for denning purposes. A study of northern quolls in Queensland found that the species is “more likely to be present in high relief areas that have shallower soils, greater cover of boulders, less fire impact and were closer to permanent water” (Department of the Environment 2016a).

The *EPBC Act referral guidelines for the northern quoll* (Department of the Environment 2016a) states that, “on current knowledge, foraging or dispersal habitat is recognised to be any land comprising predominantly native vegetation in the immediate area (i.e. within 1 km) of shelter habitat, quoll records or land comprising predominately native vegetation that is connected to shelter habitat within the range of the species”.

Northern quolls are opportunistic omnivores, which consume a wide range of prey items including invertebrates, carrion, fruit nectar, mammals, birds, reptiles and frogs. Cane toads are a food item of particular concern because ingestion of their toxins is a major cause of decline in northern quoll populations.

Significant survey effort was undertaken within the Study Area in accordance with the *EPBC Act referral guidelines for the northern quoll* (Department of the Environment 2016a), to determine the potential presence and density of northern quoll within the Study Area. The field survey program included a reconnaissance survey in 2019 and targeted trapping survey in 2020 which employed both camera traps (total of 490 trap nights) and Elliot traps (total of 320 trap nights).

The northern quoll was detected on camera traps on two occasions. Records were made within fringing riparian *Casuarina cunninghamiana* and *Melaleuca* spp. woodland (RE 11.3.25b) with a rocky stream bed, and in an adjacent rocky gully with large boulders fringed by *Corymbia citriodora* and *Eucalyptus crebra* woodland (RE 11.12.6). Vegetation, particularly the shrub layer, was structurally complex in these locations. These areas provided denning opportunities, as did similar habitats with rocky relief, predominantly on drainage lines in steep gullies.

Extensive foraging and dispersal habitat occurs throughout the Study Area and likely wider Study Area, generally represented by large, continuous tracts of open eucalypt woodland within 1 km of breeding and refuge habitat. Areas of potential habitat generally contain prey microhabitat including fallen logs, ground timber and small to medium-sized rocks in varying abundance.

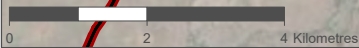
Table 3.10 Habitat Extent and Justification for Northern Quoll

Habitat Criteria	Mapping Justification	Area (ha)		
		Within the Study Area	Within the Development Corridor	Within the Disturbance Footprint
Denning and refuge				
Rocky habitats (such as major drainage lines or treed creek lines) and structurally diverse woodlands with moderate to high density of denning opportunities (i.e. large diameter trees, termite mounds, large hollow logs).	Vegetation, watercourse, and 10-metre contour mapping was examined in conjunction with survey data (including floristics and habitat assessments) and high-quality Queensland Globe satellite imagery to manually identify hilly and rocky habitats including gullies, creeklines and structurally diverse woodlands.	1,904.1	49.2	22.1
Foraging and dispersal				
Any land comprising predominantly native vegetation within 1 km of breeding and refuge habitat.	All remnant and regrowth vegetation communities within 1 km of shelter habitat (mapped within and surrounding the Study Area) were identified as foraging and dispersal habitat.	9,401.4	880.1	574.8
Total		11,305.6	929.3	596.9



C:\BESST\WILLIAMSON\UMWELT\AUSTRALIA\PTY_LTD\27261_013\SAV02_PROJECT\322203_012_PRELIMINARY\COMBINATION_V02.APR24_27261_012_0107_NORTHERNQUOLL_HABITAT

1:110,000
Scale at A4



GDA 1994 MGA Zone 56

Legend

- Pinch Points
 - ▲ Northern Quoll Records (Umwelt)
 - Northern Quoll Record (ALA)
 - Disturbance Footprint
 - Study Area
- Northern Quoll Habitat**
- Foraging and Dispersal
 - Denning and Refuge

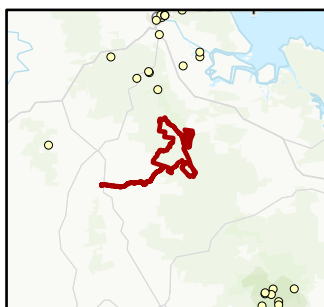


FIGURE 3.7
NORTHERN QUOLL HABITAT

3.2.6 Squatter Pigeon (Southern) (*Geophaps scripta scripta*) – Vulnerable

RFI 2.2.11 A discussion of breeding, foraging and dispersal habitat requirements across the study site

A detailed discussion on the habitat requirements of the species and the suitability of the Study Area for supporting the species ecological requirements is provided below and in **Section 2.2.3** of **Appendix E** of Attachment B4 (Assessment of Matters of National Environmental Significance). This discussion includes information on the breeding, foraging and dispersal requirements of the species as described in the DCCEEW RFI, SPRAT database and the *Conservation Advice Geophaps scripta scripta, squatter pigeon (southern)* (Threatened Species Scientific Committee 2015). This habitat assessment has informed the mapping of breeding, foraging and dispersal habitat within the Study Area (**Figure 7.13** of Attachment B3 (Assessment of Matters of National Environmental Significance); Attachment L).

The squatter pigeon (southern) occurs on the inland slopes of the Great Dividing Range, from the Burdekin-Lynd Divide in central Queensland, south to West Wyalong in northern NSW. As per the species SPRAT, the known distribution is estimated to occur within the latitudes, 17° to 30° S, and the longitudes, 141° to 153° 30' E (Department of Climate Change Energy the Environment and Water 2023a). As per the distribution map on SPRAT, the Study Area occurs in the central part of the sub-species range, in the 'likely to occur' extent.

North of the Carnarvon Ranges in Central Queensland and possibly in the area between Injune and the Carnarvon Ranges, the species is relatively common and likely to comprise a single, continuous sub-population. Populations in the southern parts of the subspecies' distribution however (i.e. south of Injune and Tin Can Bay, Queensland and NSW) are largely fragmented and isolated; in these areas there have also been noticeable disappearances. The southern boundary of the known distribution of the squatter pigeon (southern) is contracting northwards (Department of Climate Change Energy the Environment and Water 2023a).

The subspecies is known to access suitable waterbodies to drink on a daily basis, including permanent or seasonal rivers, creeks, lakes, ponds and waterholes, and artificial dams. The subspecies prefers to drink where there is gently sloping, bare ground on which to approach and stand at the water's edge.

The requirements for breeding and foraging habitat are well defined. Breeding habitat comprises remnant or regrowth open-forest to sparse, open-woodland or scrub dominated by *Eucalyptus*, *Corymbia*, *Acacia* or *Callitris* species, on sandy or gravelly soils (predominantly areas mapped as Queensland land zones 3, 5 or 7) within 1 km of a suitable waterbody (Department of Climate Change Energy the Environment and Water 2023a). Foraging habitat is almost identical, however occurring within 3 km of a suitable waterbody. As described on SPRAT, the ground layer vegetation in foraging and breeding habitat is typically considerably patchy consisting of native, perennial tussock grasses or a mix of perennial tussock grasses and low shrubs or forbs. This patchy, ground layer of vegetation rarely exceeds 33% of the ground area. The remaining ground surface consisting of bare patches of gravelly or dusty soil and areas lightly covered in leaf litter and coarse, woody debris (e.g. fallen trees, logs and smaller debris) (Department of Climate Change Energy the Environment and Water 2023a).

Although breeding can occur throughout the year if conditions are good, breeding generally coincides with the dry season (April to October) when their primary food source (grass seed) is most abundant. The nest is a depression scraped into the ground beneath a tussock of grass, bush, fallen tree or log and is sparsely lined with grass.

Squatter pigeon (southern) dispersal habitat is any forest or woodland occurring between patches of foraging or breeding habitat, and suitable waterbodies. Such patches facilitate the local movement of the subspecies between patches of foraging habitat, breeding habitat and/or waterbodies, or the wider dispersal of individuals in search of reliable water sources during the dry season or droughts. The subspecies may also move across cleared or degraded land between remnant trees or patches of habitat that does not exceed 100 m (Department of Climate Change Energy the Environment and Water 2023a).

The squatter pigeon (southern) is known to occur within the Study Area, recorded on 78 occasions throughout the field survey program, although this is likely to include multiple observations of the same individuals. It was commonly recorded along access tracks in non-remnant areas of the Study Area and several records exist within the access road corridor.

Water sources suitable for the foraging of the squatter pigeon (southern) are uncommon within the Study Area. Although stream order 1 and 2 watercourses occur throughout the Study Area as well as several stream order 4 and 5 watercourses in the access road corridor, these were found to be unsuitable due to their occurrence within rugged and steep terrain at elevation or due to their steep banks. Farm dams identified using the Department of Resources (DoR) Reservoirs dataset occur sporadically but are all considered suitable despite ongoing cattle use in varying degrees of severity. Farm dams are likely to be the primary water resource utilised by the species due to their permanency and shallow sloping banks.

Suitable habitat within the Study Area includes areas that may provide breeding, foraging and dispersal opportunities. Breeding and foraging habitat is generally limited, reflecting the dominant surface geology types (metamorphic and igneous rocks) and steep terrain associated with mapped watercourses. Breeding, foraging and suitable water sources within the Study Area and adjacent were found to all largely occur within 1 km of each other. The local movements of the subspecies will largely be driven by the presence of these resources, and given their tendency to utilise cleared, low-lying areas it is considered likely that the shortest and most direct route to adjacent habitat will be utilised. Based on this, the extent of dispersal habitat was limited to a 1 km distance from breeding and foraging habitat. The access road corridor is the exception to this where flat to undulating terrain was dominant. Although abundant exotic grasses excluded some areas from breeding and foraging opportunities, vegetated areas were largely considered suitable for dispersal in spite of distances larger than 1 km between breeding and foraging habitat.

RFI 2.2.12 Include a map of all water bodies on site with an overlay of the different habitat features (e.g. breeding, foraging, dispersal).

AND

RFI 2.2.13 Identification of permanent or seasonal water bodies or watercourses within one (1) kilometre of the disturbance footprint to support breeding habitat.

AND

RFI 2.2.14 Identification of permanent or seasonal water bodies or watercourses within three (3) kilometres of the disturbance footprint to support foraging habitat

Figure 7.13 of Attachment B3 (Assessment of Matters of National Environmental Significance) displays habitat within the Study Area, categorised into breeding, foraging and dispersal habitat. The first map in this series which shows the wind farm area (excluding the access road corridor) is provided as **Figure 3.8** below. A key criterion in defining breeding and foraging habitat was distance to permanent or seasonal water bodies. Mapping of breeding and foraging habitat was informed by the distance to such suitable waterbodies both within and outside of the Study Area.

All permanent and seasonal waterbodies within 1 km and 3 km of the Disturbance Footprint have been identified on **Figure 7.13** of Attachment B3 (Assessment of Matters of National Environmental Significance). This figure is also provided in JPEG format in Attachment L. **Figure 3.8** below shows all permanent and seasonal waterbodies within and surrounding the wind farm area (excludes the access road corridor).

RFI 2.2.15 The total area (in hectares) of each breeding, foraging and dispersal habitat type, including consideration of disturbed (non-remnant vegetation) areas.

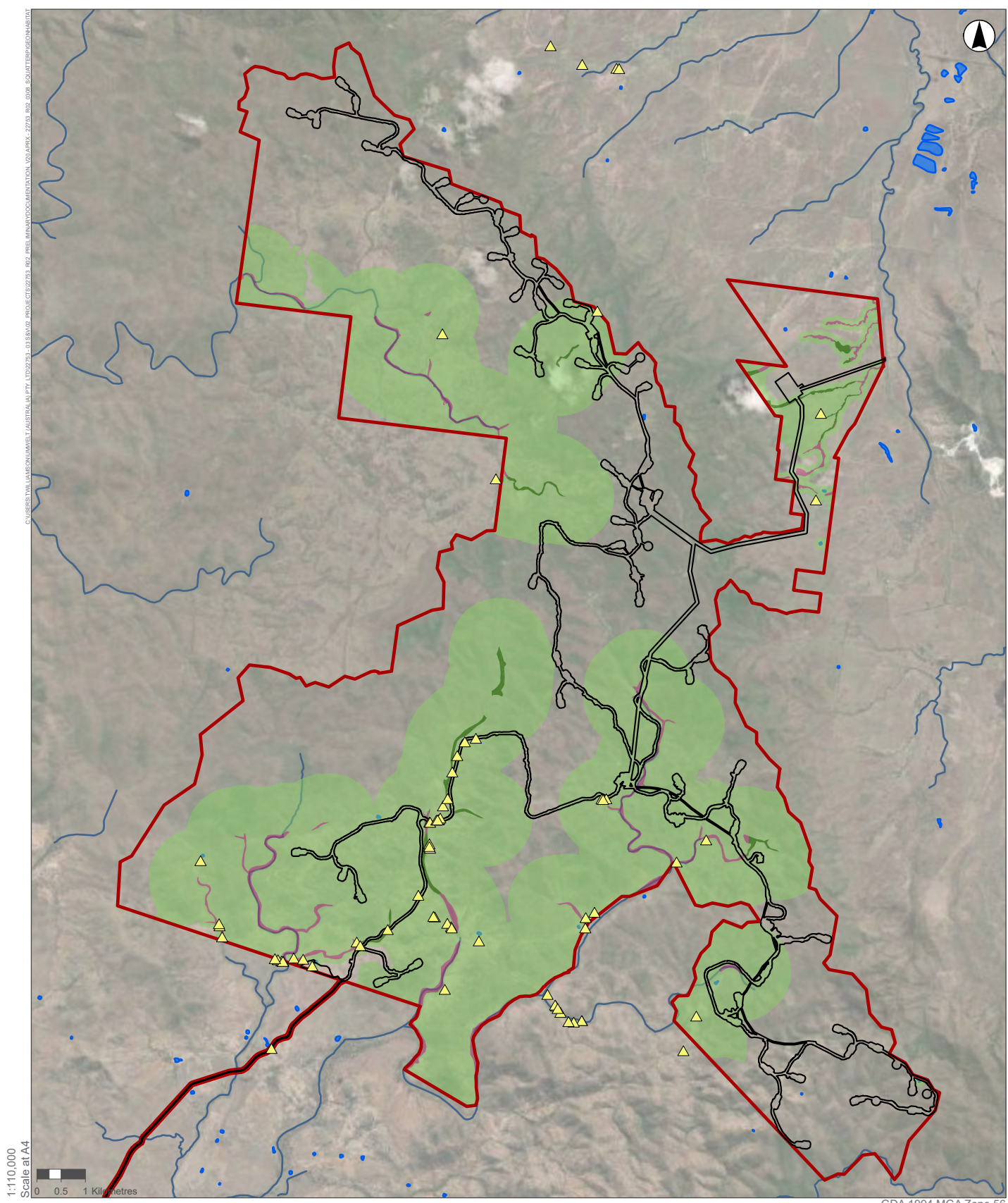
Table 3.11 defines the extent of potential habitat within the Study Area, Development Corridor and Disturbance Footprint. This table also defines the habitat mapping criteria and the justification for the mapping extent. It is also provided as **Table 2.7** of **Appendix E** of Attachment B4 (Assessment of Matters of National Environmental Significance).

Table 3.11 Habitat Extent and Justification for Squatter Pigeon (Southern)

Habitat Criteria	Mapping Justification	Area (ha)		
		Within the Study Area	Within the Development Corridor	Within the Disturbance Footprint
Breeding				
Any remnant or regrowth open-forest to sparse, open-woodland or scrub dominated by Eucalyptus, Corymbia, Acacia or Callitris species, on sandy or gravelly soils with patchy perennial tussock grasses or a mix of perennial tussock grasses and low shrubs and forbs (including but not limited to areas mapped as Queensland land zones 3, 5 or 7) and within 1 km of a permanent or seasonal waterbody with gently sloping banks.	Although no land zone 5 or 7 occurs, woodland communities associated with land zone 3 are present and, in places, are within 1 km of a suitable water source (i.e. farm dams, lacustrine wetlands and watercourses with a stream order of 3 or higher).	270.5	31.9	5.9
Foraging				
Any remnant or regrowth open-forest to sparse, open-woodland or scrub dominated by Eucalyptus, Corymbia, Acacia or Callitris species, on sandy or gravelly soils with patchy perennial tussock grasses or a mix of perennial tussock grasses and low shrubs and forbs (including but not limited to areas mapped as Queensland land zones 3, 5 or 7) and within 3 km of a permanent or seasonal waterbody with gently sloping banks (i.e. farm dams, lacustrine wetlands and watercourses with a stream order of 3 or higher).	Although no land zone 5 or 7 occurs, woodland communities associated with land zone 3 are present and, in places, are within 3 km of a suitable water source (i.e. farm dams, lacustrine wetlands and watercourses with a stream order of 3 or higher).	78.7	2.0	1.2

Habitat Criteria	Mapping Justification	Area (ha)		
		Within the Study Area	Within the Development Corridor	Within the Disturbance Footprint
Dispersal				
Any forest or woodland occurring between patches of foraging or breeding habitat that facilitates movement between patches of foraging habitat, breeding habitat and/or waterbodies, and areas of cleared land less than 100 m wide linking areas of suitable breeding and/or foraging habitat.	Breeding, foraging and suitable water sources within the Study Area and adjacent all largely occur within 1 km of each other. Based on this, all woodlands and areas of cleared land less than 100 m within 1 km of breeding and foraging were included. The exception to this rule is the access road corridor where all areas of forest or woodland connected to breeding and dispersal habitat were included despite >1 km distances between foraging and breeding habitat. Dispersal habitat includes non-remnant areas enclosed by breeding, foraging or dispersal habitat that are less than 100 ha. Dispersal habitat buffers were extended to include known records of squatter pigeon within the Study Area.	8,831.9	607.6	361.4
Total		9,18.1	641.5	368.6

C:\USER\BVL\WORK\UMWELT\ALBERTA\N\PTV\1702025\038\03\PROJ\ES\2725\RD_2REI_MHARPOCCUMENTATION\2024\RD_2725_R02_03B_SQUATTERPIGEONHABITAT



GDA 1994 MGA Zone 56

Legend

- Squatter Pigeon (Southern) Record (ALA)
- ▲ Squatter Pigeon (Southern) Record (Umwelt)
- Suitable Watercourses
- ▭ Disturbance Footprint
- ▭ Study Area
- Reservoirs (DoR)
- Squatter Pigeon (Southern) Habitat**
- Breeding
- Dispersal
- Foraging

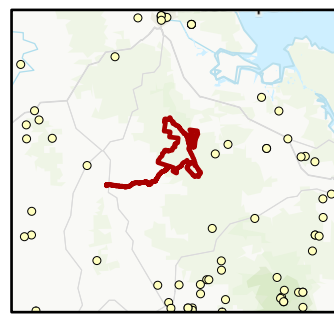


FIGURE 3.8
SQUATTER PIGEON (SOUTHERN) HABITAT

3.2.7 White-throated Needletail (*Hirundapus caudacutus*) – Vulnerable

RFI 2.2.16 Provide a detailed discussion and map of potential foraging habitat identifying areas with prominent updraughts, and potential roosting habitat

A detailed discussion of the species habitat requirements within Australia and the suitability of the Study Area to meet those requirements is provided in **Section 2.2.5** of **Appendix E** of Attachment B4 (Assessment of Matters of National Environmental Significance).

Potential habitat has been categorised into ‘roosting and foraging’ or ‘foraging and dispersal’ based on the elevation, availability of microhabitat features suitable for roosting (i.e. tall trees/hollow-bearing trees) and vegetation community condition.

A summary of potential habitat within the Study Area is provided below. The extent of habitat within the Study Area is depicted on **Figure 7.7** of Attachment B2 (Assessment of Matters of National Environmental Significance) and is also provided in JPEG format in Attachment L. The first map in this series which shows the potential habitat within the wind farm area (excludes the access road corridor) is shown in **Figure 3.9** below.

Potential Habitat within the Study Area

Potential habitat for white-throated needletail within the Study Area consists of roosting, foraging and dispersal habitat. Given the species is a non-breeding migrant to Australia, no breeding habitat exists and will not be considered further. The Study Area is dominated by woodland communities dominated by *Eucalyptus* species, semi-evergreen vine thicket and non-remnant pasture which provide foraging habitat for the species. The Project is located at the Ulam Range, which forms a part of the Great Dividing Range. South-easterly trade winds generated by warm Pacific and Tasman maritime air create the potential for convection along the Great Dividing Range which is aided by orographic lift, the movement of air masses from lower to higher elevations over rising terrain (Spassiani 2020). During the summer months, easterly troughs along the inland side of the Great Dividing Range form a boundary between moist coastal air and the drier air that occurs inland producing a ridge of high pressure along the coast (Bureau of Meteorology 2010). The combination of montane topography and pressure systems along the Great Dividing Range produce updraughts and with it, foraging opportunities for white-throated needletail.

Given the preference for roosting on tall and /or hollow bearing trees at the top of ridges, as well as vertical tree trunks, rock faces and dense canopy foliage, white-throated needletail roosting habitat is limited to remnant vegetation with mature stands of trees confined to ridgelines and mountains throughout the Study Area. As per the Queensland DoR Mountain peaks and capes dataset, the North Pimple is the landscape feature with the lowest elevation (454 m) in the local area. To ensure a conservative approach, all areas with an elevation of 400 m or higher were therefore considered the limit of potential roosting and foraging habitat. Due to the species broad habitat requirements and aerial nature, all remaining areas of regrowth and remnant vegetation are considered potential foraging and dispersal habitat.

RFI 2.2.17 Provide total area (in hectares) of each identified habitat type (e.g. roosting habitat, foraging habitat etc.)

Table 3.12 defines the extent of potential habitat within the Study Area, Development Corridor and Disturbance Footprint. This table also defines the habitat mapping criteria and the justification for the mapping extent. It is also provided as **Table 2.11** of **Appendix E** of Attachment B4 (Assessment of Matters of National Environmental Significance).

Table 3.12 Habitat Extent and Justification for White-throated Needletail

Habitat Criteria	Mapping Justification	Area (ha)		
		Within the Study Area	Within the Development Corridor	Within the Disturbance Footprint
Roosting and Foraging				
Areas containing tall and/or hollow bearing trees at high elevations including the top of ridges, peaks and mountains.	Remnant vegetation occurring within areas above 400 m AHD.	3,235.5	430.2	269.6
Foraging and Dispersal				
A range of habitats, although more often over wooded areas, where it is almost exclusively aerial.	All remaining vegetation communities in remnant or regrowth condition.	10,183.5	666.5	370.6
Total		13,419	1,096.7	640.3

RFI 2.2.18 Provide more detail on observations of white-throated needletails, include incidental observations. Include: location of incidental observations; number of observations from each vantage point/incidental observation point (include number of times evening surveys conducted and no birds detected); number of individuals per observation; detail on time period observed at each observation point (currently a four hour window); discussion on any individuals observed coming into roost.

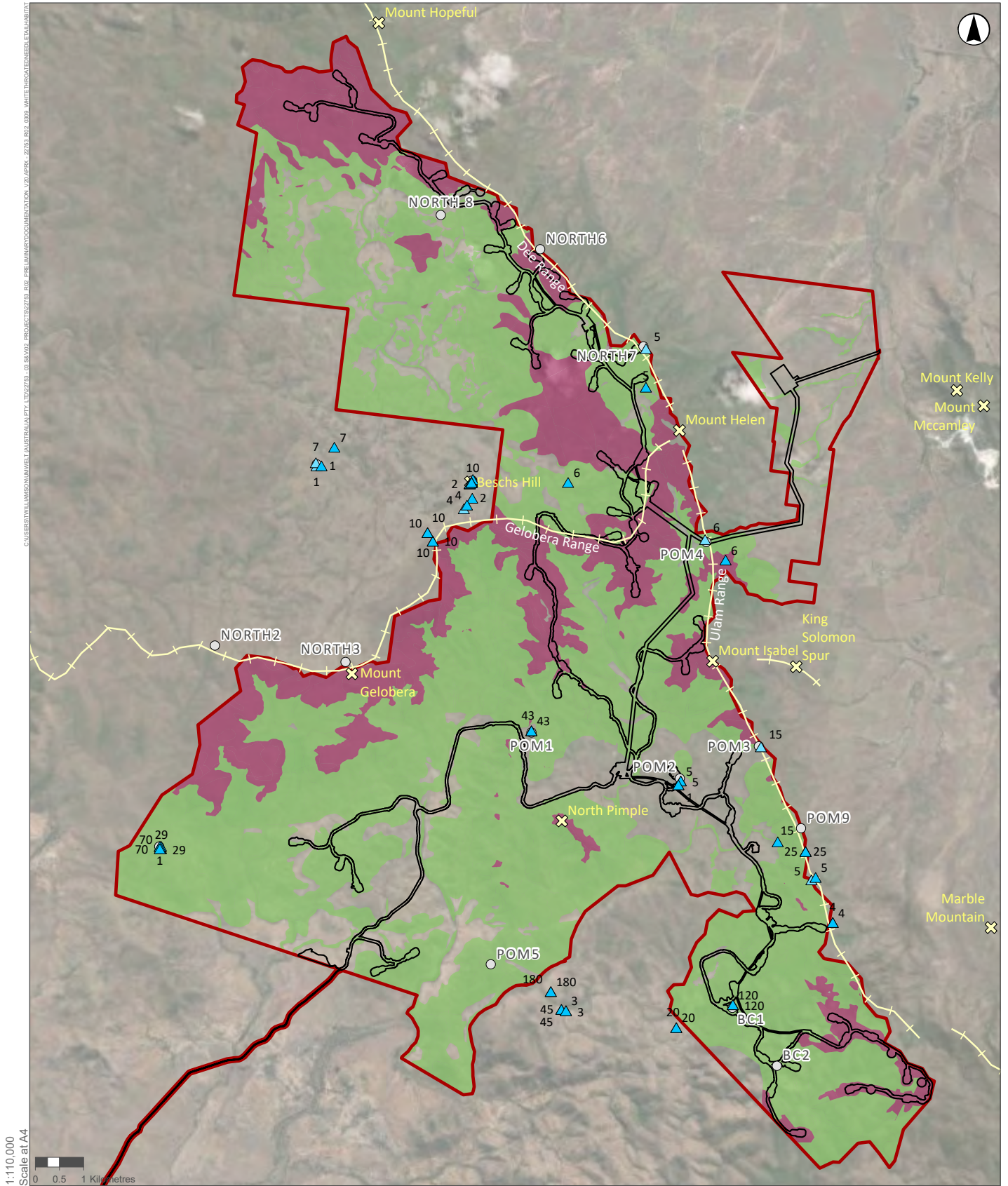
White-throated needletail was recorded on 30 occasions flying over a diversity of habitat types, both incidentally and during bird and bat utilisation surveys (BBUS). A total of 698 individuals have been recorded during all surveys with a total of 320 individuals recorded at vantage points during BBUS and a total of 378 individuals recorded incidentally across all survey events. The number of individuals observed in aggregations ranged from 1 to 180. During the morning BBUS survey period (6 am to 10 am) a total of 388 individuals were recorded. During the midday BBUS survey period (10 am to 2 pm) a total of 236 individuals were recorded. During the afternoon BBUS survey period (2 pm to 6 pm) a total of 74 individuals were recorded. No roosting individuals were recorded.

All observations of white-throated needletail during the field survey program including observation date, observation time and the number of individuals is recorded below in **Table 3.13**. The locations of observations are depicted on **Figure 3.9** below and **Figure 7.7** of Attachment B2 (Assessment of Matters of National Environmental Significance).

Table 3.13 White-Throated Needletail Observations within the Study Area

Date	Time	Time Band	Count
25/02/2020	5:38:00 pm	Afternoon (2 pm–6 pm)	43
28/02/2020	5:50:00 pm	Morning (6 am–10 am)	70
29/02/2020	7:02:52 am	Morning (6 am–10 am)	29
29/02/2020	7:23:31 am	Morning (6 am–10 am)	1
29/02/2020	9:36:00 am	Morning (6 am–10 am)	6
29/02/2020	11:10:00 am	Midday (10 am–2 pm)	15

Date	Time	Time Band	Count
3/03/2020	6:53:21 am	Morning (6 am–10 am)	10
3/03/2020	7:09:13 am	Morning (6 am–10 am)	2
3/03/2020	8:07:04 am	Morning (6 am–10 am)	1
3/03/2020	5:23:00 pm	Afternoon (2 pm–6 pm)	25
4/03/2020	7:41:00 am	Morning (6 am–10 am)	16
4/03/2020	7:51:00 am	Morning (6 am–10 am)	1
4/03/2020	8:32:00 am	Morning (6 am–10 am)	6
4/03/2020	8:40:00 am	Morning (6 am–10 am)	4
4/03/2020	8:46:00 am	Morning (6 am–10 am)	10
4/03/2020	9:59:00 am	Morning (6 am–10 am)	7
4/03/2020	12:02:00 pm	Midday (10 am–2 pm)	25
4/03/2020	12:46:00 pm	Midday (10 am–2 pm)	5
4/03/2020	12:52:00 pm	Midday (10 am–2 pm)	4
4/03/2020	1:03:00 pm	Midday (10 am–2 pm)	25
8/11/2020	10:34:45 am	Midday (10 am–2 pm)	5
8/11/2020	2:55:14 pm	Afternoon (2 pm–6 pm)	1
11/11/2020	12:19:00 pm	Midday (10 am–2 pm)	10
12/11/2020	10:16:52 am	Midday (10 am–2 pm)	4
22/01/2021	10:35:00 am	Midday (10 am–2 pm)	3
22/01/2021	10:47:00 am	Midday (10 am–2 pm)	20
23/01/2021	9:36:00 am	Morning (6 am–10 am)	180
23/01/2021	9:47:00 am	Morning (6 am–10 am)	45
23/01/2021	11:41:00 am	Midday (10 am–2 pm)	120
14/02/2022	3:00:00 pm	Afternoon (2 pm–6 pm)	5



GDA 1994 MGA Zone 56

Legend

- ⊗ Mountains, Peaks and Capes (DoR)
- ▲ White-throated Needle-tail Record (Umwelt)
- White-throated Needle-tail Record (ALA)
- Vantage Point Sites
- Mountain Range (DoR)
- ▭ Disturbance Footprint
- ▭ Study Area
- White-throated Needle-tail Habitat**
- Foraging and dispersal
- Roosting and foraging

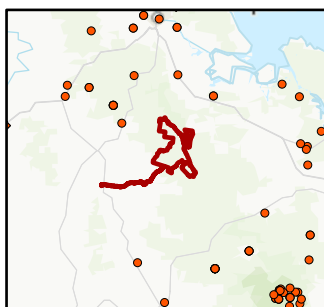


FIGURE 3.9
WHITE-THROATED NEEDLETAIL HABITAT

3.3 Migratory Bird and Bat Species Habitat Assessment

The RFI states that ‘Further information is required in the preliminary documentation, with supporting evidence, in relation to the utilisation of the project site and its surrounds by the listed threatened and migratory bird and bat species identified below. This information is required to enable a robust assessment of potential impacts associated with individual mortality from turbine collision and barotrauma, and potential changes to species utilisation of the project site and its surrounds as a result of the proposed action’.

- White-throated Needletail (*Hirundapus caudacutus*) – Vulnerable, Migratory.
- Ghost Bat (*Macroderma gigas*) – Vulnerable, Migratory.
- Grey-headed Flying-fox (*Pteropus poliocephalus*) – Vulnerable, Migratory.
- Red Goshawk (*Erythrotriorchis radiatus*) – Vulnerable, Migratory.
- Black-faced Monarch (*Monarcha melanopsis*) – Migratory.
- Spectacled Monarch (*Symposiarchus trivirgatus*) – Migratory.
- Satin Flycatcher (*Myiagra cyanoleuca*) – Migratory.
- Rufous Fantail (*Rhipidura rufifrons*) – Migratory.
- Oriental Cuckoo (*Cuculus optatus*) – Migratory.
- Fork-tailed swift (*Apus pacificus*) – Migratory.

RFI 2.3.1 Desktop Assessment – to predict the potential for the above listed threatened and migratory bird and bat species to be using the project site and its surrounds, the Preliminary Documentation must include the process and outcomes of:

A preliminary site characterisation (desktop and/or initial site visit) for each species to identify all drivers of presence on the project site and utilisation of the project site. This characterisation must include, but not limited to, the consideration of:

site characteristics: focal habitat features, topography, prevailing wind and weather patterns, wetlands (including adjacent to project site), and distance to potential nesting, roosting and foraging areas.

species characteristics: behaviour, flight or demographic factors (e.g. species presence [ongoing, transitory/migratory]), site use (e.g. transit, roosting, breeding and/or foraging), flight paths (including migratory flight paths), flight heights, soaring, flocking, and population numbers.

Desktop Assessment

An initial desktop assessment was undertaken for the Project to review the potential occurrence of Commonwealth listed threatened and Migratory bird and bat species. Tools used to investigate the potential occurrence of bird and bat species listed under the EPBC Act using a 10 km buffer around the Project boundary) included:

- EPBC Act Protected Matters Search Tool (PMST) (Department of Climate Change, Energy, the Environment and Water (DCCEEW) 2022).
- Wildlife Online search tool (Department of Environment and Science (DES) 2022).
- Spatial Portal (Atlas of Living Australia (ALA) 2022).
- Atlas and Birdata (BirdLife Australia 2022).

Review of database searches identified 30 threatened and/or migratory bird species and 4 threatened bat species that have the potential to occur within the Study Area. These results were combined with field observations to develop the Likelihood of Occurrence Assessment (**Section 3.3 of Appendix A** of Attachment G) and Risk Assessment (**Section 3.4 of Appendix A** of Attachment G).

Likelihood of Occurrence Assessment

Given the rarity and/or potentially infrequent habitation of the Study Area by threatened or migratory species, it was necessary to complete a likelihood of occurrence assessment. The likelihood of occurrence of bird and bat species listed under the EPBC Act and/or the NC Act was determined through review of existing records, assessment of the suitability of vegetation in the Study Area for species known from the region, and observations made during field surveys. Species were assigned to one of the following categories:

- **Known to Occur:** this category includes all species recorded in the Study Area in previous datasets or during Umwelt field survey.
- **High Potential to Occur:** This category includes species previously recorded in the immediate vicinity. The Study Area contains preferred habitat resources which may support a population of the species.
- **Moderate Potential to Occur:** The species is known from the broader area (desktop search extent) and some of the preferred habitat is present within the Study Area. Aerial foragers and other migratory birds that may overfly the Study Area are also included.
- **Low Potential to Occur:** The Study Area supports some suitable habitat, often marginal. The species may disperse through the Study Area infrequently and is unlikely to depend on the habitat for survival.
- **Unlikely to Occur:** This category includes those species for which the Study Area offers limited or no potential habitat, is outside their known range and/or is lacking broader habitat requirements.

The likelihood of occurrence assessment includes the five recorded listed species, and an additional five species with a High or Moderate potential of occurring in the Study Area (**Section 3.4 of Appendix A** of Attachment G).

Risk Assessment

Threatened bird and bat species listed under the EPBC Act which are Known to occur or have a Moderate or High likelihood of occurrence within the Study Area were included in the risk assessment.

The risk assessment considered the likelihood of species presence and conservation status of species observed or indicated to be present in the Study Area, as well as risk to observed species based on flight characteristics. Species that met any of the following criteria were included in the risk assessment:

- a. Bird and bat species listed as threatened and/or migratory under the EPBC Act recorded in the Study Area or deemed to have a Moderate or High likelihood of occurrence in the Study Area.
- b. Bird and bat species listed as threatened under the NC Act recorded in the Study Area or deemed to have a Moderate or High likelihood of occurrence in the Study Area.
- c. Bird species recorded flying at rotor swept area (RSA) height in the Study Area.
- d. bat species recorded in the Study Area that have Moderate to High potential to occur at RSA height.

Each species was ranked either low, moderate or high for each of six criterion depending on which was most appropriate in consideration of the assessed species' ecology and observed or predicted utilisation of the Study Area. The criterion used to assess likelihood of risk and consequence of risk include:

- Likelihood of Risk:
 - Known or likely frequency of flights within RSA height
 - Status or frequency of occurrence in the Study Area.
- Consequence of Risk
 - Highly localised or concentrated population (for whole or part of lifecycle), such that siting of wind farm could have significant consequence to Queensland, national or international population.
 - Impact on population relative to demographic capacity to replace fatalities (i.e., generalised combination of dispersal capacity of potential replacements, fecundity and generation time).
 - Known or estimated size of national or global population.
 - Listed conservation status under the EPBC Act and/or the NC Act.

The outcome of the risk assessment identified that one species received an overall risk rating of very high (white-throated needletail) and one species group (microbats) received an overall risk rating of moderate – high. Remaining species assessed in the risk assessment received either a moderate or minor overall risk rating.

The results of the risk assessment, including analysis of flight metrics, site characteristics and species characteristics is provided in **Section 4.4 of Appendix A** of Attachment G (Preliminary Bird and Bat Adaptive Management Plan).

RFI 2.3.2 Site specific assessment - To validate the outcomes of the desktop assessment, the Preliminary Documentation must include a detailed discussion of how at-risk listed threatened and migratory bird and bat species are using the project site (both project area and proposed disturbance footprint). This discussion must be informed by site-specific and species-specific site utilisation surveys (undertaken by a suitably qualified expert), and supported by other relevant scientific evidence. Further, this discussion must include detailed information on:

- **How the design of the site utilisation surveys for each relevant species has been informed by its drivers of presence on the project site and utilisation of the project site and its surrounds (as determined through the preliminary site characterisation).**
- **How site utilisation surveys for each relevant species have been designed to improve understanding of site utilisation on the project site and its surrounds, and support an ongoing Before-After, Control Impact (BACI) framework for an adaptive Bird and Bat Management Plan (BBMP).**

The proposed site utilisation survey methodology for each relevant species must be included as an appendix to the Preliminary Documentation.

At least 24 months of site utilisation surveys must be undertaken to provide sufficient baseline data about a relevant species potential to utilise the project site and its surrounds.

Site utilisation surveys must be undertaken for each relevant season over a minimum two years (up to 8 survey events). Each site utilisation survey must be of an appropriate duration and spatial coverage (including taking into consideration the potential turbine layout and visibility) to adequately evaluate site utilisation.

At a minimum, each site utilisation survey must record the relevant information specified in ‘Species characteristics’ of the ‘Desktop Assessment’ requirements for each relevant species.

As per RFI 2.3.1 and as detailed in **Appendix A** of Attachment G (Preliminary Bird and Bat Adaptive Management Plan),

Pre-commissioning bird and bat utilisation surveys were conducted within the Study Area in 2019 during Winter (9 to 12 July 2019 and 7 to 12 August 2019) to establish vantage point locations and begin collecting a baseline avifaunal data set. The next surveys were conducted during 2020 in Autumn (23 February to 5 March 2020) and late Spring (5 to 12 November 2020). The timing of these surveys coincided with the seasonal migration of EPBC Act listed birds, including white-throated needletail (*Hirundapus caudacutus*) and fork-tailed swift (*Apus pacificus*).

Ecologists conducted additional bird utilisation survey in 2021 during Spring (8 to 15 October 2021) and 2022 during Summer (14 to 21 February 2022) to capture seasonal variation in birds present within the Project site and airspace. Additional Project associated surveys have been undertaken throughout this period recording bird species incidentally to capture threatened species records and contribute towards the broader understanding of avifaunal biodiversity across the Study Area.

A total of six BBUS surveys (including one site selection and baseline avifaunal data collection survey) were undertaken throughout the survey program, five of which coinciding with the seasonal migration of EPBC Act listed birds, including white-throated needletail (*Hirundapus caudacutus*).

Bird and bat utilisation surveys occurred in various months and seasons to best record species presence within the Study Area. The survey timing is as follows:

- July 2019 (Winter).
- February to March 2020 (Autumn).
- November 2020 (Spring).
- October 2021 (Spring).
- February 2022 (Summer).

Birds were surveyed from 16 vantage points at elevated positions in the landscape using a timed survey method. Vantage point sampling locations were selected to facilitate a BACI (Before After, Control Impact) design such that reference sites which are located away from the impact area exist in similar habitats such that the similar suite of species is expected to be sampled.

