



Environmental Approval: EPBC 2020/8867

Lotus Creek Wind Farm

Offset Area Management Plan

**BLUE
POWER
PARTNERS**

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Lotus Creek Wind Farm

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Contents

1.	Introduction.....	8
1.1.	Project History	8
1.2.	Project Description	8
1.3.	Purpose of the OAMP	9
1.4.	Impact Area Description – MNES to be Offset	11
1.5.	Impact Area habitat quality scoring – summary of residual impacts	11
2.	OAMP Approval Conditions	14
3.	Offset Area Description	18
3.1.	Site Location and Size	18
3.2.	Vegetation Communities	18
3.3.	Environmental Values.....	19
3.4.	Offset Connectivity	19
3.5.	MNES within the Offset Area.....	21
3.5.1.	Koala	21
3.5.2.	Greater Glider	21
3.5.3.	Squatter Pigeon	22
3.6.	Description of Assessment Units	23
3.7.	Nature and Extent of Weeds and Feral Animals	29
3.7.1.	Pest fauna Monitoring Methodology	31
3.7.2.	Weed Monitoring Methodology.....	33
3.7.3.	Fire Fuel Load Monitoring Methodology.....	34
4.	Habitat Quality Scoring Methodology	37
5.	Offset Habitat Quality Scoring Results	46
6.	Legal Mechanism	47
7.	Offset Assessment Guide – Calculator Inputs	48
7.1.	Annual Probability of Extinction	48
7.2.	Protected Matter Attributes.....	48
7.3.	Habitat Quality.....	48
7.4.	Time over which Loss is Averted	52
7.5.	Time until Ecological Benefit	52
7.6.	Risk of Loss (%) Without Offset	52
7.7.	Risk of Loss (%) With Offset.....	52
7.8.	Confidence in Result (%).....	52
7.9.	Percentage of Impact Offset.....	54
8.	Offset Area Interim Milestones and Completion Criteria	55

8.1.	Targeted Site-Specific Attributes for Improvement	55
8.2.	Targeted Species-Specific Attributes for Improvement	56
9.	Management Actions	58
9.1.	Bushfire Management	61
9.2.	Livestock Exclusion and Management.....	65
9.3.	Feral Animal Control.....	65
9.4.	Weed Management.....	68
9.5.	Additional Management Actions	72
10.	Monitoring.....	74
10.1.	Monitoring Objectives	74
10.2.	Habitat Quality Scoring Surveys	74
10.3.	HBT Surveys	75
10.4.	Weed and pest fauna surveys	75
10.5.	Offset Area Condition Assessment Inspections.....	75
10.6.	Reporting	75
10.7.	Monitoring and Reporting Schedule	76
11.	Corrective Actions	77
12.	Adaptive Management and Review	82
13.	Risk Assessment.....	83
14.	Declaration	86
14.1.	Suitably qualified ecologist.....	86
14.1.	Declaration of accuracy	86
15.	References.....	87
	Appendix 1 - Suitably Qualified Ecologist CV.....	89

List of Abbreviations and Terms

Terms	Definitions
AU	Assessment Unit
Development Footprint	The impact area
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Cwth)
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cwth)
HBT	Hollow bearing tree
MNES	Matters of national environmental significance
OAMP	Offset Area Management Plan
Offset Area	All sites that are confirmed to form part of the offset requirement
Project	Lotus Creek Wind Farm Project
RE	Regional Ecosystem
SPRAT	Species profile and threats database
VM Act	<i>Vegetation Management Act 1999</i> (Qld)
WoNS	Weeds of National Significance

List of figures

Figure 1.1: Project Site Location	10
Figure 1.2: Impact Area Assessment Units and BioCondition Survey Sites	13
Figure 3.1: Offset Connectivity and State Mapped Biodiversity Corridors	20
Figure 3.2: [REDACTED] Offset Area, Assessment Units and BioCondition Sites	24
Figure 3.3: [REDACTED] Offset Area, Assessment Units and BioCondition Sites	25
Figure 3.4: Koala Habitat Within Offset Area	26
Figure 3.5: Greater Glider Habitat Within Offset Area	27
Figure 3.6: Squatter Pigeon Habitat Within Offset Area	28
Figure 3.7: Camera Deployment Locations within the Offset areas	35
Figure 3.8: Weed Density Survey Locations within the Offset areas	36
Figure 9.1: Pest Fauna Activity Index in Offset Management Areas	66
Figure 9.2: Example Camera Trap Images of Wild Dog and Feral Cat	66
Figure 9.3: Weed Density Index for Weed Species excluding <i>Lantana camara</i> in the Offset Management Areas	70
Figure 9.4: Weed Density Index for <i>Lantana camara</i> in the Offset Management Areas	70

List of tables

Table 1.1: Project Site Lot on Plans	8
Table 1.2: Assessment Units and BioCondition Survey Sites within the Impact Area	12
Table 1.3: Project MNES values, Impact Area and habitat quality scores	12
Table 2.1: OAMP Conditions of Approval (EPBC 2020/8867)	14
Table 3.1: Ground-truthed Regional Ecosystems within the Offset Area	18
Table 3.2: Koala habitat area by RE within the Offset Area	21
Table 3.3: Greater Glider Habitat area by RE within the Offset Area	22
Table 3.4: Squatter Pigeon Habitat area by RE within the Offset Area	23
Table 3.5: Offset Area AUs, Area (ha) and Site Number	23
Table 3.6: Known or Likely to Occur Weed Species within the Offset Area	29
Table 3.7: Fuel Load Assessment and Scoring	34
Table 4.1: Habitat Quality Data Inputs	37
Table 4.2: Site Condition, Site Context, Species Stocking Rate and Weighted Score	40
Table 4.3: Site Criteria for Assessing BioCondition Scores	42
Table 4.4: Species Specific Indicators - Koala	43
Table 4.5: Species Specific Indicators – Greater Glider	43
Table 4.6: Species Specific Indicators – Squatter Pigeon	44
Table 5.1: Baseline Offset Area Habitat Quality Scores for MNES	46
Table 7.1: International Union for the Conservation of Nature (IUCN) Red List for threatened species	48
Table 7.2: Impact Area Habitat Quality Score	49
Table 7.3: Offset Area Habitat Quality Starting Score	50
Table 7.4: Offset Area Habitat Quality 20 Year Score	51
Table 7.5: Confidence in Result for Each Management Action	53
Table 7.6: Summary of the Offset Requirement per Species	54
Table 8.1: Habitat quality score interim milestones and completion criteria for each MNES	55
Table 8.2: Weed and Pest Interim Milestones and Completion Criteria	55
Table 8.3: Targeted Site-Specific Attributes for Improvement	56
Table 8.4: Targeted Species-Specific Attributes for Improvement	57

Table 9.1: Recovery Actions for Koala, Greater Glider and Squatter Pigeon and Proposed Management Measures in the Offset areas	59
Table 9.2: Baseline Fire Fuel Load within the Offset Area.....	61
Table 9.3: Fire Management Guidelines Recommendations (Extract from (DES, 2019))	63
Table 9.4: Baseline Pest Fauna Activity Index	65
Table 9.5: Pest Control Technique for Pest Fauna	67
Table 9.6: Pest Monitoring and Management Timing.....	68
Table 9.7: Weed control measures for weeds identified within the offset areas.....	69
Table 9.8: Baseline Weed Density	69
Table 9.9: Weed Management Timing	71
Table 9.10: Vehicle Washdown and Hygiene Procedures.....	71
Table 9.11: Additional Management Actions and Offset Area Restrictions.....	72
Table 11.1: Proposed Corrective Actions	77
Table 13.1: Risk Assessment Matrix and likelihood/consequence table (DCCEEW, 2014: Environmental Management Plan Guidelines)	83
Table 13.2: Risk Assessment for Offset Management Activities	84

1. Introduction

This Offset Area Management Plan (OAMP) has been prepared for the [REDACTED] and [REDACTED] offset areas, which will be managed to offset potential significant impacts to matters of national environmental significance (MNES) associated with the Lotus Creek Wind Farm (the Project) (EPBC 2020/8867). This OAMP has been prepared to address requirements set out in the *Environment Protection and Biodiversity Act 1999* (EPBC Act) approval for the Project and the EPBC Act Environmental Offsets Policy (DSEWPC 2012).

The Project sits over three leasehold lots (see Table 1.1 and Figure 1.1 (Project Site)) between the township of Saint Lawrence on the central Queensland coast and the locality of Lotus Creek to the west. The Project Site is located within the Isaac Regional Council local government area.

Table 1.1: Project Site Lot on Plans

Lot	Plan	Shire	Property Name/
3161	PH378	Isaac Regional Council	[REDACTED]
799	PH391	Isaac Regional Council	[REDACTED]
4	KL210	Isaac Regional Council	[REDACTED]

The Project is situated on the Nebo-Connors Range, which runs south-east to north-west with elevations ranging from 400 to 550 m above sea level (ASL), with highest elevation areas generally in the south-east. The lowest elevations within the Project Area (in the east) are approximately 200 m ASL. Glencoe State Forest adjoins the east of the northern section of the Project Site lot boundaries on the Collaroy [REDACTED] Road. Road infrastructure within the area includes St Lawrence [REDACTED] Road, Collaroy [REDACTED] Road and Marlborough Sarina Road.

1.1. Project History

The initial design for Lotus Wind Farm was located in the Clarke-Connors Range and the Nebo-Connors Range and included the installation of 81 wind turbines with an upper capacity of 660 MW. An EPBC Act referral (2020/8627) was submitted on 8 May 2020. The referral decision, issues on 6 Jun 2020, was that the action would have clearly unacceptable impacts on threatened species and communities. In response to the Commonwealth Department of Agriculture, Water and the Environment's (DAWE) decision, the Project redesigned the wind farm to remove turbines and associated infrastructure from Greater Glider habitat specifically, and from the Clarke-Connors Range in general, as well as reducing the number of turbines in Koala habitat from 81 down to 55 turbines.

An additional ecological survey was undertaken in September 2020 to survey new locations of turbines and access tracks, identify Koala habitat areas, confirm Greater Glider habitat areas and target threatened species. Based on these findings, Lotus Creek Wind Farm Pty Ltd further refined the turbine and access road layout, relocating turbines, where possible, to low vegetation density or cleared areas or adjacent to existing roads, and optimised access tracks and other infrastructure to reduce the clearing footprint.

An EPBC referral was submitted for the new Development Footprint in December 2020. The referral (2020/8867) was determined to be a controlled action by the DAWE, to be assessed by preliminary documentation.

1.2. Project Description

The Project will comprise of the installation of up to 46 wind turbines with an upper capacity of 322MW that will supply electricity to the national electricity grid. Key infrastructure components include:

- Wind turbines and hardstand infrastructure

- Permanent and temporary wind monitoring masts
- Battery energy storage
- Substations and switchyard
- Telecommunication towers
- Site offices, workshops, warehouses, staff amenities
- Gravel-capped roads
- Site drainage infrastructure
- Permanent site entries
- Underground power and communication cables
- Medium and high voltage overhead powerlines
- New fencing with grids and gates
- Temporary facilities including construction compounds, laydown and stockpile areas, site entrances and accommodation construction camp
- Mobile concrete batching plant and rock crushing facilities.

All infrastructure (including temporary construction camps, lay down areas, stockpiles etc), tracks, powerlines and wind turbines will be located within the Development Footprint.

Construction activities are expected to commence in 2024 subject to approvals and commercial considerations and expected to continue for a period of approximately 24 months. The Project is anticipated to have an operational life of 30 years.

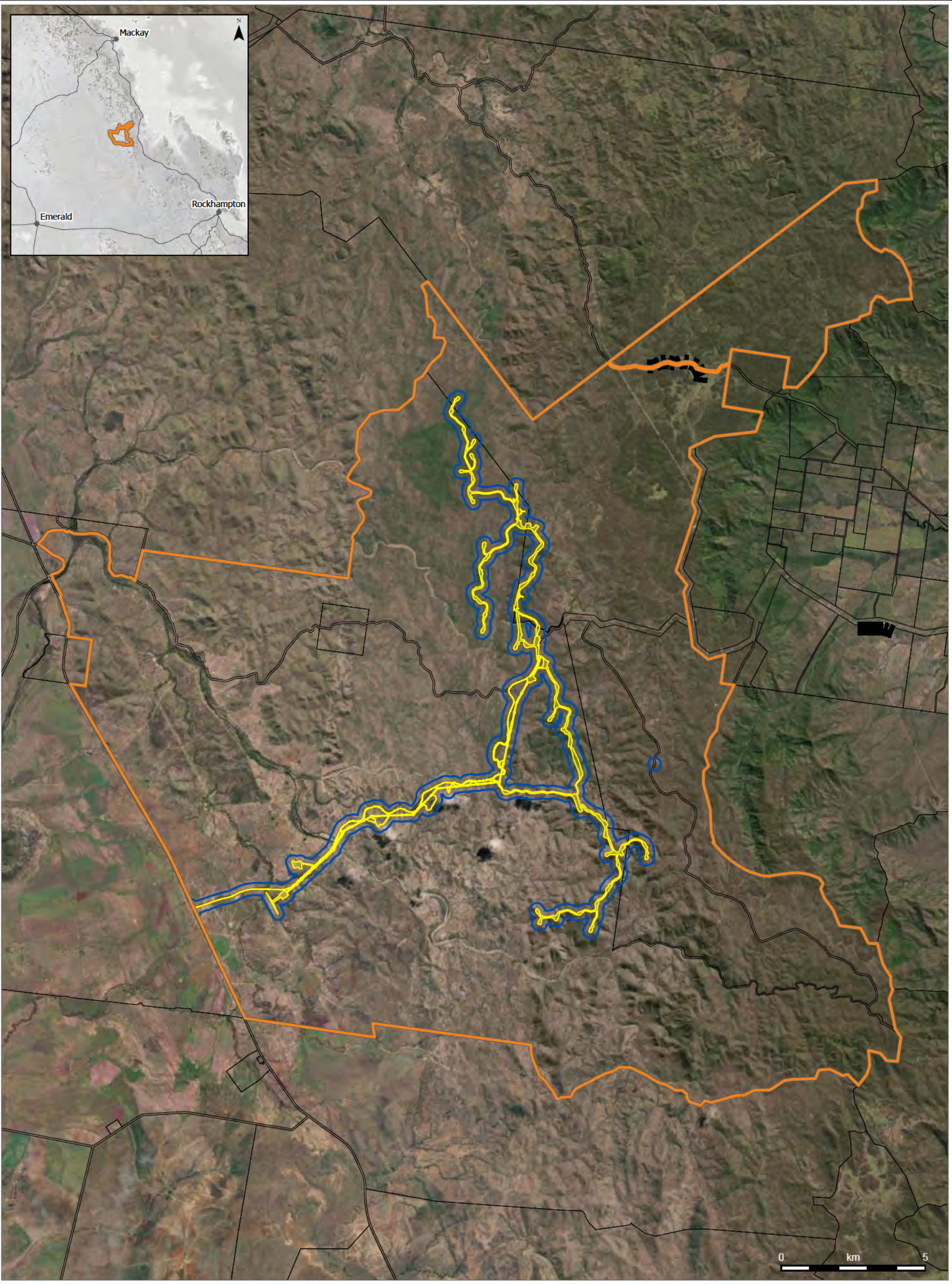
At the end of the operational phase the wind farm would either be decommissioned or repowered with new equipment. In the event of decommissioning, all above ground infrastructure would be removed from the site and a rehabilitation plan would be implemented to reinstate habitat and return the land to its pre-development condition. Redundant infrastructure would be recycled or otherwise disposed of at approved facilities. Any ground disturbance resulting from the operation and/or infrastructure removal stage would be rectified and the topsoil of disturbed areas would be re-seeded as per the rehabilitation plan. If continued operation of the wind farm is the preferred option, a development application would be submitted at that time. It is likely that much of the infrastructure present at the site would be retained and incorporated into the new proposal.

1.3. Purpose of the OAMP

The Project is committed to developing and implementing appropriate avoidance, mitigation and management measures during the pre-construction (planning), clearing, construction, operation and decommissioning phases of the project.

This plan identifies the management measures that will be undertaken within the offset areas and the respective performance outcomes, monitoring schedules and auditing that will be undertaken to demonstrate these management measures are effective in achieving the performance criteria. Specifically, the management measures to be undertaken within the offset areas are broadly grouped into the following:

- Bushfire management
- Livestock exclusion and management
- Feral animal control
- Weed management
- Additional management and maintenance



Project Location Offset Area Management Plan

Site Boundary

Cadastral

Project Area

Development Footprint

LOTUS CREEK WIND FARM

1.4. Impact Area Description – MNES to be Offset

The Project has been assessed as having a potential significant impact on habitat for; Koala, Squatter Pigeon and Greater Glider. Koala and Greater Glider were listed Vulnerable at the time of the controlled action referral decision. All impacts have been calculated using the listing at the time of the controlled action referral decision.

Impacts to MNES have been calculated based on the maximum area of habitat that will be cleared by the Project (Development Footprint) and are provided below in the following sections. These values are published in the Lotus Creek Wind Farm Preliminary Documentation (2020/8867) (NGH 2021) and were used in the Offset Assessment Guide calculations (see Section 7).

Koala

The Koala (*Phascolarctos cinereus*) were confirmed present within the Project Area. Habitat within the Development Footprint consists of vegetation communities where eucalypt species are the dominant canopy layer. This includes the communities of *Eucalyptus crebra* woodland with a grassy understorey and mixed eucalypt forests and woodlands.

The Project will impact a total of 341.36 ha of Koala habitat.

Greater Glider

The Project will impact a total of 48.75 ha of Greater Glider habitat.

Greater Glider (*Petauroides armillatus volans*) were observed across the eastern section of the Project area, with none in proximity to the Development Footprint. Breeding place surveys undertaken within the Development Footprint and identified 296 hollow bearing trees (HBTs) within the areas of mapped Greater Glider habitat. Note that suitability of HBTs for use by Greater Gliders has not yet been undertaken.

Squatter Pigeon

The Squatter Pigeon (southern) (*Geophaps scripta scripta*) is highly mobile, with records of this species predominantly located within the southern portion of the Project Area.

The Project will impact a total of 16.39 ha of breeding habitat (which also includes foraging habitat) and 32.35 ha of foraging habitat (which is additional to the area as breeding and foraging habitat above).

1.5. Impact Area habitat quality scoring – summary of residual impacts

A total of 11 BioCondition and habitat quality scoring sites (see Section 5 for information on the survey methodology) were established in the Impact Area (see Table 1.2). Surveys were undertaken between November 2022 and January 2023. The location of the Impact Area, Assessment Units (AUs) and BioCondition and habitat quality survey sites are illustrated in Figure 1.2.

Semi-evergreen vine thicket (RE 11.12.4) is present in the impact area; however, this vegetation community is not suitable habitat for the targeted species and therefore has been removed from further offset calculation.

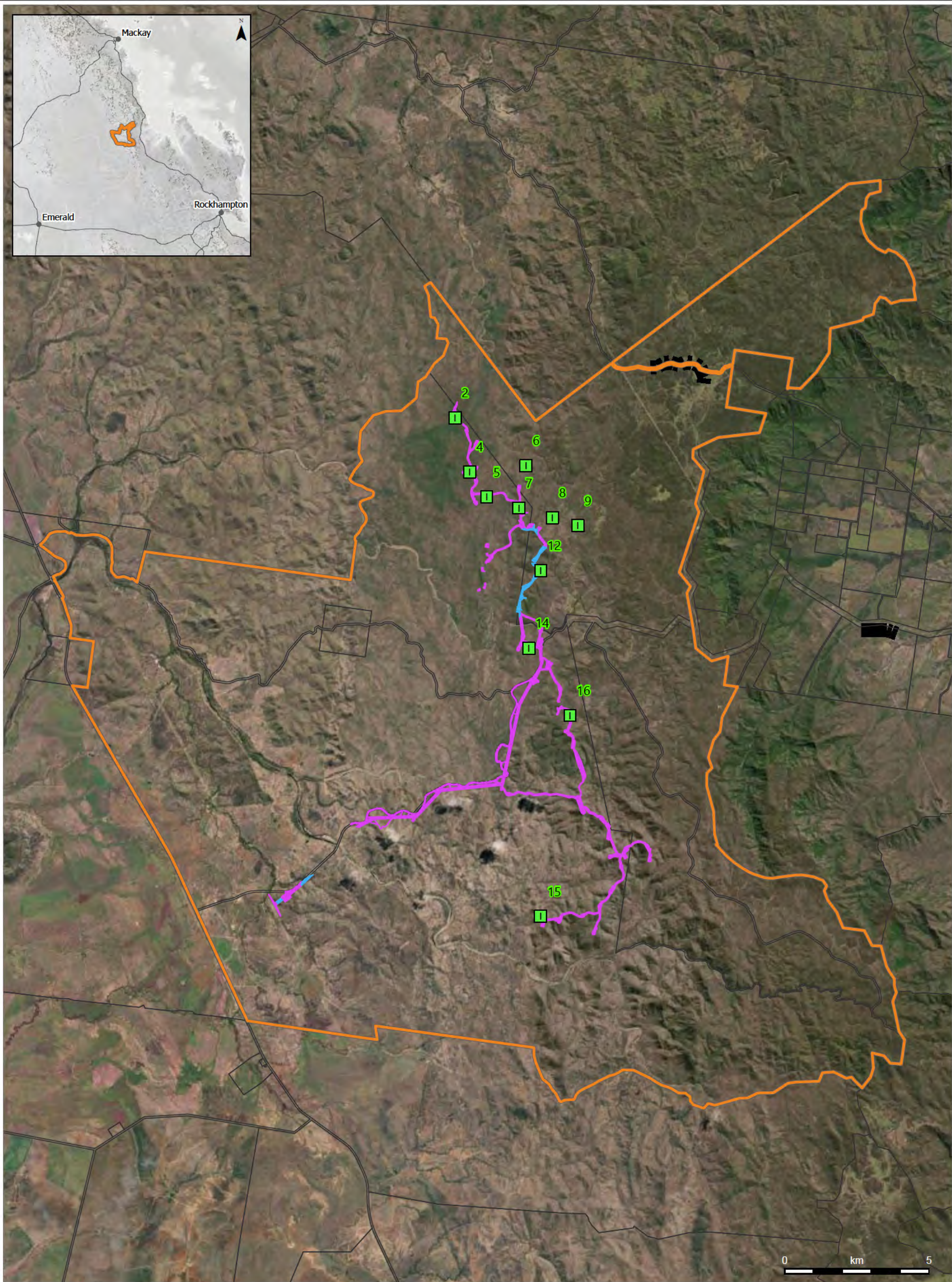
Table 1.2: Assessment Units and BioCondition Survey Sites within the Impact Area

Assessment Unit	Regional Ecosystem	Area (ha)	Number of Survey Sites	Survey Site ID
AU1	11.12.1 (remnant)	292.6	7	BC12, BC14, BC15, BC16, BC5, BC6, BC7
AU2	11.12.6 (remnant)	48.8	4	BC2, BC4, BC8, BC9

The results of the Impact Area habitat quality scoring surveys for each MNES are presented in Table 1.3.