Each vantage point was surveyed for one hour during three sampling windows per day to minimise sampling bias. The following information was recorded for each observation made during the survey:

- Species and abundance.
- Observation type (visual or aural).
- Distance and direction from the observer (to the nearest 10 m and 10° respectively).
- Approximate height above ground level (AGL) of the observed bird/s (to the nearest 10 m).
- Direction of flight (to the nearest 10°).
- Flight pattern (i.e. not flying, local movement, directional flight, circling, swooping, varied, other).
- Behaviour (i.e. flight, foraging, perching, mating, aggressive interactions, hollow inspection, nesting, on station).

Bat call detectors (Anabat Swift units) were placed at each vantage point for a period of two to five nights during each BBUS. One detector was placed at approximately 50 m AGL for three nights. Across all surveys, the total number of detector nights was 104.

Details of the data captured as part of vantage point surveys are detailed in **Appendix A** of Attachment G (Preliminary Bird and Bat Adaptive Management Plan). The bird and bat risk assessment also incorporated baseline fauna records, which included species presence data and, for relevant species, behavioural data such as flight behaviours and flight heights.

The design of pre-commissioning surveys incorporated reference locations, which can be further utilised as part of an ongoing BACI framework during post-commissioning surveys.

4.0 Impact Assessment

As per the RFI, the proposed action is considered likely to have impacts to listed threatened species and listed migratory species. The Preliminary Documentation must include an assessment of direct, indirect and consequential impacts as a result of the proposed action and must be assessed in accordance with relevant departmental policies and guidelines, including the SPRAT Database.

The department considers the proposed action may result in, but is not limited to, the following impacts:

- Vegetation clearing and loss of habitat.
- Increased predation from introduced species.
- Increased risk of vehicle strike.
- Increase light and noise pollution.
- Habitat degrading processes such as weed invasion.
- Increased risk of turbine collision and barotrauma.

4.1 Listed Threatened Species and Communities Impact Assessment

RFI 3.1.1 An assessment of the likely impacts associated with the vegetation clearance, construction, operational, maintenance and (if relevant) decommissioning components of the project.

Update all impact levels based on habitat information referred to above.

Section 8 of Attachment B4 (Assessment of Matters of National Environmental Significance) provides a detailed description of potential impacts associated with the Project. This section categorises impacts into the three phases of the Project:

- Construction phase.
- Operation and maintenance phase.
- Decommissioning and rehabilitation phase.

A summary of these impacts related to each Project phase and the anticipated duration of the disturbance is summarised below in **Table 4.1**.

Table 4.1 Description of Required Activities for each Project Phase

Work Stage	Description of Activities	Duration of Disturbance ¹
Construction		
Site preparation	Vegetation clearing	Permanent
	Topsoil stripping	Medium term / permanent
	Construction of temporary site compounds including temporary fencing as required	Medium term
	Installation of offices, hardstands	Permanent
	Stockpiling	Medium term
Installation of electrical reticulation	Excavation	Temporary
	Trenching	Short term
	Modification, diversion and realignment of utilities and associated infrastructure	Short term / medium term
Civil works	Cutting construction	Permanent
	Embankment construction using cut to fill or from external borrow sources, where required	Permanent
	Drainage controls	Permanent
Road works	Construction of permanent access roads and road upgrades	Permanent
Turbine logistics	Component stockpiling	Medium term
	Concrete batching	Medium term
Turbine construction	Ground excavation and installation of turbine foundations	Permanent
	Erection of infrastructure components	Short term
Fencing	Establish permanent fencing where strictly required (i.e. substation)	Permanent
	Establish temporary fauna exclusion fencing around laydown areas	Temporary
Reinstate ground surfaces	Ensure ground surfaces immediately post construction are safe and stable	Short term
Operation and maintenance		
Turbine operation	Movement of turbine blades resulting in noise and collision with avian species	Permanent
Rehabilitation	Restoration of disturbed areas, including revegetation where required	Temporary
Operational maintenance	Ongoing vehicle movement along established access tracks and ground-slashing and pruning in required areas	Medium term

Work Stage	Description of Activities	Duration of Disturbance ¹
Vegetation maintenance	Ongoing vegetation (primarily slashing and pruning) maintenance for safe operation and fire safety	Permanent
Decommissioning and rehabilitation		
Removal of wind turbines, site services and ancillary infrastructure	De-energising wind turbines, disposing of oils, lubricants and coolants, disassembling turbines, removing site services	Short term
Covering and grading foundations	Cover foundations with fill material and grade to reflect the slope of the surrounding area, dress in topsoil and revegetate	Short term
Revegetation	Restoration of disturbed areas, including revegetation where required	Temporary

All impacts have been considered in detail in the context of the MNES susceptibility to the impact. MNES specific impacts have been identified in **Section 8** of Attachment B4 (Assessment of Matters of National Environmental Significance) as well as in the significant impact assessment provided in **Appendix E** of Attachment B4 (Assessment of Matters of National Environmental Significance).

RFI 3.1.2 Include the direct and indirect loss and/or disturbance of MNES individuals and habitat as a result of the proposed action. This must include the quality of the habitat impacted and quantification of the individuals and habitat area (in hectares) to be impacted.

Direct and indirect loss and/or disturbance to MNES individuals and habitat is discussed in detail in **Section 8** of Attachment B4 (Assessment of Matters of National Environmental Significance). A discussion is provided on the presence, absence and likely density of populations however quantifying the number of individuals that may be impacted requires long-term studies to achieve realistic counts. It should be noted that bird and bat assessment has been undertaken over 6 seasonal survey periods over several years and a significant dataset has been analysed to reach the conclusions presented in Attachment B4 (Assessment of Matters of National Environmental Significance). Further, numerous targeted surveys have been undertaken for *Cycas megacarpa*, which are sufficient to provide a detailed estimate of the number of individuals which may be impacted by the Project.

Potential habitat has been modelled for each relevant MNES based on extensive ground-truthing and analysis of desktop data and departmental guidance. Potential habitat which may be impacted by the Project has been quantified for each of the relevant MNES and is provided below in **Table 4.2** and also in **Appendix E** of Attachment B4 (Assessment of Matters of National Environmental Significance).

Table 4.2 Impacts to MNES Species Habitat

MNES	Likelihood of Occurrence	Habitat utilisation	Maximum direct impact area (ha)
Threatened Flora			
<i>Cycas megacarpa</i>	Known	Known (confirmed)	145.1
		Known (suspected)	79.3
		Total habitat	224.4
<i>Samadera bidwillii</i>	Known	Potential habitat	347.8

MNES	Likelihood of Occurrence	Habitat utilisation	Maximum direct impact area (ha)
		Habitat Critical to the Survival of the Species	0.0*
<i>Cossinia australiana</i>	Moderate	-	8.6
<i>Decaspermum struckoiligum</i>	Moderate	-	2.3
Threatened Fauna			
Koala (<i>Phascolarctos cinereus</i>)	Known	Breeding, foraging and dispersal	641.6
		Climate refugia	5.3
Northern quoll (<i>Dasyurus hallucatus</i>)	Known	Breeding and shelter	22.1
		Foraging and dispersal	574.8
White-throated needletail (<i>Hirundapus caudacutus</i>)	Known	Roosting and foraging	269.6
		Foraging and dispersal	370.6
Ghost bat (<i>Macroderma gigas</i>)	Low	Seasonal foraging and dispersal	883.6
Greater glider (southern and central) (<i>Petauroides volans</i>)	Known	Likely or current denning habitat	244.7
		Potential or future denning habitat	175.8
		Foraging and dispersal	207.4
Yellow-bellied glider (south-eastern) (<i>Petaurus australis australis</i>)	Known	Breeding and denning	163.3
		Foraging and dispersal	158.7
Grey-headed flying-fox (<i>Pteropus poliocephalus</i>)	Low	Foraging and dispersal	277.3
Red goshawk (<i>Erythrorhynchus radiatus</i>)	Low	Marginal foraging and dispersal	633.0
Collared delma (<i>Delma torquata</i>)	Moderate	Breeding and foraging	272.8
Squatter pigeon (southern) (<i>Geophaps scripta scripta</i>)	Known	Breeding	5.9
		Foraging	1.2
		Dispersal	361.4
Migratory species			
Fork-tailed swift (<i>Apus pacificus</i>)	High	Foraging and dispersal	883.6
Oriental cuckoo (<i>Cuculus optatus</i>)	Moderate	Foraging and dispersal	348.1
Black-faced monarch (<i>Monarcha melanopsis</i>)	Moderate	Foraging and marginal breeding	17.7
		Foraging and dispersal	330.7
Spectacled monarch (<i>Symposiachrus trivirgatus</i>)	Known	Foraging and dispersal	17.9
Satin flycatcher (<i>Myiagra cyanoleuca</i>)	Moderate	Foraging and dispersal	339.7

MNES	Likelihood of Occurrence	Habitat utilisation	Maximum direct impact area (ha)
Rufous fantail <i>(Rhipidura rufifrons)</i>	Known	Foraging and dispersal	348.1

* Neoen have committed to avoiding habitat critical to the survival of quassia (*Samadera bidwillii*), approximately 0.1 ha.

A detailed discussion on indirect impacts is presented in **Section 8.1.2** of Attachment B4 (Assessment of Matters of National Environmental Significance). A summary of the risks of indirect impacts associated with the construction phase of the Project is presented below in **Table 4.3**. This table outlines the indirect impact and the relevant MNES which may be impacted, describes the impact and provides the expected frequency, duration and magnitude of the impact.

Table 4.3 MNES at Risk of Indirect Impacts Associated with the Construction Phase

Indirect Impact	Relevant MNES	Description	Frequency	Duration	Magnitude
Weed and pest incursion	Threatened flora species	Encroachment or exacerbation of exotic weed species including rubber vine and high biomass grasses could inhibit regeneration, increase fire loads and/or smother individuals within the retained areas of potential habitat.	Infrequent / periodic - fluctuate seasonally and with land management practices or breaches in general construction protocols (weed washdowns, etc.).	Temporary – outbreaks addressed via general land management obligations under State laws.	Localised, but could extend to the broader Study Area if unmanaged. Magnitude also considered low given existing condition of habitat is already impacted by weeds and pests.
	Squatter pigeon (southern)	The squatter pigeon (southern) is a predominantly ground dwelling species. The species is highly susceptible to predation from exotic predators including feral cats and foxes. However, as detailed above, feral cat population levels in the Study Area are likely to already be high and the Disturbance Footprint has been co-located with cleared areas wherever possible, that may already provide a conduit for pest movement. With the implementation of best practice weed and pest mitigation measures, it is considered unlikely the Project will lead to a notable increase in pest populations.			
	Northern quoll and ghost bat	Any potential increase in cane toad populations as a result of the Project could threaten the northern quoll and potential ghost bat populations within the Disturbance Footprint. Cane toads were recorded during the field survey and are likely to be common in the area. Increases in pest predator species such as foxes and feral cats may lead to increased competition for prey species.			

Indirect Impact	Relevant MNES	Description	Frequency	Duration	Magnitude
	Koala	Any potential increase in dingo or wild dog populations as a result of the Project could threaten any potential koala populations that occurs within the Study Area. However, as above it is considered unlikely the Project will lead to a notable increase in pest populations.			
Elevated dust	Threatened flora species	Extended periods of dust deposition could threaten the health and viability of potentially present individuals. The implementation of dust management as deemed necessary and in response to conditions will limit the chances of construction dust having an adverse impact on vegetation.	Infrequent – associated with breaches in general construction protocols. Frequency is likely to be higher within the access road corridor due to higher levels of traffic during construction.	Temporary – Potential impacts rectified through active management or through natural processes such as rainfall.	Localised / low – will only effect immediate area.
Erosion and loss of soil structure and stability	Threatened flora species	The Disturbance Footprint has a variable terrain and includes areas of steep hills and rises. Threatened flora are known, or have the potential to occur in these areas, and will be susceptible to habitat degradation and direct impact should soils become unstable as a result of adjacent works. Potential impacts relating to erosion will be actively managed via the Project’s Sediment and Erosion Control Plan, minimising these risks.	Infrequent / periodic - fluctuate seasonally and with land management practices or breaches in general construction protocols.	Temporary – limited to once off incident or rectified through seasonal inundation diluting to background levels given the ephemeral nature of most waterbodies.	Localised / low – will only effect immediate area.

Indirect Impact	Relevant MNES	Description	Frequency	Duration	Magnitude
	Greater glider (southern and central) and yellow-bellied glider (south-eastern) (<i>Petaurus australis australis</i>)	Although unlikely, erosion and alteration of riparian zones may lead to the loss of canopy vegetation. These trees may contain hollows which are necessary for the breeding of arboreal mammals such as the greater glider (southern and central). Trees may also be important for maintaining shelter and connectivity along the watercourse. As above, erosion risks will be actively managed via the Project's Sediment and Erosion Control Plan.			
Increased noise and artificial light	Nocturnal MNES	Increased lighting within or adjacent to potential habitat within the Disturbance Footprint could increase the success of predation by visual predators (including exotic pests) or could alter foraging and breeding behaviours. Construction noise during the day may disturb denning or roosting individuals and negatively affect circadian rhythms. Noise and light impacts will be managed via the Project's Construction Environmental Management Plan minimising the overall risk of adverse impacts.	Occasional – minimal night work however noise and light as a result of construction works have the potential to disrupt fauna species.	Temporary – minimal night work, significant excavation work likely required only within a portion of the Disturbance Footprint and generally limited to tower locations.	Localised – restricted to confined worksite within Disturbance Footprint.
Increased human activity	Northern quoll	Increased human activity levels within the Disturbance Footprint during construction may result in a greater availability of potential food resources, which may attract foraging northern quoll if not properly stored and/or disposed of. This may impact the species through foraging on unnatural food resources and increasing the contact with humans and traffic. Overall, this is considered unlikely to have a material impact on the species as appropriate management of food and waste will be part of the standard construction procedures.	Infrequent – associated with breaches in general construction protocols. Primary food storage area for construction workers will be associated with specific location i.e., site office.	Temporary – Potential impacts will be indirectly monitored and managed through pest protocols, as increased food will also attract these species.	Localised – restricted to confined worksite within Disturbance Footprint.

Indirect Impact	Relevant MNES	Description	Frequency	Duration	Magnitude
		Northern quoll may also utilise laydown areas/construction materials for refuge opportunities increasing human interaction and the potential to be harmed or killed during construction. However, fencing of equipment storage areas should limit the opportunities for this to occur.			

RFI 3.1.3 An assessment of the impacts of habitat fragmentation in the proposed action area and surrounding areas, including consideration of species' movement patterns

Clearing has the potential to dissect and disconnect vegetation communities, reducing the size of patches or potentially isolating them, which can impact on the success of seed dispersal, species recruitment and ultimately the long-term viability and persistence of flora species or communities within the landscape. Clearing may also result in reduced fauna movement opportunities, leading to reduced species recruitment, genetic flow and ultimately affect the long-term viability and persistence of fauna populations within the landscape.

Habitat within the Disturbance Footprint (and the wider Study Area) has been historically subjected to low level fragmentation impacts as a result of ongoing agricultural works, including the creation of farm dams and installation of tracks, firebreaks and fences. Further vegetation clearing will be required for the construction of the Project, which may exacerbate existing fragmentation impacts.

MNES that are considered most susceptible to fragmentation impacts as a result of the construction of the Project include northern quoll (*Dasyurus hallucatus*), greater glider (southern and central) (*Petauroides volans*), yellow-bellied glider (south-eastern) (*Petaurus australis australis*), koala (*Phascolarctos cinereus*) and threatened flora including *Cycas megacarpa*. *Cycas megacarpa* may be vulnerable to fragmentation as a result of its immobile nature and seed dispersal mechanism, which does not involve a vector for movement (other than gravity). Smaller fragmented populations of less than 500 individuals are at risk of loss from genetic diversity.

The northern quoll (*Dasyurus hallucatus*) is a cryptic and nocturnal species; depending on the size and nature of the clearing, impacted areas between or within areas of suitable habitat may be no longer used due to their exposed nature and the increased risk of predation, potentially resulting in altered foraging and dispersal patterns. Although the koala (*Phascolarctos cinereus*) is considered highly mobile and is known to disperse through cleared areas, it is while making these movements that they are most susceptible to vehicle collision and attack by dogs and other predators. In contrast, the greater glider (southern and central) (*Petauroides volans*) and yellow-bellied glider (south-eastern) (*Petaurus australis australis*) are known to have low dispersal ability. Vegetation clearing may create gaps or expand existing gaps between areas of suitable habitat and potentially restrict the movement of individuals and access to required habitat resources.

The Project is situated on the Great Dividing Range and remnant vegetation within the Study Area provides connectivity through biodiversity corridors that facilitate north-south movement of fauna at a regional scale. Internal fauna movement is likely afforded by waterways, ridgelines and gullies. The clearance of habitat within the Disturbance Footprint may temporarily disrupt fauna movement internally, as well as to adjacent high-quality areas outside of the Study Area. Although the Project is primarily linear in nature and will have few hard dispersal barriers (i.e. fencing), clearing widths of up to 100 m for linear infrastructure (i.e. 275 kV transmission lines) and up to 165 m for turbines will reduce functional connectivity for a number of species (i.e. greater glider (southern and central) (*Petauroides volans*) and yellow-bellied glider (south-eastern) (*Petaurus australis australis*)). Siting of the Development Corridor and Disturbance Footprint has considered the location of MNES values in the landscape and the use of existing disturbed or cleared areas has been prioritised (see **Section 9.1.1**).

Mitigation measures have been proposed to minimise fragmentation impacts including the installation of glide poles and pinch points where the width of the Disturbance Footprint is reduced to the extent that individuals (threatened glider species specifically) can easily disperse across. A glide pole monitoring program has also been proposed to understand the efficacy of this mitigation measure. Although pinch points have been designed to mitigate fragmentation impacts for threatened gliders, they would also help to facilitate movement for other MNES species including northern quoll (*Dasyurus hallucatus*) and koala (*Phascolarctos cinereus*), by reducing the width of cleared areas that would have to be traversed to access habitat resources.

The significant impact assessment **Appendix E** of Attachment B4 (Assessment of Matters of National Environmental Significance) provides a detailed assessment of potential impacts of habitat fragmentation to each relevant MNES, including consideration of the species' movement patterns.

RFI 3.1.4 An assessment of the likely duration of impacts to MNES as a result of the proposed action.

Section 8 of Attachment B4 (Assessment of Matters of National Environmental Significance) provides a description of activities proposed for each phase of the Project and duration of the disturbance from temporary to permanent. This is also provided above in **Table 4.1** in **Section 4.1**.

RFI 3.1.5 A discussion of whether the impacts are likely to be repeated, for example as part of maintenance.

As discussed in **Section 8** of Attachment B4 (Assessment of Matters of National Environmental Significance), the direct impacts associated with vegetation clearing and habitat fragmentation are unlikely to be repeated as part of the operation and maintenance phase or decommissioning and rehabilitation phase of the Project. The exception to this is areas directly adjacent to certain infrastructure (i.e. substation) and in areas required for use throughout the life of the Project such as access tracks. In these locations, clearing works would predominantly comprise grass slashing and pruning and would be conducted as required for safe access and operation of infrastructure and decommissioning activities.

The potential for fauna injury or mortality is highest during vegetation clearing in the construction phase. However, vehicle collision is possible at all stages of the Project, albeit at a reduced risk during the operation and maintenance phase and the decommissioning and rehabilitation phase given the lower frequency of vehicle movements.

As discussed in Attachment G (Preliminary Bird and Bat Adaptive Management Plan), bird and bat strike is possible throughout the operation and maintenance phase of the Project.

A detailed discussion on indirect impacts is presented in **Section 8.1.2** of Attachment B4 (Assessment of Matters of National Environmental Significance). A summary of the risks of indirect impacts associated with the construction phase of the Project is presented in **Table 4.3** of this document (in response to RFI 3.1.2). This table outlines the indirect impact and the relevant MNES which may be impacted, describes the impact and provides the expected frequency, duration and magnitude of the impact.

RFI 3.1.6 A discussion of whether any impacts are likely to be unknown, unpredictable or irreversible.

Generally, the impacts associated with the Project have a high degree of certainty given that numerous Projects of similar scale and extent have been successfully developed and mitigations suitably implemented to minimise impacts.

As detailed design of the Project has not yet been completed, the exact extent of vegetation clearance cannot be calculated. As such, when determining potential impacts on MNES, this assessment considered the Development Corridor which represents a buffered version of the Project and predicted clearing footprint. The final Disturbance Footprint for the Project would occupy approximately 65% or less of the Development Corridor.

Project infrastructure would be sited within the Development Corridor based on the location of on-ground constraints including MNES individuals and habitat. Additional field surveys specific to terrestrial ecology (as well as other types of constraints) would be conducted prior to construction, including pre-clearance surveys. This data will allow for increased accuracy and detail in mapped terrestrial ecological values within the Development Corridor including MNES habitat values. Ground-truthed ecological field data will strongly influence the final design of the Project, with the avoidance hierarchy principles in place. Future refinement of the Project will seek to avoid threatened species individuals and habitat, particularly for species where significant impacts may occur. The Disturbance Footprint which has been presented in this documentation is considered to be a worst-case scenario and is expected to reduce with detailed design and micro-siting.

There is an inherent uncertainty with the quantum of impact from bird and bat strike on any windfarm development. However, as per Attachment G (Preliminary Bird and Bat Adaptive Management Plan) an adaptive management approach and mitigation and management measures have been developed to address the risk to species which have the potential to collide with Project infrastructure. CRM was also undertaken for white-throated needletail, which was the only species which was assessed as having a Very High risk of impact. This process determined that 1 individual is expected to be impacted every 5.9 years. CRM could not be applied to other species as either none or not enough observations were available (despite 6 dedicated surveys over several years) to provide statistical strength to a mathematical model.

RFI 3.1.7 Justification, with supporting evidence, how the proposed action will not be inconsistent with:

- **Australia's obligations under the Biodiversity Convention, the Convention on Conservation of Nature in the South Pacific (Apia Convention), and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES); and a recovery plan or threat abatement plan.**

The impact assessment for MNES species provided in **Appendix E** of Attachment B4 (Assessment of Matters of National Environmental Significance) has considered the information available in the relevant recovery plans and threat abatement plans in determining the extent and type of impacts which may occur as well as the proposed avoidance, management and mitigation measures.

One species listed under Appendix I of the CITES species lists was recorded during the field survey (peregrine falcon (*Falco peregrinus*)). This species is not listed under the EPBC Act.

Neoen supports the full range of domestic measures Australia has adopted for improved conservation and tighter restrictions on trade of CITES listed species. The Project does not involve international trade in wildlife and does not threaten wild populations of any listed plants and animals.

4.2 Specific Threatened Species Information Required for Impact Assessment

As per the RFI, the Preliminary Documentation must address the following matters in addition to the general information listed above.

4.2.1 Collared Delma (*Delma torquata*)

RFI 3.2.1 Update your impact assessment based on the revised habitat assessment above.

As described in the response to RFI 2.2.1, 2.2.2 and 2.2.3, the habitat assessment for collared delma has been updated based on departmental advice. This updated habitat assessment has been used to inform the impact assessment which has been updated accordingly. The significant impact assessment for collared delma is provided below in **Table 4.4** and in **Table 2.7** of **Appendix E** of Attachment B4 (Assessment of Matters of National Environmental Significance).

Table 4.4 Significant Impact Assessment – Collared Delma

Evaluation Criteria	Response
Lead to a long-term decrease in the size of an important population of a species	<p>Potential.</p> <p>The collared delma is considered to have a moderate likelihood of occurrence within the Study Area. It was not recorded during the field survey program and the Study Area does not occur within the known or likely to occur extent of the species distribution. However, as described in Section 2.2.1.6 of Appendix E of Attachment B4 (Assessment of Matters of National Environmental Significance), modelled potential habitat broadly meets the definition of important habitat which is considered a surrogate for important populations. As such an important population has the potential to occur.</p> <p>A maximum of 272.8 ha potential habitat will be cleared for construction of the Project. Potential habitat is considered to be of only moderate quality due to the presence of threats including cattle, weeds and pests. Direct impacts to potential habitat will be minimised via micro-siting wherever possible including at watercourse crossings. As the species is sedentary, there is a risk of mortality during clearing works. To manage this risk, pre-clearance surveys will include targeted searches for the species in areas of potential habitat to be cleared. Potential indirect impacts on the species including habitat degradation via weed incursion and altered fire regimes, will be actively managed via the Project management plans.</p> <p>Despite methods employed to mitigate and manage the impact to collared delma habitat, the Project would remove approximately 272.8 ha of important habitat for the collared delma. The extent of this habitat removal has the potential to lead to a long term decrease in the size of an important population (if present).</p>
Reduce the area of occupancy of an important population	<p>Potential.</p> <p>The species' area of occupancy has not been estimated. However, as per SPRAT, the species has previously been reported to be relatively common in occupied areas. As described above, modelled potential habitat meets the definition of important habitat and therefore, important populations may occur. The extent of habitat removal will be a maximum of 272.8 ha. If the species is present, this quantum of impact may be sufficient to reduce the area of occupancy of an important population.</p>
Fragment an existing important population into two or more populations	<p>Potential.</p> <p>Little is known about the movement patterns of the species, though it is thought to be sedentary with one study finding that individuals occupy a small (<20 m²) home range (Porter 1998a). A maximum of 272.8 ha of suitable habitat will be removed. The remaining habitat would continue to support the ecological requirements of the species.</p>

Evaluation Criteria	Response
	<p>Nevertheless, it is likely that vegetation clearance for the Project's access tracks and other infrastructure would present a barrier to movement for the species, given its' low dispersal capacity. If important populations are present within the Study Area, there is a possibility that the shape and scale of the clearing could result in fragmenting these populations into two or more populations.</p> <p>Suitable microhabitat features such as ground timber and boulders will be retained where possible or relocated to adjacent areas of potential habitat. Pre-clearance surveys will also be undertaken and will aim to relocate any individuals present to adjacent areas of suitable habitat. Any individuals or eggs observed, will be relocated within suitable adjacent habitat. Despite the implementation of these mitigation and management methods, the Project may fragment an existing important population into two or more populations if the species is present.</p>
<p>Adversely affect habitat critical to the survival of a species</p>	<p>Yes.</p> <p>As described in Section 2.2.1.5 of Appendix E of Attachment B4 (Assessment of Matters of National Environmental Significance), modelled potential habitat meets the definition of important habitat which is considered to be interchangeable with habitat critical to the survival of the species.</p> <p>Under worst-case scenario, a maximum of 272.8 ha of habitat critical to the survival of the species would be cleared for construction of the Project. Direct impacts to this potential habitat will be minimised wherever possible via micro-siting and the final clearance area is expected to be less than the proposed impact area. The risk of further habitat degradation via weed incursion and altered fire regimes in areas retained will be actively managed via the Project management plans.</p> <p>As potential habitat within the Study Area meets the broad criteria to be considered as habitat critical to the survival of the species, removal of the 272.8 ha of this habitat is likely to result in an adverse impact.</p>
<p>Disrupt the breeding cycle of an important population</p>	<p>No.</p> <p>As described above, the species was not detected during field surveys and a conservative approach to the mapping of potential habitat has been applied. The breeding cycle of the species is not well defined, however females are known to produce two eggs in December that hatch between February – March (Peck & Hobson 2007).</p> <p>Clearing and construction of the Project will be staged so only a subset of the Disturbance Footprint will be impacted at one time. Pre-clearance surveys will include targeted searches for individuals and any potential eggs (should clearing occur within potential habitat during December). Where practical, microhabitat features that cannot be avoided through micro-siting will be relocated to areas of adjacent potential habitat.</p> <p>Project works are therefore unlikely to disrupt the breeding cycle of a population or an important population.</p>
<p>Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</p>	<p>No.</p> <p>As described above, potential habitat within the Study Area is generally of moderate quality as a result of ongoing disturbance from cattle, weeds and pests.</p> <p>The extent of habitat removal will be a maximum of 272.8 ha. However, it is likely that the clearing limits will be reduced due to the micro-siting of Project infrastructure.</p>

Evaluation Criteria	Response
	<p>Construction works involve the modification, disruption and removal of habitat for the species. However, this species has not been observed within the Study Area and habitat of similar quality is widely available in the landscape. Further, large areas of retained habitat within the Study Area would continue to support the ecological requirements of the species.</p> <p>As such, although the Project would result in impacts to potential habitat for the species, this is not considered to be of the magnitude that would result in the likely decline of the species.</p>
<p>Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat</p>	<p>No.</p> <p>Invasive species, particularly weeds including lantana (<i>Lantana camara</i>*) were recorded throughout the field survey program. The feral cat, a recognised threat to the species, was also recorded multiple times. The Project will employ best practice control methods for weeds and pests and is unlikely to introduce or exacerbate weeds or pests beyond existing levels.</p>
<p>Introduce disease that may cause the species to decline</p>	<p>No.</p> <p>There are no known diseases affecting the species. Nonetheless, the Project will employ best practice biosecurity protocols; therefore, introduction of a disease that may cause the species to decline is unlikely.</p>
<p>Interfere substantially with the recovery of the species</p>	<p>No.</p> <p>As outlined on SPRAT, a recovery plan for the Queensland Brigalow Belt Reptiles including the collared delma has been drafted by WWF-Australia in 2006 (Richardson 2006). Several recovery objectives are outlined in the plan and on the species SPRAT profile and broadly cover a range of topics including identification of threats and key habitat, research priorities, conservation and the establishment of reserves, monitoring programs and the development of management guidelines.</p> <p>The Project is unlikely to hinder the success of any of the recovery actions. Furthermore, the Project will not exacerbate any known threats to the species including cattle grazing, weed and pest levels and altered fire regimes. Potential indirect impacts on the species as a result of the Project will be actively managed via one or multiple Management Plans. Given the above and that the species was not recorded during the field survey program, the Project is unlikely to interfere substantially with the recovery of the species.</p>

4.2.2 *Cycas megacarpa*

RFI 3.2.2 Update the development class and number of *Cycas megacarpa* individuals in each development class within and adjacent to the project site as per James et al. 2018.

The number of *Cycas megacarpa* individuals in each Development Class has been calculated for the Study Area as per James *et al.* (2018). It should be noted that not all individuals within the Study Area have been classified by age class. During pre-clearance surveys of the Disturbance Footprint all individuals would be classified by James *et al.* (2018). Refer to **Table 4.1** below for the individuals within the Study Area that have been compared to James *et al.* (2018). This information is also presented in **Appendix E** of Attachment B4 (Assessment of Matters of National Environmental Significance).

Table 4.5 Number of *Cycas megacarpa* Individuals in each Development Class from James *et al.* (2018) and Across the Study Area

Development Class	James et al., (2018) Individual Numbers	James et al., (2018) Percentage in Population	Study Area Individual Numbers	Study Area Percentage in Population
Seedlings (≤ 0.49 m, non trunked)	Approximately 450	16%	262	21%
Juveniles (≥ 0.5 m, not trunked; ≤ 0.49 m, trunked)	Approximately 900	33%	368	30%
Sub adults (<1 m, trunked)	Approximately 550	20%	_ ¹	_ ¹
Adults (≥ 1 m, trunked)	Approximately 500	18%	572 ²	47%
Total Individuals	2,668	-	1,202	

¹ Juvenile and sub adults have been different classifications for the Umwelt surveys, as a result these have been captured as 'Juveniles' to compare to James *et al.*, (2018).

² Adults have been separated into adult and large adults for the Umwelt surveys. Adults and large adults have been captured as 'Adults' to compare to James *et al.*, (2018). The data collected during the Umwelt surveys shows that a larger proportion of 'Adults' were identified within the Study Area. Further work will need to be done to characterise population in line with James *et al.*, (2018).

RFI 3.2.3 Include the total number of individual plants and the total area of habitat (ha) impacted by the project footprint.

Habitat mapping for *Cycas megacarpa* was completed via the interpretation of point records, plot-based density estimates, aerial imagery and field notes. Habitat has been defined for the Project as follows:

- Known habitat (confirmed): includes all land within 80 m of a confirmed record.
- Known habitat (suspected): includes areas of the Development Corridor for which known habitat (confirmed) does not overlap, however based on field notes, adjacent records and connective habitat, *Cycas megacarpa* presence is presumed or reasonably suspected.
- Nil recorded: includes areas of the Development Corridor which have been confirmed (via field survey) to not support *Cycas megacarpa*. Nil recorded habitat also includes areas where reasonable extrapolation to edges of the Development Corridor has been applied, based on nearby 'absence' records, absence of connective habitat and field derived opinions of ecologists.

Cycas megacarpa habitat within the Study Area includes remnant, regrowth and cleared vegetation units. Habitat within the Study Area and the Development Corridor which is known to support the species include:

- Eucalypt woodland to open woodland on steep slopes or undulating terrain, dominated by *Corymbia citriodora*, *Eucalyptus crebra*, white mahogany (*Eucalyptus acmenoides*) and gum-topped box (*Eucalyptus moluccana*).
- Woodlands on alluvium, dominated by weeping tea-tree (*Melaleuca fluviatilis*), Moreton Bay ash (*Corymbia tessellaris*) and Queensland blue gum (*Eucalyptus tereticornis*).
- Semi-evergreen vine thicket and microphyll vine forest.
- Non remnant or cleared pasture.

The primary habitat for this species (i.e. where the species was most consistently recorded and abundant) was woodland to open forest on upper slopes and crests consisting of *Corymbia citriodora*, *Eucalyptus crebra*, *Eucalyptus melanophloia*, pink bloodwood (*Corymbia intermedia*) and *Eucalyptus tereticornis* on metamorphosed sediments and volcanic geologies at altitudes of between 200 and 500 m.

The extent that habitat is mapped throughout Development Corridor and Disturbance Footprint is provided in **Table 4.2** and shown on **Figure 3.3** in **Section 3.2.2** (also provided as **Figure 7.1** of Attachment B2 (Assessment of Matters of National Environmental Significance)). Given the data resolution required to complete habitat extent mapping, the comparative habitat extent areas are unavailable for the Study Area.

Table 4.6 Habitat Extent and Justification for *Cycas megacarpa*

Habitat Criteria	Mapping Justification	Extent within Development Corridor (ha)	Extent within the Disturbance Footprint (ha)
Known habitat (confirmed)	An 80 m buffer on confirmed <i>Cycas megacarpa</i> records, to reflect the latest population research which indicates most individuals disperse within 80 m of mature female plants (Etherington et al. 2018; James 2016 PhD thesis). Mapping has not been limited to certain REs noting the species was also recorded within non-remnant vegetation within the Study Area.	209.5	145.1
Known habitat (suspected)	Includes areas of the Development Corridor for which known habitat (confirmed) does not overlap, however based on adjacent records and connective habitat, <i>Cycas megacarpa</i> presence is presumed or reasonably suspected.	131.8	79.3
Known habitat (total)	Combined areas of confirmed and suspected habitat	341.3	224.4
Nil detected	Includes areas of the Development Corridor which have been confirmed (via field survey) to not support <i>Cycas megacarpa</i> . Nil recorded habitat also includes areas where reasonable extrapolation to edges of the Development Corridor has been applied, based on nearby 'absence' records, absence of connective habitat and field derived opinions of ecologists.	1004.8	642.2

To inform impact assessment and the potential requirement for secondary approvals or biodiversity offsets, it was necessary to project an upper limit of individuals within the various Project boundaries. This was completed using the outputs of the IDW density map, and where available, aligned with known habitat areas (as mapped by Umwelt) for the species.

To achieve a projected count per hectare, density count plot data (collected over 0.25 ha plots) was projected out by a factor of 4. For visual estimate records, a mid-point was assumed for actual count prior to projecting (i.e. count of 6.5 individuals was assumed in areas visually estimated to support 1–10 plants per 0.25 ha). IDW polygon sizes were determined and then multiplied by the project count.

Following completion of the projections, and to provide a contextual basis of comparison, a correction factor was applied to Study Area estimates, in line with observations made in the Development Corridor. This correction factor accounts for the overestimation of ‘low’ density points, which are mapped across large areas and not appropriately weighted due to the absence of data record points.

The results of this assessment are summarised below in **Table 4.3** for the Study Area, Development Corridor and Disturbance Footprint. Desktop and field survey *Cycas megacarpa* records are shown on **Figure 3.4** in **Section 3.2.2** of this report as well as **Figure 6.2** of Attachment B1 (Assessment of Matters of National Environmental Significance).

Further detailed information on the Project’s potential impact on the species is provided in **Appendix E** of Attachment B4 (Assessment of Matters of National Environmental Significance) and Attachment E (Preliminary *Cycas megacarpa* Species Management Plan).

Table 4.7 *Cycas megacarpa* Individuals (Projected Count)

	Study Area	Development Corridor	Disturbance Footprint
Individual records of <i>Cycas megacarpa</i>	141,392	6,021	3,727

4.2.3 Greater Glider (*Petauroides volans*)

RFI 3.2.4 Include the updated total area of impact (in hectares) of Greater Glider habitat, including breeding and foraging habitat.

As described in the response to RFI 2.2.6 and 2.2.7, the habitat assessment for greater glider (southern and central) has been updated based on departmental advice and to reflect the most recent departmental documents relevant to the species. This updated habitat assessment, including habitat area calculations, has been used to inform the impact assessment which has been updated accordingly. The impact assessment for greater glider is provided in **Table 2.14** of **Appendix E** of Attachment B4 (Assessment of Matters of National Environmental Significance).

The total area of impact of greater glider (southern and central) breeding and foraging habitat is provided in Section 3.2.3 of this report and habitat mapping is presented in Figure 3.5.

4.2.4 Koala (*Phascolarctos cinereus*) (combined populations of Qld, NSW and the AC)

RFI 3.2.5 Reconsider the Koala impact assessment in consultation with the updated Recovery Plan and Conservation Advice.

The significant impact assessment for koala have been updated with consideration of information presented in the *Conservation Advice* (DAWE 2022a), *National Recovery Plan* (Department of Agriculture Water and the Environment 2022b) and recent Referral Guidelines.

The updated impact assessment for koala is provided below in **Table 4.8** and also in **Table 1.15** of **Appendix E** of Attachment B4 (Assessment of Matters of National Environmental Significance).

In line with the *Significant Impact Guidelines 1.1 – MNES* (Department of the Environment 2013), the assessment below only considers the adverse impacts on the species that may arise as a result of the Project (and not potential beneficial impacts). Although included in the broader discussion of potential impacts below, it is acknowledged that rehabilitation (which may be considered a beneficial impact) does not negate or offset the loss of habitat. The assessment of significance has been made independent of these measures and applies the precautionary principle as appropriate.

In summary, the assessment found that the Project **is likely to result in a significant impact** on the koala.