Table 1.3: Project MNES values, Impact Area and habitat quality scores

MNES	Impact Area (ha)	Habitat Quality Score (value used in OAG)
Koala	341.36	7.47 (7)
Greater Glider	48.75	7.46 (7)
Squatter Pigeon – Breeding habitat	16.39	6.41 (6)
Squatter Pigeon – Foraging habitat	32.35	6.41 (6)



Impact Site - Assessment Units Offset Area Management Plan

LOTUS CREEK WIND FARM

- Site Boundary
- Assessment Units
- AU1 Remnant 11.12.1
- AU2 Remnant 11.12.6
- MHQA Site
- Cadastral



2. OAMP Approval Conditions

This OAMP was prepared to meet the requirements of Conditions 5-9 and Attachment B of the EPBC approval (EPBC 2020/8867).

Table 2.1: OAMP Conditions of Approval (EPBC 2020/8867)

Condition Number	Condition Requirements	Relevant Sections/Demonstration of Compliance
5	Prior to commencement of the action, the approval holder must submit to the department for the approval of the Minister an Offset Area Management Plan (OAMP) proposing the environmental offset site(s) for Koala habitat, Squatter Pigeon breeding habitat, Squatter Pigeon foraging habitat, and Greater Glider habitat to the satisfaction of the Minister.	This document outlines compliance with this condition.
6	The approval holder must: a. not commence the action until the OAMP has been approved by the Minister; b. commence implementing the OAMP upon commencement of the action; and c. continue implementing the approved OAMP for the remaining duration of the approval.	This document outlines compliance with this condition.
7	The OAMP must: a. be in accordance with the EPBC Act Environmental Offsets Policy; b. be prepared by a suitably qualified ecologist; c. include the details outlined in Attachment B; and d. be attached to the legal mechanism used to secure the environmental offset area(s). Each offset area(s) must be secured within 12 months of the commencement of the action. The approval holder must notify and provide evidence to the department within 5 business days of any environmental offset area(s) being secured.	The OAMP outlines compliance with this condition through the following: a. Section 3 b. Section 14 c. See Section 9 d. Section 6
8	To ensure that the offsets required for Koala habitat, Squatter Pigeon habitat and Greater Glider habitat provide a conservation gain in accordance with the EPBC Act Environmental Offsets Policy, the completion criteria specified in the approved OAMP must be achieved within 20 years of the commencement of the Action and then be maintained or improved for the duration of the approval.	Section 8

Condition Number	Condition Requirements	Relevant Sections/Demonstration of Compliance
9	The approval holder must, within 40 business days of the 20th anniversary of the commencement of the action: - submit to the department a report detailing the area and condition of Koala habitat, Squatter Pigeon breeding habitat, Squatter Pigeon foraging habitat, and Greater Glider habitat in all offset area(s) specified in the approved OAMP; and - notify the department in writing of any completion criteria at any offset area(s) specified in the approved OAMP that have not been achieved and the likely reasons that these completion criteria have not been met; and - if any completion criterion has not been achieved within the 20th anniversary of the commencement of the action, the approval holder must submit to the department for the Minister's approval an OAMP to address the shortfall in environmental offsets consistent with the Environmental Offsets Policy, and the approval holder must implement the approved OAMP, or any subsequent version of the OAMP approved by the Minister in writing, for the remaining duration of this approval.	Section 10.7
a	A summary of the residual impacts to Koala habitat, Squatter Pigeon breeding habitat, Squatter Pigeon foraging habitat, and Greater Glider habitat that will be compensated for by the environmental offsets. This summary must include the final impact area to be offset for Koala habitat, Squatter Pigeon breeding habitat, Squatter Pigeon foraging habitat, and Greater Glider habitat at all impact sites which the particular offset is to address	Section 1.4

Condition Number	Condition Requirements	Relevant Sections/Demonstration of Compliance
b	Details of the management actions, and timeframes for implementation, to be undertaken to achieve the offset completion criteria specified in the OAMP as required under condition 5, including but not limited to: i. interim milestones that set targets at 5-yearly intervals for progress towards achieving the offset completion criteria. ii. details of the nature, timing and frequency of monitoring to inform progress against achieving the 5-yearly interim milestones and maintaining improvements of habitat quality (the frequency of monitoring must be sufficient to track progress towards each set of milestones, and sufficient to determine whether the environmental offset is likely to achieve those milestones in adequate time to implement any necessary corrective actions); iii. timing for the implementation of corrective actions if monitoring activities indicate the interim milestones will not be, or have not been, achieved. iv. a risk analysis and a risk management and mitigation strategy for all risks to the successful implementation of the OAMP and timely achievement of the offset completion criteria, including weed and feral animal management, management of potential wild fires and a rating of all initial and post-mitigation residual risks in accordance with the risk assessment matrix (Attachment C). v. evidence of how the management actions and corrective actions take into account relevant approved conservation advices and are consistent with relevant recovery plans and threat abatement plans.	The OAMP outlines compliance with this condition through the following: i. Section 8 ii. Section 10 iii. Section 11 iv. Section 13 v. Table 9.1
c	A description of the environmental offset area(s), including location, size, condition, environmental values present and surrounding land uses.	Section 3
d	The mechanism by which the environmental offset area(s) will be secured.	Section 6
e	Baseline data, including results from field validation surveys, and quantifiable ecological data on habitat quality, and other supporting evidence, that documents the presence of Koala habitat, Squatter Pigeon breeding habitat, Squatter Pigeon foraging habitat, and Greater Glider habitat and the quality of Koala habitat, Squatter Pigeon breeding habitat, Squatter Pigeon foraging habitat, and Greater Glider habitat within the impact sites and environmental offset area(s).	Section 5
f	details of how the environmental offset will provide connectivity with other habitats, populations and biodiversity corridors and/or will contribute to a larger strategic offset for Koala habitat, Squatter Pigeon breeding habitat, Squatter Pigeon foraging habitat, and Greater Glider habitat.	Section 3.4
g	Maps and shapefiles to clearly define the location and boundaries of the environmental offset area(s), accompanied by offset attributes.	Figure 3.1 and Figure 3.2

Condition Number	Condition Requirements	Relevant Sections/Demonstration of Compliance
h	Specific offset completion criteria derived from the site habitat quality to demonstrate the improvement in the quality of Koala habitat, Squatter Pigeon breeding habitat, Squatter Pigeon foraging habitat, and Greater Glider habitat within the environmental offset area over the period of effect of this approval required to meet the requirements of the Environmental Offsets Policy.	Section 8

3. Offset Area Description

The following sections present an overview of the offset area values.

3.1. Site Location and Size

The offset area as shown in Figure 3.1 is located across two properties and includes the [REDACTED] property (316PH378) located east of the Project area and the [REDACTED] property (4KL201) located west of the Project area. The [REDACTED] and [REDACTED] offset areas are 1,931.2 ha and 2,577.1 ha respectively. The offset area is a total of 4,508.3 ha.

3.2. Vegetation Communities

Four regional ecosystems (REs) were ground-truthed within the offset areas in 2022 and 2023. The dominant vegetation communities present within the offset area are characterised by dominated by RE 11.12.1 and RE 8.12.7b, with smaller areas of RE 11.3.4 and RE 11.3.25. More detail on the REs that occur within the offset site are provided in RE descriptions and status under the Queensland *Vegetation Management Act 1999* (VM Act) are provided in Table 3.1.

Table 3.1: Ground-truthed Regional Ecosystems within the Offset Area

RE Code	Description	VM Act Status
8.12.7b	<i>Corymbia citriodora</i> woodland to open forest. Codominant to associated canopy species usually include <i>Eucalyptus crebra</i> and/or <i>E. portuensis</i> . Other associated species may include <i>Corymbia intermedia</i> , <i>E. exserta</i> and <i>C. trachyphloia</i> . There is often a very sparse to sparse secondary tree layer consisting of species such as <i>Lophostemon confertus</i> , <i>Acacia flavescens</i> , <i>A. aulacocarpa</i> , <i>Planchonia careya</i> and <i>A. julifera</i> subsp. <i>curvinervia</i> . There is usually a very sparse to sparse shrub layer with species such as <i>Lophostemon confertus</i> , <i>Coelospermum reticulatum</i> , <i>Acacia crassa</i> subsp. <i>longicoma</i> and <i>Jacksonia scoparia</i> . The ground layer is dominated by species such as <i>Heteropogon contortus</i> , <i>Xanthorrhoea latifolia</i> subsp. <i>latifolia</i> , <i>H. triticeus</i> , <i>Themeda triandra</i> , <i>Eremochloa bimaclata</i> , <i>Cymbopogon</i> spp. and <i>Hardenbergia violacea</i> . Occurs on slopes, ridges and crests (often in drier areas) on undulating hills to rolling mountains of foothills and uplands, on Mesozoic to Proterozoic igneous rocks. Contains minor areas of Tertiary acid volcanics (land zone 8), (subregion 4). Geologies mapped include PKdm (Double Mountain Volcanics), PKgp (Pyri Pyri Granite) and RKvp (Peninsula Range Volcanics). Early Cretaceous - Late Permian dacitic crystal tuff, lithic, vitric and lapilli tuff, muscovite-biotite granite and hornblende-biotite adamellite.	Least Concern
11.3.25	<i>Eucalyptus tereticornis</i> or <i>E. camaldulensis</i> woodland to open forest. Other tree species, including <i>Casuarina cunninghamiana</i> , <i>E. coolabah</i> , <i>Melaleuca bracteata</i> , <i>Melaleuca viminalis</i> , <i>Livistona</i> spp. (in north), <i>Melaleuca</i> spp. and <i>Angophora floribunda</i> , may occur. A tall shrub layer may occur, including <i>Acacia salicina</i> , <i>A. stenophylla</i> and <i>Lysiphyllum carronii</i> . Low shrubs are present, but rarely form a conspicuous layer. The ground layer is open to sparse and dominated by perennial grasses, sedges or forbs. Occurs on fringing levees and banks of major rivers and drainage lines of alluvial plains throughout the region. Soils are very deep, alluvial, grey and brown cracking clays with or without some texture contrast. These are usually moderately deep to deep, soft or firm, acid, neutral or alkaline brown sands, loams or black cracking or non-cracking clays, and may be sodic at depth (Burgess 2003).	Least concern

RE Code	Description	VM Act Status
11.3.4	<i>Eucalyptus tereticornis</i> woodland to open forest. Other tree species that may be present include <i>E. camaldulensis</i> , <i>Corymbia tessellaris</i> , <i>C. clarksoniana</i> , <i>E. melanophloia</i> , <i>E. platyphylla</i> or <i>Angophora floribunda</i> . <i>E. crebra</i> and <i>Lophostemon suaveolens</i> may be locally common. A shrub layer is usually absent, and a grassy ground layer is prominent, and may include any of <i>Bothriochloa bladhii</i> subsp. <i>bladhii</i> , <i>Aristida</i> spp., <i>Heteropogon contortus</i> , <i>Dichanthium</i> spp. and <i>Themeda triandra</i> . Occurs on Cainozoic alluvial plains and terraces. Occurs on variety of soils, including deep cracking clays, medium to fine textured soils, and deep texture-contrast soils.	Of Concern
11.12.1	<i>Eucalyptus crebra</i> +/- <i>Corymbia erythrophloia</i> woodland to open woodland. <i>E. melanophloia</i> is rarely present and may be locally dominant. Also includes localised areas may be dominated by <i>E. persistens</i> . Occurs on ranges on igneous rocks.	Least Concern

3.3. Environmental Values

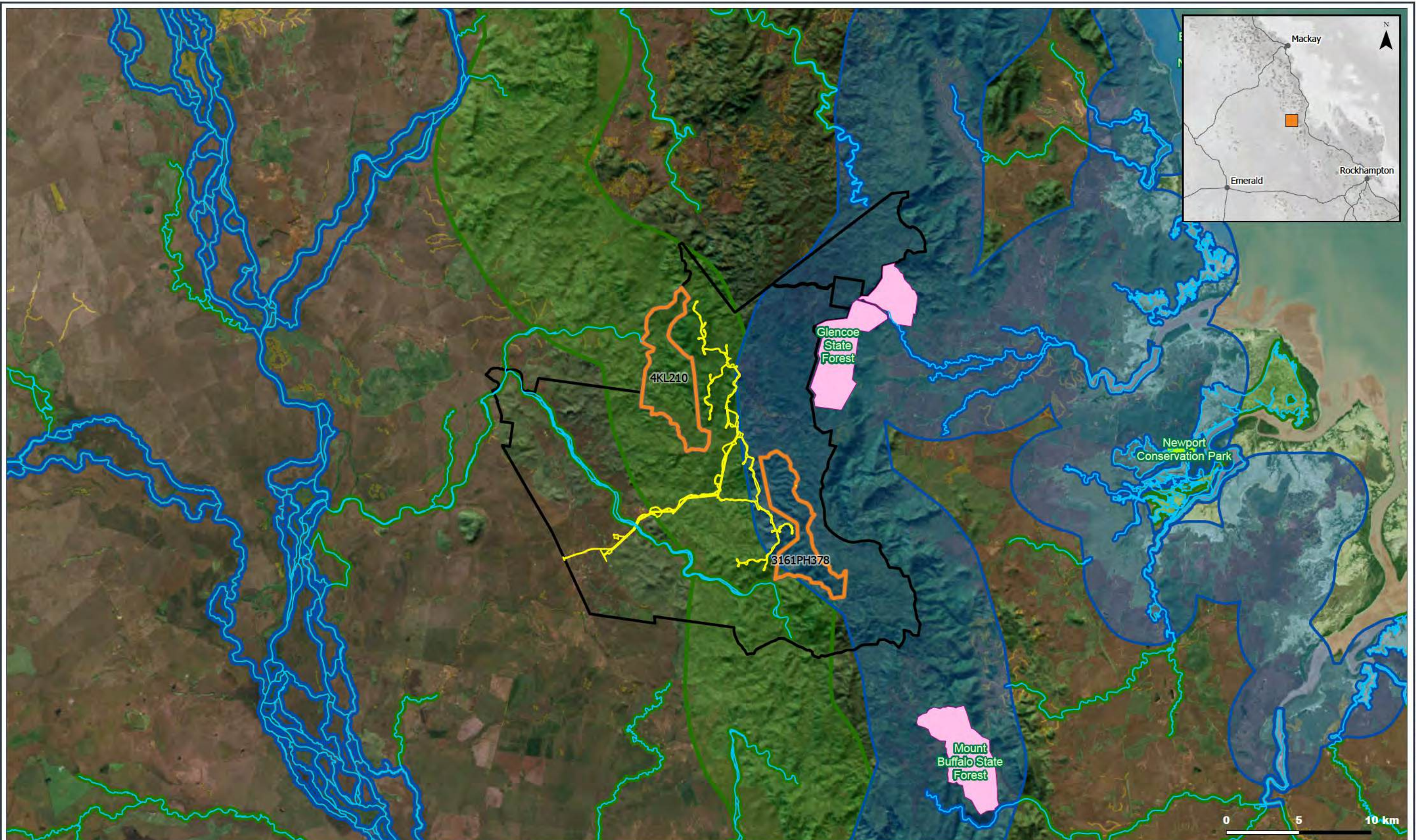
The offset area and surrounding land uses are predominately cattle grazing. Some areas to the west of the offset contain a mix of cleared and remnant vegetation. To the east, Glencoe State Forest supports intact native vegetation. No production crops, including forestry, or other activities such as mining occur in the offset area or its immediate surrounds.

3.4. Offset Connectivity

The vegetation within the offset area includes mature native canopy trees and large patches of remnant vegetation with strong connectivity at the local, site and landscape level. Most of the offset area is mapped as remnant vegetation under the State mapping system. The offset area lies in the Nebo-Connors/Clarke-Connors Range which contains one large, almost contiguous, patch of vegetation that runs north to south from Mackay down to Marlborough and through to the coast. The range is known to contain critical habitat for Koala (Melzer et al., 2018). The range is thought to contain a significant proportion of the regions expected Koala population making it valuable habitat in the region. It is also considered to be a climate refuge for the species in the future (Melzer et al., 2018).

Several nature refuges and protected areas lie within the range including Glencoe State Forest (adjacent to the Site Boundary), Mount Buffalo State Forest (south), Collaroy State Forest (north) Porphyry Hill State Forest and West Hill State Forest (north), however, the majority of the range is not protected and is held by private landowners as freehold or leasehold land for grazing.

State significant biodiversity corridors connect both offset areas north and south (see Figure 3.1).



Connectivity Offset Area Management Plan

Project Site	Riparian Biodiversity Corridor	Remnant Vegetation	National park
Development Footprint	State Biodiversity Corridor	Regrowth Vegetation	Conservation park
Offset Site Boundary	Regional Biodiversity Corridor	State forest	

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SCALE (A3): 1:250,000

DATE: 16/04/2024

DWG No: CIP-006_001

FIGURE 3-1

3.5. MNES within the Offset Area

Habitat mapping prepared during the preparation of Preliminary Documentation, and presented in the EPBC Act approval, extends across the Project Site. The proposed offsets are entirely within the Project Site, and as such all calculations of areas of habitat for each MNES have been undertaken using this habitat mapping. In addition to the habitat mapping numerous records exist across the Project Site from studies undertaken for the preparation of the Preliminary Documentation, and from observations during BioCondition and habitat quality scoring surveys. The following sections describe in more detail records and habitat mapping for each MNES.

3.5.1. Koala

A number of Koalas have been recorded in both offset areas (see Figure 3.4).

Koala habitat has been mapped within the offset area using definitions applied to the impact area, provided in the Lotus Creek Wind Farm Preliminary Documentation (2020/8867) (NGH 2021). The approved conservation advice defines habitat as the following:

- Koala habitat can be broadly defined as any forest or woodland containing species that are known Koala food trees, or shrubland with emergent food trees. The distribution of this habitat is largely influenced by land elevation, annual temperature and rainfall patterns, soil types and the resultant soil moisture availability and fertility. Preferred food and shelter trees are naturally abundant on fertile clay soils.

Definitions that were applied for mapping habitat within both the impact and offset area included the following:

- Eucalyptus crebra woodland, mixed eucalypt woodland and Lophostemon woodland; and
- REs where the species were more commonly recorded including 11.12.1 and 11.12.13 where Koala food and habitat trees are abundant.

The majority of the offset area is remnant eucalypt woodlands (see Figure 3.4). In total, the offset area contains 4,448.5 ha of Koala habitat (see Table 3.2).

Table 3.2: Koala habitat area by RE within the Offset Area

Assessment Unit / RE	Koala Habitat (ha)
AU1 / 11.3.25 (remnant)	338.8
AU2 / 11.12.1(remnant)	2,230.2
AU3 / 8.12.7b (remnant)	1,837.5
AU4 / 8.12.7b (non-remnant)	39.9
AU5 / 11.3.4 (remnant)	3.2
Total	4,449.5

3.5.2. Greater Glider

Numerous Greater Glider have been observed within the [REDACTED] offset area (see Figure 3.5). The [REDACTED] offset area was not included in offset calculations as the areas of potential Greater Glider habitat mapped as potentially occurring within this property were assessed as unlikely to provide suitable habitat.

Greater Glider habitat has been mapped within the offset area (noting the exclusion of areas mapped within the [REDACTED] offset area) using definitions applied to the impact area, provided in the Lotus Creek

Wind Farm Preliminary Documentation (2020/8867) (NGH 2021). The approved conservation advice defines habitat as the following:

- Open woodlands and forests with a preference for taller, montane, moist eucalypt forests with old trees and abundant hollows;
- Forests with mixed eucalypt species particularly *Eucalyptus moluccana*, *E. fibrosa*, *Corymbia citriodora*, *Eucalyptus tereticornis*;
- Areas that provide 1-4 ha of habitat to support individual's home range and more than 6 hollows;
- 1-2 live, large hollow-bearing trees (>50 cm diameter at breast height) for every 1 ha of forest habitat for denning. Hollows in dead trees are rarely used.

Definitions that were applied for mapping habitat within both the impact and offset area included the following:

- REs with a mixed eucalypt canopy and where the species were more commonly recorded including 11.12.6; and
- All areas containing >1 live hollow-bearing tree.

In total, the offset area contains 1,206.03 ha of Greater Glider habitat (see Table 3.3).

Table 3.3: Greater Glider Habitat area by RE within the Offset Area

Assessment Unit / RE	Greater Glider Habitat (ha)
AU1 / 11.3.25 (remnant)	37.64
AU3 / 8.12.7b (remnant)	1,153.90
AU4 / 8.12.7b (non-remnant)	11.32
AU5 / 11.3.4 (remnant)	3.17
Total	1,206.03

BioCondition surveys within the [REDACTED] offset area recorded an average of 6.7 large trees per hectare at remnant vegetation sites within mapped Greater Glider habitat. As large trees are recognised as potentially containing suitable sized hollows for Greater Gliders (Eyre et al 2022), it is proposed that any change in the number of hollow-bearing trees will be captured within the 5-yearly BioCondition monitoring schedule.

In addition to habitat quality surveys undertaken, a survey will be conducted to identify the number of HBTs within the areas of mapped Greater Glider habitat within the offset area. As set out in Section 10, this survey will be undertaken within 12 months of commencement of the action.

3.5.3. Squatter Pigeon

Squatter Pigeon foraging and breeding habitat has been mapped within the offset area using definitions presented in the EPBC variation request. Several Squatter Pigeon records exist within the [REDACTED] offset area, with seasonally permanent water points identified through both properties (see Figure 3.6).

Breeding habitat and foraging habitat within the Development Footprint and offset area are defined as follows:

- Breeding habitat (which is also foraging habitat) - stony rises occurring on sandy or gravelly soils and comprising all eucalypt woodland within 1km of a waterpoint (artificial or natural) or waterway (Stream Order 2 and above) and with a patchy, ground layer of vegetation not exceeding 33% of the ground area.

- Foraging habitat - 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 within 3 km of a water-point (artificial or natural) or waterway (Stream Order 2 and above) and with a patchy, ground layer of vegetation not exceeding 33% of the ground area.

The majority of the [REDACTED] offset area was ground-truthed as mapped as breeding habitat, with a small additional area of foraging habitat with all areas assessed as <33% cover of ground layer vegetation. As all breeding habitat is also foraging habitat, the area of breeding habitat has been used in all calculations presented in the OAMP. This overlap of habitat occurs as they rely on habitat that provides both suitable foraging opportunities and appropriate conditions for nesting and breeding. The majority of the offset area is within 1 km of the water (making them both breeding and foraging habitat), whilst only a very small area is further than 1 km from water and would only be considered foraging habitat (see Figure 3.6). In total, the offset area contains 2,215.7 ha of breeding (and foraging) habitat and 8.6 ha of foraging habitat (see Table 3.4).