Table 4.8 Significant Impact Assessment – Koala

Evaluation Criteria	Response
<p>Lead to a long-term decrease in the size of a species</p>	<p>No.</p> <p>This species was recorded once during the field survey program (a mature female with joey) in narrow-leaved ironbark (<i>Eucalyptus crebra</i>). Desktop records in the region are scarce and generally >50 years old. Hunting practices within and surrounding Rockhampton in the early 1900s are known to have severely reduced the regional population and recovery has been very slow. Only a small, low-density population of the species is likely to inhabit the Study Area. As described in Section 1.2.2.6 of Appendix E of Attachment B4 (Assessment of Matters of National Environmental Significance), these individuals are conservatively considered to constitute an important population as they may be important for maintaining genetic diversity or have the potential to act as a source population.</p> <p>A maximum of 646.9 ha of potential koala habitat will be directly impacted for construction of the Project, including 641.6 ha suitable for breeding, foraging and dispersal and 5.3 ha of potential climate refugia. Potential habitat for koala dominates the Study Area and is not considered unique or high quality due to the ongoing disturbance from cattle grazing, weeds and pests. Potential habitat associated with the non-remnant vegetation communities especially, is highly disturbed and in places contains a low abundance of koala food trees.</p> <p>Within the wider region potential habitat is likely to occur extensively and include areas of higher quality particularly in protected areas such as the adjacent State Forests. The extent of habitat that will remain following the construction of the Project is of the magnitude and quality to support a much larger population than is currently expected to occur. Noting this, any population present is expected to continue to persist within the region regardless of the Project.</p> <p>Indirect impacts on the species as a result of the Project are anticipated to be limited, as the Project is unlikely to exacerbate predatory pest populations or vehicle strikes with the suite of general mitigation measures proposed including speed limits and pest monitoring. Nonetheless, koala specific measures including pre-clearance survey requirements are also proposed and will be captured in one or multiple Project management plans.</p> <p>Given the presence of a small, low-density population of the species within the Study Area as well as the implementation of mitigation measures and Project management plans, a long-term decrease in the size of a population is unlikely to result from the Project.</p>
<p>Reduce the area of occupancy of the species</p>	<p>No.</p> <p>As stated in the species' Conservation Advice, the area of occupancy for the koala is estimated at 19,428 km² and is contracting. It is noted that the area of occupancy may be potentially overstated given the low resolution in the mapping methodology used by the Commonwealth (2 km x 2 km grid).</p>

Evaluation Criteria	Response
	<p>The koala is widespread across Queensland and the Study Area is not located near the limit of the species distribution. Although the Project would result in the removal of up to 646.9 ha of potential habitat, only a very small number of individuals are expected to be utilising such habitat. The quantum of potential habitat that will remain is sufficient to continue to maintain the current low-density population. Furthermore, habitat of similar and higher quality is widely available in the local area and connectivity to these areas will be maintained. Based on this, Project works are considered unlikely to materially reduce the availability or quality of habitat for the species to the extent that the area of occupancy of a population would be reduced.</p>
<p>Fragment an existing population into two or more populations</p>	<p>No.</p> <p>The species is considered highly mobile and known to readily disperse large distances including across cleared areas. As described above, a population comprising a small number of individuals is known to utilise modelled habitat.</p> <p>Modelled potential habitat generally has low to moderate levels of fragmentation as a result of historical clearing and ongoing agricultural practices. Where potential habitat is associated with non-remnant vegetation, existing fragmentation impacts are more pronounced, and the canopy cover overall is notably lower. Modelled habitat does however have a relatively high degree of connectivity to adjacent protected areas.</p> <p>Through considered design and siting of the Development Corridor and Disturbance Footprint, connectivity within and to adjacent protected areas will be largely maintained. The use of existing cleared areas has been maximised and 19 pinch points will be maintained within habitat for the species. Further, the access road corridor, where koala habitat is mapped at numerous locations, will also serve as a pinch pint throughout given its narrow clearing width.</p> <p>It is expected 20% of the Disturbance Footprint will be revegetated post construction with native species including eucalypt trees where practical. Where rehabilitation is proposed in areas previously identified as potential koala habitat, recommendations provided in the <i>Revegetating koala habitat</i> (Youngentob, Marsh & Skewes 2021) document available on the koala referral guidance website will be considered. Pinch points and rehabilitated areas will minimise habitat fragmentation and provide safe movement opportunities for koalas within the Disturbance Footprint (i.e. less distance required to travel in exposed areas where there may be an increased risk of predation).</p> <p>During construction, increased vehicle activity and ground excavations may become temporary barriers to dispersing individuals. However, the risk of mortality as a result of entrapment and collision will be actively managed via Project management plans. Vehicle traffic will be localised to the construction site and speed limits will be enforced. Any open excavations will contain materials to aid evacuation (i.e. ramps, sticks, hessian sacks) and be checked at set times by a spotter catcher. Once constructed, the Project itself will not create a barrier to movement as ground surfaces will be reinstated and turbines will occur in discrete locations. Any koala deaths will be reported to DCCEEW within 2 business days.</p> <p>Based on the above, the Project is considered unlikely to present significant barriers to the species local movement to the extent that it fragments a population into two or more populations.</p>

Evaluation Criteria	Response
Adversely affect habitat critical to the survival of a species	<p>Likely.</p> <p>As described in Section 1.2.2.5 of Appendix E of Attachment B4 (Assessment of Matters of National Environmental Significance), modelled habitat may comprise habitat critical to the survival of the species. The modelled koala habitat comprises large, contiguous patches with high connectivity to the surrounding landscape. It is considered reasonably possible that the habitat may be recolonised and support larger numbers of the species in the future. This habitat may provide important movement corridors in the local area.</p> <p>There is a paucity of information regarding koala presence in the Rockhampton region, however one observation of two individuals (adult female and joey) has been recorded within the Study Area. A maximum of 646.9 ha of habitat will be directly impacted via vegetation clearing required for construction of the Project. Of this total area, >100 ha comprises non-remnant vegetation that is notably degraded relative to the surrounds. Exotic pest species including the dog are also common and established.</p> <p>The Project will not lead to the further degradation of retained habitat, as potential indirect impacts such as altered fire regimes, edge effects, weeds and pests will be actively managed via Project management plans. Nonetheless, while large areas of habitat will remain, the magnitude of habitat removal required is likely to be considered an ‘adverse effect’ on habitat critical as per the Conservation Advice.</p>
Disrupt the breeding cycle of a population	<p>No.</p> <p>As described above, only a small number of individuals are likely to utilise modelled habitat , however these may comprise an important population. Male koalas are known to disperse large distances during the breeding season in search of a mate, and dispersal will not be hindered by the Project, as described earlier. Koalas are nocturnal and mating calls generally occur at night when construction noise would be minimal. The severity of impact from operational noise is also considered minor as increases from ambient noise levels will be limited to 2 dB/ 5% at 0.5-3km and 7 dB/ 15% within 0.1-1km from the WTGs. Moreover, the overall predicted ambient noise level remains below typical noise thresholds of a rural area (50-55 dB) and other scenarios where koalas persist (Dooling & Popper 2007).).</p> <p>As the species does not have specific breeding requirements, all potential habitat may be suitable for breeding and large areas will be retained following construction of the Project. Potential habitat degradation will be actively managed through the Project management plans. Given the low-density of the population of this species in the area, the Project is unlikely to disrupt the breeding cycle of a population.</p>
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	<p>No.</p> <p>The koala was historically hunted in the Rockhampton region and occurs at very low densities at the landscape scale. The species has very broad habitat requirements and can inhabit vegetation in varying condition, including non-remnant areas. Suitable habitat that may be used preferentially for climate refuge and movement across the landscape (eucalypt woodland on alluvial soils) has been largely avoided by the Project. Although a maximum 646.9 ha of suitable habitat will be removed via vegetation clearing for construction, large, connected areas of potential habitat will remain. Retained habitat is highly likely to be of sufficient size and quality to support any individuals present. The Project will not result in degradation of retained habitat, as potential impacts such as weed incursion will be actively managed.</p>

Evaluation Criteria	Response
	<p>As already described, habitat fragmentation impacts have been minimised through considered design and siting of the Development Corridor and Disturbance Footprint. The use of existing cleared areas has been maximised and no patches will become significantly isolated. Movement will be facilitated at the pinch points. The final area of impact is expected to reduce as an outcome of the detailed design process and on ground micro-siting of Project infrastructure.</p> <p>As such, it is unlikely that the Project will alter habitat to the extent where the species is likely to decline.</p>
<p>Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat</p>	<p>No.</p> <p>Several exotic fauna species were identified during the field survey program. Wild dogs were recorded commonly and are expected to occur throughout the wider Study Area and surrounding region. Although potential habitat is generally moderately to highly connected, existing conduits for movement do occur comprising cleared areas for tracks, roads, fence lines and cattle grazing areas. Based on this, it is considered unlikely that clearing required for construction of the Project will significantly exacerbate the movement of exotic predators. The Project will employ best practice control methods for weeds and pests and is unlikely to introduce or exacerbate weeds or pests beyond existing levels.</p>
<p>Introduce disease that may cause the species to decline</p>	<p>No. Chlamydia and Koala Retrovirus (KoRV) are known threats to the species. Project works are unlikely to spread disease; nonetheless, best practice biosecurity measures will be implemented through the Project management plans. Should an unwell koala be identified during clearing works, it will be handled appropriately by a qualified spotter catcher and taken to a predesignated veterinarian/wildlife care facility for treatment prior to release. Based on the above, it is unlikely the Project will introduce disease that may cause the species to decline.</p>
<p>Interfere substantially with the recovery of the species</p>	<p>Unlikely.</p> <p>A National Recovery Plan for the Koala was published in 2022. Four main objectives are detailed:</p> <ul style="list-style-type: none"> • Stabilise and then increase the area of occupancy and size of populations that are declining. • Maintain or increase the area of occupancy and size of populations that are stable. • Metapopulation processes are maintained or improved. • Partners, communities and individuals have a greater role and capability in koala monitoring, conservation and management. <p>There is limited information available about the koala population viability and trend within the Rockhampton region. However, historical hunting practices are known to have reduced numbers severely in the 1900s. Since then, several threatening processes have increased in the region which may have halted or slowed recovery including road traffic, wild dog populations, bushfires and clearing for agricultural purposes.</p> <p>One observation of two individuals (adult female and joey) has been recorded within the Study Area. Given the infrequency of records made from within the Study Area and the surrounding region, it is expected that only a small, low-density population of koala utilises modelled habitat within the Study Area.</p>

Evaluation Criteria	Response
	<p>Habitat for koala dominates the Study Area and is not considered unique or high quality due to the ongoing disturbance from cattle grazing, weeds and pests. Habitat associated with the non-remnant vegetation communities especially, is highly disturbed and in places contains a low abundance of koala food trees.</p> <p>Within the wider region, habitat is likely to occur extensively and include areas of higher quality particularly in protected areas such as the adjacent State Forests. The extent of habitat that would remain following the construction of the Project is of the magnitude and quality to support a much larger population than is currently expected to occur. Noting this, any population present in the region is expected to continue to persist and the quantum and quality of habitat which would be removed as a result of the Project would not be sufficient to interfere with the species' recovery.</p>

4.2.5 Northern Quoll (*Dasyurus hallucatus*)

RFI 3.2.6 Update your impact assessment based on the revised habitat assessment above. Include all foraging, breeding and dispersal habitat as part of your impact assessment.

As described in the response to RFI 2.2.9 and 2.2.10, the habitat assessment for northern quoll (*Dasyurus hallucatus*) has been updated based on departmental advice and further detailed habitat mapping. This updated habitat assessment, including habitat area calculations, has been used to inform the impact assessment which has been updated accordingly.

The impact assessment for northern quoll is provided below in **Table 4.9** as well as in **Table 1.12 of Appendix E** of Attachment B4 (Assessment of Matters of National Environmental Significance). To inform the impact assessment, a discussion on habitat critical to the survival of the species and important populations is provided below and in **Section 1.2.1 of Appendix E** of Attachment B4 (Assessment of Matters of National Environmental Significance).

Habitat Critical to the Survival of the Species

The *EPBC Act referral guidelines for the northern quoll* (Department of the Environment 2016) defines habitat critical to the survival of the species as habitat within the modelled distribution of the species which provides shelter for breeding, refuge from fire or predation and potential poisoning from cane toads.

As stated in the Referral Guideline, critical habitat usually occurs in the form of:

- Off-shore islands where the northern quoll is known to exist.
- Rocky habitats such as ranges, escarpments, mesas, gorges, breakaways, boulder fields, major drainage lines or treed creek lines.
- Structurally diverse woodland or forest areas containing large diameter trees, termite mounds or hollow logs.
- Dispersal and foraging habitat associated with or connecting 'populations important for the long-term survival of the northern quoll' is also considered critical habitat.

Modelled denning and refuge habitat (rocky gullies and treed creek lines, structurally diverse woodlands with denning resources) may constitute habitat critical to the survival of the species through the provision of shelter for breeding. However, based on the above definitions and the lack of an important population as described below, modelled foraging and dispersal habitat is not habitat critical to the survival of the species.

Important Populations

As stated in the *EPBC Act referral guideline for the endangered northern quoll *Dasyurus hallucatus** (Department of the Environment 2016), populations important for the long-term survival of the species includes populations which are:

- High density quoll populations, which occur in refuge-rich habitat critical to the survival of the species, including where cane toads are present.
- Occurring in habitat that is free of cane toads and unlikely to support cane toads upon arrival i.e. granite habitats in WA, populations surrounded by desert and without permanent water.
- Subject to ongoing conservation or research actions i.e., populations being monitored by government agencies or universities or subject to reintroductions or translocations.

For the purposes of this assessment, populations important for the long-term survival of the species are considered the same as important populations conceptually.

The *EPBC Act referral guideline for the endangered northern quoll *Dasyurus hallucatus** (Department of the Environment 2016) identifies a high-density population as being characterised by numerous camera triggers of multiple individuals across multiple cameras and or traps. It characterises a low-density population by infrequent captures of one or two individuals confined to one or two traps. The targeted field survey deployed a large array of camera traps for a combined total of 490 trap nights. Two camera locations detected northern quoll, both detecting the species once during the same survey program. Based on the survey findings and referral guideline characterisation, the Mt Hopeful population is regarded as low density.

Given the low-density population determination, the prevalence of cane toad and absence of ongoing conservation action or research, the population of northern quoll at Mt Hopeful is not regarded as an important population.

Significant Impact Assessment

In summary, the significant impact assessment found that the Project **is likely to result in a significant impact** on the northern quoll as it will result in the loss of habitat critical to the survival of the northern quoll. As detailed above, habitat critical to the survival of the species is considered to be refuge and denning habitat within the Disturbance Footprint. On this basis, a significant impact is expected on refuge and denning habitat only and therefore, offsets have been proposed to compensate for impacts on these areas.

Table 4.9 Significant Impact Assessment – Northern Quoll

Evaluation Criteria	Response
<p>Result in the loss of habitat critical to the survival of the northern quoll</p>	<p>Likely.</p> <p>As described above and in Section 1.2.1.5 of Appendix E of Attachment B4 (Assessment of Matters of National Environmental Significance), modelled denning and refuge habitat meets the definition of habitat critical to the survival of the species. Modelled foraging and dispersal habitat is not considered critical given the populations likely low-density (see above and Section 1.2.1.5 and Section 1.2.1.6 of Appendix E of Attachment B4 (Assessment of Matters of National Environmental Significance)). All habitat within the Study Area and likely wider area comprises large, contiguous patches with relatively high levels of connectivity. Although already impacted by low levels of historical clearing, weeds and pests, the habitat resources necessary to maintain a population are present.</p> <p>A maximum of 596.9 ha of modelled habitat will be directly impacted via vegetation clearing, however of this area only 22.1 ha is suitable for denning and refuge and considered critical habitat. This area of impact is expected to reduce as an outcome of the detailed design process and micro-siting, however critical habitat will still be subject to increased fragmentation (albeit low) and the loss of potentially important shelter features. Although potential shelter features will be relocated where possible, relocated features may no longer be suitable for a range of reasons and this may result in an overall net loss of potential denning opportunities. While large areas of habitat will remain following construction, there will be a loss of critical habitat and important features. As per the referral guidelines this is likely to result in a significant impact on the northern quoll.</p>
<p>Decrease the size of a population important for the long-term survival of the northern quoll and therefore interfere with the recovery of the species</p>	<p>No.</p> <p>The northern quoll is known to the Study Area, recorded twice during the field survey program. Based on the number of records relative to the total camera trapping effort (490 trap nights), the population present is regarded as low density and is therefore not considered important for the long-term survival of the species (as described above and in Section 1.2.1.6 of Appendix E of Attachment B4 (Assessment of Matters of National Environmental Significance)).</p> <p>A maximum of 596.9 ha of northern quoll habitat will be directly impacted for construction of the Project, including 22.1 ha suitable for denning and refuge and 574.8 ha suitable for foraging and dispersal. Potential habitat for the northern quoll occurs commonly across the Study Area however it is degraded in places due to the historical clearing for agricultural works and ongoing disturbance from cattle grazing, weeds and pests. Although some fragmentation exists, habitat is generally well connected internally and to areas outside of the Study Area. Given the linear nature of the Project, this connectivity will largely be maintained following construction.</p> <p>Vegetation clearing will be completed in phases, ensuring only a subset of the Disturbance Footprint is impacted at one time and allowing time for individuals to relocate. Clearing proposed to occur within or directly adjacent to areas of denning and refuge habitat will aim to be completed outside of the northern quoll breeding season (late July to late August). If this is not possible, to reduce the chances of breeding individuals being impacted by Project works, a trapping and relocation program in these areas will be undertaken prior to clearing commencing. Active animal breeding places will not be tampered with unless an approved DES SMP is acquired and implemented.</p>

Evaluation Criteria	Response
	<p>Micro-siting of Project infrastructure will aim to retain identified potential denning habitat features including large hollow logs and large boulders piles. Where such features must be removed, efforts will be made to reinstate or relocate features to adjacent areas of habitat where safe and not overly disruptive to the environment. Overall, the quantum of habitat and habitat features that will remain following construction of the Project is considered sufficient to maintain the likely low-density population present.</p> <p>Potential indirect impacts on the species as a result of the Project are expected to be limited but will be actively managed through the Project's management plans which will include specific measures for the northern quoll including cane toad control, fencing specifications, speed limits for traffic and trapping requirements should clearing occur within or adjacent to denning and refuge habitat during the breeding season. Based on the above, the Project is unlikely to decrease the size of a population important for the long-term survival of northern quoll.</p>
<p>Introduce inappropriate fire regimes or grazing activities (i.e. increasing the risk of late dry season high intensity fires to the area) that substantially degrade habitat critical to the survival of the northern quoll or decrease the size of a population important for the long-term survival of the species.</p>	<p>No.</p> <p>As described above, an important population of northern quoll does not occur within the Study Area. However, modelled denning and refuge habitat is considered habitat critical to the survival of the species. Although approximately 22.1 ha suitable for denning and refuge (habitat critical) and 574.8 ha suitable for foraging and dispersal will be removed via vegetation clearing, large areas of suitable habitat will remain which should be of sufficient size to maintain the population present.</p> <p>Retained habitat will not be subject to further degradation as altered fire regimes, weed and pest incursion will be actively monitored or managed as required through Project management plans (i.e. Weed and Pest Management Plan; Bushfire Management Plan). Cattle grazing operations will continue, largely unchanged, once construction is completed, and as such, fuel loads are unlikely to be significantly altered from current levels. A portion of the grazing land within the Study Area has been identified as potential offset locations. If these areas are secured for offsets, they will be subject to active management to improve the vegetation quality.</p> <p>As such, it is unlikely that the Project will introduce inappropriate fire regimes or grazing activities that substantially degrade habitat critical or decrease the size of an important population.</p>
<p>Fragment a population important for the long-term survival into two or more populations</p>	<p>No.</p> <p>The northern quoll is highly mobile and may utilise open habitats such as grasslands while foraging or dispersing through the landscape. Modelled habitat has a relatively high degree of connectivity both internally and to external areas including the State Forests, and this connectivity will be largely maintained following the construction of the Project. Habitat fragmentation impacts have been considered in the design and siting of the Disturbance Footprint. The use of existing cleared areas has been maximised and no significant patch isolation will occur. Nineteen pinch points will be maintained within the Disturbance Footprint. Furthermore, it is expected approximately 20% of the final clearing footprint will be rehabilitated post construction. Pinch points and rehabilitated areas will minimise habitat fragmentation and provide safe movement opportunities for northern quolls within the Disturbance Footprint (i.e. less distance required to travel in exposed areas where there may be an increased risk of predation, and reduced chances of hindered movement by weeds such as exotic grasses).</p>

Evaluation Criteria	Response
	<p>During construction, increased vehicle activity and ground excavations may present temporary barriers to dispersing individuals. However, the risk of mortality as a result of entrapment and collision will be actively managed via the Project's management plans. Vehicle traffic will be localised to the construction site and speed limits will be enforced. Any open excavations will contain materials to aid evacuation (i.e. ramps, sticks, hessian sacks) and be checked at set times by a spotter catcher. These excavations would be temporary and only present in a small area within the site at any one time. Once constructed, the Project itself will not create a barrier to movement as ground surfaces will be reinstated and turbines will occur in discrete locations.</p> <p>Based on the above reasons, the Project is unlikely to present significant barriers to the existing population to the extent where it would become fragmented into two or more populations. Furthermore, as already detailed, the population of northern quoll within the Study Area is low-density and not considered important for the long-term survival of the species.</p>
<p>Result in invasive species or increases of them that are harmful to the northern quoll becoming established in its habitat, namely cane toads, feral cats, red foxes or exotic grasses which increase fire risk.</p>	<p>No.</p> <p>Several invasive species are a recognised threat to the northern quoll. Weeds may degrade habitat and exotic fauna species including feral cats, pigs, wild dogs and cattle may directly predate or compete with the northern quoll or spread disease. Cane toads in particular have known to cause significant local declines as ingestion usually results in death.</p> <p>Invasive species relevant to northern quoll, particularly weeds including exotic grasses, feral cats and cane toads, were recorded throughout the field survey program and are likely to be well established in the Study Area and surrounds. Although modelled habitat is generally moderately to highly connected, existing conduits for movement do occur comprising cleared areas for tracks, fence lines and cattle grazing areas.</p> <p>Although the Project is unlikely to exacerbate invasive species levels beyond the current extent, the Project will employ best practice control methods for weeds and pests. To ensure cane toad breeding opportunities are not provided, where pits, voids or trenches are required they will be appropriately covered to prevent extended water retention in these spaces. Monitoring will ensure any pest population outbreaks are detected and managed as required.</p>

4.2.6 Squatter Pigeon (Southern) (*Geophaps scripta scripta*)

RFI 3.2.7 Update your impact assessment based on the revised habitat assessment above.

As described in the response to RFI 2.2.11 to 2.2.15, the habitat assessment for squatter pigeon (southern) (*Geophaps scripta scripta*) has been updated based on departmental advice and further detailed habitat mapping. This updated habitat assessment, including habitat area calculations, has been used to inform the impact assessment which has been updated accordingly.

In line with the *Significant Impact Guidelines 1.1 – MNES* (Department of the Environment 2013), only the adverse impacts on the species that may arise as a result of the Project have been considered (and not potential beneficial impacts). Although included in the broader discussion of potential impacts below, it is acknowledged that rehabilitation (which may be considered a beneficial impact) does not negate or offset the loss of habitat. The assessment of significance has been made independent of these measures and applies the precautionary principle as appropriate.

In summary, the assessment found that the Project is **unlikely to result in a significant impact** on the squatter pigeon (southern).

The impact assessment for squatter pigeon (southern) is provided below in **Table 4.10** as well as in **Table 2.8 of Appendix E** of Attachment B4 (Assessment of Matters of National Environmental Significance).

Table 4.10 Significant Impact Assessment – Squatter pigeon (southern)

Evaluation Criteria	Response
<p>Lead to a long-term decrease in the size of an important population of a species</p>	<p>No.</p> <p>The squatter pigeon (southern) is known from the Study Area and surrounds, primarily recorded in cleared non-remnant vegetation. As described in Section 2.2.3.6, of Appendix E of Attachment B4 (Assessment of Matters of National Environmental Significance) individuals within the Study Area are not considered to comprise an important population. There is no evidence to indicate that the population present is genetically isolated and the Study Area does not occur within NSW or near the limit of the sub-species’ distribution.</p> <p>Under worst-case scenario, a maximum of 368.5 ha of suitable habitat including 5.9 ha of breeding habitat, 1.2 ha of foraging habitat and 361.4 ha of dispersal habitat will be directly impacted via vegetation clearing required for construction of the Project. Habitat is considered to be of moderate quality due to the presence of cattle, weeds and pests including feral cat which was recorded during the field survey program. Nonetheless, direct impacts to habitat will be minimised wherever possible via micro-siting and the final clearing areas are expected to be lower. Farm dams will be maintained to ensure the availability of suitable water sources required by the species is not affected. The quantum of habitat that will remain following construction of the Project, particularly breeding and foraging habitat, will be sufficient to maintain the population present.</p> <p>As the subspecies is predominantly ground-dwelling and known to frequent tracks, there is a risk of mortality during construction as a result of vehicle/plant strike. To manage this risk, speed limits will be strictly enforced (in private areas) and pre-clearance surveys will include flushing for the subspecies in areas of habitat to be cleared. Potential indirect impacts on the species including habitat degradation via weed and pest incursion will be actively managed via the Project management plans.</p> <p>The temporary worker’s accommodation camp is adjacent to squatter pigeon (southern) dispersal habitat and although the anticipated noise and light levels may result in temporary avoidance of this habitat by the species, it is unlikely to disrupt breeding or foraging behaviours given the buffer distance between the camp and these habitat types (approximately 100 m to breeding habitat and 850 m to foraging habitat).</p> <p>The turbine collision risk assessment identified the species as being of Moderate risk for impacts from the Project, reflecting the species’ vulnerable listing and frequency of occurrence within the Study Area. However, it is noted that the species is highly unlikely to fly at RSA height. Any potential operational impacts on this subspecies will be managed by the Project BBAMP.</p> <p>Given the implementation of the Project management plans including the BBAMP, it is considered unlikely that the Project will lead to a long-term decrease in the population.</p>

Evaluation Criteria	Response
<p>Reduce the area of occupancy of an important population</p>	<p>No.</p> <p>The squatter pigeon (southern) occurs across a large portion of eastern Queensland. It's area of occupancy was estimated to be 10,000 km² (1,000,000 ha) in 2000. However, it is noted that this estimate may be potentially overstated given the low resolution in the mapping methodology used by the Commonwealth (2 km x 2 km grid).</p> <p>During the field survey program the subspecies was commonly recorded in low-lying land both within the Study Area and in areas adjacent. These areas were generally highly disturbed from historical clearing and ongoing cattle grazing activities. The Project is linear in nature and infrastructure has been sited to maximise wind patterns in the landscape i.e. along ridgelines and hill tops. As a result, direct impacts to breeding and foraging habitat are particularly limited and clearing in these areas will be further minimised via micro-siting. As detailed above, the population of squatter pigeon (southern) within the Study Area is not considered important. Therefore, the Project is unlikely to reduce the area of occupancy of any population including an important population.</p>
<p>Fragment an existing important population into two or more populations</p>	<p>No.</p> <p>As described above, individuals that occur within the Study Area are not considered to comprise an important population. The squatter pigeon (southern) is considered highly mobile and was frequently recorded in highly disturbed and cleared areas, highlighting the subspecies' ability to utilise fragmented landscapes. The Project has been strategically sited to maximise the use of cleared areas, minimising additional habitat fragmentation including within breeding and foraging habitat, which are likely important for the population's persistence in the area. Clearing will be completed only as strictly necessary and final impact areas are likely to be lower.</p> <p>The turbine collision risk assessment identified the species as being of Moderate risk for impacts from the Project. However, the species is highly unlikely to fly at RSA height and as such it is unlikely the wind turbines will create a barrier to movement. Potential operational impacts on squatter pigeon (southern) will be managed by the Project BBAMP.</p> <p>As such, it is unlikely the Project will fragment an existing important population into two or more populations.</p>
<p>Adversely affect habitat critical to the survival of a species</p>	<p>No.</p> <p>As described in Section 2.2.3.5 of Appendix E of Attachment B4 (Assessment of Matters of National Environmental Significance), habitat within the Study Area is not considered critical to the survival of the subspecies as it is unlikely to provide refuge and is average in quality, subject to ongoing impacts from recognised threatening processes. The vast majority of identified habitat is suitable for dispersal purposes only due to the dominant surface geology and lack of suitable water sources. Potential habitat for squatter pigeon (southern) is likely to occur extensively in the wider local area associated with lower elevation coastal communities; this habitat is likely to be higher quality due to the increased water availability. Vegetation clearing required for construction of the Project will result in maximum disturbance of 368.5 ha of habitat, including 5.9 ha suitable for breeding and 1.2 ha suitable for foraging. However, clearing will be staged and occur only as strictly required. Via micro-siting, it is anticipated that final clearing areas will be lower. Furthermore, farm dams will be maintained and areas known to be commonly utilised by squatter pigeon (southern) individuals avoided.</p> <p>For these reasons, the Project is unlikely to adversely affect habitat critical to the survival of the species.</p>

Evaluation Criteria	Response
<p>Disrupt the breeding cycle of an important population</p>	<p>No.</p> <p>Squatter pigeon (southern) may breed throughout the year if conditions are suitable. Within the Study Area, breeding habitat for the subspecies is of average quality and limited. Although under worst case scenario 5.9 ha of breeding habitat will be impacted via vegetation clearing, micro-siting efforts are anticipated to reduce this extent significantly as many areas will also be associated with watercourse crossings. Specific mitigation measures are also proposed to ensure no squatter pigeon (southern) nests are impacted during construction, including nest searches during pre-clearance surveys and demarcating any located. Active animal breeding places will only be tampered with under an approved DES SMP. Additionally, to reduce vehicle or plant collision or crushing of nests, all vehicles and pedestrians will remain within designated access tracks.</p> <p>As described above, an important population of squatter pigeon (southern) does not occur within the Study Area. The Project is therefore unlikely to disrupt the breeding cycle of an important population.</p>
<p>Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</p>	<p>No.</p> <p>As described above, vegetation clearing required for construction of the Project will result in direct impacts to a maximum of 368.5 ha of suitable habitat. However, the majority of habitat identified within the Study Area is suitable for dispersal only. The quantum of breeding, foraging and dispersal habitat that will remain following construction is expected to be sufficient to support the population present. The subspecies is known to utilise fragmented landscapes and important habitat resources (suitable water sources) will be maintained. Potential indirect impacts on the species including habitat degradation via weed and pest incursion will be actively managed via the Project management plans. Therefore, the Project is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.</p>
<p>Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat</p>	<p>No.</p> <p>Invasive species including weeds and predators such as the feral cat were recorded throughout the field survey program. Historical clearing has occurred in discrete locations across the Study Area primarily for cattle grazing purposes. It is considered likely that these areas already act as conduits for pest movement in the landscape. The Project will employ best practice control methods for weeds and pests including monitoring and adaptive management. Based on this, it is unlikely the Project will result in invasive species that are harmful to the squatter pigeon (southern) becoming established.</p>
<p>Introduce disease that may cause the species to decline</p>	<p>No.</p> <p>There are no known diseases affecting the subspecies. Nonetheless, the Project will follow best practice biosecurity protocols during both construction and operation; therefore, introduction of a disease is unlikely.</p>
<p>Interfere substantially with the recovery of the species</p>	<p>No.</p> <p>There is no recovery plan currently in place for the subspecies nor is one considered required. As per SPRAT, the following recovery actions have been recommended (DCCEEW 2023):</p> <ul style="list-style-type: none"> • Determine the population size and distribution of the Squatter Pigeon (southern) in southern Queensland and New South Wales, and assess the pigeon's conservation status and requirements.

Evaluation Criteria	Response
	<ul style="list-style-type: none"> • Undertake studies in North and Central Queensland to determine the relationship between pigeon abundance, tree density and stocking rates. • Establish sites for sub-population monitoring. If possible, these sites should be established with the cooperation of local land-owners and/or conservation organisations. • Develop and implement public education programs and community based tree planting schemes to revegetate favoured habitat types. • Establish control measures for predators (especially cats and foxes) at important sites. • Establish conservation measures to protect grassy woodlands and forests. <p>The Project is highly unlikely to impede any of the above actions and populations within central Queensland are likely to be stable. Although clearing will occur within areas of suitable habitat, the majority of the area to be impacted comprises habitat suitable for dispersal only. Construction of the Project is unlikely to change the subspecies utilisation of the Study Area or limit its success in the region. Implementation of the Project's BBAMP will assist in minimising potential impacts to the subspecies during operation. Therefore, the Project is unlikely to interfere with the recovery of the subspecies.</p>

4.2.7 White-throated Needletail (*Hirundapus caudacutus*)

RFI 3.2.8 Update your impact assessment based on the revised habitat assessment above.

As described in the response to RFI 2.2.16 to 2.2.1.8, the habitat assessment for white-throated needletail has been updated based on departmental advice and further detailed habitat mapping. This updated habitat assessment, including habitat area calculations, has been used to inform the impact assessment which has been updated accordingly.

The significant impact assessment for the species using the Vulnerable criteria is presented in Table 4.11 below (also found in **Section 2.2.5.10** of **Appendix E** of Attachment B4 (Assessment of Matters of National Environmental Significance)). The significant impact assessment for the species using the Migratory criteria is presented in **Table 4.12** of **Section 4.4.1** below (also found in **Section 2.2.5.10** of **Appendix E** of Attachment B4 (Assessment of Matters of National Environmental Significance)). These assessments consider the latest information available in the species' Conservation Advice (Threatened Species Scientific Committee 2019) and where applicable, the *Draft referral guideline for 14 birds listed as migratory species under the EPBC Act* (Department of the Environment, 2015). In summary, the assessment found that the Project is **unlikely to result in a significant impact** on the white-throated needletail.

Table 4.11 Significant Impact Assessment (Vulnerable Criteria) – White-throated Needletail

Evaluation Criteria	Response
<p>Lead to a long-term decrease in the size of an important population of a species</p>	<p>No.</p> <p>The white-throated needletail is known to the Study Area, recorded on 30 occasions during the field survey program, totalling 698 individuals. It is a non-breeding migrant to eastern Australia where it occurs as transient populations, often influenced by prevailing weather conditions. The species generally arrives in Australia during spring and migrates along both sides of the Great Diving Range in Queensland and NSW to the southern parts of their range. The journey is reversed as the species leaves Australia in autumn. While migrating, it is likely the species will inhabit the airspace above all remnant and regrowth habitat types within the Study Area. The population observed during the field survey program constitutes an important population and it is considered likely that an internationally significant proportion of the population may also utilise the Study Area at some point. However, as described above the population is only present for a short period before it continues to move north or south.</p> <p>Under worst-case scenario, up to 269.6 ha of roosting and foraging habitat and 370.6 ha of foraging and dispersal habitat will be directly impacted via vegetation clearing for construction of the Project. Relative to the area that will be cleared, large areas of suitable habitat will remain. Given the species aerial nature and broad requirements for roosting and foraging, it is unlikely this loss of habitat will result in a material change to the species' utilisation of the area.</p> <p>The turbine collision risk assessment identified the species as being of Very High risk for impacts from the Project, reflecting the Vulnerable status of the species and the frequency at which the species occurs at RSA. Given the flight behaviours of the species and known occurrence within the Study Area, the mortality of individual birds may occur during the lifetime of the Project, particularly whilst the species is present in Australia (October–March). However, collision risk modelling completed for the Project indicates overall mortality numbers will be very low (i.e. 1 individual every 5.9 years). The potential impact on this species would be managed by the Project BBAMP, which governs the operational and compliance reporting response following any confirmed mortality event. As the plan is adaptive, the death of a single white-throated needletail would result in notification to DCCEEW, an investigation and additional monitoring. Given the implementation of a BBAMP, it is considered unlikely that the Project will lead to a long-term decrease in the population.</p>
<p>Reduce the area of occupancy of an important population</p>	<p>No.</p> <p>While in Australia the species has a large distribution that extends across eastern Australia. As per the species' Conservation Advice, the estimated area of occupancy within Australia is >18,000 km² however this may be overstated given the mapping methodology used by the Commonwealth (2 km x 2 km grid).</p> <p>Although the Project will result in a maximum loss of up to 269.6 ha of roosting and foraging habitat and 370.6 ha of foraging and dispersal habitat, habitat is likely to only be utilised temporarily while on migration. The quantum of habitat that will remain is likely to be sufficient to support the ecological requirements of populations of the size observed during field surveys (an important population). Furthermore, areas of suitable habitat are likely to occur extensively within the wider region. Given the aerial nature and high mobility of the species, as well as the broad habitat requirements and habitat availability in the broader region, the Project is unlikely to reduce the area of occupancy of an important population.</p>

Evaluation Criteria	Response
<p>Fragment an existing important population into two or more populations</p>	<p>No.</p> <p>As described above, an important population of white-throated needletail may utilise the Study Area. The species is highly mobile, flying for thousands of kilometres during migration. It is known to occur within fragmented landscapes as well as over a range of habitat types. The Project has been strategically sited to maximise the use of cleared areas, minimising additional habitat fragmentation including within roosting and foraging habitat, which may be preferred habitat while a population is present in the area. Given the aerial nature of the species, vegetation clearance associated with the Project is unlikely to reduce the mobility of the species and will not result in the fragmentation of a population.</p> <p>Once operational, wind turbines may present a barrier to movement. The turbine collision risk assessment identified the species as being of Very High risk for impacts. Predicted mortality rates determined through Collision Risk Modelling based on existing BBUS data and turbine specifications indicates collision events will be rare (i.e. 1 mortality every 5.9 years). The potential impact on this species would be managed by the Project BBAMP, which governs the operational and compliance reporting response following any confirmed mortality event. As such, it is unlikely the Project will fragment an existing important population into two or more populations.</p>
<p>Adversely affect habitat critical to the survival of a species</p>	<p>No.</p> <p>As described in Section 2.2.5.5 of Appendix E of Attachment B4 (Assessment of Matters of National Environmental Significance), modelled roosting and foraging habitat is conservatively considered habitat critical to the survival of the species. Vegetation clearing required for construction of the Project will result in the loss of up to 269.6 ha of roosting and foraging habitat. However, clearing will be staged and occur only as strictly required. Hollow-bearing trees will be demarcated and avoided where possible via the micro-siting of Project infrastructure. The final clearing extents are anticipated to be lower, and the quantum of habitat that will be retained is likely to be sufficient to support the ecological requirements of any population that may occur. For these reasons, the Project is unlikely to adversely affect habitat critical to the survival of the species.</p>
<p>Disrupt the breeding cycle of an important population</p>	<p>No.</p> <p>The species is a non-breeding migrant to Australia. As the species forages predominantly on insects, foraging resources are widely available and are not a limitation to building sufficient energy reserves required for their return migration to breeding grounds. Therefore, the Project is unlikely to disrupt the breeding cycle of a population of the species.</p>
<p>Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</p>	<p>No.</p> <p>As described above, vegetation clearing required for construction of the Project will result in direct impacts to a maximum of 269.6 ha of roosting and foraging habitat and 370.6 ha of foraging and dispersal habitat. However, the species is mostly aerial and likely to only utilise the potential habitat for a short period while on migration south or north. The species is known to utilise fragmented landscapes and will occur over cleared areas. Via micro-siting, hollow-bearing trees which may be important for roosting will be avoided where possible. The quantum of habitat, and habitat resources including hollow-bearing trees, that will remain following construction is expected to be sufficient to support any population present in the future.</p>

Evaluation Criteria	Response
	<p>Although some minor fragmentation impacts are anticipated, it is highly unlikely these will impact the species or limit its mobility. The Project will not lead to the further degradation of retained habitat, as potential indirect impacts such as altered fire regimes, edge effects, weeds and pests will be actively managed via Project management plans. Therefore, the Project is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.</p>
<p>Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat</p>	<p>No.</p> <p>Invasive species are not known to be a threat to the white-throated needletail. Nonetheless, the Project will employ best practice control methods for weeds and pests and is unlikely to introduce or exacerbate weeds or pests beyond existing levels.</p>
<p>Introduce disease that may cause the species to decline</p>	<p>No.</p> <p>There are no known diseases affecting the species. The Project will employ best practice biosecurity protocols during construction and operation; therefore, introduction of a disease that may cause the species to decline is unlikely.</p>
<p>Interfere substantially with the recovery of the species</p>	<p>No.</p> <p>As identified on SPRAT, a recovery plan for the white-throated needletail is not required as the necessary information is provided in the species' Conservation Advice. This document identifies the primary conservation actions for the species as the protection of breeding habitat in East Asia and the protection of important habitat in Australia.</p> <p>There is currently no evidence to suggest that the species relies on the habitat of the Study Area while in Australia or on migration. No roosting locations were identified during the field survey program, however potential roosting habitat has been identified based on the topography of the site and presence of hollow-bearing trees. Following construction of the Project, large and extensive areas of potential roosting and foraging habitat will remain which are of sufficient scale to support any individuals that may occur.</p> <p>Infrastructure including wind turbines are recognised as potential collision threats to the species, and the improvement of knowledge surrounding the species and wind farms is identified as an information and research priority. Monitoring will be completed as part of the BBAMP as required and allow additional data on the white-throated needletail to be collected. Given the above, it is unlikely that Project will interfere with recovery of the species.</p>

4.3 Migratory Species Impact Assessment

RFI 3.3.1 Justify, with supporting evidence, how the proposed action will not be inconsistent with Australia's obligations under:

- the Bonn Convention;
- China-Australia Migratory Bird Agreement;

- **Japan-Australia Migratory Bird Agreement;**
- **International Agreement – Republic of Korea-Australia Migratory Bird Agreement; and**
- **any international agreement approved under subsection 209(4) of the EPBC Act.**

Australia has played an important role in international cooperation to conserve migratory birds in the East Asian - Australasian Flyway, entering into bilateral migratory bird agreements with Japan in 1974, China in 1986 and most recently the Republic of Korea in 2007. Each of these agreements provides for the protection and conservation of migratory birds and their important habitats, protection from take or trade except under limited circumstances, the exchange of information, and building cooperative relationships (DCCEEW 2022a). Birds listed on the annexes to these agreements are listed migratory species under the EPBC Act.