Table 3.4: Squatter Pigeon Habitat area by RE within the Offset Area

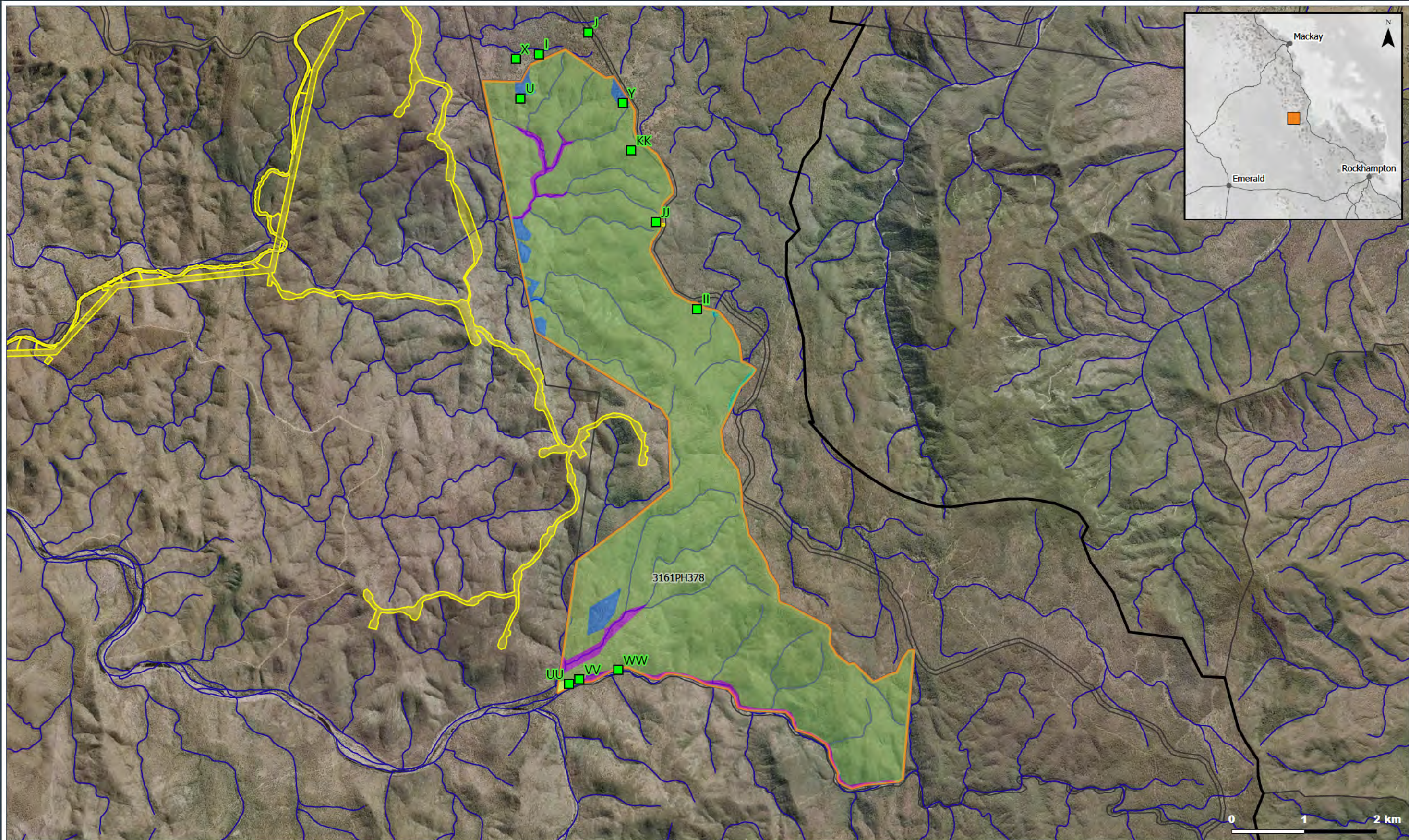
Assessment Unit / RE	Squatter Pigeon Foraging Habitat (ha)	Squatter Pigeon Breeding Habitat (ha)
AU1 / 11.3.25 (remnant)		343.7
AU3 / 8.12.7b (remnant)	4.8	1,837.5
AU4 / 8.12.7b (non-remnant)	3.8	39.9
AU5 / 11.3.4 (remnant)		3.2
Total	8.6	2,215.7

3.6. Description of Assessment Units

In accordance with methodologies set out in the Queensland BioCondition Assessment Manual Version 2.2 (Eyre et al. 2015), the offset area has been stratified into five Assessment Units (AUs) (Table 3.5, Figure 3.2 and Figure 3.3). A total of 20 BioCondition and habitat quality scoring sites were established across these AUs to ensure that future assessments could be repeated consistently. A summary of the area, regional ecosystem and condition of each AU is presented in Table 3.5.

Table 3.5: Offset Area AUs, Area (ha) and Site Number

Assessment Unit	Regional Ecosystem	Area (ha)	Number of Survey Sites	Site Identification
AU1	11.3.25 (remnant)	343.7	4	G, MM, QQ, WW
AU2	11.12.1 (remnant)	2,284.0	6	AA, OO, CC, DD, EE, RR
AU3	8.12.7b (remnant)	1,837.5	6	I, J, U, KK, JJ, II
AU4	8.12.7b (non-remnant)	39.9	2	Y, X
AU5	11.3.4 (remnant)	3.2	2	UU, VV
Total area		4,508.3	20	



Offset Site Offset Area Management Plan

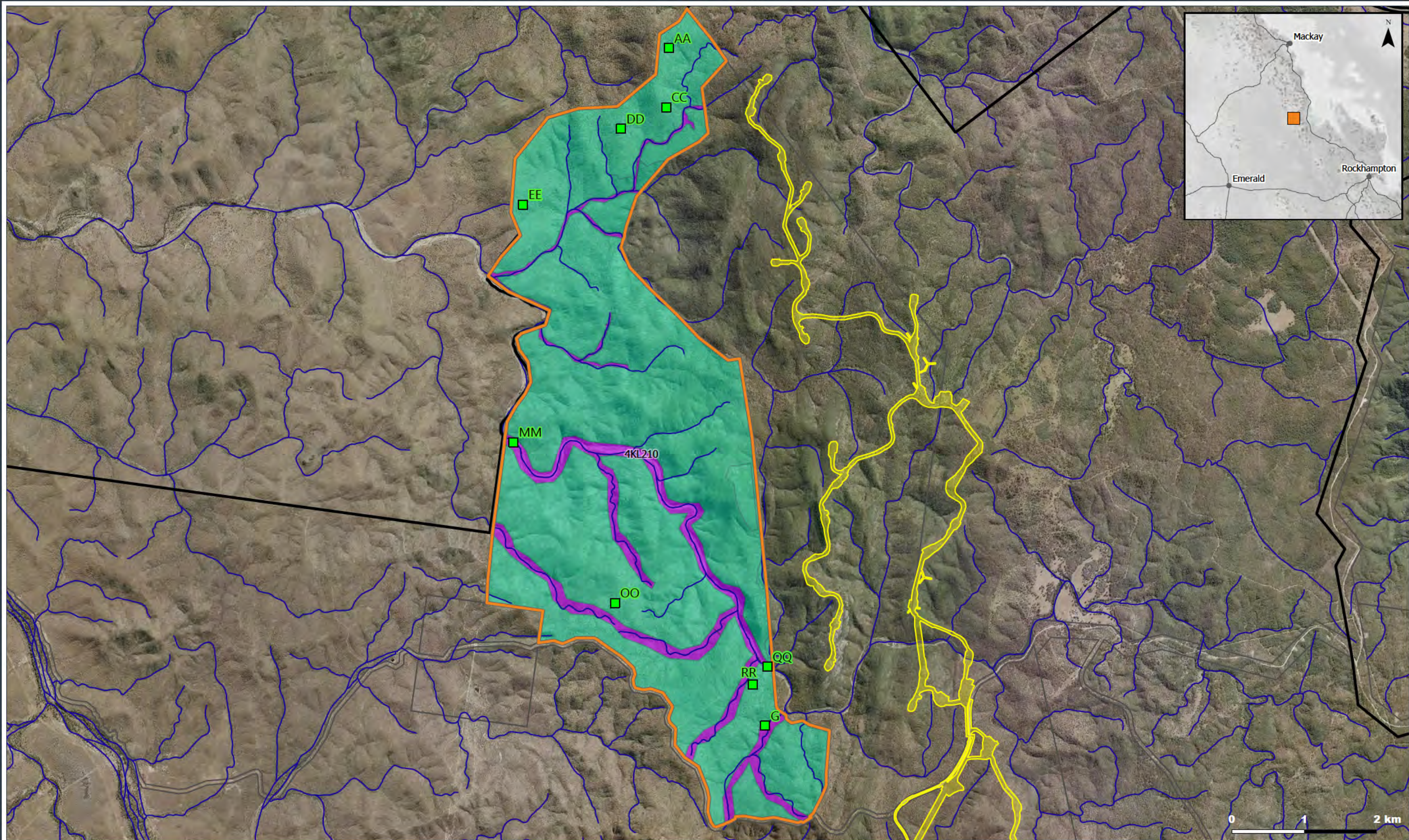
- Project Site
- Development Footprint
- Offset Site Boundary
- MHQA Site
- Watercourse
- AU1 Remnant 11.3.25 - 52.89 ha
- AU2 Remnant 11.12.1 - 7.88 ha
- AU3 Remnant 8.12.7 - 1887.79 ha
- AU4 Non-remnant 8.12.7 - 40.93 ha
- Lot Boundary
- AU5 Remnant 11.3.4 - 3.30 ha

LOTUS CREEK WIND FARM

GDA2020 MGA Zone 55

Data Source: QldMap_Relief: © State of Queensland (Department of Resources) 2023
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Offset Site Offset Area Management Plan

Project Site	MHQA Site	AU1 Remnant 11.3.25 - 284.03 ha
Development Footprint	Watercourse	AU2 Remnant 11.12.1 - 2282.46 ha
Offset Site Boundary	Lot Boundary	

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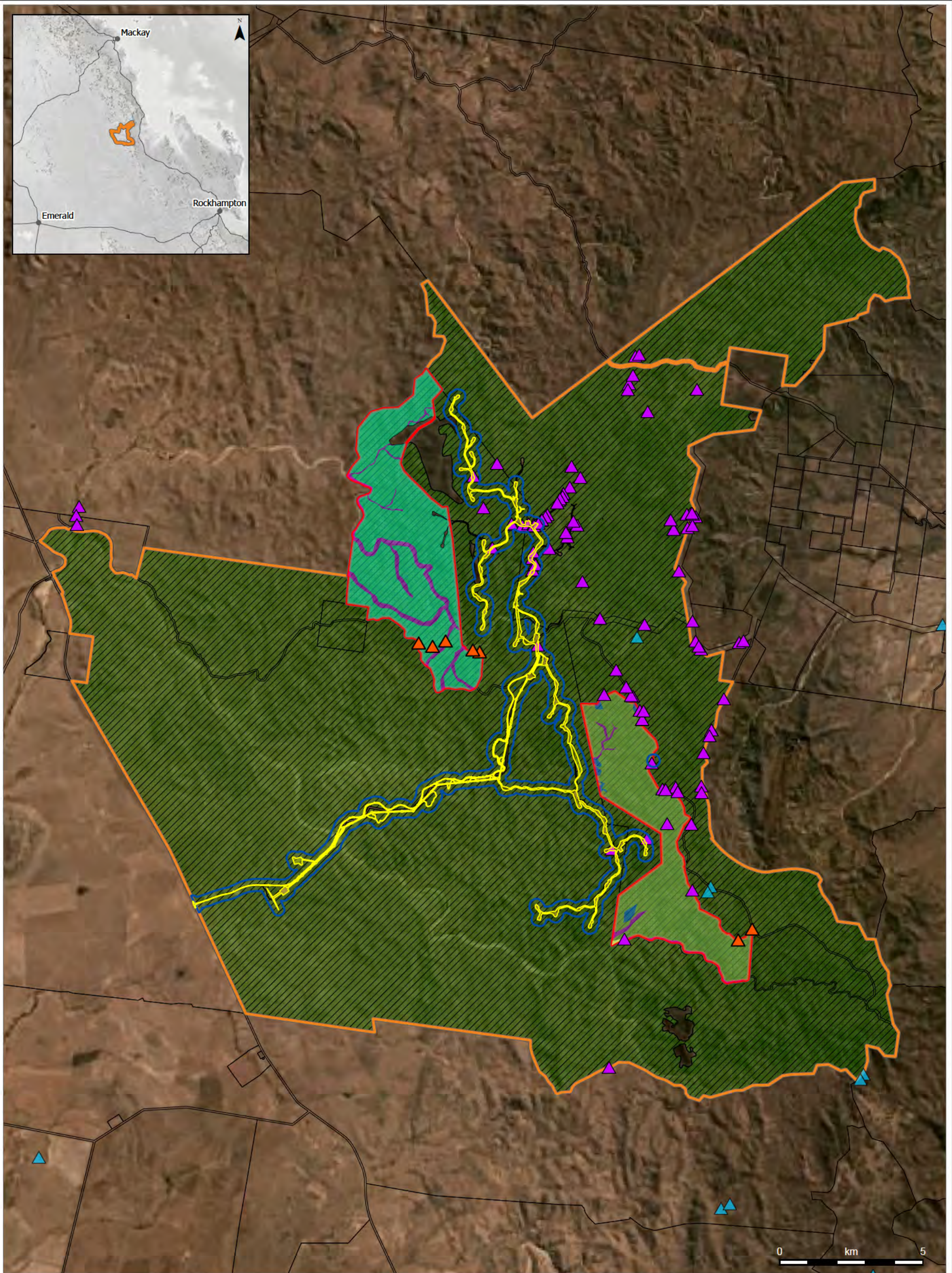
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DATE: 16/04/2024

DWG No: CIP-006_002

FIGURE 3-3



Koala Offset Area Management Plan

- Site Boundary
- Project Area
- Development Footprint
- Offset Site Boundary

- Koala Sighting Attexo 2024
- Koala sighting
- Historic Sighting (WildNet)

- Koala Habitat (Preliminary Documentation NGH 2021)
- AU1 Remnant 11.3.25
- AU2 Remnant 11.12.1
- AU3 Remnant 8.12.7

- AU4 Non-remnant 8.12.7
- AU5 Remnant 11.3.4
- Cadastre

LOTUS CREEK WIND FARM



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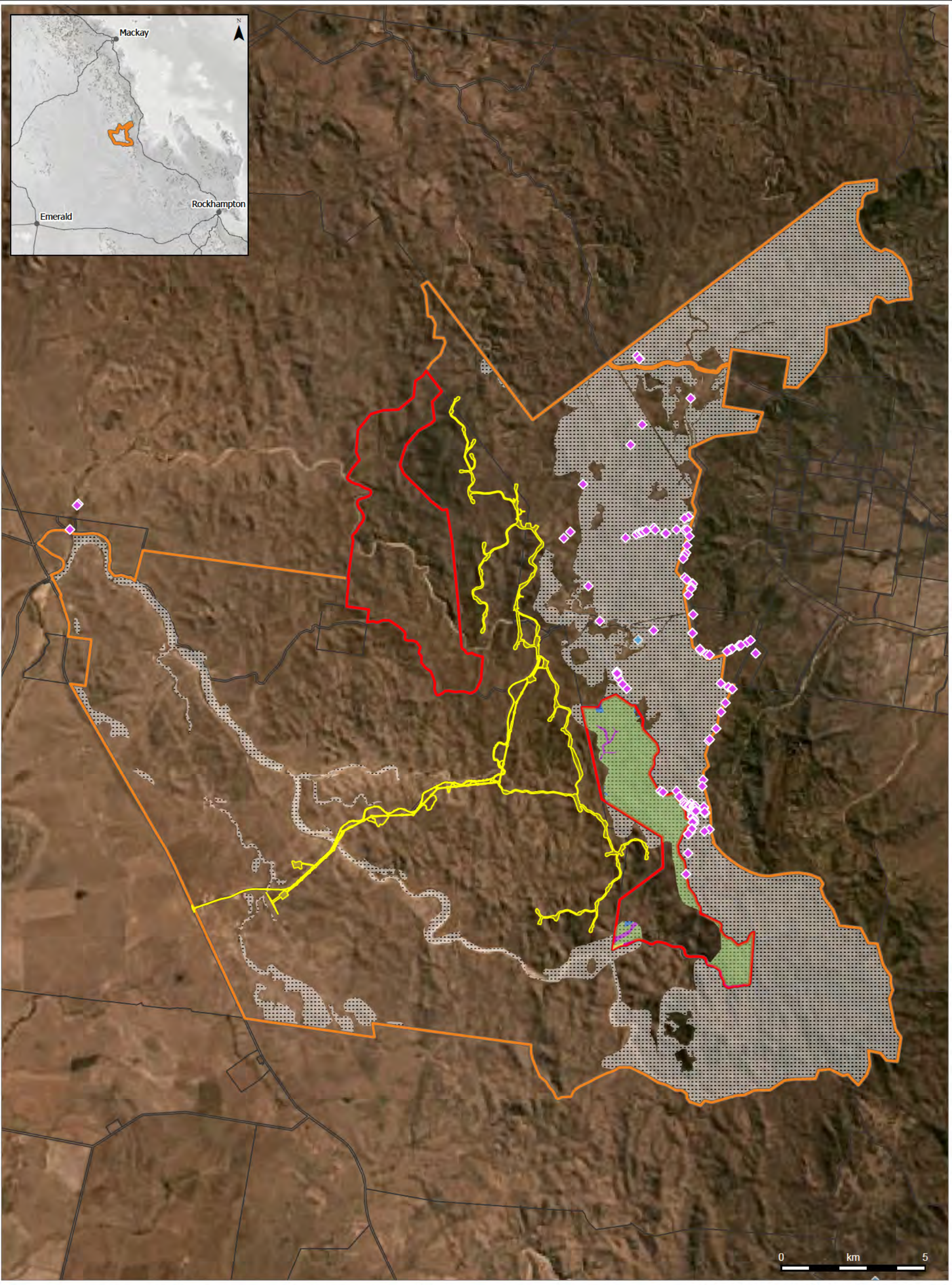
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FIGURE 3-4

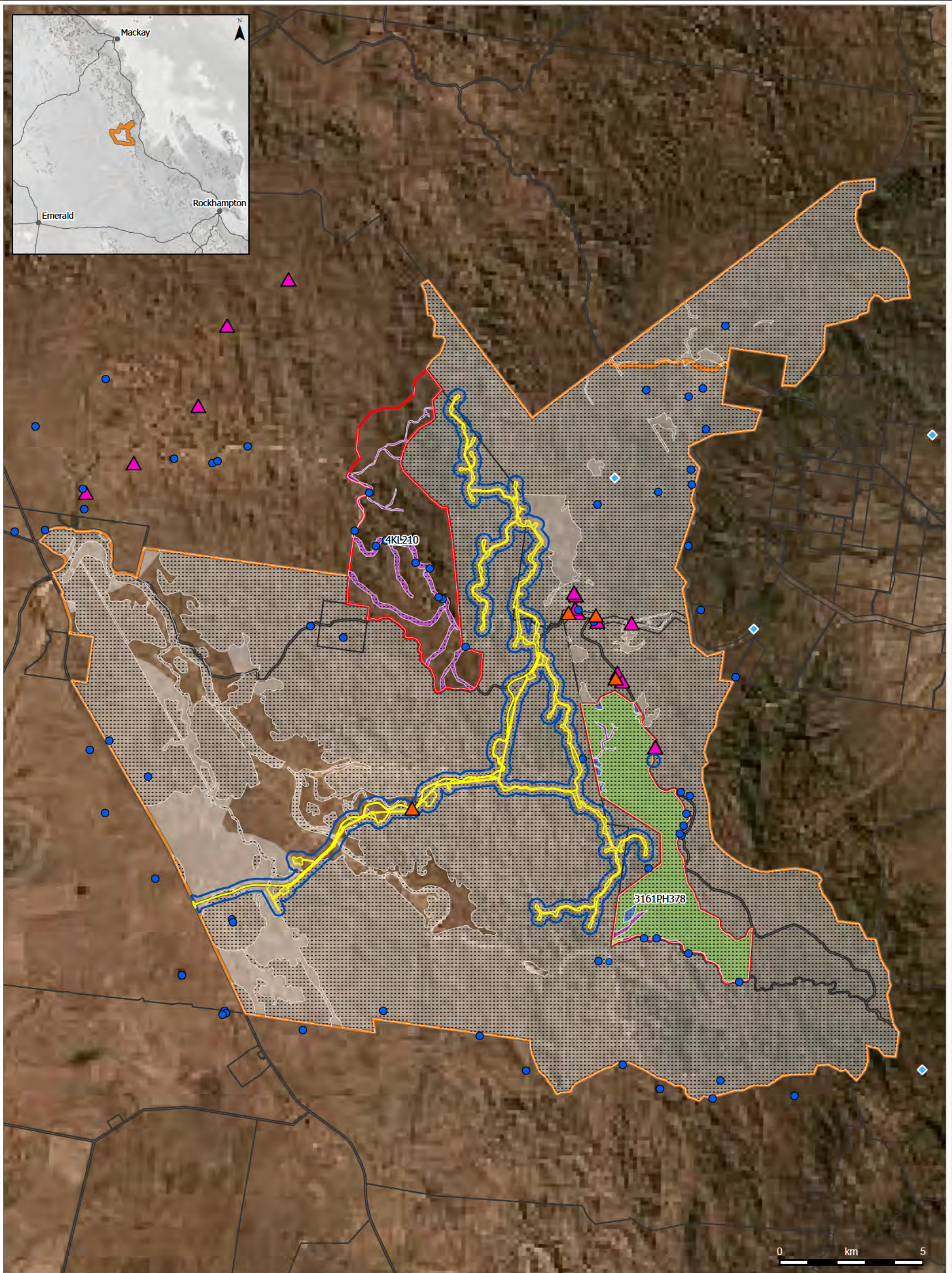


Greater glider Offset Area Management Plan

LOTUS CREEK WIND FARM

- | | | |
|-------------------------|---|------------------------|
| Site Boundary | Historic Sighting (WildNet) | AU4 Non-remnant 8.12.7 |
| Development Footprint | Greater glider habitat (Preliminary Documentation NGH 2021) | AU5 Remnant 11.3.4 |
| Offset Site Boundary | AU1 Remnant 11.3.25 | Cadastre |
| Greater Glider Sighting | AU3 Remnant 8.12.7 | |





Squatter pigeon Offset Area Management Plan

- Site Boundary
- Project Area
- Offset Site Boundary
- Development Footprint

- Squatter pigeon Sighting Attexo 2024
- Squatter pigeon Sighting
- Historic Sighting(Wildnet)
- Permanent Water Point

- Foraging Habitat (Preliminary Documentation NGH 2021)
- Breeding Habitat (Preliminary Documentation NGH 2021)
- AU1 Remnant 11.3.25

- AU3 Remnant 8.12.7
- AU4 Non-remnant 8.12.7
- AU5 Remnant 11.3.4
- Cadastre

LOTUS CREEK WIND FARM



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SCALE (A3): 1:125,000

DATE: 29/07/2024

DWG No: CIP-006_003

FIGURE 3-6

3.7. Nature and Extent of Weeds and Feral Animals

A total of nine weed species were observed within the offset areas and are listed in Table 3.6. Of this total, six are recognised as restricted matter under the *Biosecurity Act 2014*, all are listed as Weeds of National Significance (WoNS), five are recognised as high or very high priority weeds from the Isaac Regional Council Biosecurity Plan (Isaac Regional Council 2024), and eight are considered direct or indirect threats to MNES impacted by the Project. Weed species and their listing are summarised in Table 3.6 along with an assessment of potential impacts to MNES.