With regard to the above, the migratory status of relevant birds known to occur or hold potential to occur within the Study Area have been considered in the ecological assessment and throughout the various design iterations of the Project. Further, a range of avoidance and mitigation measures have been committed to including habitat avoidance, preclearance surveys, pre-commissioning surveys and adaptive management strategies. Throughout this process, a conservative approach has been applied, with the final impact assessment outcomes determining the Project unlikely to result in a significant impact on migratory species.

4.4 Specific Migratory Species Habitat Assessment Information Required

4.4.1 White-throated Needletail (*Hirundapus caudacutus*)

RFI 3.4.1 The total population of this species has declined to approximately 41,000 birds (Garnett and Baker 2021). The department notes that an ecologically significant proportion of the population was recorded in the study area and that the site represents important habitat for this species.

Provide an updated impact assessment in light of the number of birds detected on site.

An updated impact assessment for white-throated needletail (*Hirundapus caudacutus*) was undertaken, and considered revised population metrics, in conjunction with proposed habitat clearance and projected annual mortality estimates derived from mathematical CRM. The updated impact assessment against the migratory criteria is presented in:

- **Table 4.12** below.
- **Appendix E** of Attachment B4: Assessment of Matters of National Environmental Significance.
- Attachment G: Preliminary Bird and Bat Adaptive Management Plan.

RFI 4.2.5 provides further context and justification regarding the avoidance and management strategies implemented for the species. The outcome of the updated impact assessment determined that a significant impact on the species is **unlikely**.

Table 4.12 Significant Impact Assessment (Migratory Criteria) – White-throated Needletail

Evaluation Criteria	Response
<p>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</p>	<p>No.</p> <p>As described above, the species is a non-breeding migrant to Australia which may persist within the Study Area as transient populations. Modelled habitat within the Study Area may be suitable for roosting, foraging and dispersal, however has already been modified through historical clearing, weeds and pests. Nonetheless, potential habitat is considered to comprise important habitat.</p> <p>Impact area thresholds for the species are not outlined in the <i>Draft referral guidelines for 14 birds listed as migratory species under the EPBC Act</i>. Up to 370.6 ha of foraging and dispersal habitat and 269.6 ha of roosting and foraging habitat will be directly impacted via vegetation clearing for construction of the Project. However, clearing will be completed only as strictly necessary and impact areas are anticipated to be reduced in the detailed design phase and through micro-siting. Direct impacts to habitat have been minimised through considered siting and design of the Disturbance Footprint, ensuring the use of existing cleared areas has been maximised. No fragmentation impacts are anticipated due to the species high mobility capacity. The Project will not lead to the further degradation of retained habitat, as potential indirect impacts such as altered fire regimes, edge effects, weeds and pests will be actively managed via Project management plans. Based on the above, the Project is unlikely to substantially modify, destroy or isolate an area of important habitat.</p>
<p>Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species</p>	<p>No.</p> <p>As above, invasive species are not known to be a threat to the white-throated needletail. Nonetheless, the Project will employ best practice control methods for weeds and pests and is unlikely to introduce or exacerbate weeds or pests beyond existing levels.</p>
<p>Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species</p>	<p>No.</p> <p>As described in Section 2.2.5.8 of Appendix E of Attachment B4 (Assessment of Matters of National Environmental Significance), the Study Area is considered to support an ecologically significant proportion of the national population and potentially international population. However, based on the species aerial nature and broad habitat requirements, it is unlikely the population will rely on the potential habitat within the Study Area for any part of its lifecycle. Home ranges and territories are not maintained while the birds are in Australia. Therefore, utilisation will be limited to short periods within the migratory season (October to March).</p> <p>This species has been subject to a turbine collision risk assessment and collision modelling, as already described. Potential operational impacts on the species will be managed by the Project's BBAMP. A single white-throated needletail death is considered a reportable incident to DCCEEW and will result in follow-up actions to further understand impacts. Given the predicted size and wide-ranging distribution of the global population and implementation of the BBAMP, it is considered unlikely that the Project will seriously disrupt the lifecycle of an ecologically significant proportion of the population.</p>

4.5 Collision Risk Assessment for Listed Threatened and Migratory Bird and Bat Species

RFI 3.5.1 An assessment of the potential impact pathways on each relevant species (based on the desktop assessment and site utilisation surveys) including, but not limited to:

- **direct mortality from turbine collision and barotrauma; and**
- **potential changes to site utilisation during construction and operation of the proposed action.**

A total of 137 bird species were recorded within the Study Area during the field surveys; four of which are threatened or migratory under the EPBC Act including:

- Rufous fantail (*Rhipidura rufifrons*).
- Spectacled monarch (*Symposiarchus trivirgatus*).
- Squatter pigeon (southern) (*Geophaps scripta scripta*).
- White-throated needletail (*Hirundapus caudacutus*).

An additional four species were found to have a High likelihood of occurring in the Study Area, and one species with a Moderate likelihood of occurring.

The risk assessment detailed within **Appendix A** of Attachment G (Preliminary Bird and Bat Adaptive Management Plan) found white-throated needletail to have a Very High risk of impact by the Project and for seven identified microbat species to have a Moderate to High-risk potential. An additional three species were included in the assessment based on the Project's RFI including red goshawk, grey-headed flying-fox and ghost bat. Despite these species Low likelihood of occurrence within the Study Area, they each received a Moderate overall risk rating. These species, along with other species with a Moderate and Minor risk potential, have been considered in the preliminary BBAMP.

The potential for residual impacts on birds and bats as a result of wind turbine collisions, barotrauma and barrier effects was considered for significance against the Commonwealth Significant Impact Assessment (SIA) guidelines. Given the Project may also result in other impacts on fauna, such as habitat loss, SIAs were addressed in Attachment B4 of the Preliminary Documentation (Assessment of Matters of National Environmental Significance). A summary of this assessment, as it relates to this report is presented below.

The SIA assessment considered the potential impacts on threatened and migratory fauna, including threatened birds and bats identified as having a Moderate to Very High collision risk profile. Disregarding habitat clearance impacts, the assessment identified no significant impacts to birds or bats as a result of turbine collision, barotrauma or barrier effects, noting the following reasons:

- Collision Risk Modelling:
 - Modelling for the white-throated needletail determined at a lower, conservative extreme, the results at 0.99 dynamic avoidance rate are 0.17 collisions per annum (equating to one collision every 5.9 years) for white-throated needletails for either of the two turbine specifications modelled.

- Adaptive management:
 - The Project will be governed by a BBAMP, which identifies the operational response to bird and bat collisions in the event that mortalities are recorded and exceed trigger thresholds (the Preliminary BBAMP is provided as Attachment G of the Preliminary Documentation).
 - The BBAMP outlines a dynamic monitoring approach, with individual turbine risk profiles informing the frequency and timing of monitoring events, including carcass searches.
- Flight behaviours/infrequent visitation:
 - As documented in this report, the Project presents a Moderate collision risk to numerous threatened and migratory species due to the infrequency of flights at RSA or the infrequency of occurrence with the Study Area.
 - The predicted size of migratory bird populations, coupled with operational response measures as governed by the BBAMP reduce the likelihood of significant impacts on populations as a result of mortality from wind turbine collisions.
- Habitat availability/fauna movement corridors:
 - The Project is situated within and adjacent to a large, vegetated corridor associated with Ulam Range.
 - The Study Area does not support regionally unique habitat features (i.e. wetlands or other important foraging/roosting locations) that the Project would be otherwise restricting access to (e.g. flight barriers).
 - The Study Area does not support habitat features such as wetlands that may attract large groups of threatened or migratory water birds.
 - The Study Area does not support any known flying fox camps and is not positioned near mapped nationally important camp locations.

The significance of impacts for listed threatened and migratory bird and bat species has been provided in **Appendix E** of Attachment B4 (Assessment of Matters of National Environmental Significance).

Changes in Site Utilisation

Post-commissioning bird and bat utilisation surveys will be conducted using a variety of survey techniques including but not limited to those undertaken in the pre-commissioning surveys. Site utilisation of threatened and migratory bird and bat species will be assessed following post-commissioning bird and bat utilisation surveys by comparing utilisation metrics such as flight height and direction, species count, observation count and species diversity. This will allow for comparison between pre and post commissioning utilisation of the Study Area. Further discussion of pre and post commissioning bird and bat utilisation surveys is provided in Attachment G (Preliminary Bird and Bat Adaptive Management Plan).

Barotrauma

Barotrauma is a phenomenon in which rapid air pressure changes cause tissue damage to air-containing structures, most notably the lungs (Baerwald *et al.* 2008). Barotrauma can also result in non-lethal injuries such as hearing impairments and other internal injuries that may result in bats succumbing to their injuries at a later time.

There is currently no published information on barotrauma in Australia. One study undertaken in Canada found that 90% of bat fatalities involved internal hemorrhaging consistent with barotrauma, and that collision with turbine blades accounted for about 50% of the fatalities (Baerwald *et al.* 2008). However, another study found that only 6% of bats collected at a wind farm in Illinois had lesions possibly consistent with barotrauma, leading to the conclusion that traumatic injury (i.e. collisions) is the major cause of bat mortality at wind farms (Rollins *et al.* 2012).

Due to the difficulty in diagnosing barotrauma unless the carcass is examined immediately after death, it is possible that cases attributed to barotrauma have been confused with traumatic injury associated with direct collisions.

Of the microbat species detected during field surveys, it is considered probable that seven species may fly at RSA, none of which are listed under the EPBC Act. In the absence of data from RSA height in the Study Area a very high level of uncertainty is inherently associated with any estimate relating to whether each species rarely, occasionally or regularly flies at RSA. However, the risk of barotrauma is relevant to all microbat individuals when flying within RSA.

RFI 3.5.2 Identification of potential impacts to each relevant species from direct mortality, including but not limited to:

analysis and mapping of suitable habitat, territories and activity/utilisation patterns/rates ('heat maps') in the project site and its surrounds.

Flight data metrics, site utilisation patterns and habitat mapping for the four threatened and migratory bird species recorded within the Study Area are presented below.

Rufous Fantail – Migratory EPBC Act

Rufous fantail was only recorded incidentally and not during vantage point surveys, as such no flight data were recorded. Of four observations, three were made on the western edge of the Study Area, while the remaining observations occurred along the eastern boundary of the Study Area.

- One individual observed actively foraging within a narrow gully, comprising a structurally complex lower tree and shrub layer. The gully was situated adjacent to steep sloping Eucalypt woodland.
- One individual observed within vine thicket vegetation, comprising structurally complex shrub layer over ground microhabitat of fallen logs and coarse litter.
- Two individuals were recorded on separate occasions on steep slopes, dispersing through eucalypt woodland in close proximity to vine thicket vegetation and in areas invaded by *Lantana camara*.

On all occasions, the rufous fantail was using lower portions of habitat, occupying the ground and mid-stratum vegetation layers (i.e. below RSA).

Rufous fantail habitat mapping for the wind farm area is provided as **Figure 4.1** with the full series within the Study Area provided as **Figure 7.18** of Attachment B3 (Assessment of Matters of National Environmental Significance).

Spectacled Monarch – Migratory EPBC Act

Spectacled monarch was observed only twice incidentally during June 2020 in other ecological surveys, however the observations were made over 6 km apart, once in the central portion and once in the north-eastern portion of the Study Area. On both occasions the species was observed in the mid-stratum vegetation layers.

Habitat suitable for foraging and dispersal was present within the Study Area and included the following:

- Semi-evergreen vine thicket.
- Gullies in eucalypt woodlands where dense vegetation occurs.

The species utilises this region on its' migration and does not reside or breed in the region. As such habitat within the Study Area has been identified as foraging and dispersal only (i.e., below RSA).

Spectacled monarch habitat mapping for the wind farm area is provided as **Figure 4.2** with the full series within the Study Area provided as **Figure 7.19** of Attachment B3 (Assessment of Matters of National Environmental Significance).

Squatter Pigeon (Southern) – Vulnerable EPBC Act

Squatter pigeon was observed on 78 occasions, throughout the field survey program, although this is likely to include multiple observations of the same individuals. It was commonly recorded along access tracks in non-remnant areas of the Study Area and was observed using a range of habitat types. All observations were made incidentally with 55.1% of observations based on one individual, however groups of up to 11 individuals were observed, often within close proximity to water sources.

Water sources suitable for the foraging of the squatter pigeon (southern) do not occur commonly within the Study Area. Stream order 1 and 2 watercourses occur extensively, however are associated with rugged and steep terrain areas generally at elevation. Farm dams identified using the Department of Resources (DoR) Reservoirs dataset were all considered suitable and are likely to be the primary resource utilised by the species due to their permanency.

On all occasions the species was observed on the ground or perched upon infrastructure (farm gates). When flushed, squatter pigeon was infrequently observed flying onto a nearby tree perch, no taller than 6 m (below RSA).

Squatter pigeon (southern) habitat mapping for the wind farm area is provided as Figure 3.8 in **Section 3.2.6** with the full series within the Study Area provided as **Figure 7.13** of Attachment B3 (Assessment of Matters of National Environmental Significance).

White-throated Needletail – Vulnerable EPBC Act

White-throated needletail were observed on 30 occasions, 21 of which were incidental. Observations were variable in abundance and behaviour, with some individuals transiting through the airspace, however the majority of observations were of larger flocks (1 to 180) circling between 5 to 400 m AGL. A total of 698 individuals have been recorded during surveys with a total of 324 individuals recorded at vantage points during BBUS and a total of 374 individuals recorded incidentally across all survey events. The number of individuals observed in aggregations ranged from one to 180. During the morning BBUS survey period (6 am to 10 am) a total of 413 individuals were recorded. During the midday BBUS survey period (10 am to 2 pm) a total of 236 individuals were recorded. During the afternoon BBUS survey period (2 pm to 6 pm) a total of 49 individuals were recorded.

While only nine records were made during the bird utilisation survey, minimum and maximum flight height was often recorded during other ecological surveys, allowing for analysis of 76.7% of all records. Needletails were observed transiting through and foraging in circular movements through the Study Area airspace. Approximately 50% of observations involved flocks of 10 or more individuals, with two large flocks of 120 and 180 needletails recorded during an ecological survey in January 2021. A total of 73.3% of observations involved flight within the RSA.

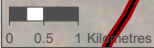
Records throughout a migration event generally began during spring when the species arrives in Australia and ended in autumn when the species is leaving Australia. Data has been collected across two migration events recording 310 individuals during the 2019-2020 migration and 384 individuals during the 2020–2021 migration.

White-throated needletail habitat mapping for the wind farm area is provided as **Figure 3.9** in **Section 3.2.7** with the full series within the Study Area provided as **Figure 7.13** of Attachment B3 (Assessment of Matters of National Environmental Significance).



C:\USER\STVILL\AMCON\UMWELT\AUSTRALIA\PTY_LTD\27263_03_SAVO2_PROJECT\27263_B03_PRELIMINARYDOCUMENTATION_V20_ABRK_22203_032_0461_RUFUSFANTAIL_HABITAT

1:110,000
Scale at A4



GDA 1994 MGA Zone 56

Legend

- ▲ Rufous Fantail Record (Umwelt)
- Rufous Fantail Record (ALA)
- Disturbance Footprint
- Study Area
- Rufous Fantail Habitat**
- Rufous Fantail Habitat

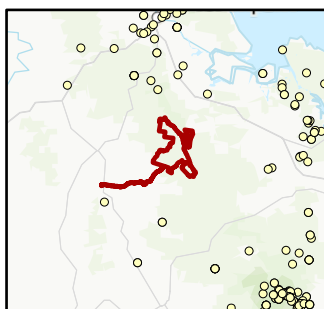
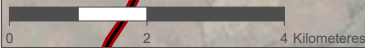


FIGURE 4.1
RUFIOUS FANTAIL HABITAT



C:\USER\STW\LAAS\CON\MUMMELT\AUSTRALIA\PTV_LTD\2023-03\BAV02_PROJECTS\2023_R02_PBE\PRIMARY\DOCUMENTATION\VOL\APR4_22\03_R02_PBE_SPECTACLED_MONARCH_HABITAT

1:110,000
Scale at A4



GDA 1994 MGA Zone 56

Legend

- Spectacled monarch Record (ALA)
- ▲ Spectacled monarch Record (Umwelt)
- ▭ Disturbance Footprint
- ▭ Study Area
- Spectacled Monarch Habitat**
- Foraging and Dispersal (Important Habitat)

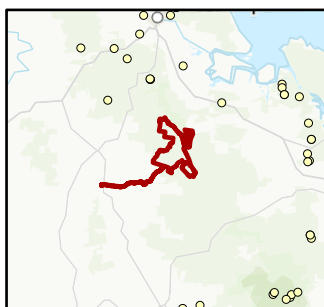


FIGURE 4.2
SPECTACLED MONARCH HABITAT

RFI 3.5.3 Mathematical Collision Risk Modelling (CRM), which must:

- incorporate a project site-wide assessment to identify high risk turbines and to provide a mortality estimate for relevant species;
- incorporate baseline data collected during the minimum 24 months of site utilisation surveys (see Section 2 above);
- incorporate the recommendations of a model peer review (the peer review must be included as an appendix to the Preliminary Documentation); and
- include a literature review, justification of the choice of the model used, and a statement of all assumptions and uncertainties.

Pre-commissioning bird and bat utilisation surveys were conducted within the Study Area and surrounds between 2019 and 2022. A total of six BBUS surveys (including one site selection and baseline avifaunal data collection survey) were undertaken throughout the survey program, five of which coinciding with the seasonal migration of EPBC Act listed birds, including white-throated needletail (*Hirundapus caudacutus*).

Following the completion of pre-commissioning surveys, a collision risk assessment was undertaken (Refer to **Appendix B** of Attachment G (Preliminary Bird and Bat Adaptive Management Plan)). The risk assessment considered the likelihood of species presence and conservation status of species observed or indicated to be present in the Study Area, as well as risk to observed species based on flight characteristics. Bird and bat species were considered in the risk assessment if they met the following criteria:

- Bird and bat species listed as threatened and/or migratory under the EPBC Act or NC Act, recorded in the Study Area or deemed to have a Moderate or High likelihood of occurrence in the Study Area.
- Bird and bats species identified as a low likelihood of occurrence, however requested by DCCEEW for further consideration as part of the Preliminary Documentation.
- Bird species recorded flying at RSA height in the Study Area.
- Bat species recorded in the Study Area that have Moderate to High potential to occur at RSA height.

The risk assessment calculated the likelihood and consequence of risks to each species based on a set of criteria as documented in **Appendix A** of Attachment G (Preliminary Bird and Bat Adaptive Management Plan). The results of the risk assessment, determined one relevant species as having a very high risk of collision, being white-throated needletail.

On this basis, mathematical collision risk modelling was completed by Biosis for white-throated needletail. The outcomes of this assessment are summarised below:

- At a lower, conservative extreme, the results at 0.99 dynamic avoidance rate would result in approximately 0.17 collisions per annum for white-throated needletails. This would equate to an approximate average of one white-throated needletail collision in 5.9 years.
- Results for the highest avoidance rate of 0.999 (estimated annual collision of approximately 0.02) would equate to an approximate average of one white-throated needletail collision in 50 years.

This mathematical CRM is provided in **Appendix B** of Attachment G (Preliminary Bird and Bat Adaptive Management Plan).

RFI 3.5.4 The Preliminary Documentation must clearly demonstrate how relevant departmental policies and guidelines, and the SPRAT Database have been used to assess the potential impacts of direct mortality from turbine collision and barotrauma, and potential changes to site utilisation during construction and operation of the proposed action on relevant listed threatened and migratory bird and bat species.

The Preliminary Documentation must include a map for each relevant species which identifies area/s in the project site and its surrounds which have been determined as ‘high risk’ based on the outputs of the CRM.

Note: The department notes the above requirements focus on direct mortality. Potential impacts as a result of changes to site utilisation may only become evident after the construction stage and during the operation stage. Therefore, ongoing BACI monitoring (through the implementation of an approved BBMP) is required to inform adaptive avoidance, mitigation and management measures in relation to potential changes in site utilisation (see Appendix C of the RFI).

RFI response 3.5.1 provides detail regarding the generalised impact assessment for birds and bats. Attachment G (Preliminary Bird and Bat Adaptive Management Plan) provides further detail regarding the utilisation of birds and bats, and for white-throated needletail (*Hirundapus caudacutus*), presents detailed outputs resulting from the pre-commissioning surveys.

Where relevant, departmental policies and guidelines were used to inform the individual risk assessment on threatened and migratory bird and bat species known or potentially occurring within the Study Area. The risk assessment sought to identify and assess the impacts of direct mortality based on turbine collision and barotrauma. Individual species Conservation Advices, Recovery Plans, SPRAT Profiles and Listing Advices were used to support the risk assessment, informing the conservation status, population metrics, habitat requirements, species occurrence and distribution of assessed species. In addition, published literature, available records and field data collected during site utilisation surveys were used where relevant to support the assessment. The full risk assessment, which includes the application of relevant departmental policies and guidelines is provided in Appendix A of Attachment G (Preliminary Bird and Bat Adaptive Management Plan).

Vantage point sampling locations discussed in Attachment G (Preliminary Bird and Bat Adaptive Management Plan) have been selected to facilitate a BACI (Before After, Control Impact) design such that reference sites which are located away from the impact area exist in similar habitats such that the similar suite of species is expected to be sampled. Discussion of pre and post commissioning bird and bat utilisation surveys is provided in Attachment G and discussed in further detail (including specific site locations) in Appendix A of Attachment G (Preliminary Bird and Bat Adaptive Management Plan).

A Turbine Collision Risk Assessment was undertaken for white-throated needletail (*Hirundapus caudacutus*) by Biosis Pty Ltd (Biosis).

The following key inputs were used in the model:

- Bird utilisation data collected during the BBUS including the frequency of observation, individual count per observation and flight height (noting whether the individuals were recorded above or below the rotor height).

- Site-population (estimated at 1,000 individuals).
- Wind farm parameters (63 turbines).
- Turbine specifications based on two potential options (Turbine A and Turbine B).
- The flight speed of the species (estimated at 100 km per hour).
- A bill-tip to tail-tip length of the species (averaged at 21 centimetres).
- The avoidance rate of the species (modelled at three intervals, 0.99, 0.995 and 0.999).

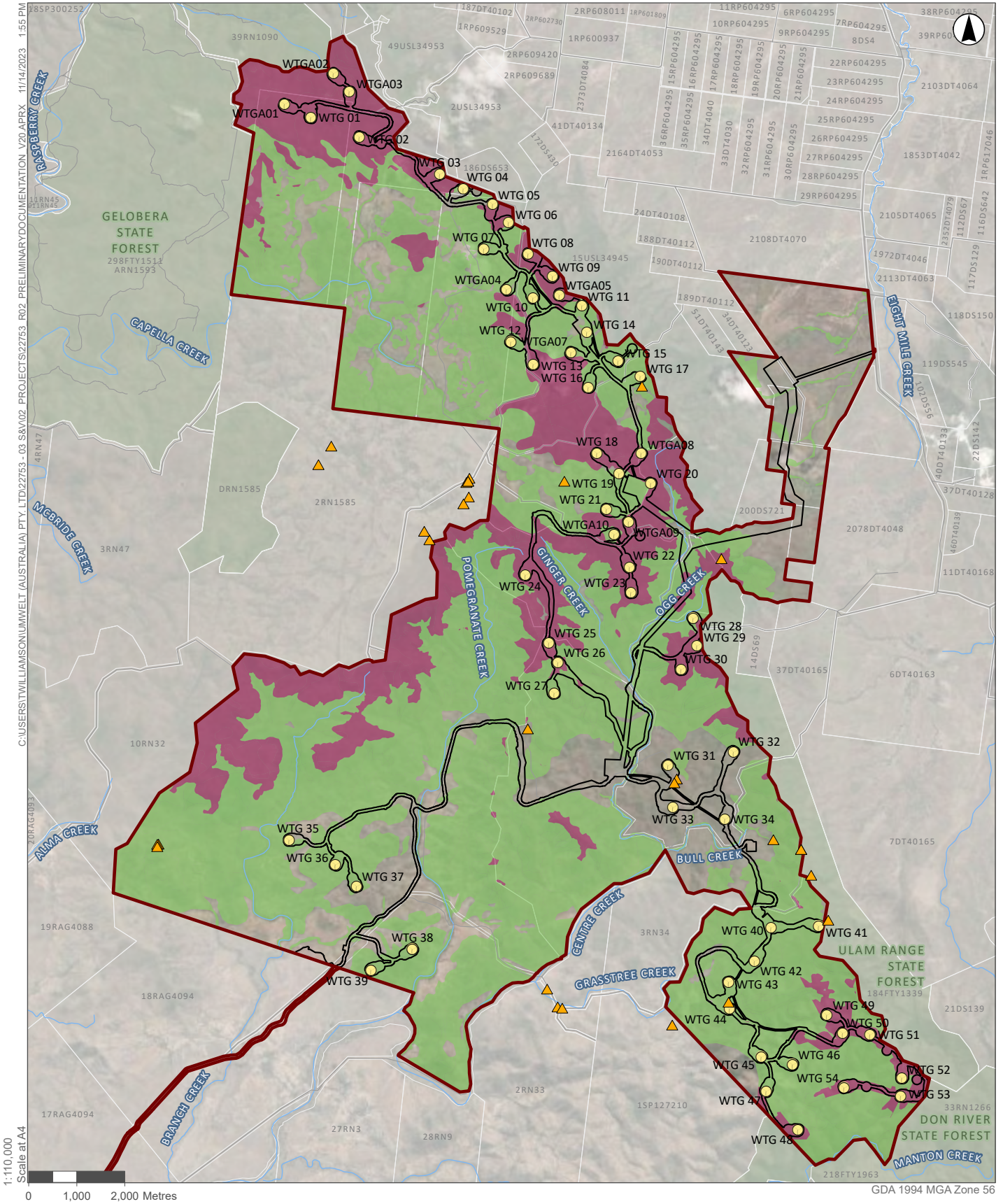
Collision risk modelling for this species was undertaken using two proposed turbine options with differing dimensions.

The results of the model in reference to the respective avoidance rate are provided in **Table 4.13** below.

Table 4.13 Annual Collision Risk Model Results for White-throated Needletail

Turbine Option	Estimated Number of Collisions		
	0.99	0.995	0.999
Turbine A	0.172	0.089	0.022
Turbine B	0.166	0.083	0.017

All turbines within the Project are regarded as high-risk for the white-throated needletail (*Hirundapus caudacutus*) (Attachment G (Preliminary Bird and Bat Adaptive Management Plan)). **Figure 4.3** depicts high-risk turbines for white-throated needletail, known records of this species based on field survey data and the mapped extent of roosting and foraging habitat within the Study Area.



C:\USERS\T\WILLIAMSON\UMWELT (AUSTRALIA) PTY LTD\22753 - 03 S\W02 PROJECTS\22753_R02 PRELIMINARY\DOCUMENTATION_V20\APRX 11/14/2023 1:55 PM
 1:110,000
 Scale at A4

- Legend**
- High Risk Turbines (All)
 - ▲ White-throated Needletail Records
 - Property Boundaries
 - Study Area
 - Development Corridor
 - White-throated Needletail Habitat**
 - Foraging and dispersal
 - Roosting and foraging

FIGURE 4.3

HIGH RISK TURBINES AND WHITE-THROATED NEEDLETAIL

Image Source: ESRI Basemap (2022) Data source: Department of Resources (2022)
 NB: Layout is Indicative Only

5.0 Avoidance, Mitigation and Management Measures

RFI 4.1.1 A detailed summary of measures proposed to be undertaken by the proponent to avoid, mitigate and manage relevant impacts of the proposed action on relevant MNES.

The avoidance of MNES has been demonstrated since early stages of the Project, through selection of the Project location and Disturbance Footprint, which have been subject to ongoing review. An ecological constraints analysis was undertaken with the intention to determine priority avoidance areas based on the flora and fauna values, taking into consideration sensitivity levels and environmental significance.

A key initial input in the constraints analysis was the delineation of remnant and regrowth habitat types from non-remnant cleared areas, as well as the identification of suitability for MNES including the presence of habitat features which may be limited in the environment.

Since referral of the Project, predicted direct impacts to MNES across the Study Area have been minimised via a significant redesign of the Project. The Project originally proposed the construction, operation and decommissioning of 118 turbine generators and supporting ancillary infrastructure within a Development Corridor covering 1,974.7 ha. Influenced by a range of factors including MNES values, the Project scope and Development Corridor configuration were recently reassessed and adjusted by Neoen. This process resulted in significant changes to the Project including a decrease in the number of turbines (118 to 63) and the Development Corridor size (reduced by >400 ha). A primary benefit of these changes is the minimisation of impacts to MNES, as detailed in **Table 5.1**.

To demonstrate the nature and extent of the Project changes, the original Development Corridor and the current Development Corridor are shown on **Figure 9.1** of Attachment B4 (Assessment of Matters of National Environmental Significance). The first map in this series, which shows the wind farm area, is provided in **Section 2.0** as **Figure 2.1**.

Table 5.1 Comparison of predicted direct impacts on MNES between current Disturbance Footprint, Development Corridor and referral Development Corridor

Threatened Species or Migratory Species		Referral Development Corridor (ha) ⁴	Current Development Corridor (ha)	Disturbance Footprint (ha)	Area Reduction (ha)	Area Reduction (%)
Threatened Flora						
<i>Cycas megacarpa</i> – density modelling ⁵	High	4.8	0.9	0.7	4.1	85.4
	Moderate	172.9	21.7	12.4	162.8	92.9
	Low	1,040.7	294.5	191.3	833.7	86.2
	Total	1,218.4	317.1	204.4	1,000.7	83.0
<i>Cossinia australiana</i>		46.1	21.1	8.6	37.5	81.3
<i>Decaspermum struckoiligum</i>		6.2	6.3	2.3	3.9	62.9

⁴ The impact area for each species will differ from those in the referral as the new habitat rules have been applied, as per the Request for Information (RFI).

⁵ Refer to Section 1.1.1 of Appendix E for descriptions of density categories.

Threatened Species or Migratory Species	Referral Development Corridor (ha) ⁴	Current Development Corridor (ha)	Disturbance Footprint (ha)	Area Reduction (ha)	Area Reduction (%)
<i>Samadera bidwillii</i>	1,042.1	638.9	347.8	694.2	66.6
Threatened Fauna					
Northern quoll (<i>Dasyurus hallucatus</i>) – denning/refuge and foraging/dispersal	1,456.1	929.5	596.9	859.2	59.0
Koala (<i>Phascolarctos cinereus</i>) – breeding/foraging/ dispersal and climate refugia	1,587.8	1,095.2	646.9	940.8	59.2
Collared delma (<i>Delma torquata</i>) – breeding/foraging	650.7	448.6	272.8	377.9	58.1
Red goshawk (<i>Erythroriorchis radiatus</i>) – foraging/dispersal	1,627.4	1,092.4	633.0	994.4	61.1
Squatter pigeon (southern) (<i>Geophaps scripta scripta</i>) – breeding, foraging and dispersal	819.1	641.5	368.5	450.6	55.0
Ghost bat (<i>Macroderma gigas</i>) – seasonal foraging/dispersal only	1,974.7	1,564.6	883.6	1091.1	55.3
White-throated needletail (<i>Hirundapus caudacutus</i>) – roosting/foraging and foraging/dispersal	1,621.5	1,096.7	640.2	981.3	60.5
Greater glider (southern and central) (<i>Petauroides volans</i>) – breeding/denning and foraging/dispersal	1,558.6	1,054	627.9	930.7	59.7
Yellow-bellied glider (south-eastern) (<i>Petaurus australis australis</i>)	913.1	531.6	322.0	591.1	64.7
Grey-headed flying-fox (<i>Pteropus poliocephalus</i>) – foraging/dispersal	901.8	510.4	277.3	624.5	69.3
Migratory Species					
Fork-tailed swift (<i>Apus pacificus</i>) – foraging/dispersal	1,974.7	1,564.6	883.6	1,091.1	55.3
Oriental cuckoo (<i>Cuculus optatus</i>) – foraging/dispersal	1,042.1	639.2	348.1	694.2	66.6
Black-faced monarch (<i>Monarcha melanopsis</i>) – foraging/marginal breeding and foraging/dispersal	1,044.0	639.7	348.4	695.6	66.6
Satin flycatcher (<i>Myiagra cyanoleuca</i>) –foraging/dispersal	995.9	618.3	339.7	656.4	65.9

Threatened Species or Migratory Species	Referral Development Corridor (ha) ⁴	Current Development Corridor (ha)	Disturbance Footprint (ha)	Area Reduction (ha)	Area Reduction (%)
Rufous fantail (<i>Rhipidura rufifrons</i>) –foraging/dispersal	1,042.1	639.2	348.1	694	66.6
Spectacled monarch (<i>Symposiarchus trivirgatus</i>) – foraging/dispersal	101.6	40.2	17.7	83.9	82.6

Project infrastructure will be sited within the Development Corridor based on the location of on-ground constraints including MNES individuals and habitat. Additional field surveys specific to terrestrial ecology (as well as other types of constraints) will be conducted prior to construction, including pre-clearance surveys. This data will allow for increased accuracy and detail in mapped terrestrial ecological values within the Development Corridor including MNES habitat values. Ground-truthed ecological field data will strongly influence the final design of the Project, with the avoidance hierarchy principles in place. Future refinement of the Project will seek to avoid threatened species individuals and habitat, particularly species where significant impacts may occur.

Infrastructure micro-siting will aim to avoid or further minimise disturbance to:

- Habitat features required by MNES fauna species including hollow bearing trees and stags, trees with diameter at breast height (DBH) >30 cm, large hollow logs and complex boulder piles.
- Large reproductive-age *Cycas megacarpa* individuals.
- Breeding habitat for threatened and migratory fauna species.
- Vine thicket communities.
- Riparian zones, including avoiding placement of turbines within 50 m of waterways.

Infrastructure micro-siting must ensure the avoidance of threatened flora individuals not pre-approved for impact or translocation.

Throughout the life of the Project, potential impacts on MNES would be directly or indirectly managed via Project Management Plans. Extensive mitigation and management measures relevant to MNES would be captured in one or multiple of the Project Management Plans, listed below:

- Preliminary Health, Safety and Environment Management Plan.
- Preliminary Construction Environmental Management Plan.
- Preliminary Bird and Bat Adaptive Management Plan.
- Preliminary *Cycas megacarpa* Species Management Plan.
- Preliminary Vegetation Management Plan.
- Preliminary Weed and Pest Management Plan.

- Preliminary Erosion and Sediment Control Plan.
- Preliminary Decommissioning Management Plan.
- Preliminary Translocation Management Plan for *Cycas megacarpa*.
- Rehabilitation Management Plan.

Eight of the above Management Plans have been submitted as part of the Preliminary Documentation assessment as requested in the RFI (Attachment C to K). All plans will be finalised prior to construction commencing.

Further to these plans, general and species-specific mitigation measures have been developed and are provided in **Section 9** of Attachment B4 (Assessment of Matters of National Environmental Significance). Key threatening processes to each MNES as detailed in made/adopted National Recovery Plans, SPRAT, Threat Abatement Plans, Approved Conservation or Conservation Listing have been reviewed in order to propose meaningful mitigation and management measures that take into consideration species-specific threats. Measures proposed incorporate industry best practices, statutory or policy basis mitigation and management of MNES, or peer reviewed literature, where available. A summary of species-specific mitigations can also be found in **Table 5.2** below. Greater consideration has been given to MNES values that may be particularly sensitive to potential Project impacts including the endangered *Cycas megacarpa*, northern quoll, greater glider (southern and central), yellow-bellied glider (south-eastern) and koala.

Further detail on avoidance, minimisation, mitigation, management and rehabilitation is provided in **Section 9** of Attachment B4 (Assessment of Matters of National Environmental Significance). A discussion on rehabilitation requirements is also provided in **Section 5.4** of this report.

Table 5.2 MNES Specific Measures

Relevant MNES	Measures
<p><i>Cycas megacarpa</i></p>	<ul style="list-style-type: none"> • Pre-clearance surveys for <i>Cycas megacarpa</i> will occur across the Disturbance Footprint plus a 5 m buffer to confirm the location, extent, numbers, and age class of the population within the clearing extent, with all efforts made to avoid impacts via micro-siting to high-density areas and large reproductive-age individuals. • Areas proposed to be cleared will be demarcated to ensure no accidental clearing outside the approved Disturbance Footprint. • A pre-approved <i>Cycas megacarpa</i> SMP will be implemented through all Project phases. A preliminary SMP is provided as Attachment E of the Preliminary Documentation. This plan will provide detailed information regarding: <ul style="list-style-type: none"> ○ species information including a description to aid identification ○ mitigation and management methods, including corrective actions ○ vegetation clearing requirements and methods to reduce impacts to surrounding individuals and their habitat ○ specific weed and pest management measures to reduce impacts on the long-term integrity of the remaining habitat and population, including high-biomass weeds ○ erosion, sedimentation, and dust management requirements specific to the species. • A pre-approved translocation plan will be implemented for individuals that would otherwise be removed through clearing for the Project. The plan will specify pre and post monitoring requirements, translocation and propagation methods and protocols and reporting requirements and performance criteria. The Preliminary Translocation Management Plan for <i>Cycas megacarpa</i> is provided as Attachment J of the Preliminary Documentation. This Plan has been developed in accordance with the <i>National Multi-species Recovery Plan for Cycads</i> (Queensland Herbarium, 2007), the <i>Guidelines for the Translocation of Threatened Plants in Australia</i> (Commander <i>et al</i> 2018) and with consideration to learnings from other translocation programs for the species undertaken by Ecologica for the coal seam gas and transport sectors between 2008 and 2015. • This species is also considered a protected plant under the State NC Act. The Nature Conservation (Plants) Regulation 2020 outlines the regulatory requirements for managing potential impacts on a protected plant. Should the Project’s clearing impact area (footprint inclusive of a 100 m buffer) contain high risk trigger area mapping or protected plant individuals, a protected plants permit will be required. The permit application will need to be supported by a protected plants assessment and survey in accordance with the Flora Survey Guidelines – Protected Plants (DES, 2020b),, and if necessary an impact management plan will be developed and implemented. If required, this will be developed in accordance with the Queensland Government Nature Conservation (Plants) Regulation 2020 – Protected Plants Assessment Guidelines (DES, 2021).

Relevant MNES	Measures
<p><i>Cossinia australiana</i>, <i>Samadera bidwillii</i> and <i>Decaspermum struckoalicum</i></p>	<ul style="list-style-type: none"> • Where clearing is proposed in areas of mapped potential habitat, pre-clearance surveys will include searches for the respective potentially occurring threatened flora species. If any individuals or populations are located during the targeted surveys, a detailed account of their occurrence must be recorded including number of individuals, GPS location and extent. The plants or population area including a 5 m buffer must be demarcated. The pre-clearance survey constraints protocol (see response to RFI 4.1.6 in Section 5.0) will then be followed to ensure any potential impacts on the species are avoided or managed appropriately. • All potentially occurring threatened flora species are also considered protected plants under the State NC Act. The Nature Conservation (Plants) Regulation 2020 outlines the regulatory requirements for managing potential impacts on a protected plant. Should the Project’s clearing impact area (footprint inclusive of a 100 m buffer) contain high risk trigger area mapping or protected plant individuals, a protected plants permit will be required. The permit application will need to be supported by a protected plants assessment and survey in accordance with the guidelines (DES, 2022b), and if necessary an impact management plan will be developed and implemented (DES, 2021).
<p>Koala (<i>Phascolarctos cinereus</i>)</p>	<ul style="list-style-type: none"> • Pre-clearance surveys will include canopy searches for koalas. If a koala is located during pre-clearance surveys or during clearing activities: <ul style="list-style-type: none"> ○ the individual must not be forcibly relocated ○ any tree which houses a koala as well as any tree with a crown that overlaps that tree will not be cleared until the koala vacates the tree on its own volition ○ allow a clearing buffer surrounding the tree, equal to the height of the tree or deemed suitable by the fauna spotter-catcher ○ any injured koala (and fauna in general) should be transported to a vet or recognised wildlife carer ○ requirements for koalas subject to handling to be examined and if suspected of Chlamydia infection will be taken to a predesignated veterinarian/wildlife care facility for treatment prior to release. • Clearing must be carried out in a way that ensures any koala present have time to move out of the clearing site without human intervention. • In the unlikely event that a koala is killed as a result of Project activities, DCCEEW will be notified within a maximum period of 2 business days. • Vehicles may cause direct mortality to koalas (DAWE, 2022). Speed limit restrictions (40km/hr) will be enforced throughout the site to minimise potential vehicle strike risk to the species.

Relevant MNES	Measures
	<ul style="list-style-type: none"> Nineteen ‘pinch points’ (excluding the access road corridor which acts as a pinch point throughout) are proposed within the Disturbance Footprint, which have been primarily designed to minimise fragmentation impacts on greater glider (southern and central) and yellow-bellied glider (south-eastern) (see Figure 3.6 in this report and Figure 7.5 of Attachment B2 (Assessment of Matters of National Environmental Significance)). Pinch points describe locations of the Disturbance Footprint which are reduced in width to provide dispersal opportunities. Although pinch points have been designed primarily to facilitate movement for greater glider (southern and central) and yellow-bellied glider (south-eastern), the reduction in clearing width at these locations will also minimise fragmentation impacts to koala. Facilitating movement for koala and connecting habitat aims to adhere to the planning and design principles of the Koala Sensitive Design Guideline (DES, 2022). Facilitating movement for koala and connecting habitat aims to adhere to the planning and design principles of the Koala Sensitive Design Guideline (DES, 2022). Habitat degradation by invasion of weeds has the potential to increase impacts associated with land clearing (DAWE, 2022). The Weed and Pest Management Plan will be implemented to ensure no introduction or proliferation of invasive weed species or pest fauna species. This includes for lantana (<i>Lantana camara</i>) and rubber vine (<i>Cryptostegia grandiflora</i>), which are known habitat degrading species of the koala and have been identified as occurring on site.
<p>Greater glider (southern and central) <i>(Petauroides volans)</i> and yellow-bellied glider (south-eastern) <i>(Petaurus australis australis)</i></p>	<ul style="list-style-type: none"> Where clearing is proposed for areas of greater glider (southern and central) and/or yellow-bellied glider (south-eastern) breeding and denning habitat, pre-clearance surveys must include canopy searches and inspections of suitably sized hollows (>8 cm diameter). Where inspection of hollows cannot be safely undertaken prior to felling, the hollow-bearing tree will be slow felled to minimise the chances of injury or death and will be inspected by a qualified fauna spotter to confirm presence or absence of greater glider (southern and central) or yellow-bellied glider (south-eastern). If an individual is found to be present, it will be inspected for injury and if healthy, relocated to an adjacent area of mapped breeding and denning habitat after dusk. If the individual is injured it will be transported to a local wildlife carer and rehabilitated prior to releasing in a suitable area adjacent to the location in which it was found. Every effort will be made to retain suitable hollow bearing trees (those containing hollows >8 cm diameter) within areas identified as breeding and denning habitat including <i>Eucalyptus moluccana</i> woodlands. The retention of trees >30 cm DBH on patch edges will be prioritised next in areas of potential greater glider (southern and central) and yellow-bellied glider (south-eastern) habitat. Trees to be retained within the Disturbance Footprint must be clearly demarcated and avoided. If deemed necessary, a TPZ may be established.

Relevant MNES	Measures
	<ul style="list-style-type: none"> Increasing evidence of glider use of glide poles is emerging in Australian literature (Goldingay & Taylor, 2009; Goldingay, et. al., 2010; Soanes et. al, 2017; Goldingay, et. al., 2018; Taylor & Rohweder, 2020) and ongoing in-field studies (Brendan Taylor, Southern Cross University) that demonstrate glide poles as a tool to mitigate linear infrastructure impacts. Glide poles are proposed to be installed at 38 locations within the Disturbance Footprint to provide movement opportunities between areas of suitable habitat in the landscape (Figure 5.1 of this report and Figure 9.2 of Attachment B4 (Assessment of Matters of National Environmental Significance)). The proposed glide pole locations represent areas important for dispersal and where ongoing connectivity is required to avoid isolation of patches and retention of possible high use areas (i.e. riparian corridors and <i>Eucalyptus moluccana</i> woodlands). Glider pole specifications and locations will be finalised during the detailed design phase of the Project. Nineteen ‘pinch points’ are proposed within the Disturbance Footprint associated with areas of greater glider (southern and central) and yellow-bellied glider (south-eastern) modelled habitat to maintain movement opportunities and minimise fragmentation impacts on the species landscape (Figure 5.1 of this report and Figure 9.2 of Attachment B4 (Assessment of Matters of National Environmental Significance)). Pinch points describe locations of the Disturbance Footprint which are reduced in width to the extent that individuals can easily disperse across (i.e. based on usual volplane distances, the clearing will have a width no greater than 1.2 times the average canopy height at that location). Pinch points locations will be finalised during the detailed design phase of the Project. In areas of habitat where greater gliders (southern and central) and yellow-bellied glider (south-eastern) are known to occur (i.e. the far northern Study Area), cleared suitable hollows (>8 cm diameter) will be replaced at a 1:2 ratio with a suitable nest box, to be installed in adjacent suitable habitat (i.e. two nest boxes for every hollow removed). A nest box is considered suitable if it is a design known to be used by the greater glider. No barbed wire fencing will be installed as part of the Project within the Study Area unless strictly necessary (i.e. substation). In the unlikely event that a greater glider (southern and central) or yellow-bellied glider (south-eastern) is killed as a result of Project activities, DCCEEW will be notified within a maximum period of 2 business days.
Red goshawk <i>(Erythrotriorchis radiatus)</i>	<ul style="list-style-type: none"> Pre-clearance nest surveys will be undertaken for red goshawk within the Disturbance Footprint. Searches will be undertaken during fauna spotter catcher pre-clearance surveys whereby suitably qualified fauna spotter catchers will actively search for red goshawk nests. Where a potential nest is identified, clearance activities within the area will cease and a suitably qualified ecologist will undertake an investigation to determine the species that the nest belongs to. If the nest does not belong to a red goshawk, or any other threatened or migratory fauna species, clearance activities will continue as planned in accordance with the Project management plans. In the event that a red goshawk nest is identified within the Study Area DCCEEW will be notified within 10 business days. A review of the current mitigation measures outlined in the BBAMP and recommendation of additional actions will be made where necessary.

Relevant MNES	Measures
	<ul style="list-style-type: none"> As detailed in the Preliminary BBAMP (Attachment G of the Preliminary Documentation), a single red goshawk death will be a reportable incident to DCCEEW and trigger further investigation with regard to causation. Dependent on the outcome of the investigation, the overall collision risk determination for the species may be revise. Other operational measures relevant to red goshawk are detailed in the Preliminary BBAMP.
White-throated needletail (<i>Hirundapus caudacutus</i>)	<ul style="list-style-type: none"> As detailed in the BBAMP the single death of a white-throated needletail will be a reportable incident to DES/DCCEEW and trigger further investigation with regard to causation. Dependent on the outcome of the investigation, the overall collision risk determination for the species may be revised. Other operational measures relevant to this species are detailed in the BBAMP.
Squatter pigeon (southern) <i>(Geophaps scripta scripta)</i>	<ul style="list-style-type: none"> Where clearing is proposed for areas of squatter pigeon (southern) breeding, foraging or dispersal habitat, pre-clearance surveys must include flushing to encourage the movement of individuals out of the clearing area. As squatter pigeon (southern) nests on the ground and is at high risk of direct mortality, nests should be identified and clearly demarcated by a spotter-catcher during pre-clearance surveys. If the spotter-catcher determines a nest to be active, it will be managed in accordance with an approved High-risk SMP. To reduce vehicle or plant collision or crushing of nests, all vehicles and pedestrians will remain within designated access tracks in squatter pigeon breeding habitat. To minimise the chances of a collision, in known squatter pigeon (southern) occurrence areas speed limits (in private areas) will be reduced to 40 km/hr or less and signage will be installed that indicates subspecies' presence. Signage will also be installed within the public access road corridor. The construction contractor will not conduct water extraction activities at any location that provide suitable resources for squatter pigeon (southern) (i.e. suitable watercourses and reservoirs mapped on Figure 3.8 in the wind farm area, with the full map series provided as Figure 7.13 of Attachment B3 (Assessment of Matters of National Environmental Significance)). As outlined in the Preliminary BBAMP, a single squatter pigeon (southern) death resulting from potential wind turbine collision will be a reportable incident to DCCEEW and trigger further investigation with regard to causation. Dependent on the outcome of the investigation, the overall collision risk determination for the species may be revised. Other operational measures relevant to squatter pigeon (southern) are detailed in the Preliminary BBAMP.

Relevant MNES	Measures
Grey-headed flying-fox <i>(Pteropus poliocephalus)</i>	<ul style="list-style-type: none"> In the event that a flying-fox congregation is identified within the Disturbance Footprint, an exclusion zone will be established. A suitably qualified person will refer to the <i>Interim Policy for Determining When a Flying-fox Congregation is Regarding as flying-fox Roost under Section 88C of the Nature Conservation Act 1992</i> (DES, 2021) to determine if the congregation could be considered a roost. If determined that the congregation constitutes a roost, impacts to the flying-fox congregation will be managed in accordance with the <i>Code of practice – Ecologically Sustainable Management of Flying-fox Roosts</i> (DES, 2020). As detailed in the Preliminary BBAMP (Attachment G of the Preliminary Documentation), a single grey-headed flying-fox death will be a reportable incident to DCCEEW and trigger further investigation with regard to causation. Dependent on the outcome of the investigation, the overall collision risk determination for the species may be revised. Other operational measures relevant to the grey-headed flying-fox are detailed in the Preliminary BBAMP.
Ghost bat <i>(Macroderma gigas)</i>	<ul style="list-style-type: none"> Where pits, voids or trenches are required, include appropriate cover to prevent extended water retention in these spaces and/or subsequent breeding opportunities for cane toads. As detailed in the Preliminary BBAMP (Attachment G of the Preliminary Documentation), a single ghost bat death will be a reportable incident to DCCEEW and trigger further investigation with regard to causation. Dependent on the outcome of the investigation, the overall collision risk determination for the species may be revised. Other operational measures relevant to ghost bat are detailed in the Preliminary BBAMP.
Northern quoll <i>(Dasyurus hallucatus)</i>	<ul style="list-style-type: none"> Micro-siting of Project infrastructure will aim to retain potential denning habitat features including large hollow logs and large boulders piles. Habitat features that can be avoided will be demarcated. Where they cannot be retained in situ, features will be relocated to adjacent areas of suitable habitat if safe and practical (i.e. the relocation of habitat features must not cause unnecessary disturbance). Vegetation clearing required within or directly adjacent to areas of breeding and denning habitat should be completed outside of the northern quoll breeding season (late July to late August). Where this cannot be committed to, a trapping and relocation program for northern quoll in these areas must be undertaken prior to vegetation clearing commencing. Potential denning sites in areas to be cleared will have entrances closed to avoid use by northern quoll prior to and during clearing. Where possible, detection dogs will be used to assist in locating northern quoll where potential denning habitat will be impacted. Following the completion of the trapping program, should an active den be found within the Disturbance Footprint, measures outlined in a pre-approved high-risk SMP will be implemented to ensure no impacts occur to an active breeding place. This may include blocking access to dens once vacated to ensure they are not re-utilised during construction.

Relevant MNES	Measures
	<ul style="list-style-type: none"> Inappropriate fire regimes is a known threat to the species (DoE, 2016). To avoid degradation of habitat from fire, a Bushfire Management Plan will be prepared in consultation with Queensland Fire and Emergency Services (QFES). Where pits, voids or trenches are required, include appropriate cover to prevent extended water retention in these spaces and/or subsequent breeding opportunities for cane toads. Carcass surveys will be conducted by a suitably qualified ecologist to detect and remove carrion in operational areas that may attract northern quolls. The Preliminary BBAMP (Attachment G of the Preliminary Documentation) will include a carcass survey protocol and include details such as survey frequency and timing. Construction areas that may inadvertently provide potential denning opportunities through stockpiling of materials will have fauna exclusion fencing installed around the perimeter. In the unlikely event that a northern quoll is killed as a result of Project activities, DCCEEW will be notified within a maximum period of 2 business days.
Collared delma <i>(Delma torquata)</i>	<ul style="list-style-type: none"> Micro-siting of Project infrastructure will aim to retain terrestrial habitat features including large stones, boulders and coarse woody debris. Habitat features that can be avoided will be demarcated. Where they cannot be retained in situ, features will be relocated to adjacent areas of suitable habitat if safe and practical (i.e. the relocation of habitat features must not cause unnecessary disturbance). Where clearing is proposed for areas of potential collared delma habitat, pre-clearance surveys must include active searches targeting areas with common surface rocks. Collared delma is thought to be sedentary with one study finding that individuals occupy a small (<20 m) home range (Porter 1998). Should an individual or eggs of the species be located, relocation of captured individuals will occur at least 200 m from the Disturbance Footprint within habitat that is considered the same or better quality based on the availability of microhabitat features. In the unlikely event that a collared delma is killed as a result of Project activities, DCCEEW will be notified within a maximum period of 2 business days. The Weed and Pest Management Plan will be implemented to ensure no introduction or proliferation of invasive weed species or pest fauna species. This includes for lantana (<i>Lantana camara</i>), which is a known habitat degrading species of the collared delma.
Migratory birds	<ul style="list-style-type: none"> As detailed in the Preliminary BBAMP (Attachment G of the Preliminary Documentation), the single death of a white-throated needletail, fork-tailed swift, oriental cuckoo, black-faced monarch, satin flycatcher, rufous fantail or spectacled monarch will be a reportable incident to DCCEEW and trigger further investigation with regard to causation. Dependent on the outcome of the investigation, the overall collision risk determination for the species may be revised. Other operational measures relevant to migratory birds are detailed in the Preliminary BBAMP.

RFI 4.1.2 The proposed measures must be based on best available practices, appropriate standards, evidence of success for other similar actions and supported by published scientific evidence.

The measures which have been proposed to avoid, mitigate and manage impacts to MNES (identified above in response to RFI 4.1.1 and in **Section 9** of Attachment B4 (Assessment of Matters of National Environmental Significance)) are based on departmental species-specific guidance, legislative requirements and industry best practice.

These measures to be implemented during the construction, operation and maintenance and decommissioning and rehabilitation phases of the Project respond directly to government and industry recommendations, including but not limited to:

- SPRAT database (DCCEEW 2022b), relevant conservation advices and recovery plans.
- Preparation and implementation of a detailed erosion and sediment control plan in accordance with the (International Erosion Control Association (IECA) 2008) *Best Practice Erosion and Sediment Control Guidelines*.
- Ensuring waterway crossings are constructed in accordance with the Queensland *Accepted development requirements for operational work that is constructing or raising waterway barrier works* (Department of Agriculture and Fisheries 2018) to the extent practicable.
- Ensuring any works within riparian areas are undertaken in accordance with the Queensland *Riverine protection permit exemption requirements Version 2.01* (Department of Natural Resources Mines and Energy 2019) to the extent practicable.
- Ensuring that any clearing of koala habitat trees is undertaken in accordance with the Queensland *DES Nature Conservation (Koala) Conservation Plan 2017*.
- Managing noise associated with construction activities in accordance with the thresholds and requirements established under the *DES Environmental Protection (Noise) Policy 2019*.
- DES approved and appropriate (low or high risk) Species Management Plans as per the *Nature Conservation (Animals) Regulation 2020*.
- *Cycas megacarpa* translocation plans undertaken by the Queensland Department of Transport and Main Roads and gas sectors, including the transmission lines for Gladstone Liquefied Natural Gas (GLNG), Queensland Curtis LNG (QCLNG) and Australia Pacific LNG (APLNG).
- Compliance with the conditions imposed by the Queensland Government Department of State Development, Infrastructure, Local Government and Planning under a State Development Approval issued for the Project on 17 June 2022 (2109-24892).

Through the delivery of wind farm development in Australia and internationally, Neoen has a strong environmental track record demonstrating evidence of success in support of the proposed measures.

RFI 4.1.3 All proposed measures for MNES must be drafted to meet the ‘S.M.A.R.T’ principle:

- **S – Specific (what and how)**
- **M – Measurable (baseline information, number/value, auditable)**
- **A – Achievable (timeframe, money, personnel)**
- **R – Relevant (conservation advices, recovery plans, threat abatement plans)**
- **T – Time-bound (specific timeframe to complete)**

Avoidance and mitigation measures proposed to manage impacts on MNES values are identified above in response to RFI 4.1.1 and **Section 9** of Attachment B4 (Assessment of Matters of National Environmental Significance). Certainty in how risk will be managed and monitored is provided in the form of the Project’s management plans including:

- Attachment D : Construction Environmental Management Plan.
- Attachment E: Preliminary *Cycas megacarpa* Species Management Plan.
- Attachment F: Preliminary Vegetation Management Plan.
- Attachment G: Preliminary Bird and Bat Adaptive Management Plan.
- Attachment J: Preliminary Translocation Management Plan for *Cycas megacarpa*.

As detailed design for the Project has not yet been undertaken, these plans are preliminary and are aimed at mitigating the expected impacts of the Project. Prior to construction, plans will be updated as necessary and implementation of proposed avoidance, mitigation, management and monitoring measures, and corrective actions will be appropriate to the location of works and activities being undertaken.

The management plans identify timing, frequency and duration of proposed measures, however as stated above these plans may be updated prior to Project activities commencing based on changes to the proposed impact and departmental advice. In response to Departmental feedback regarding bird and bat collision risk, additional information has been provided regarding post-commissioning monitoring (see Attachment G).

All of the relevant management plans reference relevant literature, Government codes and guidance and departmental advice on specific MNES.

RFI 4.1.4 Include the plans specified above (in approved or draft format) as appendices to the preliminary documentation.

All plans specified above have been provided as Attachments to this Preliminary Documentation (Attachments C to K).

RFI 4.1.5 Details of specific and measurable environmental outcomes to be achieved for relevant MNES. All commitments must be drafted using committal language (e.g. ‘will’ and ‘must’) when describing the proposed measures.

As per RFI 4.1.1 and RFIs 5.1 to 5.4, the proposed avoidance, minimisation, mitigation and management measures and monitoring requirements represent commitments from Neoen. These measures are also outlined in the following documentation:

- Attachment B4: Assessment of Matters of National Environmental Significance (**Section 9**).
- Attachment D: Preliminary Construction Environmental Management Plan.
- Attachment E: Preliminary *Cycas megacarpa* Species Management Plan.
- Attachment F: Preliminary Vegetation Management Plan.
- Attachment G: Preliminary Bird and Bat Adaptive Management Plan.
- Attachment J: Preliminary Translocation Management Plan for *Cycas megacarpa*.

In rare circumstances, language such as ‘where practical’ has been used with qualifications provided, for example ‘features will be relocated to adjacent areas of suitable habitat if safe and practical (i.e. the relocation of habitat features must not cause unnecessary environmental disturbance)’ (refer to **Appendix E** of Attachment B4 (Assessment of Matters of National Environmental Significance)).

RFI 4.1.6 Details of the proposed measures to be undertaken to avoid, mitigate and manage the relevant impacts of the proposed action, including those required through other Commonwealth, State and local government approvals. Including, but not limited to:

- **A pre-clearance survey methodology, and its predicted effectiveness, for commitments to avoid (with appropriate buffers) listed threatened flora species and habitat for listed fauna species (including those identified in Section 2 of the RFI – habitat assessment) during the construction stage.**
- **Use of a qualified fauna spotter-catcher.**
- **Specific procedures to minimise and manage potential impacts on the *Cossinia*, *Quassia*, *Decaspermum struckoiligum* and other listed and migratory species if found on site during construction and operation.**

As specified in the response to RFI 4.1.1, throughout the life of the Project, potential impacts on MNES would be directly or indirectly managed via Project management plans. Extensive mitigation and management measures relevant to MNES will be captured in one or multiple of the Project management plans.

Further to these plans, general and species-specific mitigation measures have been developed and are provided in **Section 9** of Attachment B4 (Assessment of Matters of National Environmental Significance). Greater consideration has been given to MNES values that may be particularly sensitive to potential Project impacts including *Cycas megacarpa*, northern quoll, greater glider (southern and central), yellow-bellied glider (south-eastern) koala and collared delma. Species-specific mitigation measures have been summarised in **Table 5.2** above, in response to RFI 4.1.1.

As per the RFI request, the mitigation measures proposed for the Project do include:

- A pre-clearance survey methodology as described below and detailed in **Section 5.4** of Attachment F (Preliminary Vegetation Management Plan) and **Section 9** of Attachment B4 (Assessment of Matters of National Environmental Significance).
- A commitment to use a qualified fauna spotter-catcher during pre-clearance surveys and construction.
- Commitments to avoid listed threatened flora species and habitat for threatened fauna (Attachment E (Preliminary *Cycas megacarpa* Species Management Plan; **Section 9** of Attachment B4 (Assessment of Matters of National Environmental Significance)). A maximum limit of disturbance has been provided, however micro-siting is expected to reduce this figure (refer to **Section 8** and **9** of Attachment B4 (Assessment of Matters of National Environmental Significance)).
- Other relevant measures required under Commonwealth, State and Local Government approvals.

These mitigation measures are summarised below.

Pre-clearance survey methodology

Pre-clearance surveys are ecological surveys that will be undertaken prior to clearing works and the permanent removal of vegetation. The following will be conducted prior to and during the pre-clearance surveys within the Disturbance Footprint:

- Desktop assessment will be undertaken to understand the extent, locality, and presence of vegetation communities and threatened flora species.
- Field surveys will be completed by suitably qualified ecologists⁶ and will include:
 - Threatened flora species searches for the five threatened species with a 'high' to 'moderate' likelihood of occurrence within vegetation communities with potential habitat, to inform the micro-siting process. Other threatened species will also opportunistically be searched for in areas of suitable habitat. It should be noted that pre-clearance surveys will also occur within the areas 5 m either side of the Disturbance Footprint (to account for GPS inaccuracies) and include detecting the presence of *Cycas megacarpa* individuals. Pre-clearance requirements for *Cycas megacarpa* has been addressed separately within the Preliminary *Cycas megacarpa* Species Management Plan (Attachment E of the Preliminary Documentation).
 - Identify and mark high-value microhabitat features (i.e. hollow bearing trees; hollow logs; boulder piles) and potential or active breeding places (which are to be managed under an appropriate DES SMP) to be avoided or managed during clearing.
 - Opportunistic threatened and migratory fauna identification. Any individuals observed will be recorded including number of individuals, behaviour at the time of observation (i.e. foraging, roosting, dispersing) and GPS location.
 - All pest fauna species encountered during opportunistic pre-clearance surveys will be recorded including number of individuals, behaviour at the time of observation and GPS location.

⁶ A suitably qualified ecologist is a person who possessed a degree in environmental planning, environmental science, environmental management or similar from a recognised tertiary institution, and has at least five years of relevant experience in environmental assessment.

- Weed surveys to record the presence and abundance weed species. Areas containing infestations will be treated prior to the commencement of site disturbance and any construction activities.
- Protected plant survey in accordance with the *Flora Survey Guidelines – Protected Plants* (DES 2020).

Where threatened flora species (NC Act or EPBC Act) and weed species have been identified then the following information will be recorded:

- GPS location.
- Collector, date and time.
- Species (scientific and common name).
- Number or density of individuals.
- Habit.
- Vegetation communities known to occur in.
- General notes on the feature identified.
- Collect a reference specimen.

If threatened flora species (excluding *Cycas megacarpa* which will be managed separately) are located within the Disturbance Footprint, the plants or population area including a 5 m buffer must be demarcated and completely avoided via micro-siting. No direct or indirect impacts to a confirmed population will be permitted without prior consultation with DCCEE and/or DES. The pre-clearance survey constraints protocol (see below and **Section 9.3.2.2** of Attachment B4 of the Preliminary Documentation (Assessment of Matters of National Environmental Significance)) will then be followed to ensure any potential impacts on the species are avoided or managed appropriately.

The specific pre-clearance survey requirements and management measures relevant to *Cycas megacarpa* are outlined in the Project's Preliminary Translocation Management Plan for *Cycas megacarpa*. (Attachment J of the Preliminary Documentation) the Preliminary *Cycas megacarpa* Species Management Plan (Attachment E of the Preliminary Documentation). A pre-clearance survey report will be populated after the field surveys.

Use of Fauna Spotter-catcher

A qualified fauna-spotter will be present at all times during clearing and pre-clearance surveys. In areas of MNES habitat planned to be cleared, qualified spotter-catchers will scout the area immediately prior to the commencement of disturbance for the presence of habitat trees and other features (i.e. coarse woody debris, hollow logs, large stones and boulder piles), as well as EPBC Act listed species. This will include an inspection of terrestrial habitat features prior to disturbance to determine utilisation by fauna, using work platforms, inspection cameras, or other methods deemed safe and suitable. Habitat features/trees will be marked using appropriate paint or flagging tape. Located fauna (excluding koalas, see **Table 5.2**) will be moved to a nearby and suitable undisturbed location by the spotter-catcher. Fauna spotters will also be present during earthworks where exposed trenches and holes will be left for periods greater than 24 hours.

Pre-clearance Survey Constraints Protocol

A pre-clearance survey constraints protocol has also been developed for the Project to provide an adaptive management framework, should an unexpected MNES find occur during a pre-clearance survey or any other surveys undertaken prior to construction. As the process for managing threatened reptiles and mammals located during pre-clearance survey is defined in **Table 5.2** and for threatened or migratory birds is defined in the Bird and Bat Adaptive Management Plan (Attachment G of the Preliminary Documentation), this protocol relates specifically to threatened flora with a moderate likelihood of occurrence. Whilst the occurrence of new MNES is considered highly unlikely, the intent of this protocol is to ensure the appropriate adaptive management response is implemented and adverse impacts mitigated should they be discovered.

The trigger to undertake the pre-clearance surveys constraints protocol is the observation of one or more individual of a flora species listed as threatened under the EPBC Act within the Disturbance Footprint during future surveys or construction. If either are to be found, the constraints protocol below will then be followed.

STEP 1: Halt construction/clearing activities in the area (i.e. adjacent areas within the Disturbance Footprint where suitable habitat is present – to be determined by a suitably qualified ecologist).

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

1. Updating of habitat mapping.
2. Updating of Significant Impact Assessment.
3. Determination of avoidance and mitigation strategies.

STEP 3: Communicate outcomes with DCCEEW and determine next steps.

Other relevant measures required under Commonwealth, State and Local Government approvals

All Commonwealth measures and requirements have been addressed in this document, however additional requirements at the State level are relevant to the Project. These include:

- Prepare a Rehabilitation Management Plan.
- Prepare a Rehabilitation Annual Monitoring Report.
- Prepare a Cleared Vegetation Plan.
- Prepare a Vegetation and Fauna Management Plan.
- Prepare a Construction Environmental Management Plan tailored to the detailed design and specific construction activities.
- Prepare a Decommissioning Management Plan.
- Prepare a Stormwater Management Plan.

- Ensure clearing works associated with the Project are limited to those areas shown in the Vegetation Management Plan (2109-24892 SRA) approved by the Queensland Department of Resources.
- Ensure that any impacts to potential breeding places of threatened species or colonial breeders are appropriately managed under a pre-approved Department of Environment and Science High Risk Species Management Plan.
- Ensure that the clearing of native vegetation identified on the Regulated Vegetation Management Map, prepared under the *Vegetation Management Act 1999*, does not exceed 548.50 ha (note that State approvals do not include the access road corridor and that a minor change application is pending with the State that may reduce the upper limit of vegetation clearance to 519.94).
- Prepare an Erosion and Sediment Control Plan.
- Protected plants permit and associated surveys where the Project's clearing impact area (footprint inclusive of a 100 m buffer) contain high risk trigger area mapping or protected plants individuals.

RFI 4.1.7 Information on the timing, frequency and duration of the proposed avoidance, mitigation, management and monitoring measures, and corrective actions to be implemented.

Avoidance, minimisation and mitigation measures proposed to manage impacts on MNES values are discussed in response to RFI 4.1.1 and described in further detail in **Section 9** of Attachment B4 (Assessment of Matters of National Environmental Significance). Certainty in how risk would be managed and monitored is provided in the form of the Project's management plans including:

- Attachment E: Preliminary *Cycas megacarpa* Species Management Plan.
- Attachment F: Preliminary Vegetation Management Plan.
- Attachment G: Preliminary Bird and Bat Adaptive Management Plan.
- Attachment J: Preliminary Translocation Management Plan for *Cycas megacarpa*.

These plans included commentary on timing, frequency and the duration of the proposed measures as well as identifying corrective actions if/when thresholds or triggers are exceeded. Since the original submission of the Preliminary Documentation, several updates have been made to the Preliminary Bird and Bat Adaptive Management Plan to clarify types of monitoring, as well as monitoring timing and frequency.

RFI 4.1.8 An assessment of the expected or predicted effectiveness of the proposed measures.

Neoen has experience in planning and development of wind farms with potential for impacts to MNES, including three Projects which have obtained EPBC approval. The management plans and proposed mitigation measures have been adapted from existing approved management plans (developed by Neoen as well as other proponents) and encompass regulatory approval requirements as well as incorporating learnings and extensive experience in infrastructure development. Across all of Neoen's projects, Neoen has complied with environmental protocols and has never been found to be in breach of any permit, law or environmental regulation.

RFI 4.1.9 Any statutory or policy basis for the proposed measures, including reference to the SPRAT Database and relevant approved conservation advice, recovery plan or threat abatement plan, and a discussion on how the proposed measures are not inconsistent with relevant plans.

The measures which have been proposed to avoid, mitigate and manage impacts to MNES (identified in **Section 9** of the Assessment of Matters of National Environmental Significance (Attachment B4)) and management plans (Attachment C to K) are based on departmental species-specific guidance, legislative requirements and industry best practice. These management plans are underpinned by detailed habitat assessment and species-specific management measures which make direct reference to the SPRAT Database and relevant recovery plans, approved conservation advices and threat abatement plans. The Project management plans demonstrate consistency with the aforementioned departmental documents.

RFI 4.1.10 Details of ongoing management, including monitoring programs to support an adaptive management approach, that validate the effectiveness of the proposed measures and overall demonstrate that environmental outcomes will be achieved.

The Project's potential environmental impacts, including those relevant to MNES, would be managed through a framework of Project management plans as described above. Adaptive management processes integrate monitoring into the implementation of avoidance, mitigation and management measures in the following plans:

- Attachment D: Construction Environmental Management Plan.
- Attachment E: Preliminary *Cycas megacarpa* Species Management Plan.
- Attachment F: Preliminary Vegetation Management Plan.
- Attachment G: Preliminary Bird and Bat Adaptive Management Plan.
- Attachment J: Preliminary Translocation Management Plan for *Cycas megacarpa*.

Each of these plans provide details of ongoing management commitments, timing for the commitments, as well as trigger/thresholds levels and corrective actions and clearly demonstrate the processes to be undertaken to ensure their objectives are achieved.

RFI 4.1.11 Details of tangible, on-ground corrective actions that will be implemented in the event the monitoring programs indicate that the environmental outcomes have not or will not be achieved.

The Project management plans and supporting monitoring programs adopt methodologies that have been implemented for wind farms and other developments in Queensland. As appropriate, the management plans have also taken into account the latest research available as well as expert opinion when determining the likelihood of achieving objectives. As such, Project environmental outcomes are considered achievable.

During the Project lifecycle, corrective actions would be implemented if the performance criteria and management objectives outlined in these Project management plans are not being adhered to, when undertaking monitoring activities. As per RFI 4.1.10, adaptive management processes integrate monitoring into the implementation of avoidance, mitigation and management measures in the following plans:

- Attachment E: Preliminary *Cycas megacarpa* Species Management Plan.
- Attachment F: Preliminary Vegetation Management Plan.

- Attachment G: Preliminary Bird and Bat Adaptive Management Plan.
- Attachment J: Preliminary Translocation Management Plan for *Cycas megacarpa*.

Some examples of corrective actions from these plans include:

- If clearing occurs outside of the Disturbance Footprint or approved clearing limits are exceeded, the responsible person must:
 - Review clearing procedures.
 - Install additional fencing or flagging to reinforce a no-go zone.
 - Undertake toolbox talks and re-educate site personnel on site practices and management obligations.
- If there is evidence of infestation by introduced flora species within/adjacent the Disturbance Footprint:
 - Treat new infestations.
 - Undertake additional monitoring to review the success of treatment of infestations.
 - Undertake toolbox talks and re-educate site personnel on site practices and management obligations.
 - Review weed management procedures contained within the Preliminary Vegetation Management Plan (Attachment F).
- If there is a reduction in individuals (of *Cycas megacarpa*) or populations due to land management practices (fire and timber harvesting) the responsible person must:
 - Rehabilitate and restore any impacted areas.
 - Review incident to identify causes of timber harvesting or accidental fires.
 - Review the mitigation measures within the Bush Fire Management Plan.
 - Undertake toolbox talks and re-educate site personnel on site practices and *Cycas megacarpa* management obligations.
- The impact trigger for a threatened bird or bat species is the confirmation of one carcass or injured individual as recorded during the carcass detection program or detected within 200 m of project infrastructure as part of carrion removal procedures or incidentally during other activities. If an impact trigger level for threatened species is met or exceeded, a further investigation and reporting response is required (as detailed in the Preliminary Bird and Bat Adaptive Management Plan (Attachment G)).

It is acknowledged that there a number of risks that may potentially limit the success of the proposed *Cycas megacarpa* translocation program (see Attachment J – Preliminary Translocation Management Plan for *Cycas megacarpa*), including:

- Translocated individuals dying.
- Hot bushfire impacting on existing populations.
- Hot bushfire impacting transplanted/propagated individuals.
- Seed recruitment being reduced through feral pigs.
- Juveniles being smothered by weeds.
- Illegal harvesting or clearing.
- Propagated seeds not germinating.

The Translocation Management Plan for *Cycas megacarpa*.and/or the overarching management plans will identify specific measures to manage and mitigate the risk from these events. However, the following is specifically noted in the **Section 13.3** of the Preliminary Translocation Management Plan for *Cycas megacarpa* with regard to fires:

- If a wildfire appears to negatively impact on individuals present within any of the recipient sites, translocated and reference site individuals would be monitored for a period of 12 months post impact. If they do not recover within this period (i.e. no indication of growth) the Project proponent will consult DCCEEW and/or DES regarding potential compliance implications on the translocation and monitoring program and an appropriate course of action.

RFI 4.1.12 Details of any measures proposed to be undertaken by Queensland and local governments, including the name of the agency responsible for approving each measure.

The Project was approved under the provisions of the Queensland *Planning Act, 2016* on 17 June 2022 (reference 2109-24892 SDA). The Project approval was subject to 38 conditions, of which relevant conditions are summarised below:

- Condition 12: Prepare a Vegetation and Fauna Management Plan. To be prepared prior to commencement of construction works and submitted to:
 - Department of State Development, Infrastructure, Local Government and Planning.
 - Banana Shire Council.
 - Rockhampton Regional Council.
- Condition 13, 14, 35 and 36: Prepare a Rehabilitation Plan, prior to commencement of construction works and a rehabilitation annual monitoring audit, submitted to:
 - Department of State Development, Infrastructure, Local Government and Planning.
 - Natural Resource Assessment, Department of Resources.

- Condition 15 and 37: Prepare a Cleared Vegetation Plan, prior commencement of construction works, submitted to:
 - Department of State Development, Infrastructure, Local Government and Planning.
- Condition 16: Prepare a finalised Bird and Bat Management Plan, prior to commencement of operation of the wind turbine (s), submitted to:
 - Department of State Development, Infrastructure, Local Government and Planning.
- Condition 17: Prepare an additional bird utilisation survey, within 12 months following the commencement of the use, submitted to:
 - Department of State Development, Infrastructure, Local Government and Planning.
- Condition 33 and 34: Enter into an agreed delivery arrangement to deliver an environmental offset in accordance with the *Environmental Offsets Act 2014*, Prior to commencing any works that impact on essential habitat for *Cycas megacarpa* or land within the defined distance of a watercourse.

5.1 Specific Threatened Species Avoidance, Mitigation and Management Information Required

Avoidance is the first step in the DCCEEWs mitigation hierarchy and must be implemented to the greatest extent possible prior to progressing to the following steps (mitigate, offset). Specific descriptions of Project avoidance to MNES is provided below that demonstrate implementation of this step, followed by mitigation and management measures that have been derived from industry best practices, statutory or policy basis, or peer reviewed literature, where available (refer to **Table 5.2** for the full list of MNES specific mitigation measures).

5.1.1 *Cycas megacarpa*

RFI 4.2.1 Describe the number, location and proportion of individuals of the *Cycas megacarpa* population on site that will be avoided.

Detailed responses to the population of *Cycas megacarpa* are provided in the following documents:

- Attachment B4: Assessment of Matters of National Environmental Significance (Appendix E).
- Attachment E: Preliminary *Cycas megacarpa* Species Management Plan.

To inform impact assessment and the potential requirement for secondary approvals or biodiversity offsets, it was necessary to project an upper limit of individuals within the various Project boundaries. This was completed using the outputs of the IDW method, and where available, aligned with known habitat areas (as mapped by Umwelt) for the species.

To achieve a projected count per hectare, density count plot data (collected over 0.25 ha plots) was projected out by a factor of 4. For visual estimate records, a mid-point was assumed for actual count prior to projecting (i.e. count of 6.5 individuals was assumed in areas visually estimated to support 1–10 plants per 0.25 ha). IDW polygon sizes were determined and then multiplied by the project count.

Following completion of the projections, and to provide a contextual basis of comparison, a correction factor was applied to Study Area estimates, in line with observations made in the Development Corridor. This correction factor accounts for the overestimation of 'low' density points, which are mapped across large areas and not appropriately weighted due to the absence of data record points.

The results of this assessment are summarised below in **Table 5.2** for the Study Area, Development Corridor and Disturbance Footprint. Based on the metrics below, the Project would impact on 2.6% of the Study Area population.

Table 5.3 *Cycas megacarpa* Avoidance Summary

Population Category	Study Area ¹	Development Corridor ²	Disturbance Footprint
Individual Summary			
Individual records of <i>Cycas megacarpa</i>	141,392	6,021	3,727
Density Summary			
High (25–50 plants per 0.25 ha)	74.9 ha	0.9 ha	0.7 ha
Moderate (10–25 plants per 0.25 ha)	711.2 ha	21.7 ha	12.4 ha
Low (1–10 plants per 0.25 ha)	5,389.0 ha	294.5 ha	191.3

¹ Study Area values have been corrected to provide contextual comparison with development corridor, for which IDW outputs have been clipped to the known (confirmed) and known (suspected) habitat area.

² IDW outputs clipped to areas of mapped known (confirmed) and known (suspected) habitat area.

RFI 4.2.2 Include full justification on the avoidance measures that will be undertaken with respect to the *Cycas megacarpa* individuals.

Details on avoidance measures for the Project are provided in the following locations:

- Attachment B4: Assessment of Matters of National Environmental Significance (**Section 9 and Appendix E**).
- Attachment E: Preliminary *Cycas megacarpa* Species Management Plan.
- Attachment K: Offset Management Strategy.

The avoidance of MNES has been demonstrated since early stages of the Project, through selection of the Project location and Disturbance Footprint, which have been subject to ongoing review. An ecological constraints analysis was undertaken with the intention to determine priority avoidance areas based on the flora and fauna values, taking into consideration sensitivity levels and environmental significance.

A key initial input in the constraints analysis was the delineation of remnant and regrowth habitat types from non-remnant cleared areas, as well as the identification of suitability for MNES including the presence of habitat features which may be limited in the environment. High density areas of *Cycas megacarpa* were modelled during early project revisions, and the avoidance of >99% is evident in the final project design. The avoidance, including further avoidance strategies for *Cycas megacarpa*, is specifically detailed below.