Table 3.6: Known or Likely to Occur Weed Species within the Offset Area

Weed Species	Biosecurity Act 2014 Status	WoNS	Isaac Regional Council	Recognised Threat to MNES	Detected within Offset Areas
Balloon Cotton (<i>Gomphocarpus fruticosus</i>)	-	Yes	-	The degradation of habitat by invasive weeds is one of the current threats to Squatter Pigeon. While Balloon Cotton is not specifically recognised as a threat to Squatter Pigeon, Balloon Cotton, it is an invasive weed that can form dense thickets that can outcompete native vegetation.	✓
Bellyache Bush (<i>Jatropha gossypifolia</i>)	Category 3	Yes	Very high	Whilst not a direct threat to MNES, Bellyache Bush forms dense thickets (CRC 2003) that may increase the risk of intense fire, which is recognised threat to MNES. In addition, bellyache bush may restrict Koala movement.	-
Castor Oil Plant (<i>Ricinus communis</i>)	-	Yes	Very high	Whilst not a direct threat to MNES, Castor Oil Plant can form dense stands, particularly along watercourses (CRC 2003), which may lead to degradation of habitat and restriction of movement.	✓
Chinee Apple (<i>Ziziphus mauritiana</i>)	Category 3	Yes	Very high	Whilst not a direct threat to MNES, Chinee Apple forms dense thickets (CRC 2003) that may increase the risk of intense fire, which is recognised threat to MNES. In addition, Chinee Apple may restrict Koala movement.	-
Common Prickly Pear (<i>Opuntia stricta</i>)	Category 3	Yes	Medium	The degradation of habitat by invasive weeds is one of the current threats to Squatter Pigeon. Common Prickly Pear is not specifically recognised as a threat to Squatter Pigeon, it is an invasive weed that can form dense infestations that can outcompete native vegetation (Centre for Invasive Species Solutions 2021).	✓
Giant Rat's Tail Grass (<i>Sporobolus pyramidalis</i> & <i>S. natalensis</i>)	Category 3	Yes	Very high	The degradation of habitat by invasive weeds is one of the current threats to Squatter Pigeon. Giant Rat's Tail Grass is not specifically recognised as a threat to Squatter Pigeon however, it is an invasive weed that can form dense infestations that can outcompete native vegetation and increase fire intensity (Walton 2001; CRC 2003) which are recognised threats to other MNES.	-

Weed Species	Biosecurity Act 2014 Status	WoNS	Isaac Regional Council	Recognised Threat to MNES	Detected within Offset Areas
Harrisia Cactus (<i>Harrisia martinii</i>)	Category 3	Yes	High	The degradation of habitat by invasive weeds is one of the current threats to Squatter Pigeon. Harrisia Cactus is not specifically recognised as a threat to Squatter Pigeon however, it is an invasive weed that can form dense infestations that can outcompete native vegetation (Parsons and Cuthbertson 2001).	-
Mimosa Bush (<i>Acacia farnesiana</i>)	-	No	Very high	Whilst not a direct threat to MNES, Mimosa Bush can form dense stands, particularly along watercourses (DAF 2024), which may lead to degradation of habitat and restriction of movement.	-
Mother of Millions (<i>Bryophyllum delagoense</i>)	Category 3	Yes	Very high	The degradation of habitat by invasive weeds is one of the current threats to Squatter Pigeon. Mother of Millions is not specifically recognised as a threat to Squatter Pigeon however, it is an invasive weed that can form dense infestations that can outcompete native vegetation.	✓
Lantana (<i>Lantana camara</i>)	Category 3	Yes	Very high	Whilst not a direct threat to MNES, Lantana forms dense thickets that increases the risk of intense fire (CRC 2003), which is recognised threat to MNES. In addition, Lantana may restrict Koala movement	✓
Mexican Poppy (<i>Argemone mexicana</i>)	-	Yes	-	This species does is not considered to pose a threat to MNES.	✓
Parthenium (<i>Parthenium hysterophorus</i>)	Category 3	Yes	Very high	The degradation of habitat by invasive weeds is one of the current threats to Squatter Pigeon. Parthenium is not specifically recognised as a threat to Squatter Pigeon however, it is an invasive weed that can form dense infestations that can outcompete native vegetation and completely degrade habitat (Kaur 2014).	✓
Parkinsonia (<i>Parkinsonia aculeata</i>)	Category 3	Yes	Very high	Whilst not a direct threat to MNES, Parkinsonia can form dense stands, particularly along watercourses (CRC 2003), which may lead to degradation of habitat and restriction of movement.	-
Prickly Acacia (<i>Vachellia nilotica</i>)	Category 3	Yes	Very high	The degradation of habitat by invasive weeds is one of the current threats to Squatter Pigeon. Prickly Acacia is not specifically recognised as a threat to Squatter Pigeon however, a moderate canopy cover reduces native grass cover greatly and alters the abundance of native plant richness (CRC 2003).	-

Weed Species	Biosecurity Act 2014 Status	WoNS	Isaac Regional Council	Recognised Threat to MNES	Detected within Offset Areas
Rubber vine (<i>Cryptostegia grandiflora</i>)	Category 3	Yes	Very high	May lead to restricted movement of Koala.	✓
Velvety tree pear (<i>Opuntia tomentosa</i>)	Category 3	Yes	Medium	The degradation of habitat by invasive weeds is one of the current threats to Squatter Pigeon. While velvety tree pear is not specifically recognised as a threat to Squatter Pigeon, it is an invasive weed that can form dense infestations that can outcompete native vegetation (Centre for Invasive Species Solutions 2021).	✓
Westwood pear (<i>Opuntia streptacantha</i>)	Category 3	Yes	Medium	The degradation of habitat by invasive weeds is one of the current threats to Squatter Pigeon. While Westwood pear is not specifically recognised as a threat to Squatter Pigeon, it is an invasive weed that can form dense infestations that can outcompete native vegetation (Centre for Invasive Species Solutions 2021).	-

Baseline pest surveys of the offset areas identified two¹ pest fauna species, of which all are listed as restricted matters under the *Biosecurity Act 2014* and are identified as threats within the approved conservation advice for the MNES. Specifically, pest species are:

- Wild dogs (*Canis lupus*) – identified as a threat in the conservation advice for Koala;
- Feral cat (*Felis catus*) – identified as a threat in the conservation advice for Greater Glider and Squatter Pigeon.

Feral pigs (*Sus scrofa*), a restricted matter under the *Biosecurity Act 2014*, were also identified during the baseline pest surveys. Although this pest species is not listed as a threat within the approved conservation advice for the MNES, they may contribute to habitat degradation. Pest management activities will be implemented to reduce feral pigs within the offset sites (see Section 9.3 for details).

Baseline weed and pest surveys have been undertaken following the methods proposed in the following sections. Methods allow for the collection of a robust weed and pest baseline, with future monitoring surveys repeated with the same methodology and effort to demonstrate the effectiveness of management actions over time.

3.7.1. Pest fauna Monitoring Methodology

Camera trapping surveys were used to generate an activity index for Dogs, Foxes (note that no Foxes were detected during surveys) and Cats in and around the offset areas in accordance with the protocol recommended by Kays et al (2020). The index provides a measure of relative abundance for each species.

In the most comprehensive empirical study on camera trap survey design to date, Kays et al (2020) evaluated how the number of cameras deployed, the length of time they are run, and the seasonality of the site affect estimates of mammal species richness, occupancy and detection rates. Kays et al (2020) reviewed 41 study areas across 20 countries on five continents, making the results broadly relevant to the

• ¹ Note that previous surveys have identified that foxes (*Vulpes vulpes*) may occur in the region. Foxes are identified as a threat in the conservation advice for Greater Glider and Squatter Pigeon.

proposed survey. Kays et al (2020) recommend that studies aimed at estimating species richness and relative abundance/occupancy of mammal species use arrays of at least 40–60 camera traps run for 3–5 weeks.

A total of 40 camera traps were deployed within proposed offset areas for a duration of 4 weeks, see Figure 3.7:Figure 3.7. Camera traps were unbaited to avoid interference with predator behaviour and false increases in activity indices. Camera traps were set at 1 m above the ground on a post or tree, and if on a track, at an angle of 45 degrees to the track to increase detection rates. Camera trap locations were selected in the field, with cameras generally placed at a minimum spacing of 1 km, with several cameras placed at 200 m spacing due to poor access conditions and difficult terrain. A range of habitat were selected to place the camera traps to target pests, including riparian areas (including major creek lines like Yellow Creek, and Lotus Creek), vehicle tracks and fence lines, and remnant woodland. Examples of camera locations are shown in Plate 1.

Plate 1: Example of Camera Trap Locations showing Variation in Habitat



To determine pest fauna activity indices for applicable species the following methodology was applied for each species (See Section 9.3 for results):

- All photos from cameras were analysed using Wildlife Insights (an AI supported photo recognition software tool) followed by manual validation to identify species recorded.
- Camera events for each camera site were combined into 30 minute intervals to ensure multiple counts of the same individual tripping the same camera were removed to produce unique species individual events. The number of species individual events at each camera site were totalled.
- This total was divided by the total camera days for the site to produce a pest fauna activity index for the site (observations per cameras per day).
- The number of species individual events at each Offset Area were totalled.
- This total was divided by the total camera days for the Offset Area to produce a pest fauna activity index for the offset area (observations per cameras per day).
- The number of species individual events throughout the entire offset area were totalled.
- This total was divided by the total camera days for the entire offset area to produce a pest fauna activity index for the entire offset area (observations per cameras per day).
- To calculate total pest activity, as part of Section 8, the number of total observations of wild dogs and feral cats was divided by the total trap nights (1658 trap nights).

Results were used to inform predator control measures (to establish a baseline index of activity for each species) (see Section 9.3) and interim milestones and completion criteria (see Section 8). The methodology will be repeated for monitoring surveys to assess change in pest fauna abundance.

3.7.2. Weed Monitoring Methodology

Weed surveys were undertaken at each of the 40 camera trap locations and followed the *NSW Government Monitoring Manual for Invasive and Native Flora* (Watson et al 2021). Objectives of the surveys was to provide an assessment of the abundance (density indices) of the target weed species, before and after control.

Transects were established at each camera trap location in the offset area to measure density of target weeds using the line intercept method. The density of weeds was measured at each transect by surveying 15 m either side of the centre line (creating a 300 x 30 m quadrat, with sample area of 9,000 m²). Weed density calculations were generated for each species at each site and expressed as an overall density across the offset (see Section 9.4).

Changes in weed density will be used to assess the success of control measures, and set interim milestones and completion criteria as outlined in Section 8.

To determine weed density indices for applicable species, the following methodology was applied (see Section 9.4 for results):

- Individual counts of weed species were filtered by sites and totalled to find the total number of weed species per property (██████ and ██████ areas) and for the entire offset area. The weed density index was then calculated by dividing the total count of weed plants by the total area surveyed which amounted to 180,000m² (40 repeats of 300 x 30m transects).
- To calculate the plants per hectare, as part of Section 8, the weed density index was multiplied by 10,000m².

Results were used to inform weed control measures (to establish a baseline index of density for each species) (see Section 9.3) and offset area interim milestones and completion criteria (see Section 8). The methodology will be repeated for monitoring surveys to assess change in weed density.

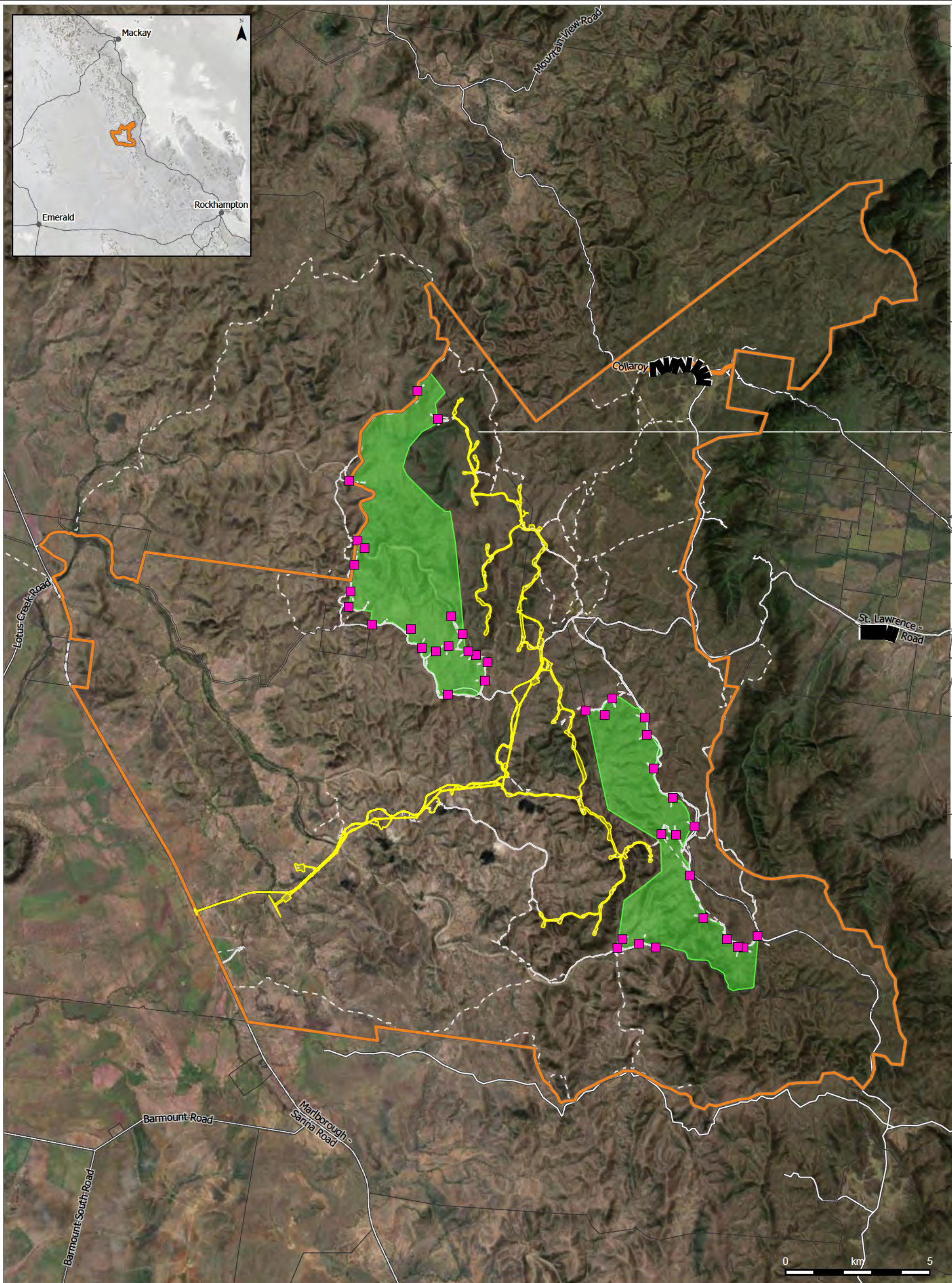
3.7.3. Fire Fuel Load Monitoring Methodology

To accurately measure fire risk and inform effectiveness of bushfire management, three parameters will be measured at each site and graded accordingly (see Table 3.7:), per assessment unit. These critical fire fuel load assessment parameters and associated score values and scaling are informed by the *Overall fuel hazard assessment guide* (Hines et al 2010). Parameters were developed in accordance with the 'SMART' principle (see Section 10.1) and are based on site-based attributes assessed as part of the habitat quality scoring methodology (see Table 4.1Table) and additional attributes collected as part of the BioCondition methodology but not assessed for habitat quality.

Once each parameter is scored, the average score is applied against the score ranges used to assess 'Threats to Species' and assessed as either High (mean score of 1-6), Moderate (mean score of 7-14) or Low (mean score of 15).

Table 3.7: Fuel Load Assessment and Scoring

Fuel Load Parameter	Score		
	1	7	15
Elevated fire fuel (shrub canopy cover %)	>40 %	10-40 %	<10 %
Near-surface fuel (plant cover %)	>40 %	10-40 %	<10 %
Surface fuel (litter cover %)	>80 %	10-40 %	<10 %

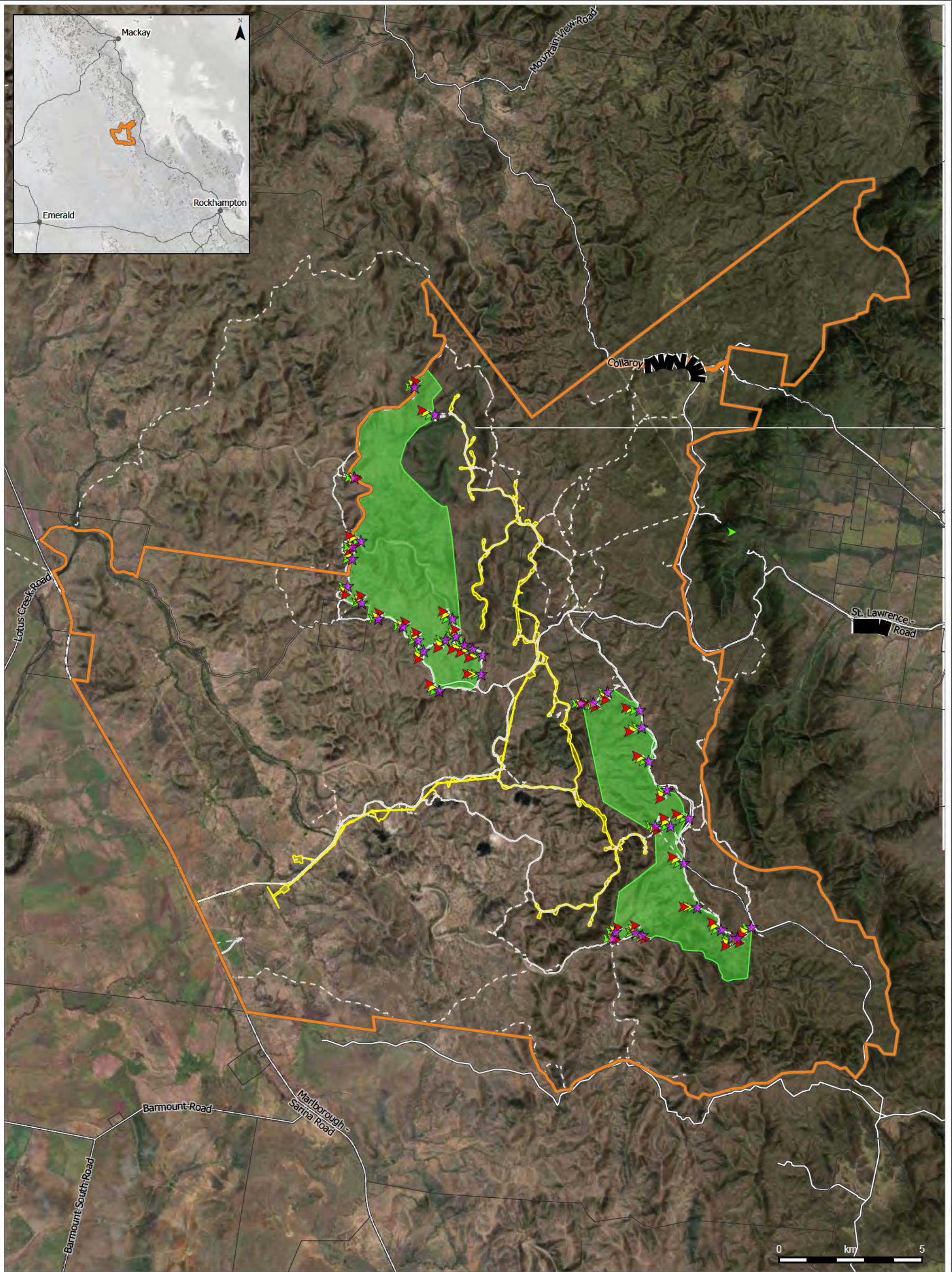


Camera Deployment Locations within the Offset areas

- Site Boundary
- Offset Site Boundary
- Development Footprint
- Camera Location
- Access Tracks
- Roads
- Cadastre

LOTUS CREEK WIND FARM





Weed Density Survey Locations within the Offset areas

- | | | |
|-----------------------|----------------|---------------|
| Site Boundary | Transect Start | Access Tracks |
| Development Footprint | Middle | Roads |
| Offset Site Boundary | End | Lot Boundary |
| Weed Density Survey | | |

LOTUS CREEK WIND FARM



4. Habitat Quality Scoring Methodology

Habitat quality assessments have been undertaken within the offset area using the same approach to habitat quality scoring undertaken in impact area. Habitat quality data was collected, using the methodology set out in the Queensland BioCondition Assessment Manual Version 2.2 (the BioCondition Manual) (Eyre et al. 2015) and the Guide to Determining Terrestrial Habitat Quality Version 1.2 (the Guide) (DEHP 2017). The survey approach also incorporated guidance provided by DCCEEW on using a Modified Habitat Quality Assessment (MHQA) to better reflect the requirements of the EPBC Act Environmental Offsets Policy.

The MHQA method was presented in the Offset Strategy published with the Lotus Creek Wind Farm Preliminary Documentation (2020/8867) submitted for the Project during the impact assessment phase of the Project under the EBPC Act. The MHQA defines field data that will be collected during field habitat assessments to allow comparative analysis between sites and subsequently support area calculations for the purposes of acquitting offset requirements for relevant MNES species (see Section 1.1). A comprehensive summary of MHQA data inputs and scoring methodology is provided in the following sections.

The MHQA used Government published BioCondition benchmarks for each regional ecosystem (RE) represented within the offset area to allow scoring of the assessment unit. The MHQA also incorporates habitat-specific Site Condition and Site Context attributes to allow for a more comprehensive and robust analysis of habitat scores. A summary of how these additional attributes were assessed and scored for each MNES value has been presented in the following tables.