The avoidance of *Cycas megacarpa* has been demonstrated through both selection of the Study Area and the design of the Disturbance Footprint. Revisions to both have occurred throughout the life of the Project as a result of community and landholder consultation, wind resource data, grid connectivity options and an understanding of on-ground constraints. The Disturbance Footprint size and configuration in particular has undergone numerous revisions to account for impacts to *Cycas megacarpa*. Known high-density areas of *Cycas megacarpa* were prioritised for avoidance; the current Disturbance Footprint avoids the majority (>99%) of these areas. As part of ongoing avoidance measures micro-siting around Project infrastructure would further prioritise the following, where possible:

- Areas where high densities of *Cycas megacarpa* are known to occur.
- Large reproductive-age individuals (>1 m).
- Mature female plants.

Further avoidance opportunities exist for *Cycas megacarpa* with the installation of overhead powerlines, with individuals less than 4 m potentially be retained in these areas. The final number of *Cycas megacarpa* individuals to be avoided will be based on the final detailed design and subject to micro-siting requirements of transmission line infrastructure. Approximately 629 individuals within the Disturbance Footprint are mapped under 33 kilovolt (kV) and 275 kV reticulation.

The *Cycas megacarpa* Species Management Plan defines additional mitigation and management measures for *Cycas megacarpa* adjacent the Disturbance Footprint, including:

- Pre-clearance surveys will be undertaken within known and potential habitat for *Cycas megacarpa* prior to construction activities occurring within the Disturbance footprint and 5 m either side of the Disturbance Footprint, to inform the micro-siting process.
- *Cycas megacarpa* individuals will be clearly marked, so that accidental damage is avoided in populations not directly impacted by construction activities.
- ‘No-go’ areas, including clearing limits will be clearly demarcated including the implementation of signage and fencing. Information fact sheets will also be given to applicable land holders. ‘No go’ areas will include areas adjacent to the Disturbance Footprint which contain habitat (known or potential) or *Cycas megacarpa* individuals.
- Ongoing monitoring will occur within Disturbance Footprint and 5 m either side of the Disturbance Footprint to monitor individual numbers and the health and condition of retained individuals, which will include the presence of insects that predate on cycads and feral pig presence (*Sus scrofa*).
- Machinery will be located in areas outside the known vicinity of individuals, and areas which contain *Cycas megacarpa* individuals or habitat that has been clearly demarcated as ‘no go’ zones outside of the Disturbance Footprint.

5.1.2 Greater Glider (*Petauroides volans*)

RFI 4.2.3 Describe specific methods that will be implemented to avoid habitat fragmentation for this species

Vegetation clearing required for the construction of the Project would result in direct impacts of up to 244.7 ha of likely or current denning habitat, 175.8 ha of potential or future denning habitat and 206.0 ha of foraging and dispersal habitat. The Project is linear in nature and has been designed and sited within the Study Area to maximise the use of existing cleared areas and minimise overall habitat fragmentation. However, clearing widths in some Disturbance Footprint locations would be greater than the greater glider (southern and central) is able to volplane. Within the access road corridor, connectivity will be largely maintained as clearing widths will not exceed this volplane distance (post-construction clearing widths of approximately 8 m for the majority of the access road corridor – the current road footprint is approximately 4–5 m) within mapped potential habitat.

To minimise this impact, a number of mitigation measures have been developed and are provided below and in **Section 9** of Attachment B4 (Assessment of Matters of National Environmental Significance). These are summarised below.

Enclosed Areas

In some areas, the Disturbance Footprint creates habitat fragments by enclosing potential habitat with roads or other infrastructure (i.e. electrical reticulation and associated clearing) of which, widths exceeds the volplane distance of the species. Although the *Guide to Greater Glider Habitat in Queensland* (DES 2022) states that any RE that has been identified as greater glider habitat, no matter how fragmented, will have value for greater gliders if hollow-bearing trees are present, it is recognised that the species is sensitive to fragmentation (DCCEEW 2022b) and has low viability in small remnants. With consideration of this guidance, any fragments, irrespective of area, may not be viable to sustain greater gliders. Although larger enclosed areas (i.e. >20 ha) may be able to support the ecological requirements of a population of the species, these areas may still contribute to reduced genetic variation and ultimately impact the viability of any population present.

Where greater glider (southern and central) habitat has been enclosed, fragmentation mitigation measures have been considered including glide poles and pinch points. In some cases, enclosed areas are small and fragmentation mitigation measures are not viable. These areas have been included in impact calculations.

Despite the fragmentation impacts that would be sustained, suitable habitat would remain in adjacent areas and the Project would not result in a number of small patches being retained in a broadly cleared landscape.

Pinch Points

Nineteen ‘pinch points’ are proposed within the Disturbance Footprint associated with areas of greater glider (southern and central) modelled habitat to maintain movement opportunities and minimise fragmentation impacts on the species. Pinch points describe locations of the Disturbance Footprint which are reduced in width to the extent that individuals can readily disperse across (i.e. based on usual volplane distances, the clearing will have a width no greater than 1.2 times the average canopy height at that location). The access road corridor has been designed to minimise fragmentation impacts for greater glider. Additional pinch points have not been identified in this area, as the road access corridor does not exceed the volplane distance of the species within suitable habitat, and as such it effectively serves as a pinch point Throughout. A total of 19 pinch points has been proposed for the Project (**Figure 5.1**).

Glide Poles

Glide poles will be established in areas where mapped greater glider (southern and central) habitat is intersected by the Disturbance Footprint. Areas prioritised for glide poles include sections of the Disturbance Footprint where the species is known to occur, areas which intersect with likely or current denning habitat, or areas of any habitat type which occur along enclosed sections of the Disturbance Footprint.

Glide poles were strategically placed to maximise movement options for greater glider (southern and central), particularly in areas where the Disturbance Footprint may present a barrier to movement. These locations were selected in consideration of potential movement pathways for the species (creek lines or eucalypt gullies) particularly where high value habitat such as likely or current denning occurs on either side of the Development Corridor. It should be noted that in areas under the 275 kV line where clearing widths are up to 70 m–100 m, glide poles are likely to be ineffective and hence pinch points have been preferred wherever they are feasible.

Where glide poles were placed around enclosed areas, consideration was given to the movement options for individuals once they have exited the enclosed area. For example, glide pole placement was prioritised to facilitate movement into high value habitat including likely or current denning habitat.

The highest density of glide poles will be placed within these areas to afford maximum dispersal opportunity for any individuals which may occur within enclosed areas, and where the highest abundance of individuals is expected to occur (within likely or current denning habitat and where the species has been previously observed). While in areas of foraging and dispersal habitat where no enclosed areas occur along the Disturbance Footprint, a lower density of glide poles is proposed. A total of 38 glide poles have been proposed for the Project (**Figure 5.1**). Glide poles will be 15 m high throughout the Disturbance Footprint, with the exception of 5 locations beneath 33 kV line where 8 m glide poles are proposed to account for clearance requirements. At these locations, clearing widths are up to 30 m (**Figure 5.1**).

As there is still some uncertainty around the use of glide poles by greater glider (southern and central), a glide pole monitoring program will be developed to determine the efficacy of this mitigation measure.

Glide Pole Monitoring Program

To identify the effectiveness and utilisation of glide poles, a monitoring program will be developed. This monitoring program will determine if the fauna movement infrastructure is effective in aiding movement of the greater glider (southern and central) and maintaining connectivity across habitat areas. The monitoring program will include the following:

- Regular monitoring over an appropriate period of time (up to 5 years) in areas where the species has been previously recorded and where habitat may be fragmented. This includes monitoring glide poles for utilisation, as well as general population monitoring. This will identify if glide poles are being used and if the species is dispersing or persisting in all areas of potential habitat.
- Monitoring would likely include the use of camera traps, spotlighting and scat surveys. The camera traps would be set up to view the glide poles such that it can be determined if gliders are utilising these poles to disperse, as well as to determine use of habitat within and outside of potentially fragmented areas.

Greater monitoring effort will be undertaken in areas where the species has been previously recorded and habitat is of the highest quality. This will be the most effective way to identify if the greater glider (southern and central) is persisting within habitat adjacent to the Disturbance Footprint and/or dispersing across the Project using the glide poles or natural vegetation.

If within two years there is no evidence available to demonstrate adequate use of glide poles for dispersal across the Disturbance Footprint, corrective actions will be identified and implemented to provide movement opportunity for this species. Dispersal by use of glide poles will be considered adequate if there are multiple observations of the species utilising glide poles during a 12 month period of the monitoring program. If other methods for fauna movement cannot be developed or do not support movement for the greater glider (southern and central) within a subsequent two years of monitoring post implementation, supplementary offsets for the resulting fragmentation impacts for the isolated population will be developed.

Supplementary Offsets

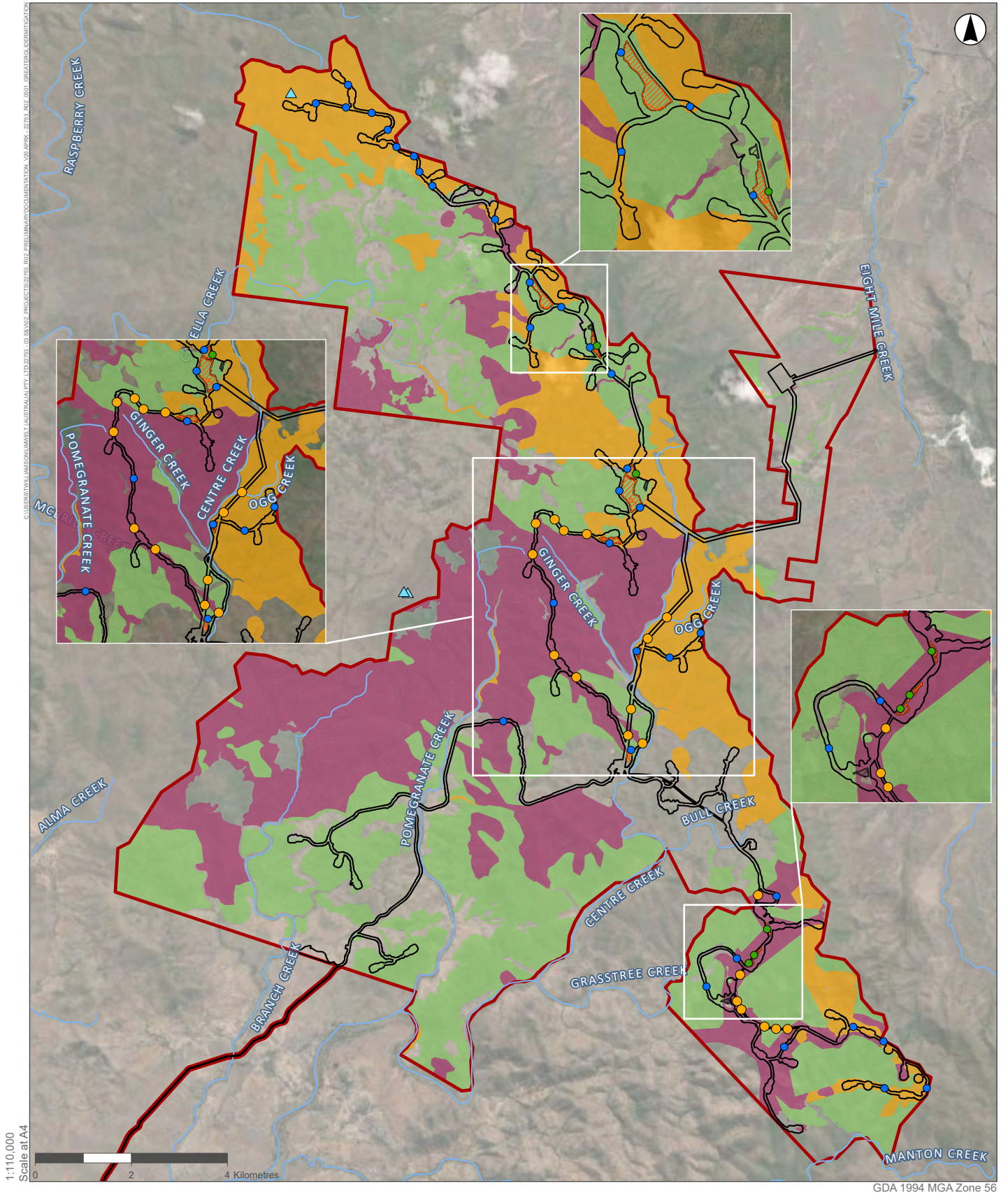
Where pinch points are included in design and provide suitable dispersal opportunities to adjacent habitat, habitat fragments are considered to be functionally connected and maintain their viability as habitat in the long-term. However, as there is still some uncertainty around the utilisation of glide poles by greater glider (southern and central), habitat fragments which only include glide poles and no pinch points may require supplementary offsetting if glide poles are not found to be effective during the glide pole monitoring program. Areas which may require supplementary offsets are presented in **Figure 5.1**. The magnitude of supplementary offsets is presented in **Table 5.4** below.

Table 5.4 Enclosed areas potentially requiring supplementary offsets

Habitat Category	Enclosed area (ha) potentially required supplementary offsets
Likely or current denning habitat	4.1 ha
Potential or future denning habitat	2.3 ha
Foraging or dispersal habitat	34.4 ha
Total	40.8 ha

Additional Fragmentation Mitigation Measures

- Every effort would be made to retain suitable hollow bearing trees (those containing hollows >8 cm diameter) within areas identified as breeding and denning habitat including *E. moluccana* woodlands. The retention of trees >30 cm DBH on patch edges would be prioritised next in areas of potential greater glider habitat. Trees to be retained within the Disturbance Footprint must be clearly demarcated and avoided. If deemed necessary, a Tree Protection Zone (TPZ) may be established.
- In areas of habitat where greater gliders are known to occur (i.e. the far northern Study Area), cleared suitable hollows (>8 cm diameter) would be replaced at a 1:2 ratio with a suitable nest box, to be installed in adjacent habitat (i.e. two nest boxes for every hollow removed). A nest box is considered suitable if it is a design known to be used by the greater glider.
- Design measures have sought to cross watercourses at as close as possible to 90 degrees to minimise clearing of riparian vegetation, noting that these areas may provide important corridors for the species.
- No barbed wire fencing would be installed as part of the Project unless strictly necessary (i.e. substation).



Legend

- Proposed 8m Glide Poles
 - Proposed 15m Glide Poles
 - Pinch Points
 - ▲ Greater Glider (Southern and Central) Record (Umwelt)
 - ▭ Disturbance Footprint
 - ▭ Study Area
 - ▨ Potential Supplementary Offset Areas
 - ▨ Enclosed Areas without Poles (Additional Impact Areas)
- Greater Glider (Southern and Central) Habitat**
- Foraging and dispersal
 - Likely / current denning
 - Potential future / denning

GDA 1994 MGA Zone 56

FIGURE 5.1

GREATER GLIDER MITIGATION AND POTENTIAL SUPPLEMENTARY OFFSET AREAS

5.1.3 Northern Quoll (*Dasyurus hallucatus*)

RFI 4.2.4 Describe methods that will be used to avoid Northern Quoll habitation of construction associated debris and equipment.

It is acknowledged that northern quoll are opportunistic and that shelter sites are non-specific and they have been observed using human dwellings (Hill & Ward 2010). During construction, laydown areas where construction equipment is stored may present denning opportunities for northern quoll (i.e. in pipes or crevices created by stockpiling of materials). If an individual was to utilise this construction equipment, there is an associated risk of disturbance, injury or death through crushing when the materials are moved.

To mitigate this risk, it is proposed that construction areas that may inadvertently provide potential denning opportunities through stockpiling of materials, would have fauna exclusion fencing installed around the perimeter (refer to **Table 5.2** of this report and **Section 9** of Attachment B4 (Assessment of Matters of National Environmental Significance)).

5.1.4 White-throated Needletail (*Hirundapus caudacutus*)

RFI 4.2.5 The referral notes that White-throated Needletail are at very high risk of turbine collision risk from impacts for the project. The proponent notes that given the implementation of the Preliminary Bird And Bat Adaptive Management Plan, it is considered unlikely that the Project will lead to a long-term decrease in the population. Provide a detailed discussion on methods that will be used to avoid collision strike to this species.

A Preliminary Bird and Bat Adaptive Management Plan has been prepared for the Project (Attachment G). The Preliminary Bird and Bat Adaptive Management Plan was developed using baseline ecological data, pre-commissioning bird utilisation survey data and the outcomes of the bird and bat utilisation risk assessment. The species is deemed a very high risk of collision strike.

Given the outcomes of the risk assessment, a mathematical CRM for the species was also prepared by Biosis (**Appendix B** of the Preliminary Bird and Bat Adaptive Management Plan (Attachment G)).

The outcomes of this assessment are summarised below:

- At a lower, conservative extreme, the results at 0.99 dynamic avoidance rate are about 0.17 collisions per annum for white-throated needletails. This would equate to an approximate average of one white-throated needletail collision in 5.9 years.
- Results for the highest avoidance rate of 0.999 (estimated annual collision of approximately 0.02) would equate to an approximate average of one white-throated needletail collision in 50 years.

The Preliminary Bird and Bat Adaptive Management Plan (Attachment G) provides a monitoring and adaptive management framework, developed to further reduce and minimise risks to the white-throated needletail population. Monitoring would include:

- Post-commissioning utilisation surveys for a period of 2 years.
- Carcass detection program, initially running for 2 years within 3 months of commencement.

The above monitoring is designed to further characterise the utilisation of the Project airspace by white-throated needletail, validate the number and location of high-risk turbines (required to carcass detection program) and detect mortality events.

The Preliminary Bird and Bat Adaptive Management Plan (Attachment G) establishes the reporting and management response framework should a mortality event occur. This framework incorporates adaptive management strategies, with investigations into mortality causation required. Mortality events are reportable to DCCEEW.

At the population level, an incremental mortality threshold has been proposed, designed to protect ecologically significant portions of the population. This threshold is 0.05% of the population. The exceedance of this threshold trigger would result in further consultation with DCCEEW, as well as the potential requirement for indirect offsets and the curtailment of relevant turbines.

Based on the above and given the predicted mortality per year (0.17 collisions per annum), a significant impact on the species, including the potential for the Project to lead to a long-term decrease in the population was deemed unlikely.

5.2 Translocation Plan for *Cycas megacarpa*

RFI 4.3.1 The Preliminary Documentation must include a discussion of the proposed avoidance and mitigation measures in the context of the department's Translocation of Listed Threatened Species – Assessment under Chapter 4 of the EPBC Act Policy Statement (2013). The policy statement can be found at: www.environment.gov.au/system/files/resources/c0463a3b-cf06-44a7-a7c6-76b488321561/files/epbc-act-policy-translocation.pdf.

Detailed responses to the avoidance of *Cycas megacarpa* are provided in the following documents:

- Attachment B4: Assessment of Matters of National Environmental Significance (**Section 9 and Appendix E**).
- Attachment E: Preliminary *Cycas megacarpa* Species Management Plan.

Further, the response to RFI 4.2.1 and 4.2.2 provides an account of the avoidance of cycad individuals for the Project.

The *Policy Statement: Translocation of Listed Threatened Species – Assessment under Chapter 4 of the EPBC Act* (DSEWPaC 2013) provides guidance on the appropriateness and demonstrable requirements for an action that proposed translocation as a measure to mitigate or compensate for impacts. As detailed in RFI 4.2.1 and 4.2.2, the Project has incorporated avoidance principles throughout the design process, including specifically for *Cycas megacarpa*. Given the large population within the Study Area, avoidance of all individuals was not possible, and a residual impact on *Cycas megacarpa* on a projected 3,727 individuals remains. The ongoing avoidance of individuals through micro siting or retention under overhead lines is also proposed and would be further defined as the Project footprint is finalised.

The translocation of *Cycas megacarpa*, as well as the retention of sustainable translocated populations is established. As such, to minimise impacts to the population situated within the Study Area, translocation is proposed, in conjunction with land-based habitat offsets. Recipient sites located within the current population geographic extent is also proposed minimising population fragmentation impacts.

Where practicable, direct impacts on the species would aim to be avoided and/or minimised through the implementation of an overall performance objective being that there is a no net loss of individuals. This would be achieved through the following:

- All healthy *Cycas megacarpa* that cannot be avoided would be translocated to identified recipient sites in suitable nearby habitat within the wider Study Area.
- Any individuals that cannot be translocated due to poor health, or that do not survive the translocation, would be replaced with propagated plants at a ratio of 1:2.
- Translocation activities including salvage, seed collection and propagation for *Cycas megacarpa* have been successfully used on other linear projects on a smaller scale to this project in Central Queensland.

Based on the current projections of *Cycas megacarpa* impacted by the project the translocation program would result in the addition of approximately 1,118 individuals to the local population.

RFI 4.3.2 The preliminary translocation plan for *Cycas megacarpa* must be attached to the Preliminary Documentation as an appendix.

The Preliminary Translocation Management Plan for *Cycas megacarpa* has been provided as Attachment J.

RFI 4.3.3 Estimate the number of individuals to be translocated, noting their source location from the project footprint.

It is estimated that approximately 3,727 *Cycas megacarpa* individuals would be translocated to recipient sites. The source location will be throughout the Disturbance Footprint, wherever individuals are present. Habitat and known records of *Cycas megacarpa* are shown on Figure 3.3 and **Figure 3.4** respectively. Further details relating to the source location within the Disturbance Footprint can be found in **Section 4.1** of Attachment J (Preliminary Translocation Management Plan for *Cycas megacarpa*).

RFI 4.3.4 Identify the site/s for *Cycas megacarpa* translocation, and provide justification for site selection.

The translocation of plants from the Mount Hopeful site into other *Cycas megacarpa* populations, and that the addition of new plants, is likely to enhance the genetic diversity of receiver populations. Seedlings added to any potential offset populations created from translocated plants are also unlikely to lead to outbreeding depression and these would ideally be sourced from multiple locations to reduce the changes of genetic swamping by particular allelic variants.

A number of recipient sites have been identified for the species to be translocated to within the Project locality. The recipient sites allow for the challenges within the local landscape. That is, the sites allow for ongoing access for the purposes of monitoring and management and the habitat is known to support the species and that there is likely to be sufficient carrying.

Suitable areas which can be a recipient site or where recipient sites can be located are considered viable due to the following:

- Presence of *Cycas megacarpa* (i.e. the sites are in habitat contiguous with the impact area and in some cases the same cycad clusters being impacted).
- The habitat is known or suitable for cycads, noting that it is not uncommon for this species to have clear geographical breaks despite the presence of suitable habitats. Key considerations include the presence of suitable crown cover to protect the plants, especially seedlings and proximity to known cycads which is important for genetic variability, linkage and pollinators.

- Whether the site can link or supplement clusters and/or populations (i.e. enhance the viability of the population) including re-establishing the species in areas where the species has been targeted by landholders.
- The sites are accessible and do not pose a significant safety risk.
- Threats such as weeds and fires could be mitigated within the recipient sites and adjacent areas.

Site 1 is approximately 99 ha in area and is located within the locality of the Project. The area is known to support cycads and is located within a different catchment to the rest of the Study Area. The site is connective with habitat in the Bouldercombe Gorge Resource Reserve. The site has been mapped by Umwelt and the State as predominantly regrowth associated with RE 11.12.1, with numerous cycads in this area.

Site 2 is approximately 1,024 ha and has been predominantly mapped by Umwelt as RE 11.12.6 with areas of RE 11.12.1 and vine thicket (RE 11.12.4). This area was ground-truthed and cycads were detected. This area is located on upper slopes of steep hills making distribution of seeds once the plants are established a benefit of this area.

Site 3 is approximately 624 ha and mapped by the State as high value regrowth (RE 11.11.3/11.11.15), with a section mapped by Umwelt as non-remnant, RE 11.3.25, RE 11.11.3 and RE 1.11.15 – there are a lot of cycads in this area and it would be preferred to keep the plants in the same catchment.

Site 4 is approximately 460 ha. The area has been mapped by Umwelt as predominately non-remnant, with patches of regrowth associated with RE 11.3.25 and RE 11.11.4. This area was ground-truthed in part and only a small number of cycads were detected. Cycads in this area are likely to be associated with Population 5 and where the species has been previously cleared or poisoned.

Site 5 is connective with Don River State Forest. Umwelt has mapped the area as remnant and regrowth predominately associated with RE 11.11.3, along with areas of RE 11.12.6 and non-remnant areas.

In addition to securing the land, the final location of the recipient sites and the size will be determined following field work to confirm the carrying capacity of the sites and suitability in terms of geology, along with ensuring that risks from the works will not impact on other ecological and cultural values in the area.

Additional field assessments of these sites will need to be undertaken by a suitably qualified and experienced ecologist to determine the following information gaps:

- Soil type(s).
- Vegetative habitat and condition.
- Planting areas and finalising locations for translocated and propagated individuals to go.
- Presence/absence and abundance of *Cycas megacarpa*. This includes identifying plants to be used as part of the reference monitoring.
- Potential values for or presence of other threatened flora species.
- Presence/absence of pollinators.

- Potential threats and constraints including:
 - Accessibility and site security.
 - Water availability and associated infrastructure requirements.
 - Weed prevalence and potential management requirements.
 - Domestic and feral animal management requirements.
 - Insect attack and soil borne pathogens.
 - Fire risks.

The findings of the field assessments will be used to inform the recipient site preparatory requirements and support preparation of the recipient area management sub-plan which will include recommended actions to manage the site both prior to and post translocation activities. This will also include addressing the following:

- The specific edaphic conditions and elevation range within which the species is known to occur.
- The population demographics and long-term viability of the population, including:
 - Specific pollination mechanism of the species, and the potential to further fragment the species distribution by reducing cross-pollination between sub-populations.
 - Dioecy of the species⁷, and how female and male plants will be distributed to maintain reproductive capacity of the translocated population.
 - Genetic drift.

The recipient sites are on private properties and access to the sites will be restricted. The locations of the translocated individuals should not be visible from public roads.

Genetics studies indicate that there are no anticipated impacts of outbreeding depression that would result from the translocation of plants from the Mount Hopeful site into other *Cycas megacarpa* populations and that the addition of new plants is likely to enhance the genetic diversity of receiver populations. Seedlings added to any potential recipient populations created from translocated plants from Mount Hopeful population are also unlikely to lead to outbreeding depression and these would ideally be sourced from multiple locations to reduce the changes of genetic swamping by particular allelic variants.

RFI 4.3.5 Describe the design of the translocation program, including timeframes for implementation. The design should include consideration of:

- **the specific edaphic conditions and elevation range within which the species is known to occur;**
- **the population demographics and long-term viability of the population, including:**
 - **specific pollination mechanism of the species, and the potential to further fragment the species distribution by reducing cross-pollination between sub-populations;**

⁷ This will be a challenge as the sex of the plants is generally unknown. As noted in Section 4.2 of the Preliminary Translocation Management Plan for *Cycas megacarpa*, only a small fraction of the population can be identified as male or female.

- **dioecy of the species, and how female and male plants will be distributed to maintain reproductive capacity of the translocated population; and**
- **genetic drift.**

The Preliminary Translocation Management Plan for *Cycas megacarpa* (Attachment J) describes the design of the translocation plan in detail including timeframes for implementation and in consideration of the items above. Specifically, this detail can be found in the following sections:

- The specific edaphic conditions and elevation range within which the species is known to occur (refer **Section 1.0** and **Section 5.0** of Attachment J).
- The population demographics and long-term viability of the population, including:
 - Specific pollination mechanism of the species, and the potential to further fragment the species distribution by reducing cross-pollination between sub-populations (**Sections 4.2, 5.0, 6.1.1, 8** of Attachment J).
 - Dioecy of the species, and how female and male plants would be distributed to maintain reproductive capacity of the translocated population (**Sections 5.0, 6.1.1, 6.1.2, 8.1.1, 8.1.2, 11.1.2** of Attachment J).
 - Genetic drift (**Section 5** of Attachment J).

RFI 4.3.6 Provide strategies for *Cycas megacarpa* propagation, including seed sourcing, to cover individual mortality as a result of the proposed action both before and after translocation.

Sections 8, Section 13 and **Section 14** of Attachment J (Preliminary Translocation Management Plan for *Cycas megacarpa*) present a detailed methodology for seed collection, propagation and planting. This is summarised below.

To meet the performance outcomes of a no net loss of *Cycas megacarpa* individuals, and to replace those lost at a 1:2 ratio it is estimated that 4,845 salvaged and propagated *Cycas megacarpa* will need to be alive within the recipient sites seven (7) years post translocation and preferably five years post the end of maintenance works. This includes 2,609 translocated individuals and 2,236 propagated individuals (i.e. 1,118 cycads of the 3,727 individuals within the Disturbance Footprint will be required to be replaced at 1:2).

To support this requirement and accommodate likely attrition rates, it is estimated that 6,519 seeds will need to be collected and propagated. This figure incorporates a 1:2 replacement ratio (for expected fail rates through salvage activities **(TBC)** and plants that cannot be salvaged **(TBC)**) as well as anticipated seedling survival in terms of seed viability (70% though the natural viability is likely much lower given the number of seedlings present in the field), strike rate (70%) and survival once planted into the recipient sites (70%).

At least 3,194 propagated individuals will be planted into the recipient sites where they will be monitored and managed for a minimum period of two (2) years post translocation.

These numbers will continue to be reviewed by a specialist ecologist in response to actual deaths in the translocated cycads, along with seed viability and strike rates.

With the exception of those within the Disturbance Footprint, the seeds will be collected from the wider population (preferably from the Study Area and/or Offset Area) to help ensure that the impacts from the legal harvesting of seeds on the population(s) is negligible (refer **Section 8.1.1** and **Section 8.1.2** of Attachment J (Preliminary Translocation Management Plan for *Cycas megacarpa*)).

To encourage genetic variation within the recipient sites, the methodologies outlined below ensure that any seed collected will not be restricted to those clusters/population(s) being directly impacted by the project works.

Propagation and Management

In consultation with key nursery personnel and a specialist ecologist, the Project proponent will develop and implement specific propagation, horticultural management and monitoring methods for *Cycas megacarpa* seeds that are collected as part of this program.

As a minimum, these methods will detail how the seeds will be propagated and managed in nursery conditions under the supervision of a suitably qualified and experienced horticulturist. The lead horticulturist will ensure that the seeds and any treatments applied can be tracked from collection; through the propagation process; and until they are transported to the recipient sites for planting out.

Once finalised, these methods will be included either within this section or as an appendix to this Plan.

Planting Out

As part of this program, *Cycas megacarpa* will be grown from seed within a controlled nursery or bush-house environment and planted into the recipient sites once sufficient maturity is achieved. Due to the number of propagated individuals required and the limited availability of seeds in the wild, it will take several years to collect, propagate and plant out the specimens within the recipient sites (3-5 years from collection).

Project proponent will confirm the dates for each planting round at least six (6) months in advance. This will be communicated to the nursery personnel so that appropriate preparatory measures can be undertaken.

Prior to planting out, propagated specimens will undergo a hardening off period in order to prepare them for local conditions at the recipient site, this is particularly relevant for watering rates, humidity levels and sun/shade tolerances under nursery conditions. This hardening off should commence at least six (6) months prior to scheduled planting activities.

Once ready for planting out, the propagated individuals will be marked with hi-visibility paint on their north facing side (nontoxic) and have the following baseline information recorded against their ID:

- Crown condition.
- Foliage development stage and any deformities.
- The presence of invertebrates including potential pollinators.
- The presence and degree of insect attack.
- Overall condition and other relevant observations.

If it does not already have one, each plant will be individually tagged with a unique identification code (fireproof/resistant aluminium tag)⁸.

It is recommended that a photolog be taken to confirm the condition of the plants prior to leaving the nursery and/or bush-house.

Care will be taken in the transportation of plants from the nursery and/or bush-house to the recipient sites, and to ensure that the plants are kept cool during transportation.

The planting of propagated individuals will follow the methods outlined in **Section 7.2** of Attachment J (The Preliminary Translocation Management Plan for *Cycas megacarpa*).

RFI 4.3.7 Provide strategies to minimise fragmentation of the impacted and translocated populations, with consideration of the criteria for viable populations of the species and that viable populations are required to ensure long-term survival of the species.

Section 5 of Attachment J (Preliminary Translocation Management Plan for *Cycas megacarpa*) provides detail regarding the translocation of *Cycas megacarpa* into recipient sites. The approach being taken by the Project is that recipient sites are located within the impacted or adjacent land parcels, with translocated individuals being retained within the geographical extent of the population recorded within the Study Area. It is intended that recipient sites would form part of environmental offset areas, and their final location would consider a range of factors including habitat connectivity with the impact area and that the site can link or supplement existing clusters or re-establish the species in areas historically targeted by landholders. Based on current projections, the translocation program would result in the addition of at least 1,118 individuals to the local population (**Section 1** of Attachment J (Preliminary Translocation Management Plan for *Cycas megacarpa*)).

RFI 4.3.8 Provide contingency measures to cover for extreme environmental conditions such as prolonged drought and extreme bush fires, limited seed availability, low propagation success, and/or weed proliferation.

It is acknowledged that there are a number of environmental factors that may limit the success of the translocation program including:

- Translocated individuals dying.
- Hot bushfire impacting on existing populations.
- Hot bushfire impacting transplanted/propagated individuals.
- Seed recruitment being reduced through feral pigs.
- Juveniles being smothered by weeds.
- Illegal harvesting or clearing.
- Propagated seeds not germinating.

⁸ This tag must allow the plant to be traced back to the parent plant and the associated monitoring captured during its time in the nursery/bush house.

As such, contingency measures to protect translocated individuals from extreme weather conditions have been provided in Attachment J (Preliminary Translocation Management Plan for *Cycas megacarpa*). Specifically, these can be found at the following locations:

- **Fire:** Sections 7.2, 8.1, 10, 11.1.2 and 13.3.
- **Prolonged drought:** Sections 14.1.1.
- **Limited seed availability:** Section 8.1.
- **Low propagation success:** Sections 8.1.2, 12.1.3, 12.2.2 and 14.1.1.
- **Weed proliferation:** Sections 6.1.4, 7.3, 8.1 and 10.

The Preliminary Translocation Management Plan for *Cycas megacarpa* (Attachment J) and/or the overarching management plans identify specific measures to manage and mitigate the risk from these events. However, the following is specifically noted in the **Section 13.3** of the Preliminary Translocation Management Plan for *Cycas megacarpa* with regard to fires:

- If a wildfire appears to negatively impact on individuals present within any of the recipient sites, translocated and reference site individuals would be monitored for a period of 12 months post impact. If they do not recover within this period (i.e. no indication of growth) the project proponent would consult DCCEEW and/or DES regarding potential compliance implications on the translocation and monitoring programme and an appropriate course of action.

RFI 4.3.9 Provide details of ongoing management of the translocated population/s, including monitoring programs, reporting requirements and corrective actions to support an adaptive management approach and determine the success of the program.

Details of ongoing management have been provided in Attachment J (Preliminary Translocation Management Plan for *Cycas megacarpa*). The above items have been addressed at the following locations:

- **Horticultural management:** Section 10.
- **Monitoring:** Section 11.
- **Reporting and communication:** Section 12.
- **Correction and prevention:** Section 13.
- **Compliance and evaluation:** Section 14.

Outlined below are specific measures relating to the management of salvaged/transplanted individuals within the recipient sites. It is expected that the horticultural management of these individuals will occur over a minimum period of two (2) years.

The duration of the management and maintenance requirements for *Cycas megacarpa* are based on both the guidelines outlined by Commander (2018) and horticultural management programs previously undertaken for *Cycas megacarpa* translocations in Central Queensland. As a minimum, the following shall occur:

- Depending on rainfall and soil moisture, each plant shall be given up to 15 litres of water once per month for the first 12 months into the post translocation program or as appropriate (higher frequency may be required in drier periods and lower in the wet season). The watering regime should be staggered down over months 13 to 24 so that plants are sufficiently hardened off to local conditions at the end of a two (2) year period.
- A soil moisture meter should be used to determine water requirements within the recipient site.
- Plants shall be given an appropriate growth stimulant at least monthly until new signs of growth are clearly visible.
- When Cycads begin to show signs of growth, they should be sprayed thoroughly with a systemic insecticide (e.g. Crown or Confidor) to reduce insect attack. These systemic insecticides should be applied at a high concentration (e.g. 5 ml Crown per 9 L of water; 10 ml Confidor per 9 litres of water)⁹.
- Plants will be checked for insect attack at least fortnightly for the first six (6) months of the post translocation program and then as required (min. monthly inspections). If pest attack is observed, particularly on new growth, plants will be managed accordingly.
- Plants will be checked within 1–2 weeks following a high rainfall event to mitigate against severe insect attack (particularly around the Cycad base)¹⁰.
- Plants should be treated with an appropriate fungicide once a month for the first 6–12 months and then as required for the next 12 months.
- Plants will be checked for signs of rot and/or pest intrusion into the base and subterranean base at least fortnightly for the first six months of the post translocation program and then as required (min. monthly inspections). If rot or pest intrusion is observed, plants will be managed with appropriate fungicides and pesticides accordingly.
- The pH levels around a sample of salvaged Cycads will be checked at least monthly for the first six (6) months to ensure soil chemistry is optimal.
- Application rates of all horticultural treatments (including watering) will be recorded on a pro-forma (hard copy or electronic) for each site visit. Any observations such as rot and/or additional ameliorative measures undertaken on specific plants shall also be recorded on the pro-forma during each visit.
- The pro-forma data will be entered into an appropriate database such as excel with copies sent to the Specialist Ecologist on a monthly basis. This will allow for data migration into the larger program management tool maintained by a specialist ecologist.

Specific measures relating to the management of the recipient site(s) in general will be outlined in a management plan for the areas (forming part of the broader offset area management plan) and agreements between project proponent and the landholder(s). Activities are likely to include:

⁹ This is particularly relevant for the first flush post translocation where frond development is critical to support root development. After this, insecticides and herbicides should be scaled back to support the re-establishment of pollinators around translocated individuals.

¹⁰ Often severe insect attacks, particularly by blow fly's on the root systems of the Cycads, coincides with high rainfall events. If a high rainfall event occurs (e.g. spring rains) outside the fortnightly maintenance checks, it is recommended that the contractor undertake a maintenance check 1-2 weeks following the event.

- Fire breaks will be established around the recipient sites and offset area. Fire breaks will be inspected and managed at the beginning of each dry season. Fuel loads around translocated plants will be removed or reduced to manage risk.
- Weeds within the recipient site will be managed. The focus of weed reduction will be in areas containing *Cycas megacarpa*.
- Pest species, particularly pigs (*Sus scrofa*) will be managed within the recipient areas and larger offset area.
- Site fencing which may be established around the recipient site(s) to exclude cattle for at least two (2) years post translocation.

RFI 4.3.10 Provide objectives of the translocation program, including success criteria and performance indicators, including details of any baseline data and proposed monitoring required to demonstrate progress towards achieving these objectives. Success should consider the long-term implications of translocation, including both survivorship and reproduction of translocated individuals.

RFI 4.3.10 is addressed in Attachment J (Preliminary Translocation Management Plan for *Cycas megacarpa*). Success criteria and performance indicators have been quantified and are described in **Section 14.1**. Detailed monitoring requirements have been developed for the Project and are identified in **Section 11**. These are summarised below.

Performance Outcomes

Outlined below are the desired criteria for translocation success for *Cycas megacarpa*. These criteria may require modification post the direct count surveys, and as works are undertaken throughout implementation of the translocation, propagation and maintenance works.

It should be noted that the level of success the program achieves is likely to be incumbent on the horticultural management program – specifically the duration and intensity of the program during post translocation activities and the understanding of the monitoring team regarding the issues that arise with the transplanted individuals.

Translocation Success

Salvaged individuals

- 70% of the salvaged individuals are alive seven years after planting or five years after the end of maintenance activities¹¹.
- Fruiting is recorded on at least 5% of salvaged individuals (of reproductive height) or comparable to the percentage fruiting occurring within the reference sites (whichever is less) upon the completion of the monitoring program¹².
- The overall health of directly translocated specimens is equal to or better than those within the reference site. This may for example include: crown health; trunk condition; degree of invertebrate attack and reproductive capacity.
- Active recruitment at year 15, along with demonstrating the trends above.

¹¹ This survival rate has been achieved for at least four (4) Queensland Cycad translocation programs under the same methodology and core translocation team members over the past 12 years.

¹² This measure will also assist in confirming the presence of pollinators across the recipient site areas.

Propagated individuals (once planted out)

- 70% of the propagated individuals are alive five years after the end of horticultural maintenance activities¹³;
- The overall health of propagated individuals is equal to or better than those of similar age class within the reference site. This may for example include: crown health and degree of invertebrate attack.

Propagation success

- At least 70% of propagated individuals are alive, healthy and able to be planted out during the scheduled timeframes.

Overall success

The criteria for overall success (i.e. no net loss of cycads) of the program are as follows:

- 70% of the salvaged individuals are alive seven years after planting and 70% of propagated individuals are alive seven years after planting, including five years post the end of horticultural maintenance.
- There are twice as many *Cycas megacarpa* (as those lost due to translocation activities or which cannot be salvaged from the Project) surviving in the recipient areas after seven years of monitoring post planting.
- The overall health of translocated specimens is equal to or better than those within the reference site/s.
- Plants grow without direct management to support individual *Cycas megacarpa* for a minimum of five years.
- Active recruitment at year 15 within the salvaged individuals.
- The clearing and management of *Cycas megacarpa* was undertaken in accordance with applicable permit conditions.
- The methodologies outlined in this Plan were complied with:
 - Maintenance and/or management concerns noticed during the monitoring surveys were relayed back to the project proponent and/or the applicable 3rd party within a reasonable timeframe and corrective actions implemented.
 - At least one (1) report for each 12-month monitoring period was received by the project proponent for submission to DCCEEW and DES. This report complied with the monitoring and reporting methodologies outlined in this Plan.
 - A final report at the end of the monitoring period was received by the project proponent for submission to the relevant government agencies. This report complied with the reporting methodology outlined in this Plan.

¹³ This survival rate has been achieved for at least four (4) Queensland Cycad translocation programs under the same methodology and core translocation team members over the past 12 years.

Monitoring

The ongoing care, management and monitoring of translocated individuals is vital for success of any translocation program. Changes to the recipient site over time will need to be recorded so that any problems or threats to the translocated plants can be detected and responded to early, minimising impacts to the individuals. Monitoring will also be critical in evaluating the success of the translocation program and provide invaluable data for future translocation efforts, particularly those relevant to cycad species which are often conservation significant species (Queensland Herbarium 2007).

The monitoring program will be led by a suitably qualified and experienced specialist ecologist (refer **Section 3** of Attachment J (Preliminary Translocation Management Plan for *Cycas megacarpa*). Support ecologists may not have direct experience with cycad translocation but will have experience in carrying out ecological monitoring including data collection and reporting.

The monitoring of salvaged and reference site individuals will be undertaken for up to 15 years post translocation. It is anticipated that propagated individuals will be planted out over several years and will be monitored for a minimum of two (2) post translocation (per planting round). A final monitoring event will be completed at year 15 to confirm that the plan has been successful.

The monitoring results will be forwarded to DES and DCCEEW annually for at least five years following the final planting of salvaged and translocated specimens.

RFI 4.3.11 Provide an assessment of the likely success of translocation of *Cycas megacarpa*. This should be supported by robust scientific evidence, including published literature, scientific reports, and monitoring reports from previous translocation programs for this species.

There is currently no evidence to suggest that the translocation activities would fail if the Translocation Management Plan for *Cycas megacarpa* is implemented. This plan has been developed in consultation with a range of relevant experts and has been successfully implemented on a number of similar Projects / cycads programs in the past decade.

A detailed assessment of the likely success of the translocation program has been provided in **Section 14.1** of Attachment J (Preliminary Translocation Management Plan for *Cycas megacarpa*) and is discussed above in response to RFI 4.3.10. This section addresses translocation success in terms of success of maintaining the health of salvaged and propagated individuals over the long term. This section also describes the overall criteria for success over the life of the program.

5.3 Specific Migratory Species Avoidance, Mitigation and Management Information Required

RFI 4.4.1 The referral notes that White-throated Needletail is at very high risk of turbine collision. The proponent notes that given the implementation of the Preliminary Bird and Bat Adaptive Management Plan, it is considered unlikely that the proposed action will lead to a long-term decrease in the population.

Detail specific methods employed to minimise the threat to the White-throated Needletail.

Note: A nationally significant proportion of the population is 41 birds (0.1% of the population) and an internationally significant number is 410 birds (1% of the total population of 41 000 birds).

A Preliminary Bird and Bat Adaptive Management Plan (Attachment G) has been prepared for the Project. The plan was developed using baseline ecological data, pre-commissioning bird utilisation survey data and the outcomes of the bird and bat utilisation risk assessment. The species is deemed a Very High risk of collision strike. All proposed wind turbines are considered high risk turbines for the white-throated needletail (*Hirundapus caudacutus*) given the number and location of records in the Study Area during Project surveys.

Given the outcomes of the risk assessment, a mathematical CRM for the species was also undertaken by Biosis (**Appendix B** of Attachment G (Preliminary Bird and Bat Adaptive Management Plan)). The outcomes of this assessment are summarised below:

- At a lower, conservative extreme, the results at 0.99 dynamic avoidance rate would result in approximately 0.17 collisions per annum for white-throated needletails. This would equate to an approximate average of one white-throated needletail collision in 5.9 years.
- Results for the highest avoidance rate of 0.999 (estimated annual collision of approximately 0.02) would equate to an approximate average of one white-throated needletail collision in 50 years.

The Preliminary Bird and Bat Adaptive Management Plan (Attachment G) provides a monitoring and adaptive management framework, developed to further reduce and minimise risks to the white-throated needletail (*Hirundapus caudacutus*) population. Monitoring would include:

- Post-commissioning bird and bat utilisation surveys, twice annually for a period of 2 years.
- Carcass detection program, including:
 - Carcass search surveys, with increased effort during the spring / summer migratory period, initially running for 2 years within 3 months of commencement.
 - Carcass persistence trial, once every 6 months following commencement of operation, for a period of 2 years.
 - Carcass detectability trial, once every 6 months following commencement of operation, for at least 1 year.

The above monitoring is designed to further characterise the utilisation of the Project airspace by white-throated needletail (*Hirundapus caudacutus*), validate the number and location of high-risk turbines (required to carcass detection program) and detect mortality events.

The Preliminary Bird and Bat Adaptive Management Plan (Attachment G) establishes the reporting and management response framework should a mortality event occur. This framework incorporates adaptive management strategies, with investigations into mortality causation required. Mortality events are reportable to DCCEEW.

At the population level, an incremental mortality threshold has been proposed, designed to protect ecologically significant portions of the population. This threshold is 0.05% of the population. The exceedance of this threshold trigger would result in further consultation with DCCEEW, as well as the potential requirement for indirect offsets and the curtailment of relevant turbines.

Based on the above and given the predicted mortality per year (0.17 collisions per annum), a significant impact on the species was deemed unlikely.

5.4 Rehabilitation Requirements

The Disturbance Footprint includes a number of linear sections associated with access tracks and supporting ancillary infrastructure such as communication and power cable lines. Linear sections of the Disturbance Footprint vary in width but in some locations span approximately 100 m; these widths have been deemed necessary for the safe transport and installation of turbine infrastructure. Excluding established access tracks and fire safety Asset Protection Zones, which at all times will need to remain free of vegetation, previously cleared areas will be reclaimed and rehabilitated. Further to this, all areas of temporary ancillary infrastructure will also be subject to rehabilitation efforts including:

- Laydown areas.
- Concrete batching plants.
- Construction compound.
- Temporary worker's accommodation camp.

With current design details, it is estimated approximately 20% of the total Disturbance Footprint (i.e. the area that will be cleared for the Project) may be able to be rehabilitated following construction. This equates to approximately 177 ha of native vegetation being rehabilitated.

Rehabilitation will include the planting of native species known to the region, consistent with the characteristics of surrounding retained vegetation. Rehabilitation will also involve continuous monitoring and management, including erosion prevention, management of weed species and protection and enhancement of impacted water sources to achieve a condition of the historic vegetation at the rehabilitation site.

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

RFI 5.1 Rehabilitation acceptance criteria, including for the restoration of habitat for relevant listed threatened species and communities.

Rehabilitation measures have been identified in **Section 5** and **Section 6** of Attachment F (Preliminary Vegetation Management Plan). This includes performance criteria, mitigation measures pre and post construction and the timing required to implement these measures. Further detail will be provided in the Rehabilitation Management Plan which will be developed in response to the State approval conditions for the Project. Additionally, a Weed and Pest Management Plan will be developed and finalised prior to construction commencement.

In locations where the integrity of infrastructure would not be compromised, opportunities to create supplementary habitat for MNES values species such as the greater glider (southern and central), yellow-bellied glider (south-eastern) koala and squatter pigeon (southern) would be investigated. For example, in addition to native grasses and shrubs which would provide ground cover for dispersing koalas and squatter pigeons (southern), trees likely to form hollows in the future would also be planted as appropriate (e.g. *Corymbia citriodora*; *Eucalyptus moluccana*).

Where threatened fauna species habitat has been cleared for Project activities, rehabilitation will aim, at a minimum, to restore habitat to its original condition, i.e. to a condition where the targeted threatened species could utilise the area. As such, management measures will target habitat values required for relevant species and monitoring will ensure the required species-specific outcomes have been achieved.

To ensure that rehabilitation achieves the habitat suitability and condition requirements, both self-sustaining and active rehabilitation actions are required during progressive rehabilitation and after decommissioning of the Project. A summary of the rehabilitation criteria for areas where threatened fauna species habitat would be cleared include:

- Undertaking condition benchmark assessments during pre-clearance surveys of the Disturbance Footprint prior to disturbance (where it intersects mapped threatened species habitat). This will inform the rehabilitation requirements. The rehabilitation will not be certified until minimum habitat values have met the required benchmark.
- Monitoring of rehabilitation to ensure progression to the pre-disturbance benchmark condition. This includes monitoring the development of long-term habitat values such as hollows and canopy tree growth.
- Monitoring of seedling growth and establishment until the benchmark conditions are met. If plantings are not developing appropriately, watering programs and re-seeding efforts will be implemented, which may include soil management.
- Monitoring and active management to restrict weed growth/establishment, clearing established weeds as necessary until the benchmark conditions are met.
- Monitoring to prevent and manage pest establishment or disturbance, including from cattle, European foxes, pigs etc.
- Examples of how rehabilitation actions may benefit MNES are provided below:
 - Re-establishing appropriate ground and midstory cover to facilitate safe dispersal opportunities in the short-term (relevant to koala, squatter pigeon (southern), northern quoll and collared delma).
 - Providing and protecting groundcover (and therefore food sources and dispersal opportunities for squatter pigeon (southern)) from erosion and sedimentation.
 - Ensuring weeds are not established (which is a high risk in the early stages of re-vegetation) beyond the historical condition of the site to provide suitable squatter pigeon (southern) and koala dispersal habitat without prevention of movement.

- Improving and maintaining the condition of water sources and associated riparian vegetation impacted by the Project back to historical condition. This will support access for the squatter pigeon (southern) to the permanent water sources this species is known to depend on.
- Re-establishing other relevant vegetation strata to provide improved habitat condition and function in the longer term (relevant to squatter pigeon (southern), collared delma, koala, greater glider (southern and central) and yellow-bellied glider (south-eastern)).

RFI 5.2 A summary of the procedures, including contingency measures, that will be undertaken to achieve the rehabilitation acceptance criteria.

No direct impacts are proposed to occur outside of the Disturbance Footprint as a result of rehabilitation activities, which will be restricted to the Disturbance Footprint. To achieve this, final clearing extents within the Disturbance Footprint and no-go areas will be demarcated with flagging tape, signs and/or fencing.

Effective management and monitoring of rehabilitation activities will ensure no indirect impacts occur to retained habitat. Some key management and monitoring efforts to prevent indirect impacts to retained habitat are provided below:

- The Erosion and Sediment Control Plan (ESCP) (Attachment H) will apply to rehabilitation works. The methods outlined in this plan will ensure that indirect impacts from dust, erosion and sediment will not impact retained habitat.
- A Weed and Pest Management Plan will be developed for the Project and will apply to rehabilitation works. The Plan will include mitigation measures and corrective actions for pests and weeds to avoid indirect impacts to retained habitat.
- Material imported into the Study Area (i.e. for use as road base) will be obtained from an appropriately licensed source where the source location is deemed 'weed clean'. Evidence must be obtained from the provider prior to importation of material to the Project site. Imported fill (rocks/screenings) shall be free of contamination from mud clumps and weed seeds.
- Use only native or certified weed free seeds in all rehabilitation works, including hydro mulch. No viable weed species are to be mulched or chipped in rehabilitation works.

Where threatened fauna species habitat has been cleared for Project activities, rehabilitation will aim, at a minimum, to restore habitat to its original condition. A summary of the rehabilitation processes that will be undertaken to restore habitat values for MNES are as follows:

- Natural regeneration will be utilised as first preference, as this reduces risk of weeds and will align with the historic vegetation to develop into habitat for MNES. Where natural regeneration is insufficient, direct seeding and watering programs will be undertaken as required. Local seed sources from surrounding areas or weed-free suppliers from the local region will be used preferentially.
- In areas where the Disturbance Footprint is adjacent to sensitive areas, including retained fauna habitat, revegetation is to occur through natural regeneration and through assisted planting to create a vegetated buffer between the Disturbance Footprint and sensitive areas. The vegetation within these areas will consist of native species analogous to adjacent vegetation community.
- Recreation of micro-habitat features in the Disturbance Footprint as per the benchmark conditions identified during pre-clearance surveys. This includes establishment of nest boxes and spreading of hollow logs, large-woody debris rock piles and leaf litter mats.

Attachment F (Preliminary Vegetation Management Plan) includes procedures and contingency measures in relation to rehabilitation and the rehabilitation acceptance criteria.

Examples of contingency measures could include:

- Additional planting / seeding could occur to establish or re-establish species within rehabilitated areas consistent with the surrounding vegetation.
- Additional treatments of new weed infestations.
- Backfill the erosion, divert runoff through doming, and cap the inflow entrance point. Topsoil the channel (if topsoil available) and seed with native grass seed mix.
- This will be determined at a later stage and as rehabilitation and rehabilitation monitoring progresses.

RFI 5.3 A summary of a monitoring program to determine the success of rehabilitation activities implemented by the proponent.

A Rehabilitation Monitoring Plan will be prepared which includes the detailed monitoring methodology, refined rehabilitation acceptance criteria, monitoring sites and monitoring implementation schedule. Refer to Attachment F (Preliminary Vegetation Management Plan) for the frequency of rehabilitation monitoring during construction and operation.

RFI 5.4 The details of any rehabilitation activities proposed to be undertaken as required by Commonwealth, State or Territory, and local government legislation. Attach relevant Commonwealth, State or Territory, and local government approvals and permits as supporting documents to the Preliminary Documentation.

A Rehabilitation Management Plan which would be developed in response to the State approval conditions for the Project. Procedures pertaining to rehabilitation and restoration include the following (further detail provided in Attachment F (Preliminary Vegetation Management Plan)):

Pre-construction

- Soil (topsoil and subsoil) and vegetation stockpile locations would be identified prior to construction. The location would be in previously cleared areas and would be clearly communicated to personnel prior to the commencement of onsite works. Stockpiles would be used for the retention of soil and reinstatement of vegetation for rehabilitation works.

Post-construction

- The period between construction activities and restoration of disturbed areas would be kept to a minimum to prevent the establishment of exotic species and loss of soil.
- Disturbed areas that do not form part of the operational footprint would be re-profiled to stable and/or original contours, re-establishing surface drainage lines and other land features. Refer to Attachment H (Preliminary Erosion and Sediment Control Plan) for erosion and sediment mitigation measures.
- Compacted areas to be ripped where required and practicable to do so.

- Seed mix to contain relevant species, aligned with prior land use. The species that would be used in rehabilitation works would be identified in consultation with the landowners. Where practicable vegetation best aligned with the historic vegetation at the rehabilitation site would be selected.
- In areas where the Disturbance Footprint is adjacent to sensitive areas, revegetation is to occur through natural regeneration and through assisted planting to create a vegetated buffer between the Disturbance Footprint and sensitive areas. The vegetation within these areas would consist of native species analogous to adjacent vegetation community.
- Where rock was naturally occurring on the ground surface, the rock can be reinstated as part of rehabilitation works. Rock is not to be reinstated where its use would create a new impact or hazard to the landowner's ability to utilise their land.
- Cleared native vegetation would be mulched and reused during progressive rehabilitation activities.

5.5 Offsets

The Project proposes to impact 640.3 hectares (ha) of native vegetation (347.9 ha remnant and 292.4 ha in regrowth condition) and would likely have a significant impact on six MNES listed under the EPBC Act. In accordance with the *Environmental Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy* (DSEWPac 2012), offsets must be secured to counterbalance the significant impact to MNES and ensure an overall environmental improvement.

An Offset Management Strategy (Attachment K) has been developed for the Project which adheres to the minimum requirements for a draft Offset Management Strategy as outlined in Appendix B.1 of the RFI. The objectives of the draft Offset Management Strategy are to:

- Detail the Commonwealth regulatory framework with regard to offsets and outline the guiding principles in which this Offset Management Strategy has been prepared.
- Document MNES values known to the Project, including potential impacts and significant impacts.
- Present proposed avoidance and mitigation measures taken by the Project.
- Identify the approach to offset delivery, including target offset properties, with supporting evidence which demonstrates, for relevant MNES, the potential suitability of habitat and outcomes of habitat quality scoring undertaken.
- Provide the calculations for offset requirements for MNES using the Commonwealth Offset Assessment Guide (OAG) and present information on the methodology, justification and supporting evidence for input into the OAG.
- Describe the proposed strategy with regard to legal mechanisms for securing offsets.
- Complete a risk assessment focussing on threats to protected matters as well as the delivery of the offset.
- Demonstrate that offsets are proportionate, suitable and feasible for the identified MNES and the Project region.

RFI 6.1.1 An assessment of the likelihood of residual significant impacts occurring on relevant MNES, after avoidance, mitigation and management measures have been applied.

Consider requirement to offset residual significant impacts resulting from turbine strike.

A detailed significant impact assessment has been conducted for all relevant MNES with consideration of the implementation of the avoidance, mitigation and management measures proposed. This assessment is provided in **Appendix E** – Attachment B4 (Assessment of Matters of National Environmental Significance). Findings of these assessments determined potential significant impacts on the following six MNES may occur as a result of the Project:

- *Cycas megacarpa*.
- Northern quoll (*Dasyurus hallucatus*).
- Koala (*Phascolarctos cinereus*).
- Greater glider (southern and central) (*Petauroides volans*).
- Yellow-bellied glider (south-eastern) (*Petaurus australis australis*).
- Collared delma (*Delma torquata*).

The Bird and Bat Adaptive Management Plan (Attachment G) describes the potential requirement for offsetting impacts should a trigger threshold resulting from turbine strike be exceeded. If an impact trigger level for a threatened or migratory species is met or exceeded, an offset might be required. Offsetting impacts, including direct offsets such as the management or improvement of habitat, or indirect offsets such as funding a conservation measure may be agreed upon with DES and DCCEEW.

RFI 6.1.2 A summary of the proposed environmental offset and key commitments to achieve a conservation gain for each protected matter.

The Project Offset Management Strategy is provided as Attachment K. The strategy details the approach to offset delivery and provides a framework for further offset actions, delivered via an Offset Area Management Plan, post approval and prior to any Project impacts.

The Project will ensure offset requirements are delivered in accordance with the EPBC Act Offset Policy, and fulfil the offset principles which underpin it. To this end, the Offset Management Strategy presents an approach built on the provision of direct, proponent driven offsets, situated within the immediate region of the impact location. It is noted that other compensatory measures (which can comprise up to 10 % of the offset requirement) have, and continue to be, investigated in accordance with the EPBC Act Offset Policy. In addition, a risk assessment was undertaken analysing potential risks to protected matters as well as to the delivery of the offset.

Based on extensive field data within the Project Disturbance Corridor and proposed offset areas, the proposed offsets are considered to be appropriate and feasible for the impacted protected matters. This includes habitat for MNES being commensurate with impacted values, for which the implementation of management actions would deliver a conservation gain. Further, the proposed offset areas are situated within the region where the Project is located, intersecting mapped biodiversity corridors.

Identified habitat quality improvement opportunities and associated management actions were tailored for each specific MNES, in accordance with corresponding Conservation Advice documents and/or Recovery Plans. Offset suitability was confirmed via the OAG, with calculations adopting a conservative approach to offset delivery, ensuring that offsets will be able to be delivered in accordance with the Offsets Policy.

A summary of key management actions or focus areas to deliver a conservation gain for each MNES is provided below. The measures presented relate to habitat quality attributes identified within the scoring methodology, comprising site condition, site context and species stocking rate:

- *Cycas megacarpa*: Improvements to site condition attributes, particularly large native trees and canopy cover. Improvements to site context scoring attributes, particularly those related to threat management such as suitable fire management consistent with species' requirements and the acquisition and reclassification of unregulated vegetation to prevent selective logging and habitat clearing.
- Northern quoll: Improvements to site condition attributes, particularly restorative management actions that facilitate vegetation regeneration and development of key foraging microhabitat features. Site context attributes including feral animal control, assisted natural regeneration of vegetation (mobility) and suitable fire management consistent with species' requirements. Species stocking rate improvements, such as continued monitoring and validation of species records over time, particularly in areas of emerging habitat.
- Greater glider (southern and central): Improvements to site condition attributes, particularly density of large foraging and habitat trees. Site context attributes including threat management (feral animal control, wildfire and habitat clearing), and increased size of foraging habitat patches via assisted regeneration of cleared areas or regrowth. Species stocking rate improvements, via improved species usage scores as potential/future denning habitat matures and meets criteria for likely/current denning habitat.
- Yellow-bellied glider (south-eastern): Improvements to site condition attributes, particularly abundance of large foraging and habitat trees. Site context attributes including threat management (feral animal control, wildfire and habitat clearing), and increases to habitat patch size. Species stocking rate improvements, via new species records and improved species usage scores as emerging habitat types mature into foraging and dispersal habitat or breeding and denning habitat.
- Koala: Improvements to site condition attributes, particularly abundance of large shelter trees. Site context attributes including threat management strategies such as the legal procurement of current and future habitat, enabling species specific feral animal control, prevention of habitat clearing and appropriate fire management consistent with species' requirements. Species stocking rate improvements, via new species records and improved species usage scores as emerging habitat types mature into foraging and dispersal habitat or breeding and denning habitat.
- Collared delma: Improvements to site condition attributes, particularly restorative management actions that facilitate vegetation regeneration and development of key foraging and shelter microhabitat features. Site context attributes including threat management (wildfire and habitat clearing) specific to the species. Species stocking rate improvements, via improvements to species presence (detection within offset area or adjacent properties).

The Project is taking steps to further refine the impact footprint (detailed design) and will continue to develop the offset delivery program. Key steps to be implemented by the Project include:

- Finalise detailed design, implementing avoidance principles.
- Prepare a supporting management plan (OAMP) which details the known / potential MNES values, habitat quality scores and required actions to be taken to achieve a conservation gain in accordance with the EPBC Act Environmental Offsets Policy (DSEWPaC 2012).
- Legally secure the offset area and begin monitoring / implementation of management actions.

RFI 6.1.3 If an offset area has not been nominated, include a draft OMS as an appendix to the PD. The draft OMS must meet the information requirements set out in Appendix B.1.

Potential offset properties have been identified in the Offset Management Strategy (Attachment K). The methodology to identify, assess and characterise potential offset properties, is provided below. Habitat scoring methodology for impacted MNES values is also provided. The broad methodology comprised:

1. Identification of potential properties, suitable for use as an offset. Properties within 20 km of the Project were targeted.
2. Characterisation of potential properties, comprising:
 - a. Desktop assessment for suitable values, comprising 'like for like' with significantly impacted MNES.
 - b. Field assessment, comprising both rapid and detailed techniques, such as targeted threatened species survey, vegetation validation / mapping and habitat assessment.
 - c. Habitat quality assessment within representative areas (matter units / assessment units)
3. Habitat quality scoring, using standard and modified scoring methodologies.

The proposed approach to securing offsets for the Project is the securement of land within the region that supports habitat for the impacted MNES and is suitable to deliver offsets in accordance with the Offset Policy. Securement of suitable land proximal to the Project is the preferred option, due to proximity to impact value (i.e. offset will benefit locally impacted values) and a high degree of confidence that target MNES values or habitat is present. To this end, properties within 20km were assessed for suitability. Properties which intersected state significant corridors or exhibited connective vegetation with corridors or protected estate were also preferentially targeted.

Based on a 20 km search radius, five property options were identified as holding potential to contribute to the Project offset portfolio. These properties have been investigated in terms of their suitability and availability for providing the required offsets.

The degree to which Project activities could influence the offset area will need to be considered as part of the final offset area selection process and align with objectives associated with achieving a conservation gain. Conservation gain or improvements in condition associated with management measures delivered during construction (i.e. feral animal control) would need to be considered and excluded from condition score calculations.

The final location of offset areas is subject to further assessment and legally securing these areas. As such a Offset Management Strategy (Attachment K) has been provided in this Preliminary Documentation. This document meets the information requirements set out in Appendix B.1 of the RFI. The above considerations would be addressed as part of the Offset Area Management Plan.

RFI 6.1.4 Where offset area/s have been nominated, include a draft OAMP as an appendix to the PD. The draft OAMP must meet the information requirements set out in Appendix B.2, and must be prepared by a suitably qualified ecologist and in accordance with the department’s *Environmental Management Plan Guidelines (2014)*, available at: www.environment.gov.au/epbc/publications/environmental-management-plan-guidelines.

Not applicable, as described above.

5.6 Ecologically Sustainable Development

RFI 7.1 A description of how the proposed action meets the principles of ESD, as defined in section 3A of the EPBC Act. The following principles are *principles of ecologically sustainable development*:

- a. **decision making processes should effectively integrate both long term and short term economic, environmental, social and equitable considerations;**
- b. **if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;**
- c. **the principle of inter generational equity—that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations;**
- d. **the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision making;**
- e. **improved valuation, pricing and incentive mechanisms should be promoted.**

Australia’s *National Strategy for Ecologically Sustainable Development* (Department of the Environment and Energy 1992) defines ecologically sustainable development (ESD) as:

- ‘using, conserving and enhancing the community’s resources so that ecological processes, on which life depends, are maintained and the total quality of life, now and in the future, can be increased’.

Section 3A of the EPBC Act provides a definition of the principles of ESD:

- Decision making processes should effectively integrate both long term and short term economic, environmental, social and equitable considerations (the integration principle).
- If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation (the precautionary principle).
- The principle of inter-generational equity—that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.

- The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision making.
- Improved valuation, pricing and incentive mechanisms should be promoted.

In delivering the Project, Neoen are delivering a project that aligns with the principles of ESD by:

- Adopting an iterative and multidisciplinary approach to design development that has integrated environmental, social, engineering and economic factors.
- Investing in critical infrastructure that will deliver clean electricity to the National Electricity Market or directly to energy-intensive industries via power purchase agreements.
- Delivering an asset that will contribute to the reduction of carbon emissions in the electricity generation sector by reducing reliance on, and demand for, fossil fuel electricity generation.
- Contributing to the mitigation of, and adaptation to, climate change.
- Aligning with Commonwealth and Queensland policy and legislation on emissions reduction.

Neoen and Sustainable Development

Neoen is an independent producer of sustainable energy with a diverse power generation portfolio including solar and wind farms, biomass congregation plants and battery storage facilities. As a company entirely dedicated to renewable energy and the transition to clean energy, Neoen's business is to contribute towards global efforts to combat climate change. Neoen's commitment to sustainable development is captured in their Sustainability Framework (Attachment M) which aligns the company's activities with the United Nations Sustainable Development Goals.

Neoen's "develop to own" business model for project development means that the Neoen team has an ongoing interest in and commitment to the positive performance of their projects consistent with the Neoen Sustainability Framework.

Climate Change and Supporting Renewable Energy

Human-induced climate change is caused by an increase in greenhouse gases (GHG) in the atmosphere, most notably carbon dioxide, methane and nitrous oxide. The electricity generation sector is responsible for a significant portion of GHG emissions globally and in Australia, comprising approximately one third of the country's total GHG emissions.

The Intergovernmental Panel on Climate Change (IPCC) (2022) Sixth Assessment Report (AR6) identifies the following observed impacts that are directly attributable to human-induced climate change:

- Increases in the frequency and intensity of climate and weather extremes, including hot extremes on land and in the ocean.
- Heavy precipitation events.
- Increased drought and fire weather.
- Ocean acidification and coral bleaching.

- Sea level rise.
- Regional decreases in precipitation.

These changes to natural systems have also caused widespread impacts to terrestrial, freshwater and coastal and open marine ecosystems, as well as people, settlements, and infrastructure. In Australia, further climate change impacts are inevitable with the rate and magnitude of these impacts largely dependent on the levels of future GHG emissions.

The AR6 report states that “[t]he cumulative scientific evidence is unequivocal: Climate change is a threat to human well-being and planetary health. Any further delay in concerted anticipatory global action on adaptation and mitigation will miss a brief and rapidly closing window of opportunity to secure a liveable and sustainable future for all (very high confidence).”

Queensland currently generates 12.3 GW of electricity from fossil fuel sources, approximately 4.7 GW (38%) of which is generated in the Central Queensland region¹⁴ to support local communities and energy-intensive industrial activities primarily located around Gladstone. Over half of the region’s fossil fuel generation capacity will be decommissioned by 2035 due to the forecast closures of the Callide B Power Station (2028)¹⁵ and the Gladstone Power Station (2035).¹⁶

Alternative generation capacity will be required to address the potential shortfall in power generation and to cater for likely future increases in electricity use. Energy generation diversification, particularly the use of decentralised renewable sources including wind farms, will reduce greenhouse gas emissions contributing to future climate change, and reduce vulnerabilities to the impacts of climate change.¹⁷

Policy and Legislative Framework

The Paris Agreement was adopted in 2016 with a goal to avoid the worst impacts of climate change by limiting global warming to well below 2 degrees Celsius, preferably to 1.5 degrees Celsius, compared to pre-industrial levels. The key mechanism for driving countries to reduce emissions is the system of nationally determined contributions (NDCs) which require nations to submit commitments to emission reductions every five years. Subsequent NDCs must achieve a greater reduction in emissions and act as a ‘ratchet’ to drive down global emissions over time, with the objective of reaching net-zero emissions by 2050.

Globally, the Paris Agreement aims to accelerate emissions reductions through a number of measures, including the provision of finance to support climate mitigation, technology transfer and climate-related capacity building for developing countries.

Domestically, emissions reductions are achieved through changes in law, policy and technology. Australia’s obligations as a signatory to the Paris Agreement are codified in the *Climate Change Act 2022* (Cth), including an emissions reduction target of 43% below 2005 levels by 2030 and net zero by 2050, providing for economy-wide emissions reduction targets. Queensland government policy also supports a significant reduction in GHG in the electricity generation sector, including:

¹⁴ <https://electricity-generation-map.epw.qld.gov.au/#>

¹⁵ <https://www.csenergy.com.au/news/statement-on-the-future-of-callide-b-power-station>

¹⁶ <https://www.abc.net.au/news/2022-06-12/queensland-coal-fired-power-stations/101143552>

¹⁷ https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_Chapter11.pdf

- Supporting the establishment of Queensland as a ‘renewable energy superpower’, which is identified as one of five key focus areas of the SIS.
- Aiding in the transition from coal fired power generation and contributing to the industrial decarbonisation of the Central Queensland region, including supporting the establishment of Gladstone as a world-leading renewable hydrogen and clean manufacturing hub.
- The renewable energy target of 50% by 2030, 70% by 2032 and 80% by 2035.
- Reducing emissions by 30% below 2005 levels by 2030.
- Achieving net zero emissions by 2050.
- Delivering 95% of clean energy infrastructure investment in regional Queensland.

The Project is aligned with Commonwealth and State policies relating to the introduction of renewable energy generation and will contribute to meeting emissions reductions targets established in the *Climate Change Act 2022* and the Paris Agreement.

Principles of ESD Relating to Energy Generation

The Project will implement the principles of ESD in relation to energy generation in Central Queensland as follows:

Inter-generational equity: the Project will contribute to climate change mitigation and adaptation by contributing to transition from fossil fuel electricity generation to cleaner, renewable sources, thereby incrementally reducing the impacts of climate change on future generations.

Biodiversity conservation and integrity: the Project will contribute to the mitigation of future human-induced climate change impacts on ecosystems and species by reducing GHG emissions created by electricity generation.

Environmental Decision Making

Neoen are committed to ensuring the Project follows the principles of ecologically sustainable development. In planning for and developing the Project, Neoen have implemented the hierarchy of management principles. These principles and the order in which they have been applied is as follows:

1. Avoid: locating activities to avoid direct and indirect impacts on MNES.
4. Minimise: minimising direct and indirect impacts where they cannot be completely avoided.
5. Mitigate: implementing mitigation and management measures to reduce direct, indirect and cumulative impacts.
6. Remediate and rehabilitate: actively remediate and rehabilitate impacted areas to promote long-term recovery.
7. Offset (where necessary): provide suitable offsets for activities that result in significant residual impacts to MNES even with the implementation of the above principles.

Avoid

The Project has been subject to a rigorous multi-disciplinary design process during the development of the Project layout. This process included a major amendment to the State approved Project layout which sought to balance the delivery of a Project that is economically viable and constructible with the avoidance and minimisation of environmental and social impacts.

During the development of the Project layout, the following measures were implemented to integrate multiple decision-making criteria including ecological values:

- The completion of baseline ecological surveys to reduce the scientific uncertainty relating to the ecological values present on the site and the potential impacts of the Project.
- Utilising ecological data such as high-density locations of the endangered *Cycas megacarpa* to develop constraints 'heat maps' to inform decisions relating to the location of proposed infrastructure.
- Multidisciplinary design review workshops to identify solutions to engineering challenges while considering environmental impacts.

Project infrastructure has been located in accordance with the avoidance and minimisation principles included in the Queensland government guideline *Accepted development vegetation clearing code: Clearing for infrastructure* (Department of Natural Resources, Mines and Energy 2020) which include:

- Locating as much infrastructure as possible in previously cleared areas known as 'Category X' areas.
- Avoiding high value regrowth ('Category C') and regrowth associated with watercourses in Great Barrier Reef catchments ('Category R') as far as practicable and placing infrastructure in these locations where this could not be reasonably avoided.

Following the application of the above measures, prioritising impacts to remnant vegetation communities ('Category B') with the lowest listing (Least Concern) where impacts to 'Category B' regulated vegetation could not be avoided.

Seeking to only locate Project infrastructure within 'Category B' Of Concern vegetation, 'Category B' Endangered vegetation, essential habitat, areas within close proximity to watercourses, drainage features and wetlands, and areas containing known threatened ecological values (e.g., threatened species under the *Nature Conservation Act 1992* (Qld) or EPBC Act) where avoidance of these areas was not possible.

Minimise

Where impacts on MNES cannot be avoided, all efforts will be made to minimise Project impacts. Vegetation clearing and the subsequent construction of the Project would occur progressively and in phases. By doing this, only a small subset of the Development Corridor would be impacted at one time. Indirect impacts resulting from the construction of the Project would be localised, short-term, and actively managed.

Since the referral of the Project, the predicted direct impacts to MNES across the Study Area have been minimised via the significant redesign of the Project. Micro-siting of Project infrastructure would provide opportunities to further minimise direct impacts on MNES within the Development Corridor.

Mitigate

A detailed suite of mitigation, management and rehabilitation measures have also been developed for the Project, including general mitigations and MNES specific mitigations (see **Section 9** of Attachment B4 (Assessment of Matters of National Environmental Significance) for detailed measures). All mitigation measures relevant to MNES would be captured in one or multiple of the Project Management Plans (Attachment C to Attachment K) and have been developed to be consistent with the S.M.A.R.T principle.

Rehabilitate

Rehabilitation would include the planting of native species known to the region, consistent with the characteristics of surrounding retained vegetation. In locations where the integrity of infrastructure would not be compromised, opportunities to create supplementary habitat for MNES values species such as the greater glider (southern and central), yellow-bellied glider (south-eastern), koala and squatter pigeon (southern) would be investigated. For example, in addition to native grasses and shrubs which would provide ground cover for dispersing koalas and squatter pigeons (southern), trees likely to form hollows in the future would also be planted as appropriate (e.g. *Corymbia citriodora*; *Eucalyptus moluccana*).

Offset

Despite the avoidance, minimisation, mitigation and rehabilitation measures described above, the Project has the potential to have a significant residual impact on 6 MNES listed under the EPBC Act (**Section 10** of Attachment B4 (Assessment of Matters of National Environmental Significance)). In accordance with the *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy* (DSEWPaC 2012), offsets must be secured to counterbalance the significant impact to MNES and ensure an overall environmental improvement. Offsets would be provided where the residual impacts to MNES after avoidance and mitigation measures are assessed as significant (Attachment K (Offset Management Strategy)).

Principles of ESD Relating to Environmental Decision Making

Demonstration of the integration of ESD principles in environmental decision making includes:

The integration principle: Neoen has considered a range of multiple decision-making criteria, including ecological values, constructability, engineering and cost, in defining the Project layout.

Conservation of biological diversity and ecological integrity: Neoen has used ground-truthed ecological values to generate ecological constraints mapping and developed a Project layout based on avoiding and minimising impacts to constrained areas. Detailed mitigation, management and rehabilitation measures have also been developed and any significant residual impacts to MNES would be offset, with the aim to result in no net loss to MNES ecological values.

Summary

Neoen is an established 'develop to own' organisation entirely dedicated to renewable energy and the transition to clean energy. The Project would assist in the decarbonisation of the central Queensland region and assist in offsetting the forecast closure of fossil fuel electricity generation infrastructure over the next 10 to 15 years. Additionally, Neoen has developed the Project layout with consideration of environmental, social and economic considerations through process described in Environmental Decision Making (above).

The alignment of the Project with the principles of ESD is further described in **Table 5.3**.

Table 5.5 Application of the Principles of ESD to the Project

ESD Principle	Application
Decision making processes should effectively integrate both long term and short term economic, environmental, social and equitable considerations (the integration principle)	Environmental considerations generally and impacts to were considerations in balancing the impacts of the Project with the need to develop a commercially viable project. Decision making processes, including multidisciplinary design workshops and reviews, were implemented during the design development to ensure integration of environmental, social, economic and equitable considerations.
If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation (the precautionary principle)	Uncertainty relating to the impacts of the Project has been reduced to the degree practical and in accordance with relevant technical guidance (i.e. survey guidelines and impact assessment methods). Appropriate measures would be implemented to manage environmental impacts as described in Attachment E (Preliminary <i>Cycas megacarpa</i> Species Management Plan), Attachment F (Preliminary Vegetation Management Plan), Attachment G (Preliminary Bird and Bat Adaptive Management Plan), Attachment I (Preliminary Decommissioning Management Plan) and Attachment J (Preliminary Translocation Management Plan for <i>Cycas megacarpa</i>).
The principle of inter-generational equity—that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations	Renewable energy projects are critical in reducing GHG emissions and avoiding the worst impacts of climate change. The Project would deliver clean energy to the NEM and industrial users and the infrastructure (access tracks and turbine hardstands) may be ‘repowered’ at the end of the Project’s design life to extend the clean energy generation. Additionally, environmental values of the site have been avoided to the extent practical to ensure these values are retained for future generations.
The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision making	The Project would contribute to the mitigation of future human-induced climate change impacts on ecosystems and species by reducing GHG emissions created by electricity generation. Additionally, ecological values have been avoided to the extent possible through the completion of ecological surveys, ecological constraints mapping, and a multidisciplinary design process based on avoiding and minimising impacts.
Improved valuation, pricing and incentive mechanisms should be promoted	The Project would reduce GHG emissions compared to fossil fuel electricity generation and contribute to avoiding the worst impacts of climate change. Additionally, valuation and pricing of the ecological impacts of the Project are addressed through the offsets to be provided by Neoen in accordance with the <i>Commonwealth environmental offsets policy</i> with the aim to result in no net loss to MNES ecological values.