Table 4.1: Habitat Quality Data Inputs

Attribute	Methodology	Notes
Site Condition		
Site-based attributes:	Raw data column:	Benchmarks are specific to the Regional Ecosystem present in the assessment unit (AU).
Recruitment of woody perennial species in the ecologically dominant layer (EDL)	<i>Guide to determining terrestrial habitat quality</i>	
• Native plant species richness – trees, shrubs, grasses and forbs	• Section 5.1.1 How to measure field based attributes	
Tree canopy height	<i>BioCondition Assessment Manual</i> (Eyre et al 2015)	
Tree canopy cover	• Chapter 3 The assessment unit and site selection	
Shrub canopy cover	• Chapter 5 Assessment of site-based attributes	
Native grass cover	Benchmarks column:	
Organic litter	<i>Guide to determining terrestrial habitat quality</i>	
Large native trees	• Section 5.1.1 How to measure field based attributes, Table 2	
Coarse woody debris	Guide for site condition scoring sheet <i>BioCondition benchmarks</i> (DES 2019)	
Non-native plant cover	Each attribute scores 0, 3 or 5 according to the <i>Guide to determining terrestrial habitat quality</i>	

Attribute	Methodology	Notes
Species habitat attributes: - Quality and availability of food and foraging habitat - Quality and availability of shelter	<i>Guide to determining terrestrial habitat quality</i> – Section 7.2 Undertaking a species habitat index assessment, Table 4 Species habitat index scoring guide Each attribute scores 1, 5 or 10 according to the <i>Guide to determining terrestrial habitat quality</i>	These attributes are scored by determining species-specific indicators and developing a rating scale for each indicator.
Site Context		
Landscape-scale attributes: Size of patch Connectedness Context	<i>Guide to determining terrestrial habitat quality</i> - Section 6.2 Undertaking a site context assessment, Table 3 Site context scoring sheet guide - Patch size scores 0, 2, 5, 7 or 15 - Connectedness scores 0, 2, 4 or 5 - Context scores 0, 2, 4 or 5 BioCondition Assessment Manual (Eyre et al 2015) - Chapter 6 Assessment of landscape-scale attributes (Section 6.1 Fragmented landscapes)	Apply procedure for fragmented landscapes: The <i>Guide to determining terrestrial habitat quality</i> includes instructions for intact and fragmented landscapes. To score these for the MHQA, apply the procedure for fragmented landscapes. Include all habitat: The <i>Guide to determining terrestrial habitat quality</i> includes only remnant or regrowth vegetation in these measurements. To score these for the MHQA, measurements must include <i>all</i> habitat for the protected matter. E.g. Koala habitat includes any forest or woodland containing species that are known locally important Koala trees or ancillary trees, or shrubland with emergent LIKT or ancillary trees as defined in the <i>EPBC Act referral guidelines for the endangered Koala</i> (DCCEEW 2024). Assess at AU scale: The <i>Guide to determining terrestrial habitat quality</i> states that measurements are to be conducted at the overall site level. To score these for the MHQA, measurements will be conducted at the Assessment Unit (AU) level. Connectivity and absence of barriers to movement: The <i>Guide to determining terrestrial habitat quality</i> measures connectivity based on adjacency to vegetation. To score this for MHQA, connectivity includes any boundaries where the protected matter can move into adjacent habitat (e.g. a boundary adjacent to a narrow strip of cleared land/track which Koalas would use to move into

Attribute	Methodology	Notes
Landscape-scale attributes: Ecological Corridors	Guide to determining terrestrial habitat quality - Section 6.2 Undertaking a site context assessment, Table 3 – Site context scoring sheet guide - Scores 0, 4 or 6	adjacent habitat would be considered to be ‘connected’ to adjacent habitat). Context buffer: The <i>BioCondition Assessment Manual</i> measures context using a 1 km buffer. To score these for the MHQA, measurements will be conducted from the 50 m mark on the transect used at the Site level. Shared boundary and absence of barriers to movement: Similar to Connectivity above, to score this for MHQA, ‘sharing a common boundary with’ an ecological corridor includes any boundaries where the protected matter can move into adjacent corridors (e.g. a boundary adjacent to a narrow strip of cleared land/track which Koalas would use to move into adjacent corridors would be considered to be a shared common boundary).
Species habitat attributes: Threats to the species	<i>Guide to determining terrestrial habitat quality</i> - Section 6.2 Undertaking a site context assessment, Table 4 Species habitat index scoring guide - Scores 1, 7 or 15	This attribute is scored by identifying and scoring species-specific and site-specific threat factors. <i>Proposed threat factors and scoring must be provided, supported by peer reviewed literature, with references provided, or expert opinion.</i>
Species habitat attributes: Species mobility capacity	<i>Guide to determining terrestrial habitat quality</i> - Section 6.2 Undertaking a site context assessment, Table 4 Species habitat index scoring guide - Scores 1, 4, 7 or 10	This attribute is scored by determining species-specific indicators and developing a rating scale for each indicator. <i>Proposed scoring and species-specific indicators must be supported by peer reviewed literature, with references provided, or expert opinion.</i>
Species habitat attributes: Role of site location to overall population	<i>Guide to determining terrestrial habitat quality</i> - Section 7.2 Undertaking a species habitat index assessment, Table 4 Species habitat index scoring guide - Scores 1, 4 or 5	This attribute relates to the likelihood that the site contains habitat critical to the survival of the species.
Species Stocking Rate (SSR)		
Species presence and usage attributes: Presence detected on or adjacent to site (neighbouring property with connecting habitat)	MHQA spreadsheet provides a suggested scoring matrix	Species usage: To score this attribute, consider whether there are different definitions for habitat used for dispersal, foraging and/or breeding – refer to SPRAT profiles, conservation advices, recovery

Attribute	Methodology	Notes
Species usage of the site (habitat type & evidenced usage) Approximate density (per ha)		plans or other relevant EPBC policy documents. Approximate density: For species with sufficient population data, density ranges can be calculated based on local survey records/ sightings; or if comprehensive targeted surveys have been done on the impact and offset sites, ranges could be devised based on the results. Needs to consider species abundance in the same habitat type and carrying capacity. For cryptic species and data-deficient species, calculating density may not be possible, which would also mean that an increase in stocking rate is not feasible.
Role/importance of species population on site*	Score derived from SSR supplementary table (see below)	See below.
*SSR Supplementary Table		
Attribute	Methodology	Notes
Key source population for breeding	Refer to available literature on the species (including SPRAT profiles, conservation advices, recovery plans or other relevant EPBC policy documents).	Scoring for these attributes must be supported by scientific evidence, surveys or studies, and species distribution mapping.
Key source population for dispersal		
Necessary for maintaining genetic diversity		
Near the limit of the species range		

Habitat Scoring Methodology

Table 4.2: Site Condition, Site Context, Species Stocking Rate and Weighted Score

Score	Methodology	Notes
Site Condition		
MAX Site Condition Score	Total the maximum scores for each attribute for Site Condition	For site-based attributes, maximum scores are provided in the relevant scoring tables in the: - Guide to determining terrestrial habitat quality (Step 2) and/or - BioCondition Assessment Manual
Score for sampling site	<i>Guide to determining terrestrial habitat quality</i> – Section 8 Determine the final habitat quality score, Step 3	For each sampling site: - Total all site condition attribute scores - Divide by MAX Site Condition Score
Score for assessment unit	<i>Guide to determining terrestrial habitat quality</i>	For each assessment unit: - Total all scores for sampling sites - Divide by number of sampling sites in the assessment unit

Score	Methodology	Notes
	– Section 8 Determine the final habitat quality score, Step 4	
Area-weighted score for assessment unit	<i>Guide to determining terrestrial habitat quality</i> – Section 8 Determine the final habitat quality score, Step 5	For each assessment unit: • Multiply <i>Score for assessment unit</i> by area (ha) of assessment unit • Divide by total site area (ha)
Score for the site	<i>Guide to determining terrestrial habitat quality</i> – Section 8 Determine the final habitat quality score, Step 6	For the total site (matter area): • Add the area-weighted scores for the assessment units
Site Condition Score - out of 3	Convert the score for the site to a score out of 3	To convert the score for the site to a score out of 3: • Multiply score for the site by 3
Site Context		
MAX Site Context Score	Total the maximum scores for each attribute for Site Context	• For Size of patch, Connectedness and Context, maximum scores are provided in the relevant scoring tables in the <i>BioCondition Assessment Manual</i> • For Ecological corridors, maximum score is provided in Table 3 of the <i>Guide to determining terrestrial habitat quality</i> • For Role of site location to species overall population in the state, Threats to the species and Species mobility capacity, maximum scores are provided in Table 4 of the <i>Guide to determining terrestrial habitat quality</i>
Score for sampling site	<i>Guide to determining terrestrial habitat quality</i> – Section 8 Determine the final habitat quality score	For each sampling site: • Total all site context scores • Divide by MAX Site Context Score
Score for assessment unit	<i>Guide to determining terrestrial habitat quality</i> – Section 8 Determine the final habitat quality score	For each assessment unit: • Total all scores for sampling sites • Divide by number of sampling sites in the assessment unit
Area-weighted score for the assessment unit	<i>Guide to determining terrestrial habitat quality</i> – Section 8 Determine the final habitat quality score	For each assessment unit: • Multiply <i>Score for assessment unit</i> by area (ha) of assessment unit • Divide by total site area (ha)
Score for the site	<i>Guide to determining terrestrial habitat quality</i> – Section 8 Determine the final habitat quality score	For the total site (matter area): • Add the area-weighted scores for the assessment units

Score	Methodology	Notes
Site Context Score – out of 3	Convert the score for the site to a score out of 3	To convert the score for the site to a score out of 3: • Multiply score for the site by 3
Species Stocking Rate		
Score assigned	Scored using scoring table in MHQA spreadsheet	
Total SRR score – out of 70	Total <i>Score assigned</i> column	
Total SRR score – out of 4	Convert to score out of 4	To convert the score to a score out of 4: • Divide score by 70 • Multiply score by 4
Final Habitat Quality Score (weighted)		
Average/Final	Transfer scores for Site Condition, Site Context and Species Stocking Rate	
Habitat Quality score - out of 10	Total <i>Average/Final</i> column	This score can be transferred into the Quality score fields of the <i>Offsets Assessment Guide</i> (DCCEEW) spreadsheet

Table 4.3: Site Criteria for Assessing BioCondition Scores

Site Criteria	Assessment Values
Site Condition (total score 100, scaled to score out of 3)	• Vegetation condition assessed according to the BioCondition methodology (out of 80). • Quality and availability of food and foraging habitat- poor (1), moderate (5) or high (10) (out of 10). • Quality and availability of shelter- poor (1), moderate (5) or high (10) (out of 10).
Site Context (total score 56, scaled to score out of 3)	• Size of patch (out of 10): connectedness (out of 5) and context (out of 5) was scored as per the BioCondition methodology. • Ecological Corridors: not within an ecological corridor (0), sharing a common boundary (4) or within a corridor (6) (score out of 6). • Role of the site location to the species overall population in the state: not likely to be critical (1), likely to be critical (4) and critical to the species survival (5) (score out of 5). • Threats to the species: high level of threat (1), moderate level of threat (7) and low level of threat (15) (score out of 15). • Species mobility capacity: severely restricted (1). Highly restricted (4), moderately restricted (7), not restricted (10) (score out of 10).
Stocking Rate (total score 70, scaled to score out of 4)	• Presence detected on or adjacent to the site: not present (0), adjacent (5), recorded on site (10) (score out of 10). This was determined using species records in ALA (ALA 2022) and WildNet 2022) or verified sightings during surveys. • Species usage of the site: not habitat (0), dispersal (5), foraging (10), Breeding (15) (score out of 15). Based on the habitats available and proximity to water (for Squatter Pigeon), all impact and offset area for all species were considered to be breeding habitat. • Approximate density: no records (0), same density as surrounding region (up to 30km) (10), density likely to be greater than surrounding region (up to 30 km) (20), records for species in the surrounding region are only found in the site (30) (score out of 30).

- Role or importance of the species population on site: key source population for breeding (No-0, Yes-10), key source population for dispersal (No-0, Yes-5), necessary for maintaining genetic diversity (No-0, Yes-15), near the limit of the species range (No-0, Yes-15). The sum of these criteria is then assessed on a scale of 0- 15 (score out of 15).

Table 4.4: Species Specific Indicators - Koala

Habitat Indicator		Scoring
Quality and availability of food and foraging habitat		
Number and richness of non-juvenile Koala habitat trees	Number and richness of non-juvenile Koala habitat trees based on RE technical description for the relevant RE into 3 classes.	1: low 5: medium 10: high
Quality and availability of shelter		
Non-juvenile tree species with dense foliage a	Tree species with closed or dense canopies may provide shelter during extremes of weather (heat, heavy rain periods) based on RE technical description for the relevant RE into 3 classes.	1: low 5: medium 10: high
Species mobility capacity		
Coarse woody debris and high threat weeds	High abundance of coarse woody debris or high threat weeds (woody or high biomass) limiting movement through the Assessment Unit.	1: very high 4: high 7: medium 10: low
Threats to species		
Presence of predators or disease	Abundance of wild dogs or disease	1: high threat 7: moderate threat level 15: low threat level

Table 4.5: Species Specific Indicators – Greater Glider

Habitat Indicator		Scoring
Quality and availability of food and foraging habitat		
Availability and richness of Greater Glider habitat and food tree species	Greater Glider has a specified folivorous diet and prefers foraging from larger Myrtaceous tree species. The richness of Greater Glider habitat tree species that can occur within a particular regional ecosystem supports denning habitat development	1: low 5: medium 10: high

Habitat Indicator		Scoring
Quality and availability of shelter		
Number of large eucalypt trees	Number of mature trees within suitable regional ecosystems relative to benchmark	1: low 5: medium 10: high
Species mobility capacity		
Number of mature trees	Large mature trees (30-70cm DBH) are preferred and required for arboreal species for mobility, movement, and gliding (<i>Smith et al. 2007</i>)	1: low 4: medium 7: high 10: very high
Threats to species		
Fire and timber harvesting	Uncontrolled fires with large fuel loads may damage or destroy hollows and timber harvesting may remove trees with hollows	1: high threat 7: moderate threat level 15: low threat level

Table 4.6: Species Specific Indicators – Squatter Pigeon

Habitat Indicator		Scoring
Quality and availability of food and foraging habitat		
Availability of suitable foraging habitat and absence of weeds	A patchy, ground-level vegetation cover including native tussock grasses not exceeding 33% total ground area is important for suitable foraging habitat (Squatter Pigeon Workshop 2011) and Invasive plant species outcompete the species' preferred native food plants (TSSC 2015)	1: low 5: medium 10: high
Quality and availability of shelter		
Availability of suitable foraging and breeding habitat	A patchy, ground-level vegetation cover including native tussock grasses not exceeding 33% total ground area is important for suitable breeding habitat (Squatter Pigeon Workshop 2011)	1: low 5: medium 10: high
Species mobility capacity		

Habitat Indicator		Scoring
Ease of movement for foraging and nesting	Thick and high density of understorey and ground-level vegetation cover represents unpreferred habitat	1: low 4: medium 7: high 10: very high
Threats to species		
Presence of predators	Presence and abundance of predators including feral cats and foxes	1: high threat 7: moderate threat level 15: low threat level

5. Offset Habitat Quality Scoring Results

Using the BioCondition data for each Assessment Unit, combined with scores for Site Condition, Site Context and Species Stocking Rate, weighted habitat quality scoring was completed for each MNES value, taking into consideration the size of each AU. The results of these weighted habitat quality scores is presented in in Table 5.1.

These scores represent the starting offset area habitat quality score used for each MNES value in the DCCEE Offset Assessment Guide (v1.04) calculator (see Section 7).

Table 5.1: Baseline Offset Area Habitat Quality Scores for MNES

MNES	Weighted habitat quality score (out of 10)	Value used in calculator (out of 10)
Koala	6.67	7
Greater Glider	6.01	6
Squatter Pigeon	6.27	6

6. Legal Mechanism

The offset area will be secured through a voluntary declaration under the *Vegetation Management Act 1999* (VM Act) within 12 months after the commencement of the Action (as per CoA 7d). Once the declaration has been registered on the title, the offset area will become Category A area under the QLD Regulated vegetation management map. Category A is the highest level of protection afforded to vegetation under the Queensland *Vegetation Management Act 1999* and is typically used by proponents to secure offsets or by Queensland Government as an enforceable undertaking following non-compliant clearing. Lotus Creek Wind Farm Pty Ltd will notify and provide evidence to the department within 5 business days of any environmental offset area being secured.

7. Offset Assessment Guide – Calculator Inputs

The Offset Assessment Guide Offset Calculator has been completed to determine the area of offset required to adequately compensate for the removal of Koala, Greater Glider and Squatter Pigeon habitat as a result of the Project. The following sections provides details of the calculator input.

7.1. Annual Probability of Extinction

The annual probability of extinction is an estimate of the average chance that a species or ecological community will be completely lost in the wild each year, given recent rates of decline (DSEWPac, 2012). The annual probability of extinction is incorporated into the impact and offset calculation process as a discounting factor for aligning activities that occur at different points in time. This figure is derived from the International Union for the Conservation of Nature (IUCN) Red List for threatened species, as shown in Table 7.1.

Table 7.1: International Union for the Conservation of Nature (IUCN) Red List for threatened species

Conservation status of MNES	IUCN criteria for probability of extinction in the wild	Annual probability of extinction	Annual probability of extinction (geometric mean) + probability of catastrophe
Critically Endangered	At least 50% in 10 years	6.7%	6.8%
Endangered	At least 20% in 20 years	1.1%	1.2%
Vulnerable	At least 10% in 100 years	0.1%	0.2%

The Koala, Greater Glider and Squatter Pigeon were all listed as ‘Vulnerable’ under the EPBC Act at the time of the controlled action decision, therefore the annual probability of extinction, based on IUCN category definitions, is 0.2%.

7.2. Protected Matter Attributes

Protected Matter Attributes show the various options to calculate a suitable offset depending on a protected matter’s habitat or ecology that a proposed action may be likely to impact, for example, area of habitat or birth rate.

Protected Matter Attributes used in the Offset Assessment Guide calculation are based on the maximum area of habitat that will be cleared by the Project (Development Footprint). These values are published in the Lotus Creek Wind Farm Preliminary Documentation (2020/8867) (NGH 2021) and are as follows:

- 341.36 ha of Koala habitat;
- 16.39 ha of Squatter Pigeon breeding habitat;
- 32.35 ha of Squatter Pigeon foraging habitat; and
- 48.75 ha of Greater Glider habitat.

7.3. Habitat Quality

The quality score for area of *habitat or area of community* is a measure of how well a particular site supports a particular threatened species or ecological community and contributes to its ongoing viability. There are three components that contribute to the calculation of habitat quality: site condition, site context, and species stocking rates. Each of these components has been considered to determine the quality of habitat in the impact area and proposed offset area.

Table 7.2: Impact Area Habitat Quality Score

Koala			
Final habitat quality score (weighted)	AU1 RE11.12.1	- AU2 RE11.12.6	- Weighted score
Site Condition score (out of 3)	2.12	2.22	
Site Context Score (out of 3)	2.31	2.52	
Species Stocking Rate Score (out of 4)	3.02	2.86	
Habitat Quality score (out of 10)	7.45	7.59	
Assessment Unit area (ha) in Development Footprint	292.61	48.75	
Total impact area (ha) for this MNES	341.36	341.36	
Size Weighting	0.86	0.14	
Weighted Habitat Quality Score	6.39	1.08	7.47
Greater Glider			
Final habitat quality score (weighted)	AU2 RE11.12.6	-	Weighted score
Site Condition score (out of 3)	2.22		
Site Context Score (out of 3)	2.38		
Species Stocking Rate Score (out of 4)	2.86		
Habitat Quality score (out of 10)	7.46		
Assessment Unit area (ha) in Development Footprint	48.75		
Total impact area (ha) for this MNES	48.75		
Size Weighting	1.00		
Weighted Habitat Quality Score	7.46		7.46
Squatter Pigeon			
Final habitat quality score (weighted)	AU2 RE11.12.6	-	Weighted score
Site Condition score (out of 3)	2.08		
Site Context Score (out of 3)	2.33		
Species Stocking Rate Score (out of 4)	2.00		
Habitat Quality score (out of 10)	6.41		
Assessment Unit area (ha) in Development Footprint	48.75		
Total impact area (ha) for this MNES	48.75		
Size Weighting	1.00		
Weighted Habitat Quality Score	6.41		6.41

Table 7.3: Offset Area Habitat Quality Starting Score

Offset - Koala						
Final habitat quality score (weighted)	AU2- RE 11.12.1	AU1- RE 11.3.25	Au3- RE 8.12.7	AU 4- RE non-rem 8.12.7	AU 5- RE11.3.4	Weighted score
Site Condition score (out of 3)	1.88	1.55	2.15	1.25	2.09	
Site Context Score (out of 3)	2.28	2.21	2.36	1.55	1.71	
Species Stocking Rate Score (out of 4)	2.29	2.29	2.57	2.9	2.29	
Habitat Quality score (out of 10)	6.45	6.05	7.07	5.66	6.09	
Assessment Unit area (ha)	2230.2	338.8	1837.5	39.9	3.2	
Total offset area (ha) for this MNES	4449.5	4449.5	4449.5	4449.5	4449.5	
Size Weighting	0.50	0.08	0.41	0.01	0.00	
Weighted Habitat Quality Score	3.23	0.46	2.92	0.05	0.00	6.67
Offset - Greater Glider						
Final habitat quality score (weighted)	AU1- 11.3.25		AU3- RE 8.12.7	AU4 - RE non-rem	AU5 - 11.3.4	Weighted score
Site Condition score (out of 3)	1.49		1.99	1.25	1.95	
Site Context Score (out of 3)	1.73		2.06	1.42	1.69	
Species Stocking Rate Score (out of 4)	2.00		2.00	2.0	2.00	
Habitat Quality score (out of 10)	5.21		6.05	4.67	5.64	
Assessment Unit area (ha)	37.64		1153.9 0	11.32	3.17	
Total offset area (ha) for this MNES	1206.03		1206.0 3	1206.0 3	1206.0 3	
Size Weighting	0.03		0.96	0.01	0.00	
Weighted Habitat Quality Score	0.16		5.79	0.04	0.01	6.01
Offset - Squatter Pigeon						
Final habitat quality score (weighted)	AU1- RE 11.3.25	AU3- RE 8.12.7	AU4- Non-rem 8.12.7	AU 5 - 11.3.4	Weighted score	
Site Condition score (out of 3)	1.52	2.23	1.25	2.10		
Site Context Score (out of 3)	1.97	2.44	1.69	1.96		
Species Stocking Rate Score (out of 4)	2.00	2.00	2.00	2.00		
Habitat Quality score (out of 10)	5.49	6.67	4.94	6.06		
Assessment Unit area (ha)	343.7	1832.7	36.1	3.2		
Total offset area (ha) for this MNES	2215.7	2215.7	2215.7	2215.7		
Size Weighting	0.16	0.83	0.02	0.00		
Weighted Habitat Quality Score	0.85	5.52	0.08	0.01	6.46	

Table 7.4: Offset Area Habitat Quality 20 Year Score

Offset - Koala							
Final habitat quality score (weighted)	habitat quality score	AU2- RE 11.12.1	AU1- RE 11.3.25	Au3- RE 8.12.7	AU 4- RE non-rem 8.12.7	AU 5- RE 11.3.4	Weighted score
Site Condition score (out of 3)		2.18	1.82	2.20	1.49	2.09	
Site Context Score (out of 3)		2.70	2.50	2.69	1.85	2.12	
Species Stocking Rate Score (out of 4)		2.86	2.86	2.86	2.9	2.29	
Habitat Quality score (out of 10)		7.74	7.18	7.74	6.20	6.49	
Assessment Unit area (ha)		2230.2	338.8	1837.5	39.9	3.2	
Total offset area (ha) for this MNES		4449.5	4449.5	4449.5	4449.5	4449.5	
Size Weighting		0.50	0.08	0.41	0.01	0.00	
Weighted Habitat Quality Score		3.88	0.55	3.20	0.06	0.00	7.68

Offset - Greater Glider							
Final habitat quality score (weighted)	AU1- RE 11.3.25	AU3- RE 8.12.7	AU4 - RE non-rem	AU5 - 11.3.4	Weighted score		
Site Condition score (out of 3)		1.94	2.24	1.79	1.95		
Site Context Score (out of 3)		2.50	2.87	1.85	2.12		
Species Stocking Rate Score (out of 4)		2.29	2.62	2.0	2.00		
Habitat Quality score (out of 10)		6.73	7.73	5.64	6.07		
Assessment Unit area (ha)		37.64	1153.9	11.32	3.17		
Total offset area (ha) for this MNES		1206.03	1206.03	1206.03	1206.03		
Size Weighting		0.03	0.96	0.01	0.00	1.00	
Weighted Habitat Quality Score		0.21	7.39	0.05	0.02	7.67	

Offset - Squatter Pigeon							
Final habitat quality score (weighted)	AU1- 11.3.25	RE	AU3- 8.12.7	RE	AU4- Non-rem 8.12.7	AU 5 - 11.3.4	Weighted score
Site Condition score (out of 3)		1.86	2.23		1.25	2.10	
Site Context Score (out of 3)		2.64	2.87		2.12	2.38	
Species Stocking Rate Score (out of 4)		2.00	2.57		3.14	2.00	
Habitat Quality score (out of 10)		6.50	7.67		6.51	6.48	
Assessment Unit area (ha)		343.7	1832.7		36.1	3.2	
Total offset area (ha) for this MNES		2215.7	2215.7		2215.7	2215.7	
Size Weighting		0.16	0.83		0.02	0.00	

Weighted Habitat Quality Score	1.01	6.34	0.11	0.01	7.47
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7.4. Time over which Loss is Averted

The time over which loss is averted is the foreseeable timeframe (in years) over which changes in the level of risk to a proposed offset area can be considered and quantified. That is, it is the time that any measures for securing a site for conservation purposes, such as conservation covenants on title, are intended to last. Longer time frames are valued more highly than shorter time frames (DSEWPac, 2012).