5.7 Economic and Social Matters

RFI 8.1 An analysis of the economic and social impacts of the action, both positive and negative.

The broad community around the proposed Mount Hopeful Wind Farm is located near the towns/areas of Mount Morgan and Bajool. This region has a relatively low population density. Prior to European settlement, the Gaangalu Nation People and the Darumbal People occupied the land.

5.7.1 Local Economic Challenges

The Rockhampton Regional Council *Corporate Plan 2017-2022* outlines the strategic direction and priorities, including promoting industry diversification to enhance regional economic resilience (outcome 2.6) and sustainable and innovative environmental practices (outcome 3.2).

Advance Rockhampton is the Economic Development, Tourism, Events and Marketing unit of the Rockhampton Regional Council. Neoen has met with Advance Rockhampton on a number of occasions, which is discussed further in below. Advance Rockhampton has expressed support for this Project, noting that the “transition towards a focus on a renewable energy system represents a unique economic growth opportunity for the Rockhampton Region that brings with it a host of positive impacts” [Advance Rockhampton, Renewable Energy in the Rockhampton Region].

The Banana Shire Council (2021) *Corporate Plan 2016–2021* highlights the need for sustainable growth and development for the region, including identifying options for moving to renewable energy and other innovations that increase the efficiency and reduces the long run cost of Council’s operations (discussed below).

5.7.2 Population Characteristics

The broad community around the proposed Mount Hopeful Wind Farm is located near the towns/areas of Mount Morgan and Bajool. According to the Australian Bureau of Statistics (2022) *2021 Census* the following table (**Table 5.4**) is representative of the area.

Table 5.6 Population Characteristics of the Surrounding Community (Australian Bureau of Statistics 2022)

Demographics	Mount Morgan	Bajool
Estimated Population	2,487	447
Median Age	53	44
Median Weekly household Income	\$780	\$1,262
Total Dwellings	1,417	204
Education		
Bachelor Degree level and above	4.0%	6.1%
Advanced Diploma and Diploma level	4.5%	6.1%
Certificate level III or IV	17.5%	17.9%
Year 12	12.8%	15%
Occupation		
Managers	5.4%	15.6%
Professionals	10.4%	7.0%
Labourers	18.2%	14%
Sales Workers	8.7%	7.0%
Clerical and Administrative Workers	9.5%	9.7%
Machine Operators and Drivers	13.5%	18.3%

Demographics	Mount Morgan	Bajool
Community and personal Service Workers	18.7%	8.1%
Technicians and Trades Workers	13.4%	15.6%
Industry		
Hospitals	4.5%	-
Supermarkets and Grocery Stores	3.8%	-
Landscape Construction Services	-	5.4%
Aged Care Residential Services	6.0%	-
Coal Mining	5.7%	8.1%
Beef Cattle Farming	-	9.7%
Road Freight Transport	-	4.8%
Primary Education	-	7.0%
Home Ownership		
Owned outright	49.2%	44.1%
Owned with a mortgage	21.8%	37.5%
Rented	22.7%	12.5%

5.7.3 Financial Investment and Economic Activity

Neoen commissioned Aurecon to undertake an assessment of its operational and planned Renewable Energy projects in Australia, which was prepared in July 2020 (Aurecon 2020). The assessment considered the socio-economic benefits to surrounding communities and in summary found the following:

Economic activity: The construction and operation of the renewable energy projects will directly generate regional and state-wide economic activity that will contribute to growth or output, employment and income. The economic activity would generate direct benefits and secondary or indirect effects, like the production of goods and services such as accommodation, engineering, freight services, construction materials and equipment, local labour and technical contractors. The purchase of these goods and services would generate additional employment and income for members of the regional and state economies and, in turn, lead to further output and spending.

Electricity production: The renewable energy projects are expected to produce renewable energy that will provide value to the electricity supply chain and communities more broadly.

Employment and labour income: The construction and operational phases of the renewable energy projects will generate economic activity that will directly create employment within the region and state where the projects are located, including apprentices and trainees. The direct employment generated will, in turn, lead to secondary or indirect employment effects.

Mount Hopeful Wind Farm Project represents over \$750 million in capital and construction investment and will help to support businesses in Banana Shire and Rockhampton Regional councils and across the State more broadly. Mount Hopeful Wind Farm will create an estimate of up to approximately 220 direct jobs during construction and 8 to 12 direct jobs during 30 years of operation. These numbers are prorated estimates based on Neoen’s 194 MW Bulgana Wind Farm, on which a retrospective economic impact assessment was undertaken by Aurecon after construction¹⁸.

Mount Hopeful Wind Farm will generate an estimated 1,115,000 megawatt-hours (MWh) of clean energy per year which will be fed into the Queensland electricity network and help the State meet its 70% renewable energy target by 2032¹⁹. It will supply enough energy to power more than 240,000 homes and will help reduce wholesale electricity prices in Queensland.

5.7.4 Costs and Benefits and Scale of Impact

Table 5.7 provides a summary of a range of both potential costs and benefits at a State level.

Table 5.7 Potential Costs and Benefits at a State Level

State-wide Impacts	Costs	Benefits
Short Term (3 years)	Impact of construction traffic on State and Regional roads	<ul style="list-style-type: none"> Helping the State meet its 70% renewable energy target by 2032. Increased demand for services and materials from across the State.
Long Term (30 years)	Change to visual character of landscape (noting that the area is already substantially modified from a ‘natural’ state.	<ul style="list-style-type: none"> Placing downward pressure on electricity prices in Queensland. Reliability of generation enhanced by the potential inclusion of a battery energy storage system. Displacing more than 892,000 tonnes of CO2 emissions per year.

Table 5.8 provides a summary of the potential short- and long-term costs and benefits at a more localised level.

Table 5.8 Potential Costs and Benefits at a Local Level

Localised Impacts	Costs	Benefits
Short Term (3 years)	<ul style="list-style-type: none"> Construction Traffic in the region. Pressure on local accommodation. Pressure on local road infrastructure. Localised noise and dust impacts. Loss of a limited amount of native vegetation. Potential for a spike in property rental prices. 	<ul style="list-style-type: none"> Increased local economic activity. Increased demand for local services. Increased demand for local accommodation. Increased demand for local employment.

¹⁸ Economic Assessment Report for Bulgana Green Power Hub, Aurecon, 2020

¹⁹ Queensland Energy and Jobs Plan 2022: https://www.epw.qld.gov.au/data/assets/pdf_file/0031/32989/queensland-energy-and-jobs-plan-overview.pdf

Localised Impacts	Costs	Benefits
Long Term (30 years)	<ul style="list-style-type: none"> • Visual change to an already modified landscape. 	<ul style="list-style-type: none"> • Host landowner payments (supporting rural land uses). • Neighbour benefit payments. • Community Benefit Sharing Program (CBSP).

Neoen have commenced and/or proposed a number of initiatives to avoid, manage or mitigate the short-term costs including:

- Numerous management plans to address risks associated with construction (including traffic, fire safety, noise, dust, habitat and cultural heritage).
- Early planning for accommodation and working with Council to support more accommodation options for workers (this has commenced).
- Monitoring of impacts and commitment to mitigation for matters such as Electromagnetic Interference (EMI), Flora and Fauna and Noise.)

To ensure both short and long-term benefits flow through to the community as a result of the establishment and operation of Mount Hopeful Wind Farm, Neoen would establish a Community Benefit Sharing Program (CBSP).

The CBSP would be designed to deliver benefits to key stakeholders in the community in a way that aims to meet their needs and aspirations. Specifically, Neoen’s objectives are to:

- Deliver significant and meaningful improvements to the community surrounding Mount Hopeful Wind Farm.
- Ensure a wide range of different stakeholder groups benefit from Mount Hopeful Wind Farm.
- Empower the community to shape the design and implementation of the different initiatives.
- Build support for renewable energy in the Rockhampton and Banana Shire areas.
- The majority of initiatives would be delivered during the construction and operations phase.
- In alignment with Neoen’s organisational vision, it is important that the benefit be a true benefit and be tailored to meet each distinct communities’ need.

This CBSP does not include:

- Required activities under Neoen’s permit conditions such as weed management.
- Annual council rates payments or fire levies (where applicable).
- Host landowner payments.
- The value of local jobs and investment.

However, it is worth noting that these activities would all deliver significant value to the community.




Neoen have a number of mechanisms to enable benefits to be shared in a meaningful and equitable way. Community input would be sought into these options (and any other local ideas) at the community information sessions and via the community feedback survey.



The final program is likely be a mix of 2–3 benefit-sharing mechanisms from the following list:

- Neighbour Benefit Scheme.
- Community Benefit Fund.
- Indigenous Benefit-sharing.
- Lower energy bills – through solar and/or storage subsidies.
- Community co-investment.
- Investment to address specific local issue – e.g. poor mobile coverage, electricity blackouts.

Further detail on these mechanisms is provided in **Table 5.9**.

Table 5.9 Summary of Benefit Sharing Mechanisms

Option	Pros	Cons	Requirements	Constraints
 <p>Near Neighbour Benefit Scheme</p>	Provides benefit-sharing option for near neighbours who may be most affected by the project, particularly during construction.	<p>Can be difficult to ascertain an appropriate radius.</p> <p>Can be perceived by some as ‘buying out’ neighbours.</p>	<p>Needs to be tailored to the local context.</p> <p>Must be offered without conditions in relation to complaints, avoidance of compliance activities etc.</p> <p>Must be equally applied and transparent.</p>	<p>Population, topography, visual impact, scale.</p> <p>Not applicable to involved landholders.</p>
 <p>Community Benefit Fund</p>	<p>Can create strong regional economic development outcomes.</p> <p>Can create a strong legacy in community.</p>	<p>Local government can negotiate to ‘own’ the fund – which may result in a higher cost of administration and potential politicisation of the program.</p> <p>There can be a lack of sophisticated local programs or projects to apply to fund– may need to co-develop.</p>	<p>Strong governance with community representation.</p> <p>Strong evaluation and acquittal.</p> <p>Flexible funding streams to enable longer term projects to access the fund.</p> <p>Consider other existing regional funding bodies and look to enhance or offer point of difference.</p>	<p>Not applicable to committed activities funded by any level of government.</p> <p>A goal of \$xx of fund to be allocated to projects within <insert area > local community.</p>
 <p>Lower energy bills through solar and/or storage subsidies</p>	One off deployment of offer.	Onerous to organise a defensible procurement contract.	<p>Delivered by local CEC accredited installers.</p> <p>Easiest model is to select an installer – perform due diligence and deploy initiative at a fixed price (bulk buy approach).</p>	May be competing subsidies – such as state government that need to be taken into consideration – how to complement?

Option	Pros	Cons	Requirements	Constraints
 <p>Community co-investment</p>	<p>Enhancing regional economic benefits.</p> <p>Sharing the profits of the wind farm with community retail investors.</p> <p>Enabling participation in the development and deepening the connection and interaction with the project.</p> <p>The economies of scale of large scale projects can deliver significant returns.</p>	<p>Can be challenging to integrate the investment in the back end of the project finance structure.</p> <p>May not be a supported concept in all communities – may be dependent on social economic factors.</p> <p>Can be onerous to administrate – ensure the impact/costs/ delegations are well modelled.</p>	<p>Can be delivered through fractional investment platform Domacom.</p> <p>Need to determine investment structure, debt vs equity, length of term, rate of return etc, and what is negotiable for community feedback.</p>	<p>Considerations around equity or debt structures.</p> <p>Consider timing of offer to reduce community investor exposure to issues such as connection delays.</p> <p>Consider budget for marketing and development and impacts on other benefit sharing initiatives.</p>
 <p>Investment to address specific local issue</p>	<p>Can enable direct solutions to broader community needs/issues.</p>	<p>Longevity of solution and appropriateness of solution can be difficult to establish.</p>	<p>Community needs assessment to harvest ideas and then validate a chosen approach.</p>	<p>Consider the budget allocation and how this may impact on other benefit sharing items.</p>

RFI 8.2 Details of any public consultation activities undertaken and their outcomes.

As a long-term 'owner operator', Neoen does not develop its projects to sell and, as such, expects to operate in communities for 30 years or more. Consequently, it is a vital aspect of its business that it creates long-term partnerships with communities.

5.7.5 General Community and Stakeholder Engagement

Neoen met with the Banana Shire Council Mayor and Chief Executive Officer (CEO) on 25 January 2021 in Biloela. An overview of the project was provided, along with expected timeframes. The Project was well received, with general sentiments of support for the benefits it could bring to the community.

Invitations to a community information session held in Dululu on 13 May 2021 were sent to the Banana Shire Council via email, and posters were mailed to Council in Biloela to inform the community of the event. The Council was represented at the community information session by Mayor Nev Ferrier, Councillor John Ramsey, and the Director of Council Services.

Neoen met with the Rockhampton Regional Council's CEO and Advance Rockhampton's Executive Manager on 27 January 2021 in Rockhampton. A description of the project was provided, and strong messages of support for renewable energy development, and associated opportunities for the region, were conveyed.

Neoen has subsequently met with Advance Rockhampton on 12 May 2021 to provide an update on the project, and Advance Rockhampton was represented at the community information session held in Dululu on 13 May 2021.

Neoen continued its engagement with Rockhampton Council and Banana Shire Council throughout 2021, 2022 and 2023 via project briefings, letters and emails.

On 24 and 25 March 2021, Neoen visited the Project region, to meet with all neighbours within 5 km of a turbine. Further engagement was carried out with other neighbours located within approximately 7 km of any proposed turbine. Where Neoen was not able to meet with neighbours during this trip, best endeavours were made to contact neighbours via phone.

During one-on-one sessions, information on the Project layout, construction practices and visualisations of turbines on the landscape was presented. Neighbours were presented with the opportunity to ask questions and raise concerns relating to the Project.

On 13 May 2021, two community information sessions were held. The first took place in Bajool and the second in Dululu. Both sessions were well attended, with many of the neighbours attending for further discussion on the project.

From January to April 2023, additional one-on-one engagement has taken place with Project neighbours. In particular, focused engagement has taken place with neighbours along the Project's access road (McDonalds, Playfields and Glengowan roads) to discuss concerns around construction disturbance.

In order to record, manage and track Neoen's interactions with different community stakeholder groups over time we establish a project-specific Stakeholder Register during Feasibility stage.

Neoen use a stakeholder engagement register which provides detailed records of Neoen’s interactions with stakeholders. It links to surveys and registers on the project website and project staff’s Outlook email service to facilitate and automate data capture. The Stakeholder Register has varying levels of access, for example during construction and operations it will be accessible to key Engineering and Procurement Contractor (EPC) and Operations and Maintenance (O&M) contractor staff with stakeholder communication responsibilities.

A summary of feedback received during one-on-one consultations with project neighbour and during community information sessions and general consultation is shown below in **Table 5.10**.

Table 5.10 Community Reported Concerns and Proposed Way Forward

Theme	Community Feedback	Response or Proposed Action
Weed management	Neighbours to the Project have expressed concern about weeds such as parthenium and rats tail spreading to their properties, either through seeds found within the Project's boundary, or which are brought in from outside the community on construction vehicles.	A Weed and Pest Management Plan would be developed by Neoen, in consultation with the Project's neighbours, to minimise the negative impact of weed propagation resulting from construction activities. This is further discussed in Section 9.3.1.3 of Attachment B4 (Assessment of Matters of National Environmental Significance).
Visual	The visual impact associated with wind farm developments was raised by a number of neighbours or community members.	A <i>Land Visual Impact Assessment</i> (Lat27 2021) was commissioned by Neoen, which states the following: <i>"It is acknowledged that the siting of wind farms in elevated locations responds to the operational requirement to maximise harvesting of the wind resource and, therefore, visually prominent locations are largely unavoidable.</i> <i>The Mount Hopeful Wind Farm project has been designed to minimise and mitigate impacts on landscape character, scenic amenity and landscape values to the greatest extent possible through careful siting of wind farm infrastructure in accordance with the requirements of PO9 of Wind Farm State Code 23.</i> <i>This includes consistent siting of the turbines along ridgelines within the Site that respond to the large scale of the range landscape. No nationally significant landscapes would be directly affected, no regionally important scenic viewpoints would be significantly affected and the number of visual receptors anticipated to experience significant impacts is low due to the rural location of the Site."</i>
Noise	A number of neighbours and community members raised concerns relating to noise emissions from the wind turbines.	Neoen engaged an acoustic engineering firm, Sonus, to conduct the noise impact assessment. Sonus (2021) carried out predicted noise analysis using a representative wind turbine, and found that the separation distances between turbines and nearby residences are expected to satisfy the noise requirements of State Code 23.
Small aircraft impact	Concern was raised about any no-fly zones around the wind turbines.	Low flying aircraft are required to fly by sight. Wind turbines are large and clearly visible. All wind turbines and met masts would be registered with the relevant aviation authority according to aviation requirements.

Theme	Community Feedback	Response or Proposed Action
Timing of informing community members	It was noted that Neoen had waited until close to State permitting application submission to inform the community members, and that community engagement could have taken place earlier (feedback received in May 2021).	<p>Neoen’s experience is that engagement with the community too early in the development process can be a frustrating experience with the local community, as many of the studies and design processes have not been completed. This results in many questions being difficult to answer, and can result in ineffective engagement. Neoen considers that our engagement started out at a suitable time.</p> <p>There has also been more focused engagement since the Project received approval under the State’s planning rules, including extensive engagement with neighbours along the access road, and participation in local participation sessions being run by regional councils.</p>
Layout of turbines	The final layout of wind turbines, and their position relative to property fencelines, were discussed. There was concern raised by a neighbour that the fences could be impacted by the construction and that turbines could encroach on their property.	Turbines have been located so that there is no overhang by any of the turbine blades into the neighbouring properties. All construction activities would be within the Project’s approved boundary.
Access Point	Bajool residents requested clarity over the routing of construction traffic, with a preference that Mount Hopeful Road and King Solomon Road were not used. These two roads traverse the ridge line and connect the Bajool community with Ulogie.	<p>Neoen understands concerns raised by residents over construction traffic impacts.</p> <p>The current intention with regards to wind farm traffic is outlined in the <i>Preliminary Transport Route Assessment</i> (Access Traffic Consulting 2021) commissioned by Neoen, which outlines that most construction traffic (with the exception of traffic related to the construction of the electrical infrastructure on the eastern property) would access the site via Playfields Road on the western side of the Project, which would therefore not overly impact the Bajool community.</p>
Construction traffic impact	The Dululu community session, along with one-on-one engagement with Project neighbours, showed clear concern around the impact that construction traffic could have. This was particularly important for those located along McDonalds and Playfields Road, which is the access route from the Burnett Highway.	<p>Focused engagement with property owners along the McDonalds and Playfields road has taken place in the second half of 2022 and early 2023.</p> <p>A detailed assessment of the access road’s suitability and upgrade requirements has been undertaken, including a survey of the road to accurately map out the existing road, and where any upgrades or road widening may be required.</p> <p>Any access road to be used would need to be suitably upgraded to handle construction traffic, and Neoen would comply with obligations set out in planning conditions relating to road upgrades and maintenance.</p>

Theme	Community Feedback	Response or Proposed Action
	<p>Feedback was provided on sections of the road that would require significant road upgrades, including where there are floodways and cattle grids. It was also noted that there is a potential hazard along Playfields road where vehicles could collide if speed limits were not enforced.</p> <p>It was also suggested that a concrete batching plant located within the project boundary would avoid the need for concrete trucks on the access road, with less concrete spoilage.</p>	<p>Geotechnical investigations required for upgrade design works were conducted in November 2022 along this road, with consultation with landowners occurring before any works were carried out. No complaints were received by Neoen.</p> <p>Neoen has continued to consult with Banana Shire Regional Council on the use of this road for the Project's access.</p> <p>It is expected that the Project would include a batching plant on site. Neoen would engage with the Banana Shire Regional Council with regards to all relevant permits for such a plant.</p>
<p>Telephone and internet impact</p>	<p>Concern was raised in both Bajool and Dululu around the low levels of mobile and internet reception in the region.</p>	<p>An Electromagnetic Interference (EMI) Study was commissioned by Neoen. The EMI study (WSP 2021) acknowledges that mobile phone reception can be affected by the Project, and that the mobile phone coverage is already very limited around the Project, for Telstra, Optus and Vodafone.</p> <p>Neoen would comply with all obligations set out by the State in their Decision Notice, relating to pre and post-construction assessments of television and radio reception strength to identify if the Project has had a negative impact, and to implement measures to address this.</p>

5.7.5.1 Outcomes

While many of the conversations with neighbours were focused on the concerns with the proposed wind farm, there was also considerable positivity within the range of views expressed, and an appreciation of the potential benefits that the project could bring to the community and greater region. These are summarised below in **Table 5.11**.

Table 5.11 Potential Benefits from the Project to the Community and Wider Region

Theme	Potential Opportunity
Fire mitigation	Improved access to areas of the site may result in local fire brigades being better positioned to carry out fire fighting services, and better manage bushfire risk. Neoen noted that a Bushfire Management Plan is expected to be a requirement for the project during construction and operations.
Local contractors	A number of contractors or people who are located near to the project expressed interest in being involved in the Project's construction or operational works. Neoen would be hosting local participation workshops as the Project progresses, and would maintain a register of all interested suppliers or contractors.
Community benefits	Community members at both information sessions held suggested ideas over improvements or investment that could be made in the communities. Neoen would continue to engage with local community members, and relevant community organisations to explore these ideas further.

5.7.6 Local Business and Jobseeker Engagement

One of Neoen's key areas of focus for the broader local community is facilitating the involvement of local jobseekers and businesses in the construction and operation of the wind farm to ensure a strong regional economic benefit.

During feasibility & planning/approvals phases, Expressions of Interest for work are invited and received through adverts, information days and the project website. A job interest register for internal use is created to ensure reference during construction and operation phases can be made to list of interested workers. Over 100 interested local companies and individuals have been added to the register since it was set up in May 2021.

Neoen would develop a Local Participation Plan which would go into greater detail to identify and map the following:

- Employment opportunities for local jobseekers.
- Supply chain opportunities for local contractors.
- Training and apprenticeship opportunities.

Neoen participated in local supplier meetings organized by the local councils in Biloela on 6 August 2022 and 29 November 2022 and in Rockhampton on 16 November 2022. During these sessions, Neoen had the opportunity to provide an update on the Project to the local community and to engage with local businesses and job seekers on opportunities during construction and operation of Mount Hopeful Wind Farm. Further local employment and supplier networking sessions would be held during the pre-construction phase with invitations going out to those on the job interest register and local employment agencies, ensuring they have the opportunity to meet with the appointed construction contractors.

RFI 8.3 Details of any consultation with Indigenous stakeholders.

5.7.7 Indigenous engagement

Identify existing or potential native title rights and interests, including any areas and objects that are of particular significance to Indigenous peoples and communities, possibly impacted by the proposed action and the potential for managing those impacts.

Describe any Indigenous consultation that has been undertaken, or will be undertaken, in relation to the proposed action and their outcomes.

The department considers that best practice consultation, in accordance with the *Guidance for proponents on best practice Indigenous engagement for environmental assessments under the EPBC Act (2016)* includes:

- identifying and acknowledging all relevant affected Indigenous peoples and communities;
- committing to early engagement;
- building trust through early and ongoing communication for the duration of the project, including approvals, implementation and future management;
- setting appropriate timeframes for consultation; and
- demonstrating cultural awareness.

Describe any state requirements for approval or conditions that apply, or that the proponent reasonably believes are likely to apply, to the proposed action with regards to Indigenous peoples and communities.

Neoen has had regular engagement throughout the development of the Project with the Traditional Owners of the land on which it is located, the Gaangalu Nation People (GNP) and the Darumbal People.

A Cultural Heritage Management Plan has been agreed between Neoen and the GNP, and this has been approved under Part 7 of the *Aboriginal Cultural Heritage Act 2003*. The Cultural Heritage Management Strategy between Neoen and the Darumbal People is being negotiated.

Cultural heritage surveys and monitoring activities have taken place in the second half of 2022 by the GNP prior to met mast installation and during geotechnical investigations in 2023. Site clearance surveys have also been conducted by the Darumbal People on the land parcel hosting electrical transmission infrastructure, towards the east of the Site.

In December 2022, Neoen hosted representatives of the GNP at its Kaban Wind Farm on the Atherton Tablelands. This is an active construction site, with several turbines that are already operational. The aim was to demonstrate the type of activities that would occur on the Project, and the projected scale of turbines to be used on Mount Hopeful Wind Farm. Effective and authentic engagement with the Traditional Owners continues to be a priority for Neoen.

Neoen is also exploring the option of co-developing an Indigenous Participation Plan with the Indigenous community. Participation incorporates the following three elements:

- Indigenous employment by EPC and second/ third tier contractors during construction/operations.
- Indigenous suppliers providing works packages in construction/operations.
- Indigenous workplace training & education pathways in partnership with local schools and colleges.

RFI 8.4 Projected economic costs and benefits of the project, including the basis for their estimate through cost/benefit analysis or similar studies.

As detailed in RFI 8.1 above.

RFI 8.5 Employment opportunities expected to be generated by the project (including construction and operational phases).

As detailed in RFI 8.1 above.

5.8 Environmental Record of the Person Proposing to Take the Action

This section must include details of any past or present proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against:

RFI 9.1 The person proposing to take the action

Neoen and its subsidiaries have an exemplary environmental management record in all countries in which it operates, including the numerous projects which are under construction or in operation in its Australian portfolio. Neoen is the largest owner and operator of renewable energy projects in Australia, including three projects which have received EPBC approval:

- Hornsdale Wind Farm in South Australia (EPBC 2012/6573).
- Kaban Wind Farm in Queensland (EPBC 2018/8289).
- Goyder Wind Farm in South Australia (EPBC 2021/8958).

Neoen has one other project which is currently undergoing EPBC assessment: the Kentbruck Wind Farm in Victoria (EPBC 2019/8510).

Across all of these projects, Neoen has always complied with all environmental protocols and has never been found to be in breach of any permit, law, or regulation that is related to the environment. There are no relevant past or present proceedings under Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against Neoen or any of its subsidiaries.

RFI 9.2 For an action for which a person has applied for a permit, the person making the application

Not applicable.

RFI 9.3 If the person is a body corporate – the history of its executive officers in relation to environmental matters

Not applicable.

RFI 9.4 If the person is a body corporate that is a subsidiary of another body or company (the parent body) – the history in relation to environmental matters of the parent body and its executive officers.

Not applicable.

6.0 Conclusion

This report and the associated attachments, presents the Preliminary Documentation on behalf of Neoen Australia Pty Ltd. The Preliminary Documentation is in response to DCCEEWs request for additional information (EPBC Ref: 2021/9137) for an assessment under the EPBC Act.

Neoen is committed to ensuring the Project follows the principles of ecologically sustainable development. In planning for and developing the Project, Neoen have implemented the hierarchy of management principles (avoid, minimise, mitigate, remediate and rehabilitate, offset) and have gone through a rigorous process to ensure that the Project limits impacts to MNES and other environmental values to the greatest extent possible.

Extensive survey effort and desktop resource analysis was used to prepare detailed habitat assessments for occurring and potentially occurring listed threatened and migratory species. Based on these habitat assessments, in concert with the determination of the extent of potential direct and indirect impacts, the significance of these Project-related impacts was assessed for 20 MNES values. This included 3 species that are considered to have a low likelihood of occurrence within the Study Area (but may be subject to operational impacts at some point during the life of the Project).

Assessments have been undertaken in accordance with *Matters of National Environmental Significance: Significant Impact Guidelines 1.1* (Department of the Environment 2013). The precautionary principle has been applied when deciding whether or not the Project is likely to have a significant impact on a value.

Measures to avoid, minimise, mitigate and manage risk of impacts on MNES are based on legislative requirements, industry best practice standards and species-specific guidance from government departments and species experts. These proposed measures which would be implemented throughout the lifecycle of the Project (construction, operation and maintenance, decommissioning and rehabilitation) have been developed with guidance from government and industry recommendations and departmental documents, including but not limited to: the SPRAT Database, Approved Conservation Advice, Recovery Plan, Threat Abatement Plans and the RFI.

A suite of Project management plans has been prepared for the Project to provide certainty in how risks would be managed during all phases of the Project. These plans identify performance criteria and general requirements/operational controls as well as monitoring and reporting requirements and corrective actions if triggers are exceeded. Despite the successful implementation of mitigation measures and management plans, it is anticipated that a significant residual impact may occur on 6 MNES species:

- *Cycas megacarpa*.
- Koala (*Phascolarctos cinereus*).
- Greater glider (southern and central) (*Petauroides volans*).
- Yellow-bellied glider (south-eastern) (*Petaurus australis australis*).
- Northern quoll (*Dasyurus hallucatus*).
- Collared delma (*Delma torquata*).

To compensate for the residual impacts of the Project, an Offset Management Strategy has been developed and it is expected that an Offsets Area Management Plan would be prepared post approval.

7.0 References

Access Traffic Consulting 2021, *Preliminary Transport Route Assessment*, report prepared for Neoen.

Atlas of Living Australia 2023, 'Atlas of Living Australia', retrieved from <<https://www.ala.org.au/sites-and-services/>>.

Aurecon 2020, *Neoen Renewables Energy Projects Economic Assessment Report, Revision 3*, report prepared for Neoen.

Australian Bureau of Statistics 2022, 'Find Census data', retrieved from <<https://www.abs.gov.au/census/find-census-data>>.

Baerwald, E, D'Amours, G, Klug, B & Barclay, R 2008, 'Barotrauma is a significant cause of bat fatalities at wind turbines', *Current Biology*, vol. 18, no. 16, pp. 695–696.

Banana Shire Council 2021, *Corporate Plan 2021-2016*, Banana.

Bat Call WA Pty Ltd 2021, *A review of ghost bat ecology, threats and survey requirements*, report prepared for the Department of Agriculture, Water and Environment, Canberra.

BirdLife Australia 2022, 'Atlas and Birdata', retrieved from <<https://birdlife.org.au/projects/atlas-and-birdata>>.

Bureau of Meteorology 2010, 'Easterly Trough', *Australian Government*, retrieved November 4, 2022, from <<http://www.bom.gov.au/climate/about/australian-climate-influences.shtml?bookmark=easterlytrough>>.

Commander, L, Coates, D, Broadhurst, L, Oxford, C., Makinson, R. & Matthes, M 2018, *Guidelines for translocation of threatened plants in Australia* Third Edit., Australian Network for Plant Conservation, Canberra, ACT.

DCCEEW 2023, 'Species Profile and Threats Database - Geophaps scripta scripta - Squatter Pigeon (southern)', retrieved from <https://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=64440>.

Department of Agriculture and Fisheries 2018, *Accepted development requirements for operational work that is constructing or raising waterway barrier works*, Fisheries Queensland, Brisbane.

Department of Agriculture Water and the Environment 2022a, *Conservation Advice for Phascolarctos cinereus (Koala) combined populations of Queensland, New South Wales and the Australian Capital Territory*, Commonwealth of Australia, Canberra.

Department of Agriculture Water and the Environment 2022b, *National Recovery Plan for the Koala Phascolarctos cinereus (combined populations of Queensland, New South Wales and the Australian Capital Territory)*, Commonwealth of Australia, Canberra.

Department of Agriculture Water and the Environment 2022c, *Conservation Advice for Phascolarctos cinereus (Koala) combined populations of Queensland, New South Wales and the Australian Capital Territory*, Commonwealth of Australia, Canberra, retrieved from <<https://www.environment.gov.au/biodiversity/threatened/species/pubs/85104-conservation-advice-12022022.pdf>>.

Department of Climate Change Energy the Environment and Water 2022a, 'Migratory birds', retrieved from <<https://www.dcceew.gov.au/environment/biodiversity/migratory-species/migratory-birds>>.

Department of Climate Change Energy the Environment and Water 2022b, *Conservation Advice for Petauroides volans (greater glider (southern and central))*, Commonwealth of Australia, Canberra.

Department of Climate Change Energy the Environment and Water 2023a, 'Species Profile and Threats Database', retrieved from <<https://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>>.

Department of Climate Change Energy the Environment and Water 2023b, 'Protected Matters Search Tool', *Australian Government*, retrieved from <<http://www.environment.gov.au/epbc/pmst/>>.

Department of Energy and Public Works 2022, 'Queensland Energy and Jobs Plan', retrieved from <<https://www.epw.qld.gov.au/energyandjobsplan>>.

Department of Environment and Science 2020, *Flora Survey Guidelines - Protected Plants Nature Conservation Act 1992*, Wildlife and Threatened Species Operations, Brisbane.

Department of Environment and Science 2023, 'Wildlife Online WildNet Database Species List', retrieved from <<https://www.qld.gov.au/environment/plants-animals/species-information/species-list>>.

Department of Natural Resources Mines and Energy 2019, *Riverine protection permit exemption requirements*, Divisional Support Water, Brisbane.

Department of Natural Resources Mines and Energy 2020, *Accepted development vegetation clearing code: Clearing for infrastructure*, Queensland Government, Brisbane.

Department of Sustainability Environment Water Populations and Communities 2011a, *Survey Guidelines for Australia's Threatened Mammals*, Commonwealth of Australia, Canberra.

Department of Sustainability Environment Water Populations and Communities 2011b, *Survey Guidelines for Australia's Threatened Reptiles*, Commonwealth of Australia, Canberra.

Department of Sustainability Environment Water Populations and Communities 2011c, *Draft Referral guidelines for the nationally listed Brigalow Belt reptiles*, Commonwealth of Australia, Canberra.

Department of Sustainability Environment Water Populations and Communities 2012, *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy*, Commonwealth of Australia, Canberra.

Department of Sustainability Environment Water Populations and Communities 2013, *Policy Statement: Translocation of Listed Threatened Species—Assessment under Chapter 4 of the EPBC Act*, Commonwealth of Australia, Canberra.

Department of the Environment 2013, *Matters of National Environmental Significance: Significant impact guidelines 1.1*, Commonwealth of Australia, Canberra.

Department of the Environment 2015, *Referral guideline for 14 birds listed as migratory species under the EPBC Act*, Commonwealth of Australia, Canberra.

Department of the Environment 2016a, *EPBC Act referral guideline for the endangered northern quoll Dasyurus hallucatus: EPBC Act Policy Statement*, Commonwealth of Australia, Canberra.

Department of the Environment 2016b, *EPBC Act referral guideline for the endangered northern quoll *Dasyurus hallucatus**, Commonwealth of Australia, Canberra.

Department of the Environment and Energy 1992, *National Strategy for Ecologically Sustainable Development*, Commonwealth of Australia, Canberra.

Department of the Environment and Science 2022, 'Guide to Greater Glider Habitat in Queensland', *Queensland Herbarium2*, retrieved from <<https://www.dcceew.gov.au/sites/default/files/documents/guide-greater-glider-habitat-qld.pdf>>.

Department of the Environment Water Heritage and the Arts 2010a, *Survey Guidelines for Australia's Threatened Bats*, Commonwealth of Australia, Canberra.

Department of the Environment Water Heritage and the Arts 2010b, *Survey guidelines for Australia's threatened birds*, Commonwealth of Australia, Canberra.

Etherington, R, Jeffers, B, Grigg, L & Paddock, A 2018, 'Investigating the demographics and intrapopulation spatial patterns of the endangered *Cycas megacarpa* K.D.Hill in central Queensland, Australia', *Austral Ecology*, vol. 43, no. 1, pp. 110–116.

Eyre, T, Ferguson, D, Hourigan, C, Smith, G, Mathieson, M, Kelly, A, Venz, M, Hogan, L & Rowland, J 2018, *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (Version 3)*, Department of Environment and Science, Brisbane.

Hill, BM & Ward, SJ 2010, *National Recovery Plan for the Northern Quoll *Dasyurus hallucatus**, Department of Natural Resources, Environment, The Arts and Sport, Darwin.

Hourigan, C 2011, *Ghost bat, *Macroderma gigas*. Targeted species survey guidelines*, Department of Environment and Science, Brisbane.

International Erosion Control Association 2008, *Best Practice Erosion and Sediment Control*, IECA Australasian Chapter.

James, H 2016, *Investigating a dinosaur: conservation genetics and demographic analysis of the endangered cycad species *Cycas megacarpa* and implications for the proposed translocation*, PhD thesis, University of the Sunshine Coast, Sippy Downs.

James, H, Forster, P, Lamont, R & Shapcott, A 2018, 'Conservation genetics and demographic analysis of the endangered cycad species *Cycas megacarpa* and the impacts of past habitat fragmentation', *Australian Journal of Botany*, vol. 66, no. 2, pp. 173–189.

Lat27 2021, *Mount Hopeful Wind Farm Landscape and Visual Impact Assessment*, report prepared for Neoen.

Peck, S & Hobson, R 2007, *Survey results and management options for the Collared Delma (*Delma torquata*) along the proposed Toowoomba Bypass, Toowoomba Range, South-east Queensland, November 2006*, Queensland Parks and Wildlife Service, Brisbane.

Porter, R 1998a, 'Observations on a large population of the vulnerable pygopodid, *Delma torquata*', *Memoirs Queensland Museum*, vol. 42, pp. 565–572.

Porter, R 1998b, *A preliminary field investigation of the collared delma *Delma torquata* (Reptilia: Pygopodidae)*, Lone Pine Koala Sanctuary, Queensland.

Queensland Herbarium 2007, 'National Multi-species Recovery Plan for the cycads, *Cycas megacarpa*, *Cycas ophiolitica*, *Macrozamia cranei*, *Macrozamia lomandroides*, *Macrozamia pauli-guilielmi* and *Macrozamia platyrhachis*', , p. 50.

Rockhampton Regional Council 2017, *Corporate Plan 2017-2021*, Rockhampton.

Rollins, K, Meyerholz, D, Johnson, G, Capparella, A & Loew, S 2012, 'A Forensic Investigation Into the Etiology of Bat Mortality at a Wind Farm: Barotrauma or Traumatic Injury?', *Veterinary Pathology*, vol. 49, no. 2, pp. 362–371.

Sonus 2021, *Mount Hopeful Wind Farm Noise Impact Assessment*, report prepared for Neoen.

Spassiani, AC 2020, 'Climatology of Severe Convective Wind Gusts in Australia', retrieved from <https://espace.library.uq.edu.au/data/UQ_f28816e/s44137544_phd_thesis.pdf?Expires=1667524381&Key-Pair-Id=APKAJKNB4MJBNC6NLQ&Signature=bAVDxsSIFyAl0AvTy3vkC4SnByYWgBe9HmCzzQsnKSI28sSdjiD8Xvknx9fw7ammYtgCQCc~UkINNI2tROPEyb201Y6JdV271uwTZ0sdzWYfmG0wr~o9ViX>.

The Intergovernmental Panel on Climate Change 2022, 'Sixth Assessment Report (AR6)', retrieved from <<https://www.ipcc.ch/assessment-report/ar6/>>.

Threatened Species Scientific Committee 2015, *Conservation Advice Geophaps scripta scripta (squatter pigeon (southern))*, Commonwealth of Australia, Canberra.

Threatened Species Scientific Committee 2019, *Conservation Advice Hirundapus caudacutus (white-throated needle-tail)*, Commonwealth of Australia, Canberra.

Woinarski, JCZ, Oakwood, M, Winter, J, Burnett, S, Milne, D, Foster, P, Myles, H, Holmes, B, Government, TA, Heritage, N & March, T 2008, 'Surviving the toads : patterns of persistence of the northern quoll *Dasyurus hallucatus* in Queensland', *Management*, vol. 571, no. March, pp. 571–581, retrieved from <https://denr.nt.gov.au/__data/assets/pdf_file/0003/255081/qld_quolls_finalreport.pdf>.

WSP 2021, *Mount Hopeful Wind Farm Electromagnetic Interference Study*, report prepared for Neoen.

Youngentob, KN, Marsh, KJ & Skewes, J 2021, *A review of koala habitat assessment criteria and methods*, retrieved from <<https://www.dcceew.gov.au/sites/default/files/documents/review-koala-habitat-assessment-criteria-and-methods-2021.pdf>>.