The proposed offset area has been strategically located and play an important role in providing habitat for Koala, Greater Glider and Squatter Pigeon within the broader landscape. Where the offset area is secured via an on-title agreement will secure the site within 20 years of commencement of the action.

7.5. Time until Ecological Benefit

The time until ecological benefit is the estimated time (in years) that it will take for the habitat quality improvement of the proposed offset to be realised.

The proposed weed management and cattle and horse temporary exclusion in the offset area will likely enhance existing vegetation condition. Where the offset area is heavily weed infested, management actions will have immediate value from weed control and/or planned burns. The timeframe to undertake weed management of the site has been determined as 20 years. This timeframe is an achievable, manageable goal and will be maintained for the life of the project. It expected that initial gains will be achieved in 5 years from direct weed management and fire management.

7.6. Risk of Loss (%) Without Offset

The risk of loss without an offset is calculated from the average annual background rate from the Guidance for deriving 'Risk of Loss' estimates when evaluating biodiversity offset proposals under the EPBC Act report (Maseyk et al. 2017). Consequently, the Isaac Regional Council area is at a risk of loss of 0.42% per annum.

7.7. Risk of Loss (%) With Offset

Securing the offset will prevent future loss, so the risk of loss with the offset is 0% per annum.

7.8. Confidence in Result (%)

Within the Offsets Assessment Guide, the confidence in results is determined to be 80% for both the change in quality and averted loss. This confidence level is based on the demonstrated experience of the land manager in managing their land and the legislative requirement that will be placed on the project to retain and manage the offset area to enhance the quality of the habitat. However, we recognise that, although low risk, unforeseen events may occur beyond their control.

The confidence level is influenced by the quality and reliability of the data used in the assessment. Since the data sources are robust, well-documented, and scientifically validated, it can contribute to a higher confidence level. The thorough risk analysis provided in Section 6 identifies potential uncertainties, challenges, and mitigations contributes to a more nuanced understanding of the limitations of the assessment, leading to a realistic confidence level. The assessment adheres to established regulatory standards and guidelines, therefore contributing to the confidence in the results, especially as it demonstrates compliance with legal and environmental requirements.

It is expected that a condition of the approval will be that the authority holder must comply with the agreed delivery arrangement, including the agreed offset delivery plan. This will ensure maintenance is ongoing until the performance criteria defined in the OAMP are achieved.

There is 80% confidence in the quantified averted loss. Table 7.5 provides confidence in result for each management action and the likeliness to provide benefit to each protected matter.

Table 7.5: Confidence in Result for Each Management Action

Management Action	Confidence in result for habitat quality	Justification	Likelihood to provide benefit to each protected matter
Fire management	70-80%	The confidence level was diminished due to potential uncontrolled bushfire incidents; nevertheless, the execution of management actions outlined in this OMP will bolster confidence in the change in habitat quality component.	Managing fire benefits vegetation and habitat by controlling invasive species, promoting biodiversity, clearing undergrowth, and preventing uncontrolled wildfires. This, in turn, supports the targeted species by creating diverse, healthy habitats, promoting regeneration, and enhancing foraging opportunities. Careful management ensures ecological benefits while protecting species and their habitats.
Feral predator control	70%	The confidence in the change in habitat quality resulting from feral predator control is lower, given that the effectiveness of this management action relies on diligent monitoring events and prompt interventions.	Managing and controlling feral predators benefits vegetation and habitat by reducing predation pressure on native species. This enhances biodiversity, allowing vegetation to thrive and creating a more secure environment for the targeted species. Effective management curtails the impact of predators, fostering healthier ecosystems and supporting the survival of native flora and fauna.
Weed management	90%	The confidence in the outcomes of weed management is robust, given its adaptability and ease of adjustment to enhance habitat quality through effective management practices.	Targeted weed control efforts benefit vegetation and habitat by preventing smothering of native flora, reducing high biomass weeds that increase fire fuel load and risk of severe fires, promoting plant diversity, and maintaining ecosystem balance. Targeted weed control methods proposed in this OMP are based on scientific literature and methods published by Queensland Department of Agriculture and Fisheries and will be undertaken by licenced personnel with experience in large-scale projects. This supports targeted species by providing suitable food sources, shelter, and a balanced ecosystem, fostering biodiversity and overall habitat health.

7.9. Percentage of Impact Offset

The extract of the three offset spreadsheets illustrating the offset calculations for the Koala, Greater Glider and Squatter Pigeon are summarised within the Table 7.6. Outputs from the Offset Assessment Guide demonstrate the offset provides sufficient area of habitat to support each MNES impact. The offset area provides more than 150 % of offset requirements for Koala and more than 500 % of offset requirements to squatter pigeon and Greater Glider accounted for (see Table 7.6).

Table 7.6: Summary of the Offset Requirement per Species

Species	Impact (ha)	Offset Area (ha)	% of offset impact offset
Koala	341.36	4,449.5	157
Greater Glider	48.75	1,206.03	584
Squatter Pigeon (this is all breeding habitat that is also foraging habitat)	48.74	2,215.7	597

8. Offset Area Interim Milestones and Completion Criteria

This section outlines the specific offset completion criteria that will be required for each MNES to achieve the respective nominated future habitat quality scores. The interim milestones and final habitat quality scores presented in Table 8.1, illustrates the proposed progression of improvement in the quality of habitat for each MNES over the duration of the Offset. The interim milestones have been established at 5-yearly intervals.

The Year 20 scores are the completion criteria and represent the minimum scores needed to reach the future quality with offset score values used in the Assessment Calculators in Section 7. The completion criteria must be achieved within 20 years of the commencement of the action (as per Condition 8(a)). Once the completion criteria have been met, habitat quality will be maintained or improved for the duration of the approval (until 30 September 2077) (as per Condition 6c). Ongoing monitoring for the duration of the approval will be undertaken (as outlined in Section 10.7) to ensure the completion criteria are maintained for the duration of the approval. Where any declines in scoring are identified, management actions and the associated monitoring/triggers will be implemented (as per Condition 8(b)).

To ensure that these interim milestones are achieved, ongoing management actions will be undertaken (see Section 9). To confirm that these management actions are proving the intended benefit to each MNES, and to ensure that the quality of the offset area is tracking towards these interim milestones, regular monitoring reports will be prepared to quantify this progress (see Section 10.6).

Table 8.1: Habitat quality score interim milestones and completion criteria for each MNES

MNES	Year 0	Year 5	Year 10	Year 15	Year 20
Koala	6.67	6.92	7.17	7.43	7.68
Greater Glider	6.01	6.43	6.84	7.26	7.67
Squatter Pigeon	6.46	6.71	6.96	7.22	7.47

In addition to habitat quality score interim milestones and completion criteria, the following targets for reduction in weed and pest threats to MNES will be achieved and progress assessed against.

Table 8.2: Weed and Pest Interim Milestones and Completion Criteria

Value	Year 0	Year 5	Year 10	Year 15	Year 20	Total % reduction over 20 years
Target weed densities (plants per hectare)	308	253.5	199	144.5	90	71%
Target pest activity (observations per trap night)	0.1381	0.1211	0.1041	0.0870	0.0700	50%

8.1. Targeted Site-Specific Attributes for Improvement

The increase in habitat quality scores will be achieved through the following:

- Reducing non-native plant cover, particularly those that are recognised threats to MNES (see Section 3.7);
- Improving native shrub and forbs species richness.

A detailed review of the BioCondition data collected across each AU identified several site-specific attributes that, with appropriate management, will be improved to reach the proposed interim milestones and final completion criteria. These site-specific attributes represent those values currently scoring poorly within an individual AU or across the entire offset area.

A summary of the key site-specific attributes that have become the focus of management actions discussed in Section 9, have been presented in Table 8.3.

Table 8.3: Targeted Site-Specific Attributes for Improvement

Site-Specific Attribute	Targeted Value	Justification
Non-native plant cover	90 % of Benchmark	The average score for Non-native plant cover across all BioCondition sites was 5.03 out of 10 indicating that there is room for improvement over the first 20 years of offset management. Based on the density of weeds within the offset area and implementation of weed management actions, it is considered achievable within this timeframe. Key Management Actions: Implementation of weed management actions (see Section 9.4) and the exclusion of livestock from the offset area.
Shrub species richness	90% of Benchmark	The average score for native shrub species richness across all BioCondition sites was 3.16 out of 5 indicating that there is room for improvement over the first 20 years of offset management. Based on the current burn frequency, the species richness will improve over time with the implementation of a reduced frequency over the management period. Key Management Actions: Implementation of bushfire management actions management actions (see Section 9.1).
Forbs species richness	90% of Benchmark	The average score for species richness of native forbs across all BioCondition sites was 2.03 out of 5 indicating that there is room for improvement over the first 20 years of offset management. Based on the current burn frequency, the species richness will improve over time with the implementation of a reduced frequency over the management period Key Management Actions: Implementation of bushfire management actions management actions (see Section 9.1).

The remaining site-specific attributes are also likely to increase with the implementation of the management actions discussed further in Section 9.

8.2. Targeted Species-Specific Attributes for Improvement

The increase in habitat quality scores will be achieved through a reduction in threats to the species including:

- Managing introduced predators including Wild Dogs, Feral Cats and European Foxes which prey on MNES;
- Exclusion of livestock to avoid trampling Squatter Pigeon nests.

The review of the BioCondition data identified several species-specific attributes that, with appropriate management, can be improved to reach the proposed interim milestones and final completion criteria nominated in this OAMP. Given that these species-specific attributes are scored differently for each MNES value a summary of these key attributes for each species has been presented in Table 8.4. Relevant management actions are discussed further in Section 9.

Table 8.4: Targeted Species-Specific Attributes for Improvement

Species-Specific Attribute	Targeted Value	Justification
Koala		
Site Context: Threats to species	Overall score of 15/15	Based upon the current condition of the offset area, it was determined that the Threats to species score for each BioCondition site was 7/15. This score was reached by examining the known threats to this species and the likelihood of these threats occurring within the offset area. It is considered likely that at the conclusion of the Offset (Year 20) that these risks would be mitigated, and this score would increase to 15/15. Key Management Actions: Implementation of a Bushfire Management, and Feral Animal Control.
Greater Glider		
Site Context: Threats to species	Overall score of 15/15	Based upon the current condition of the offset area, it was determined that the Threats to species score for each BioCondition site was 7/15. This score was reached by examining the known threats to this species and the likelihood of these threats occurring within the offset area. It is considered likely that at the conclusion of the Offset (Year 20) that these risks would be mitigated, and this score would increase to 15/15. Key Management Actions: Implementation of a Bushfire Management and Feral Animal Control.
Squatter Pigeon		
Site Context: Threats to species	Overall score of 15/15	Based upon the current condition of the offset area, it was determined that the Threats to species score for each BioCondition site was 7/15. This score was reached by examining the known threats to this species and the likelihood of these threats occurring within the offset area. It is considered likely that at the conclusion of the Offset (Year 20) that these risks would be mitigated, and this score would increase to 15/15. Key Management Actions: Implementation of a Bushfire Management, Weed Management, Feral Animal Control and the exclusion of livestock from the offset area.

9. Management Actions

This section outlines the management actions that will be implemented to ensure that the interim milestones and final completion criteria are achieved and maintained for the duration of the approval. These management actions have been developed from relevant guidelines, information contained within approved conservation advice documents for each MNES value and other publicly available management plans established in the region. Actions to be undertaken specific to MNES are provided in Table 9.1.

Regular monitoring (Section 10) and reporting (Section 10.6) will be undertaken to assess the effectiveness of these management actions, and will help to determine if additional corrective actions will be required (see Section 11). When interim targets (see Section 8) are not being met, a revision of this OAMP and the management actions will be undertaken. Monitoring reports (see Section 10.6) will track the progress gains the performance targets and identify any mitigation measures or additional management that needs to be implemented to ensure that the completion criteria are met.

Management actions have been developed to improve habitat quality scoring for each MNES. Key management actions proposed include:

- Bushfire management;
- Livestock exclusion and management;
- Feral animal control;
- Weed management;
- Other general management actions.

The following sections provide additional information on each of these key management actions.

Table 9.1: Recovery Actions for Koala, Greater Glider and Squatter Pigeon and Proposed Management Measures in the Offset areas

Species	Relevant conservation advice or recovery plan	Threats or recovery actions	Proposed measures in this OAMP
Koala	Conservation Advice for the <i>Phascolarctos cinereus</i> (Koala) combined populations of Queensland, New South Wales and ACT (DCCEEW, 2022) National Recovery Plan for the Koala <i>Phascolarctos cinereus</i> (combined populations of Queensland, NSW and ACT)	• Loss of climatically suitable habitat • Increased intensity of drought, heatwaves, bushfire • Declining nutritional value of foliage • Clearing and degradation of habitat • Mortality caused by dogs and vehicles • Disease	• The offset will prevent further degradation of habitat and provide improvements in habitat quality. • Bushfire management and restriction of grazing will increase Koala tree species diversity in the offset area. • Controlled burns will reduce areas with excessive coarse woody debris that may impede Koala movement. • Pest fauna management will be undertaken to reduce wild dog numbers. • Weed management will control woody, and high biomass, weeds that may impede movement of Koalas through the landscape.
Greater Glider	Conservation Advice for the <i>Petauroides volans</i> (Greater Glider southern and central) (DCCEEW, 2022) No recovery plan is publicly available for this species.	• Inappropriate fire regimes • Habitat clearing and fragmentation • Timber harvesting • Barbed wire fencing • Increased temperatures and changes in rainfall • Hyper-predation by owls • Competition with Sulphur-crested Cockatoos • Predation by Feral Cats and European Red Fox	• Bushfire management and restriction of grazing will increase Greater Glider food tree species within the offset area. • Bushfire management will reduce potential impacts of intense fires that may impact Greater Glider directly or their habitat. • Pest fauna management will be undertaken to reduce the risk of predator impacts on Greater Glider. • Protection of the offset will allow the continued development of large trees with increased likelihood of denning hollow for Greater Glider.

Species	Relevant conservation advice or recovery plan	Threats or recovery actions	Proposed measures in this OAMP
Squatter Pigeon	Conservation Advice <i>Geophaps scripta scripta</i> No recovery plan is publicly available for this species.	• Overgrazing by livestock and introduced pests such • Introduced weeds • Inappropriate fire regimes • Thickening of understorey vegetation • Trampling of nests by stock • Illegal shooting • Clearance of habitat • Reduction in abundance of natural food plants • Predation by Feral Cats and European Red Fox	• Livestock access to the offset will be restricted. • Bushfire management and restriction of grazing will provide more suitable breeding and foraging habitat within the offset area. • Pest fauna management will be undertaken to reduce the risk of predator impacts. • Weeds will be managed to improve habitat quality.

9.1. Bushfire Management

Bushfire management within the offset area will be used to reduce the overall fire hazard, manage fuel loads, reduce target weed numbers and improve native species richness and diversity. Appropriate bushfire management will ensure that a mosaic of grassy and shrubby understory species is maintained to promote regrowth of native species.

Following the methodology outlined in Section 3.7.3, baseline fire fuel load within each assessment unit was calculated and is provided below in Table 9.2.

Table 9.2: Baseline Fire Fuel Load within the Offset Area

Fire Fuel Load Parameter	Fire Fuel Load Parameter Score				
	AU1	AU2	AU3	AU4	AU5
Elevated fire fuel (shrub canopy cover %)	15	15	7	15	15
Near-surface fuel (plant cover %)	15	1	7	1	7
Surface fuel (litter cover %)	15	7	7	7	1
Final Fire Fuel Load Score	Low	Moderate	Moderate	Moderate	Moderate

The following bushfire management measures will be implemented across the offset area:

- The condition of existing fire breaks and access tracks within the offset site is to be maintained for the duration of the action. Maintenance activities will be conducted annually at the beginning of the dry season (if weather permits), and will not reduce the total habitat areas for each MNES value;
- Consultation with landowner and Queensland Rural Fire Brigade prior to undertaking controlled burns.
- Controlled burns will be undertaken to avoid impacts to specific habitat features for MNES values. This includes, but is not limited to planning burns:
 - Outside of squatter pigeon peak-breeding period (April to October) (Squatter Pigeon Workshop 2011) or where squatter pigeons have been observed nesting;
 - When native grasses are not seeding to avoid impacts to food and nesting resources of Squatter Pigeon.

The implementation of fire management will promote sustainable and resilient habitat for the Koala, Greater Glider, and Squatter Pigeon, ensuring the long-term well-being of these species and their ecosystems within the offset area. Strategic and controlled burns can mimic natural fire regimes, promoting the regeneration of native vegetation. This regeneration creates a mosaic of different-aged vegetation patches, which is beneficial for these species. Koala for instance prefer a mix of mature trees for feeding and shelter, as well as younger trees for future food sources.

Controlled burns will help control and reduce the spread of invasive plant species. Invasive plants can often outcompete native eucalyptus trees, which are a primary food source for Koalas. By managing invasive species, the natural vegetation that Koalas depend on is preserved and allowed to flourish. By reducing excessive fuel loads through controlled burns, the risk of intense, destructive wildfires is mitigated. This not only protects the targeted species habitat from catastrophic events but also promotes a healthier forest

ecosystem. These species are adapted to withstand moderate-intensity fires, and controlled burns can create a more fire-resilient landscape.

Controlled burns will contribute to creating a more diverse habitat structure. Koalas and Great Gliders will benefit from a variety of vegetation heights and densities, as this provides them with options for feeding, resting, and moving through the landscape. Controlled fires can prevent the dominance of uniform vegetation and encourage a more heterogeneous habitat. Koalas are known to prefer fresh, young eucalyptus leaves. Controlled burns can stimulate the growth of new shoots, providing Koalas with a greater abundance of high-quality food sources. This is particularly important for the health and reproduction of Koala populations.

Implementing a monitoring system as part of fire management practices allows for adaptive management. Planning for controlled burns will incorporate fire scar mapping using the Queensland fire scar mapping database². This mapping will be used to assess the time since the last burn for areas, along with burn frequencies as outlined in Table 9.3, and total proportion of each vegetation community to be burnt at any one time.

² Queensland fires scar mapping is available at 10m resolution from Sentinel-2 satellite imagery provided by the Queensland Government <https://www.qld.gov.au/environment/land/management/mapping/statewide-monitoring/firescar/firescar-maps>

Table 9.3: Fire Management Guidelines Recommendations (Extract from (DES, 2019))

RE	Season	Intensity	Interval	Strategy	Issues to consider
11.3.25	Primarily early dry season.	Low.	3 - 5 years	Protection relies on broad-scale management of surrounding country with numerous small fires throughout the year so that wildfires will be very limited in extent. Depending on position in the landscape, protection depends on broad-scale management of surrounding country, with numerous small fires throughout the year so that wildfires will be very limited in extent.	Fringing communities are critical habitat. In some situations, it may be best not to burn. Intense and extensive fires degrade vegetation structure and destroy fauna habitats. Restrict the extent and intensity of fires. Hollow trees are critical habitat.
11.12.1	Late wet to early dry season when there is good soil moisture. Early storm season or after good spring rains.	Mainly low, but also moderate	6-15 years (shorter intervals north of bioregion 5 - 10 years).	Burn less than 30% in any year. Burn under conditions of good soil moisture and when plants are actively growing. All shrubby areas will carry fire after a good season. Low to moderate burns can help limit the spread of fires. Burn less than 30% in any year. Burn under conditions of good soil moisture and when plants are actively growing	Management of this fire tolerant vegetation type will be based on maintaining vegetation composition, structural diversity, animal habitats and preventing extensive wildfire. Maintaining a fire mosaic will ensure protection of habitat and mitigate against wildfires. Planned burns have traditionally been carried out in the winter dry season. Fire can be used to control weed invasions, although there are also risks of promoting weeds.
8.12.7b	Any time when sufficient soil moisture is present (during growing season).	Low to moderate	Minimum 4 - 7 years	Attempt to retain at least 50% unburnt at any given time	In many areas, particularly those with a long history of grazing, regular (i.e. biannual to triennial) low to moderate intensity fire has been the norm. It is possible that lantana infestations, and high levels of Acacia spp. Emergence have resulted from this regime. Conservation based fire management will allow for an application of more diverse fire types including some high intensity fires. The later fire type may also be useful in initial control of heavy lantana infestations. Canopy trees provide important hollows for arboreal mammals and avifauna. Generally, fuel accumulation is slow preventing regular burning.

RE	Season	Intensity	Interval	Strategy	Issues to consider
11.3.4	Late wet season to early dry season (e.g. March to April).	Low with the occasional moderate. An occasional moderate severity fire helps to ensure emerging overabundant trees are managed.	5-10 years	Apply mosaic planned burns across the landscape at a range of intervals to create varying stages of post-fire responses (i.e. recently burnt through to the maximum time frame). Consider a broad fire interval of between 5–10 years. Climate extremes such as drought may result in slower fuel accumulation and may necessitate the need for longer intervals. Do not burn more than 30% of forests and woodlands with a shrubby understorey in the same management area in the same year.	A key management concern for this fire vegetation group (particularly where it occurs on sandstone) are frequent and extensive wildfires that impact on its ecological values. An issue threatening the structure of this community in some areas is overabundant saplings in the mid-stratum.

9.2. Livestock Exclusion and Management

The offset areas have been historically grazed. The exclusion of livestock will promote regeneration of canopy and understorey species utilised by Koalas, Greater Gliders and Squatter Pigeon. Existing fencing will be maintained to minimise the risk of livestock entering the offset area. Excluding livestock from the offset site will help reduce the risks of erosion, weed infestations and ongoing impacts to plant species richness (especially for grasses and forbs). All internal offset fencing that has a top strand of barbed wire fencing will either be removed or have the top strand replaced with plain wire to reduce the possibility that Greater Glider entanglement, a key threat recognised in the conservation advice.

9.3. Feral Animal Control

LCWF acknowledges the general biosecurity obligation (GBO) of the *Biosecurity Act 2014* and will implement relevant pest management actions proposed in this OAMP in accordance with the following:

- Take all reasonable and practical steps to prevent or minimise biosecurity risks;
- Minimise the likelihood of causing a 'biosecurity event'³ and limit the consequences if such an event is caused; and
- Prevent or minimise the harmful effects a risk could have, and not do anything that might make the harmful effects worse.

Feral animals present in the offsets that may directly impact MNES are wild dogs and feral cats⁴. Baseline activity indices for each pest fauna species have been generated and provided below in Table 9.4 and Figure 9.1 Note that during the baseline survey program, no European red foxes were detected. If this species, or other pest species that may directly impact MNES, are detected in future monitoring rounds, they will be added to the list of target pest fauna for ongoing management and control.

In addition to pest species the many have a direct impact on MNES, pigs are known to be present in the offset areas, and may have an indirect impact on MNES through reduction in habitat quality. Pest management activities will include control of pigs in addition to target pest fauna.

Example of camera trap images of pest animals are shown in Figure 9.2.

Table 9.4: Baseline Pest Fauna Activity Index

Offset Area	Baseline Activity Index	
	Feral Cat	Wild Dog
██████	0.0096	0.1147
██████	0.0451	0.1072
Sub total	0.0271	0.1110
Total		0.1381

³ A Biosecurity Event is an event that is, was or may become a significant problem for human health, social amenity, the economy or the environment, and is was or may be caused by a pest, disease or contaminant.

⁴ Foxes have been noted in surveys for the Project as potentially occurring, but no foxes were detected during baseline pest surveys of the offset areas

Figure 9.1: Pest Fauna Activity Index in Offset Management Areas

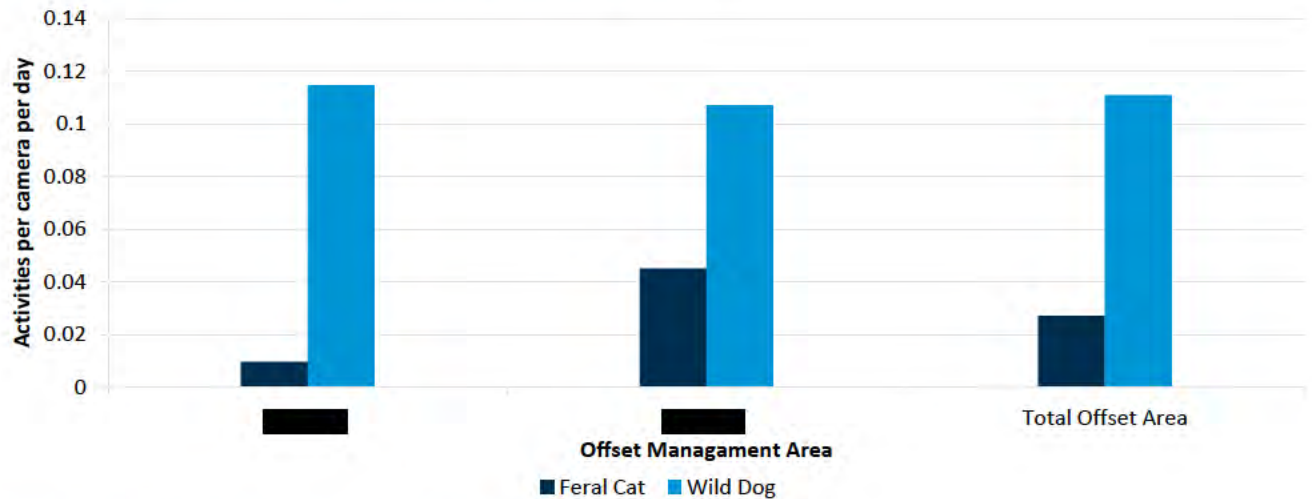


Figure 9.2: Example Camera Trap Images of Wild Dog and Feral Cat



Vertebrate pest control and monitoring will use best practice approaches, guided by the Isaac Regional Council and Department of Agriculture and Fisheries. A tailored approach to pest management has been developed as part of this OAMP which has considered how these pest species threaten each of the MNES values, and how best to manage these threats. Table 9.5 outlines the recommended pest management strategies for each of these pest species.

Table 9.5: Pest Control Technique for Pest Fauna

Target Pest Species to Control	Methods used for monitoring	Possible control techniques	Most effective timing	Relevant MNES species
Wild Dog	Trapping Spotlight counts Track counts Cameras	Soft net traps Cage traps Padded jaw traps Ground shooting Baiting (both passive and active) Fumigation of dens	No specific timing required but is most effective if carried out in conjunction with regional control.	Koala and Squatter Pigeon
Feral Cat	Trapping Spotlight counts Track counts Cameras	Soft net traps Cage traps Padded jaw traps Ground shooting Baiting (both passive and active) Fumigation of dens	No specific timing required	Greater Glider and Squatter Pigeon
European Fox	Trapping Spotlight counts Track counts Cameras	Soft net traps Cage traps Padded jaw traps Ground shooting Baiting (both passive and active) Fumigation of dens	No specific timing required	Greater Glider and Squatter Pigeon
Pigs	Trapping Spotlight counts Track counts Cameras	Cage traps Padded jaw traps Ground shooting	No specific timing required	No direct impacts to MNES. Potential secondary impact by reducing habitat quality

The pest management measures outlined in this Section will be implemented across the offset area to help ensure that interim milestones and final completion criteria can be achieved and then maintained for the duration of the approval. These measures will help to reduce risk of predation and competition for resources for each MNES value and reduce overall abundance of pest fauna within the offset area.

In addition to control methods outlined in Table 9.5, measures including disposing of waste material appropriately (i.e. bins at site office) and not interacting with or feeding pest fauna species will be implemented and provided in site inductions to prevent and minimise pest fauna abundance.

Table 9.6: Pest Monitoring and Management Timing

Control Action	Description	Timing
Baseline Pest Survey	Surveys undertaken as per Section 3.7.1 to capture full extent of target vertebrate pests within the offset site (see Table 9.4) and to ensure that they can be appropriately managed.	Year 0 – completed 2024.
Pest Management Activities	Actions outlined in this Section to be implemented within the offset area quarterly for the first five years, and then every year until completion criteria have been met. Ongoing pest management activities will be undertaken every five years, or as required, for the duration of the approval to ensure there is no reduction in habitat quality.	Quarterly for Years 1 – 5. Annually until completion criteria have been met. Every five years, or as required, for the duration of the approval.
Pest Monitoring	Camera trap monitoring to generate an activity index for target vertebrate pest fauna will be undertaken across the offset area at five yearly intervals for the duration of the approval. This monitoring will follow the same methodology outlined in Section 3.7.1. Additional monitoring will be undertaken during the implementation of pest management activities. This data will be analysed to assess the appropriateness of the scale and frequency of pest management activities to ensure that threats are appropriately managed.	Camera trap monitoring to assess the activity index for target vertebrate pests undertaken every 5 years for the duration of the approval. Pest monitoring undertaken during the implementation of pest management activities – i.e. the results of each round of management activities will be recorded and compared with previous activities to assess changes in pest numbers.

9.4. Weed Management

LCWF acknowledges the general biosecurity obligation (GBO) of the *Biosecurity Act 2014* and will implement relevant weed management actions proposed in this OAMP in accordance with the following:

- Take all reasonable and practical steps to prevent or minimise biosecurity risks;
- Minimise the likelihood of causing a 'biosecurity event' and limit the consequences if such an event is caused; and
- Prevent or minimise the harmful effects a risk could have, and not do anything that might make the harmful effects worse.

The objective of weed management is to; reduce targeted weed numbers within the offset area and to avoid weed seed/propagule set and dispersal, and to continuously reduce and minimise the extent and occurrence of weeds within the offset area.

Recognised and approved control strategies for species that are direct or indirect threats to MNES have been developed from methods by Centre for Invasive Species Solutions (2021) and Department of Agriculture and Fisheries (2022). Table 9.7 outlines the currently approved herbicide control strategy for these species, which will be implemented across the offset area. Note these proposed control methods were selected based on the situation (i.e. if treatment area is agricultural non-crop area, forestry, next to building etc) considered most appropriate to each stage and/or activity associated with the Project.

Table 9.7: Weed control measures for weeds identified within the offset areas

Weed Species	Proposed control method
Balloon Cotton (<i>Gomphocarpus fruticosus</i>)	- Manual removal and grubbing - Chemical control; Triclopyr 600 g/L
Castor Oil Plant (<i>Ricinus communis</i>)	- Manual removal - Chemical control; Fluroxypyr 200 g/L (e.g. Wynca Fluroxypyr 200 Herbicide) or Fluroxypyr 333 g/L (e.g. Starane Advanced)
Common Prickly Pear (<i>Opuntia stricta</i>)	- Chemical control; Triclopyr 240 g/L + Picloram 120 g/L (e.g. Access)
Lantana (<i>Lantana camara</i>)	- Controlled burns - Manual removal and grubbing - Chemical control; Fluroxypyr 200 g/L (e.g. Flagship 200) or Fluroxypyr 333 g/L (e.g. Starane Advanced)
Mother of millions (<i>Bryophyllum delagoense</i>)	- Controlled burns - Manual removal - Chemical control; Triclopyr 300 g/L + Picloram 100 g/L (e.g. Conqueror) or Triclopyr 300 g/L + Picloram 100 g/L + Aminopyralid 8 g/L (e.g. Grazon Extra)
Parthenium (<i>Parthenium hysterophorus</i>)	- Manual removal - Chemical control; 2,4-D as amine 625 g/L (e.g. Ken-Amine 625) or 2,4-D as amine 700 g/L (e.g. Amicide Advance 700)
Rubber vine (<i>Cryptostegia grandiflora</i>)	- Controlled burns - Chemical control; Triclopyr 300 g/L + Picloram 100 g/L + Aminopyralid 8 g/L (Grazon Extra) or Triclopyr 300 g/L + Picloram 100 g/L (e.g. Conqueror)

Baseline weed density for the offset areas was generated as per Section 3.7.2 and provided below in Table 9.8. The weed density index for each species excluding *Lantana camara* in the [REDACTED] and [REDACTED] offset management areas are shown in Figure 9.3. There was a significantly higher number of *Lantana* plants detected in the offset management areas compared to other weed species. Due to the difference in orders of magnitude of the indices, *Lantana camara* was placed in a separate graph (Figure 9.4).

Table 9.8: Baseline Weed Density

Weed Species	Baseline Density Index	
	[REDACTED] Offset Area	[REDACTED] Offset Area
Balloon Cotton (<i>Gomphocarpus fruticosus</i>)	0.00058	0.00003
Castor Oil Plant (<i>Ricinus communis</i>)	0	0.00011
Common Prickly Pear (<i>Opuntia stricta</i>)	0.00018	0.00002
Velvety Tree Pear (<i>Opuntia tomentosa</i>)	0.00002	0.00054
Lantana (<i>Lantana camara</i>)	0.01248	0.01573

Weed Species	Baseline Density Index	
	Offset Area	Offset Area
Mother of millions (<i>Bryophyllum delagoense</i>)	0.00017	0
Parthenium (<i>Parthenium hysterophorus</i>)	0	0.00092
Rubber vine (<i>Cryptostegia grandiflora</i>)	0.00003	0
Sub total	0.01345	0.01735
Total		0.03080

Figure 9.3: Weed Density Index for Weed Species excluding *Lantana camara* in the Offset Management Areas

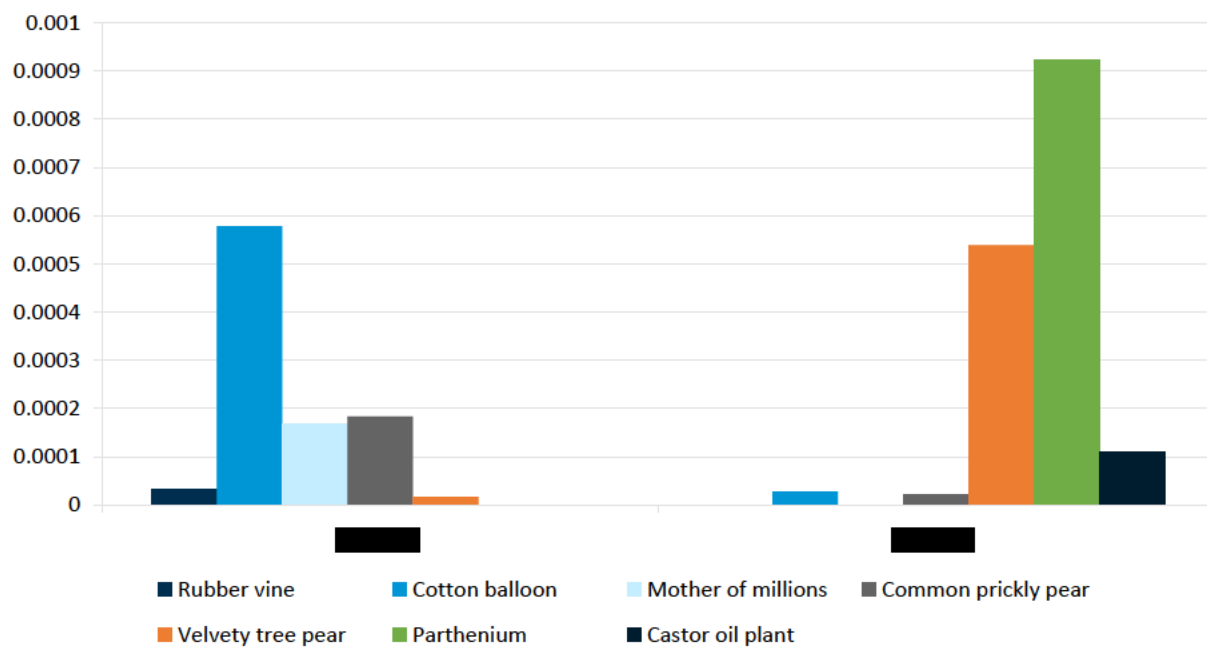
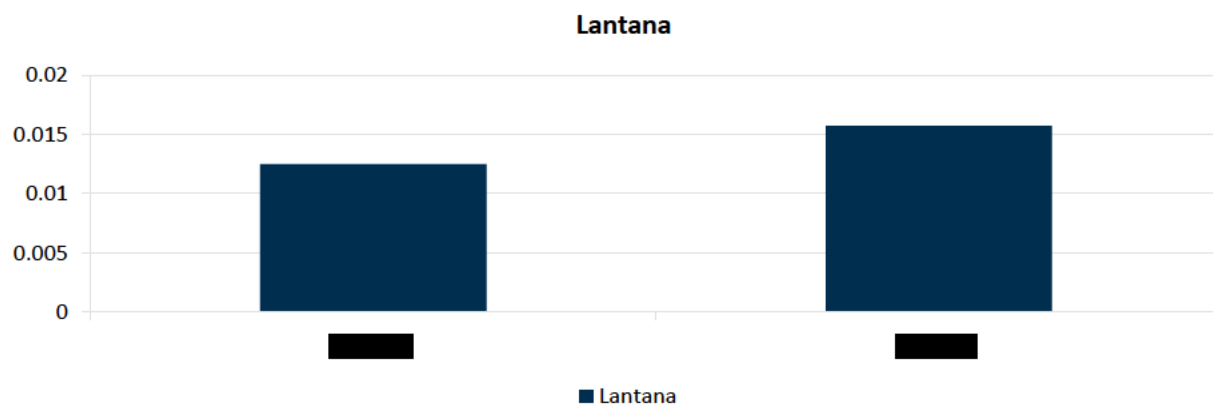


Figure 9.4: Weed Density Index for *Lantana camara* in the Offset Management Areas



To ensure that milestones and completion criteria are achieved, weed management activities and monitoring will be undertaken in accordance with the schedule outlined below in Table 9.9.

Table 9.9: Weed Management Timing

Control Action	Description	Timing
Baseline Weed Survey	Surveys undertaken as per Section 3.7.2 to capture full extent of current weeds within the offset site (see Table 9.8) and to ensure that they can be appropriately managed.	Year 0 – completed 2024.
Weed Management Activities	Actions outlined in this Section to be implemented within the offset area annually for the first five years, and then every five years for the duration of the approval.	Annually for years 1 – 5 Every 5 years for the duration of the approval.
Weed Monitoring	Monitoring across the offset area will be undertaken at five yearly intervals for the duration of the approval. Monitoring will follow the same methodology outlined in Section 3.7.2.	Every 5 years for the duration of the approval.

In addition to the targeted weed management actions to be implemented across the offset area, hygiene protocols have been developed to reduce the likelihood that weed species are introduced into the offset area. These weed hygiene protocols will be implemented for plant and equipment brought to the offset area, and include:

- Vehicle wash-downs shall be undertaken in accordance with clean-down procedures, guidelines and checklist detailed by Biosecurity Queensland, in particular the Vehicle and Machinery Checklists – Clean-down procedures (Biosecurity Queensland, 2014).
- Washdown all light vehicles prior to entry of the offset area. Vehicles must retain a valid weed hygiene certificate whilst on site. Vehicle washdown procedures have been outlined in Table 9.10.
- Washdown all heavy vehicles/machinery prior to entry of the offset area. Machinery must retain valid weed hygiene certificate whilst on site. Machinery washdown procedures have been outlined in Table 9.10.
- The movement of vegetation and soil within the offset area will be prohibited.

Table 9.10: Vehicle Washdown and Hygiene Procedures

Procedure	Description
Pre-washdown	1. Position vehicle/equipment safely and ensure stability (i.e. brakes applied); 2. Remove excessive debris (i.e. mud, branches) for appropriate disposal using a dry cleaning method before wet (e.g. scrape off mud before pressure hose applied); and 3. Detach removable items or parts and decontaminate individually (if practicable).
Decontamination of external surfaces	1. Start top-down of vehicle or equipment;

Procedure	Description
	- Wet decontamination procedure: apply disinfectant/detergent and leave for appropriate contact time (usually 10 minutes) then rinse with clean water; and - If other techniques e.g. heat, fumigation for tools, equipment and other things are required, ensure exposure requirements are met as required by disease/pest guidelines.
Decontamination of internal surfaces	- Only necessary if internal surfaces are exposed to potential contamination; - Protective covers (i.e. seat covers, dash covers) will be removed and cleaned or appropriately disposed of; - Remove solid materials with a vacuum, cloth or brush; - Air filters will be removed, replaced and cleaned (technician may be required); and - Surfaces can be wiped or sprayed with 70% alcohol or another appropriate disinfectant.

9.5. Additional Management Actions

In addition to the key management actions outlined above, further management actions and restrictions described in Table 9.11 will also be enforced across the offset area for the duration of the respective approval.

Table 9.11: Additional Management Actions and Offset Area Restrictions

Restriction	Description
Staff awareness/training	All staff, external contractors and landholders will be made aware of this OAMP and its management actions as they pertain to management activities.
Unauthorised access	Access to the offset area will be minimised and be limited to authorised personnel only. Only the landholder and authorised personnel/contractors will be granted access to the offset area. Existing fencing and locks will be maintained, and new fencing and locks established where required for access restriction. Signage will be established at all access points of the offset area that states the area is protected for conservation purposes and is restricted to authorised personnel only. The offset area will be demarcated on all site plans.
Access tracks	Vehicle movement will be restricted to designated access tracks, existing firebreaks and fence lines which will be maintained for the duration of the action. Tracks will be maintained no wider than 5 m and vegetation disturbance is to be minimised. Usage of access tracks during poor weather will be restricted. Gully crossings will be repaired following rainfall events as required to maintain access.
Speed restrictions	All vehicles will be restricted to speeds of 60 km/h throughout the offset area to reduce the potential of fauna strikes (especially Koalas and Squatter Pigeons). Driving to be avoided at night.
Vegetation clearing	Vegetation clearing within the offset area will not reduce the total area of future MNES habitat and is only permitted under the following circumstances: - Ongoing maintenance of all pre-existing access tracks, firebreaks and fence; - Weed management actions; and

Restriction	Description
	Ensuring public safety or as directed by emergency management response personnel in the event of uncontrolled fire or another emergency procedure.
Timber harvesting and firewood collection	No timber harvesting and/or firewood collection is permitted within the offset area.
Fodder harvesting	No harvesting of vegetation for fodder is permitted within the offset area.

10. Monitoring

10.1. Monitoring Objectives

The key objective of the offset is to ensure that the offsets required for MNES provide a conservation gain in accordance with the EPBC Act Environmental Offsets Policy. The completion criteria must be achieved within 20 years of commencement of the action, and once achieved, must be maintained or improved for the duration of the approval. Therefore, the monitoring program must provide an:

- 'early-control' function, that is to have confidence that management actions are effective for achieving the offset completion criteria; and
- 'early warning' function, so as to inform timely decisions on corrective actions to ensure completion criteria are achieved through the assessment of results against interim milestones.

This monitoring program will inform the effectiveness of management actions, with monitoring parameters to be 'SMART':

- Specific – (what and how) Clear and concise to avoid any misinterpretation of the data.
- Measurable – (baseline information, number/value, auditable) Can be quantified and results can be compared to other data and able to show trends if measured over time. Measurements will provide a consistent result, regardless of who is doing the calculation.
- Achievable – (timeframe, money, personnel) Practical, reasonable and credible given available resources and expected conditions.
- Relevant – (conservation advice, recovery plans, threat abatement plans) Informative and useful to stakeholders, having regard to OAMP objectives and completion criteria (i.e. need to measure what is important to the success of the plan).
- Timed – (specific timeframe to complete) Specifies a timeframe for achievement and measurement.

The condition component of the Modified Habitat Quality Assessment method (BioCondition survey method) allows for repeatable consistent measuring of habitat quality within the offset area. This methodology will be used to monitor habitat quality gains at permanent monitoring sites for the duration of the approval.

Habitat quality monitoring will be undertaken every five years and compared against interim milestones until completion criteria have been achieved, and thereafter every ten years for the duration of the approval.

10.2. Habitat Quality Scoring Surveys

Habitat quality surveys will be undertaken at each of the permanent habitat quality scoring and BioCondition sites. As per methods presented in Section 4, field survey results will be compared against benchmark data for each Regional Ecosystem. The layout and data collection methods will be consistent at each monitoring round allowing for a robust comparison of results. Results will be analysed for each Assessment Unit, as well as the overall weighted habitat quality score for the offset area, to assess for changes over time. The weighted habitat quality score will incorporate data from weed and pest monitoring (presented in Section 10.4) to inform species-specific criteria including threats to species and species mobility capacity.

10.3. HBT Surveys

Within 12 months of commencement of the action, a survey of the offset areas mapped as Greater Glider habitat will be undertaken to identify the number of HBTs present. The survey will involve a direct count of HBTs and continue until at least 296 HBTs have been identified. This data will be reported in the 5-yearly monitoring report as outlined in Section 10.8 and will be repeated with each 5-yearly monitoring event.

10.4. Weed and pest fauna surveys

Weed and pest fauna surveys will be repeated at the same locations established during baseline monitoring following the methods as outlined in Section 3.7.1 and 3.7.2 and will be repeated with each 5-yearly monitoring event. In addition, the 5-yearly monitoring, monitoring will be undertaken during each time weed and pest management activities are undertaken. This will provide data on the appropriateness of the frequency and scale of management activities being undertaken. Analysis of Ecological Monitoring Results

Data for each of the components of habitat quality scoring will be collected at each site and reported on and presented in a sequential manner (including previous data collected) to quantify change from the benchmark, and assess against progress towards interim milestones. This will record the change in each attribute measured and hence the condition of the ecological community and habitat, thus enabling a comparison to previous data and record the progression of the offset area condition over time.

In addition to habitat quality scoring, weed and pest data will be assessed against interim milestones in the same manner.

10.5. Offset Area Condition Assessment Inspections

In addition to ecological monitoring outlined in preceding sections, additional annual inspections of the offset area will be undertaken to assess:

- Condition of fencing and infrastructure to control livestock access to the offset area;
- Condition of access tracks and fire breaks to identify areas for erosion control or remediation.

10.6. Reporting

Each monitoring report will include the following information:

- A summary of the climatic conditions across the offset site during the preceding monitoring period and how this could have affected the resultant habitat quality scores;
- A summary of the most recent MHQA ecology data collected from each BioCondition assessment site;
- Results of weed and pest monitoring;
- Results of HBT monitoring
- A comparison of the current assessment data to the previous monitoring reports data and an analysis of how these attributes are tracking against the interim milestones and completion criteria for the offset site;
- A summary of all management measures implemented across the offset site over the period including:
 - Bushfire management actions and mapping (including any controlled burns or unplanned bushfires);

- Weed management actions (including an updated weed register);
- Pest management actions (including the outcomes of any trapping, baiting or shooting programs); and
- Any other maintenance actions undertaken.
- A list of recommended corrective actions required to keep the offset site on track to meet future interim milestones and completion criteria; and
- Proposed amendments to the current OAMP, including recommendations and any changes to management and monitoring methods.

10.7. Monitoring and Reporting Schedule

Monitoring and reporting will be undertaken at five yearly intervals, with the first report due five years after the commencement of the action, and continue for the duration of the approval.

In addition, within 40 business days of the 20th anniversary of the commencement of the action the following will be submitted to the department:

- A report detailing the area and condition of Koala habitat, Squatter Pigeon breeding habitat, Squatter Pigeon foraging habitat, and Greater Glider habitat the offset area(s)
- Notify the department in writing of any completion criteria at the offset area that have not been achieved and the reasons that these completion criteria have not been met; and
- If any completion criterion has not been achieved within the 20th anniversary of the commencement of the action, an OAMP to address the shortfall in environmental offsets consistent with the Environmental Offsets Policy will be submitted to the department for the Minister's approval. This approved OAMP, or any subsequent version of the OAMP approved by the Minister in writing, will be implemented for the remaining duration of the approval.

11. Corrective Actions

Guided by the results of the monitoring reports (see Section 10.6), corrective actions described in this section will to be implemented to ensure that interim milestones and final completion criteria can be met. In general, these corrective actions are additional and/or more intensive management measures than those currently proposed across the offset area (see Section 9), and if required, will be implemented in parallel with these existing management measures to ensure that completion criteria can be achieved.

If a monitoring report identifies that an interim milestone has not been achieved, then the following steps will be followed to identify which corrective actions will be undertaken:

- Within one month of detecting the failure to meet an interim milestone, an investigation into the reasons why the milestone or completion criteria were not achieved will be undertaken. This investigation will include a comparison of the improvements/deteriorations in raw data related to the specific milestone in question.
- Within six months of detecting the failure to meet an interim milestone, appropriate corrective action(s) as discussed in Table 11.1 will be implemented.
- Within six months after detecting the failure to meet an interim milestone, a review of all current management actions and corrective actions will be undertaken to ensure that they are fit for purpose, and capable of correcting the identified noncompliance. This process will be incorporated into the review of the OAMP discussed further in Section 12.

Corrective action set out in Table 11.1, have been developed to ensure that the potential attribute improvements, can be achieved if the currently prescribed management measures are ineffective, or not providing the desired benefit. This table also includes a description of the conditions that will trigger the need for this corrective action to be implemented, the timeframe in which these actions must be implemented and any additional data that needs to be captured to monitor the effectiveness of these corrective actions.

Table 11.1: Proposed Corrective Actions

Management Objective	Performance Criteria	Monitoring Method Description	Trigger for Corrective Action	Corrective Action(s)	Completion Criteria
Bushfire Management					
The overall fire hazard within the offset area is reduced and/or maintained for the duration of the action. Discussed in Section 9.1.	Fire fuel load parameters score Low (see Table 3.7:). No uncontrolled bushfires have occurred within the offset area.	Fire fuel load assessment during each habitat quality assessment. Uncontrolled bushfire monitoring will be recorded if observed, with spatial data from the Queensland	Fire fuel load parameters score High (see Table 3.7:). Uncontrolled bushfire is detected within the offset area.	- within 1 month of assessing poor fire fuel load, implement appropriate control method (i.e. weed management, planned burns). - Within 1 month of the uncontrolled bushfire	Fire fuel load score increases from previous assessment (if scored poorly) or maintained (if scored highly). Appropriate fire regime and bushfire management actions are implemented for the duration of the action.

Management Objective	Performance Criteria	Monitoring Method Description	Trigger for Corrective Action	Corrective Action(s)	Completion Criteria
		fire scar mapping database assessed annually.		- being identified, conduct an assessment to determine the extent of the damage. - Review current bushfire management measures to identify areas for improvement. - Develop a Bushfire Recovery Program (BRP) to ensure that affected areas can recover.	
	Existing fire-breaks and access tracks have been maintained.	Visual inspections of existing firebreaks, access tracks and fence lines within the offset area will be conducted at least once per year (ideally at the beginning of the dry season). The condition of these will be reported in each of the monitoring reports, in addition to all relevant management activities undertaken.	Existing fire-breaks, access tracks and fence lines have become ineffective, degraded or untraversable.	- Engage contractor to repair/maintain existing fire-breaks, access tracks and fence lines within 1 month of trigger being observed. - Review current monitoring and reporting frequencies to ensure they are adequate.	Appropriate fire regime and bushfire management actions are implemented for the duration of the action.
	Weed species that increase risk of severe fire, such as Lantana sp.,	Weed monitoring as per Section 3.7.2 and management actions as per	Detection of new, target or non-target, weed species.	- Identify new weed species present and investigate ap-	Reduction in weed numbers to meet completion criteria.

Management Objective	Performance Criteria	Monitoring Method Description	Trigger for Corrective Action	Corrective Action(s)	Completion Criteria
	does not exceed baseline density.	Section 9.4 will be undertaken as per the schedule in Table 9.9.		appropriate control methods to be applied. - The frequency or effort associated with weed control activities will be increased. - A review of the offset area's weed hygiene protocols will be undertaken to identified areas for improvement.	
Livestock Exclusion and Management					
Livestock stock will be excluded from the offset for the duration of the approval. Discussed in Section 9.2.	Any currently present livestock are removed from the offset area at commencement of the OAMP and are excluded from the offset area for the duration of the action unless required for management of fuel load.	Monitoring for evidence of stock presence will be undertaken annually during maintenance inspections. Livestock sightings and corresponding management actions will be included in the monitoring report.	Evidence of stock presence within the offset area is identified.	- Within 1 month, an investigation will be conducted to assess how the stock were introduced into the offset area. - Appropriate management actions will be taken to prevent future access.	Livestock are excluded from the offset area for the duration of approval unless undertaken in accordance with measures set out in Section 9.2.
Feral Animal Control					
The overall abundance of pest species within the offset area is managed and reduced for the duration of the action. Discussed in Section 9.3.	The occurrence of target fauna pest species within the offset area is reduced.	Pest management actions will be undertaken across the offset area for the duration of the action. Pest	Reduction in pest fauna numbers does not meet interim milestones. Activity of pest fauna species has exceeded	- The frequency or effort associated with pest control activities will be increased.	Reduction in pest fauna numbers meet completion criteria.

Management Objective	Performance Criteria	Monitoring Method Description	Trigger for Corrective Action	Corrective Action(s)	Completion Criteria
		fauna monitoring results and management actions undertaken will be presented in monitoring reports.	baseline activity levels. New target or non-target pest fauna detected during monitoring (e.g. Foxes)		

Weed Management

The overall abundance of target weeds (Table 9.8) within the offset area is managed and reduced for the duration of the action. Discussed in Section 10.4.	The occurrence of target weed species within the offset area is reduced.	Weed management actions will be undertaken across the offset area for the duration of the action. Weed monitoring results and management actions undertaken will be presented in monitoring reports.	Reduction in weed numbers does not meet interim milestones. Density of target weeds exceeds baseline density levels. Detection of new, target or non-target weed species.	- Identify new weed species present and investigate appropriate control methods to be applied. - The frequency or effort associated with weed control activities will be increased - A review of the offset area's weed hygiene protocols will be undertaken to identified areas for improvement.	Reduction in weed numbers to meet completion criteria.
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Site-specific Attribute Corrective Actions

The percentage (%) <i>Non-native Plant Cover</i> will improve over the duration of the offset (20 years). These attributes will then be maintained or exceeded for the duration of the approval.	The percentage (%) <i>Non-native Plant Cover</i> improves to 90% of RE Benchmark.	MHQAs undertaken as part of monitoring will track the % <i>Non-native Plant Cover</i> present within the offset area at each monitoring location.	Nominated interim milestones scores have not been achieved.	- See above for Weed Management.	The percentage (%) <i>Non-native Plant Cover</i> within the offset area improves to 90% of RE Benchmark for each Assessment Unit.
The percentage <i>native plant species richness – shrubs</i> will improve over	The percentage (%) <i>native plant species richness –</i>	MHQAs undertaken as part of monitoring will track the %	Nominated interim milestones scores	- See above for Weed Management.	The percentage (%) <i>native plant species richness – shrubs</i> within the offset

Management Objective	Performance Criteria	Monitoring Method Description	Trigger for Corrective Action	Corrective Action(s)	Completion Criteria
the duration of the offset (20 years). These attributes will then be maintained or exceeded for the duration of the approval.	<i>shrubs</i> improves to 90% of RE Benchmark.	<i>native plant species richness – shrubs</i> present within the offset area at each monitoring location.	have not been achieved.		area improves to 90% of RE Benchmark for each Assessment Unit.
The percentage <i>native plant species richness – grasses</i> will improve over the duration of the offset (20 years). These attributes will then be maintained or exceeded for the duration of the approval.	The percentage (%) <i>native plant species richness – grasses</i> improves to 90% of RE Benchmark.	MHQAs undertaken as part of monitoring will track the % <i>native plant species richness – grasses</i> present within the offset area at each monitoring location.	Nominated interim milestones scores have not been achieved.	- See above for Weed Management.	The percentage (%) <i>native plant species richness – grasses</i> within the offset area improves to 90% of RE Benchmark for each Assessment Unit.

Species-specific Attribute Corrective Actions

The <i>Threat</i> score will improve over the duration of the offset (20 years) by decreasing the presence of threats specific to Koala, Greater Glider and Squatter Pigeon within the offset area. These attributes will then be maintained or exceeded for the duration of the action. Relevant threats include: - <i>Lantana camara</i> and rubber vine infestations; and - Presence of livestock, wild dogs, foxes and feral cats.	<i>Threat</i> score for each MNES improves to the maximum score (15).	See above for Bushfire Management, Live-stock Exclusion and Management, Feral Animal Control Management and Weed Management.	Nominated interim milestones scores have not been achieved in respective Years 5, 10, 15 or 20.	- See above for Bushfire Management, Live-stock Exclusion and Management, Feral Animal Control Management and Weed Management.	<i>Threat</i> score for each MNES improves to the maximum score (15).
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12. Adaptive Management and Review

If structured monitoring or opportunistic observations indicate that a risk has been realised, a basic action plan is to be prepared identifying appropriate corrective actions to rectify the event or circumstance. Where any part of proposed interim milestones have not been achieved, a list of recommended corrective actions required to keep the offset site on track to meet future interim milestones and completion criteria amendments to the current OAMP, including and any changes to management and monitoring methods will be proposed within 3 months.

13. Risk Assessment

The following risk analysis was undertaken to identify the initial risks to the successful implementation of this OAMP and the achievement of the interim milestones and completion criteria within the required timeframes. These risks were assessed using the matrix provided in Project EPBC approvals, which was derived from the Environmental Management Plan Guidelines (DoE, 2014b). This analysis then incorporated the management measures and corrective actions discussed in this OAMP to calculate a residual risk rating after this OAMP has been implemented. The resultant residual risk ratings were all determined to be either low or medium indicating that the proposed management and corrective actions will successfully reduce the initial risk ratings.

Table 13.1: Risk Assessment Matrix and likelihood/consequence table (DCCEEW, 2014: Environmental Management Plan Guidelines)

		Consequence				
Likelihood		Minor	Moderate	High	Major	Critical
	Highly Likely	Medium	High	High	Severe	Severe
	Likely	Low	Medium	High	High	Severe
	Possible	Low	Medium	Medium	High	Severe
	Unlikely	Low	Low	Medium	High	High
	Rare	Low	Low	Low	Medium	High

Likelihood and consequence

Qualitative measure of likelihood (how likely is it that this event/circumstances will occur after management actions have been put in place/are being implemented)	
Highly likely (5)	Is expected to occur in most circumstances
Likely (4)	Will probably occur during the life of the project
Possible (3)	Might occur during the life of the project
Unlikely (2)	Could occur but considered unlikely or doubtful
Rare (1)	May occur in exceptional circumstances
Qualitative measure of consequences (what will be the consequence/result if the issue does occur)	
Minor (1)	Minor risk of failure to achieve the plan's objectives. Results in short term delays to achieving plan objectives, implementing low cost, well characterised corrective actions.
Moderate (2)	Moderate risk of failure to achieve the plan's objectives. Results in short term delays to achieving plan objectives, implementing well characterised, high cost/effort corrective actions.
High (3)	High risk of failure to achieve the plan's objectives. Results in medium-long term delays to achieving plan objectives, implementing uncertain, high cost/effort corrective actions.
Major (4)	The plan's objectives are unable to be achieved, with significant legislative, technical, ecological and/or administrative barriers to attainment that have no evidenced mitigation strategies.
Critical (5)	The plan's objectives are unable to be achieved, may include widespread and severe environmental harm, with no evidenced mitigation strategies.

Table 13.2: Risk Assessment for Offset Management Activities

Risk Event	Initial Risk Rating			Relevant Management Actions	Relevant Corrective Actions	Residual Risk Rating		
	L	C	R			L	C	R
Force Majeure Events								
Drought (Extreme and/or prolonged weather event)	Likely	Moderate	Medium	Relevant management actions have been discussed in Section 9. Any additional management recommendations made in the monitoring reports will also be implemented.	Relevant corrective actions have been discussed in Section 11. Any additional management recommendations made in the monitoring reports will also be implemented.	Likely	Moderate	Medium
Cyclones / Severe tropical lows / flooding	Likely	Minor	Low	Relevant management actions have been discussed in Section 9. Conduct inspection of offset site following event, when conditions permit, to identify any additional management actions required.	Relevant corrective actions have been discussed in Section 11. Any additional management recommendations made in the monitoring reports will also be implemented.	Likely	Minor	Low
Catastrophic (uncontrolled) Bushfire	Possible	Critical	Severe	Relevant management actions have been discussed in Section 9. Conduct visual inspection of offset site following event, when conditions permit, to identify any additional management actions required.	Relevant corrective actions have been discussed in Section 11. Any additional management recommendations made in the monitoring reports will also be implemented.	Unlikely	High	Medium
Standard Risks to the OAMP								
The Offset fails to meet the nominated interim or final completion criteria	Possible	Major	High	Relevant management actions have been discussed in Section 9. Any additional management recommendations made in the monitoring reports will also be implemented.	Relevant corrective actions have been discussed in Section 11. Any additional management recommendations made in the monitoring reports will also be implemented.	Unlikely	High	Medium
Erosion	Possible	Minor	Low	Relevant management actions have been discussed in Section 9.5. Any additional management recommendations made in the monitoring reports will also be implemented.	Relevant corrective actions have been discussed in Section 11. Any additional management recommendations made in the monitoring reports will also be implemented.	Possible	Minor	Low
Timber harvesting/collection	Unlikely	Moderate	Low	Relevant management actions have been discussed in Section 9.5. Any additional management recommendations made in the monitoring reports will also be implemented.	Relevant corrective actions have been discussed in Section 11. Any additional management recommendations made in the monitoring reports will also be implemented.	Rare	Moderate	Low

Risk Event	Initial Risk Rating			Relevant Management Actions	Relevant Corrective Actions	Residual Risk Rating		
	L	C	R			L	C	R
Unauthorised clearing	Unlikely	Major	High	Relevant management actions have been discussed in Section 9.5. Any additional management recommendations made in the monitoring reports will also be implemented.	Relevant corrective actions have been discussed in Section 11. Any additional management recommendations made in the monitoring reports will also be implemented.	Rare	Major	Medium
New infestations of invasive weeds in the offset site	Possible	High	Medium	Relevant management actions have been discussed in Section 9.4. Any additional management recommendations made in the monitoring reports will also be implemented.	Relevant corrective actions have been discussed in Section 11. Any additional management recommendations made in the monitoring reports will also be implemented.	Unlikely	Low	Low
Expansion of existing weed infestations in the offset site	Possible	High	Medium	Relevant management actions have been discussed in Section 9.4. Any additional management recommendations made in the monitoring reports will also be implemented.	Relevant corrective actions have been discussed in Section 11. Any additional management recommendations made in the monitoring reports will also be implemented.	Unlikely	Moderate	Low
Increased population of pest animals in the offset area.	Possible	Moderate	Medium	Relevant management actions have been discussed in Section 9.3. Any additional management recommendations made in the monitoring reports will also be implemented.	Relevant corrective actions have been discussed in Section 11. Any additional management recommendations made in the monitoring reports will also be implemented.	Unlikely	Moderate	Low
Unauthorised or inappropriate grazing in offset area	Possible	High	Medium	Relevant management actions have been discussed in Section 9.2. Any additional management recommendations made in the monitoring reports will also be implemented.	Relevant corrective actions have been discussed in Section 11. Any additional management recommendations made in the monitoring reports will also be implemented.	Unlikely	Minor	Low

14. Declaration

14.1. Suitably qualified ecologist

This OAMP was prepared by Jeromy Claridge who meets the definition of 'suitably qualified ecologist' as per the EPBC Act approval:

Suitably qualified ecologist means a person who has relevant professional qualifications and at least three (3) years of work experience preparing and implementing management plans for the conservation of and habitat improvement for the MNES relevant to the management plan which they are preparing and can give an authoritative assessment and advice on the habitat requirements of that/those MNES using relevant protocols, standards, methods and/or literature.

Jeromy Claridge is an environmental scientist with a Master of Environmental Management and a Bachelor of Science (Honours Botany) and meets the definition of being suitably qualified by demonstrating that they have:

- Almost 30 years of professional experience as an environmental scientist;
- Experience preparing and implementing management plans for the conservation of habitat for relevant MNES species;
- Experience providing advice on habitat requirements for relevant MNES species.

Further information is provided in the CV in Appendix 1.

14.1. Declaration of accuracy

In making this declaration, I am aware that section 491 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) makes it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth). The offence is punishable on conviction by imprisonment or a fine, or both. I am authorised to bind the approval holder to this declaration and that I have no knowledge of that authorisation being revoked at the time of making this declaration.

Signed: 

Full name (please print): 

Organisation (please print): **Lotus Creek Wind**

Farm Date: **06/08/2024**

15. References

- ALA. (2022). *Atlas of Living Australia Database*. Available online at: <http://spatial.ala.org.au/>
- Biosecurity Queensland. (2014). *Vehicle and machinery checklists - Clean-down procedures 2014* Brisbane Retrieved from https://www.daf.qld.gov.au/data/assets/pdf_file/0011/58178/IPA-Cleandown-Procedures.pdf
- Climate-Council (2019). Climate Council Briefing Paper: 'This is Not Normal': Climatechange and escalating bushfire risk. <https://www.climatecouncil.org.au/wpcontent/uploads/2019/11/CC-nov-Bushfire-briefing-paper.pdf>.
- DAFF. (2011). *Guidelines for the management of wild dogs (Canis familiaris or canis lupus familiaris or canis lupus dingo)* Brisbane Retrieved from www.biosecurity.qld.gov.au > Biosecurity > Weeds, pest animals and ants > Pest mapping > Annual pest distribution maps > search for a map > select Dog or Wild dog species
- DAWE, 2022. Conservation Advice for *Phascolarctos cinereus* (Koala) combined populations of Queensland, New South Wales and the Australian Capital Territory. Department of Agriculture, Water and the Environment. Available at URL: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/85104-conservation-advice-12022022.pdf>
- DCCEEW. (2020). *How to use the offsets assessment guide*. Canberra
- DEHP. (April 2017). *Guide to determining terrestrial habitat quality. A toolkit for assessing land based offsets under the Queensland Environmental Offsets Policy*. Brisbane
- Department of Environment and Science. (2017). *Guide to determining terrestrial habitat quality. A toolkit for assessing land based offsets under the Queensland Environmental Offsets Policy (Version 1.2)*. Brisbane Retrieved from
- DES. (2019). *Regional Ecosystem Descriptions*. Brisbane Retrieved from Available from: <http://www.ehp.qld.gov.au/ecosystems/biodiversity/regional-ecosystems/index.php>,
- DSEWPoC. (2012). *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy*. Canberra
- Ellis WAH, Melzer A, Green B, Newgrain K, Hindell MA, Carrick FN. Seasonal-variation in water flux, field metabolic-rate and food-consumption of free-ranging Koalas (*Phascolarctos cinereus*). *Aust J Zool*. 1995; 43:59–68.
- Eyre, T., Ferguson, DJ, Hourigan, CL, Smith, GC, Mathieson, MT, Kelly, AL, Venz, MF, Hogan, LD and Rowland, J. (2018 (Ver 3)). *Terrestrial Vertebrate Fauna Survey Assessment Guidelines for Queensland*.
- Eyre, T. J., Kelly, A. L., Neldner, V. J., Wilson, B. A., Ferguson, D. J., Laidlaw, M. J. a., & Franks, A. J. (2015). *BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland. Assessment Manual Version*. Brisbane: Queensland Herbarium, Science Delivery
- Eyre, TJ, Smith, GC, Venz, MF, Mathieson, MT, Hogan, LD, Starr, C, Winter, J & McDonald, K 2022, 'Guide to greater glider habitat in Queensland'
- Hines, F., Tolhurst, K. G., Wilson, A. A. G. and McCarthy, G. J. (2010). Overall fuel hazard assessment guide. Fourth Edition. Attorney-General's Department of the Australian Government.
- Invasive species council 2009, Weeds and climate change. Invasive species council. URL: https://invasives.org.au/wp-content/uploads/2014/02/fs_weedsandclimatechange.pdf
- Isaac Regional Council. (2024). Isaac Region Biosecurity Plan 2024-2027. URL: https://www.isaac.qld.gov.au/files/assets/public/v2/residents/environment/isaac_region_biosecurity_plan.pdf

Kays R, Arbogast BS, Baker-Whatton M, et al. (2020) An empirical evaluation of camera trap study design: How many, how long and when? *Methods Ecol Evol.* 2020; 11: 700–713.

Melzer, A., and Black, L. (2018) Infrastructure investment opportunities on the Nebo to Eton stretch of the Peak Downs Highway, Central Queensland. Koala Research CQ, School of Medical and Applied Sciences, CQUniversity, Rockhampton

Melzer, A., Black, L. and Gottke, A. (2018) Wildlife mortality on the Nebo to Eton stretch of the Peak Downs Highway, Central Queensland. Koala Research CQ, School of Medical and Applied Sciences, CQUniversity, Rockhampton.

Queensland Department of Environment and Science, 2019 Climate change in the Central Queensland Region Version 1. Department of Environment and Science. Available at URL: https://www.qld.gov.au/__data/assets/pdf_file/0020/68141/central-qld-climate-change-impact-summary.pdf

Watson GM, French KO, Burley AL, Brading MB and Hamilton MA 2021, Monitoring Manual for Invasive and Native Flora: Guidance for field monitoring and reporting, NSW Department of Planning, Industry and Environment, Sydney

Appendix 1 - Suitably Qualified Ecologist CV

