Isaac Plains East Extension - Offset Area Management Plan: EPBC 2019/8548

Stanmore IP Coal Pty Ltd

BASE/

Client	Stanmore IP Coal
Reference	J0053

Document Control

Title	Isaac Plains East Extension Offset Area Management Plan
Job Number	J0053
Client	Stanmore IP Coal Pty Ltd

Document Issue

Issue	Date	Prepared By	Reviewed/Approved By
DRAFT 1	09/09/2020	Craig Streatfeild/Isaac Witten	Craig Streatfeild
DRAFT 2	20/10/2020	Craig Streatfeild/Isaac Witten/Lincoln Smith/Andrew Craig	Craig Streatfeild
CLIENT REVIEW 1	21/10/2020	Craig Streatfeild	Richard Oldham
CLIENT REVIEW 2	25/10/2020	Craig Streatfeild	Richard Oldham
FINAL FOR DAWE	25/10/2020	Craig Streatfeild	Craig Streatfeild
RESPONSE TO DAWE COMMENTS	16/11/2020	Isaac Witten/Craig Streatfeild	Craig Streatfeild/Richard Oldham
FINAL FOR SUBMISSION TO DAWE	19/11/2020	Craig Streatfeild	Richard Oldham

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Approval Holder Declaration

I declare that:

1. To the best of my knowledge, all the information contained in, or accompanying this Biodiversity Offset Management Plan that was supplied by the proponent is complete, current and correct.

2. I am duly authorised to sign this declaration on behalf of the approval holder.

3. I am aware that:

a. Section 490 of *the Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) makes it an offence for an approval holder to provide information in response to an approval condition where the person is reckless as to whether the information is false or misleading.

b. Section 491 of the EPBC Act makes it an offence for a person to provide information or documents to specified persons who are known by the person to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* where the person knows the information or document is false or misleading.

c. The above offences are punishable on conviction by imprisonment, a fine or both.

Signed: _____

Full name: LEANDRO PIRES

Organisation: STANMORE 1 P COAL PTY LTD

Date: 15 / 4 / 21

I have read and agree to this Management Plan applying to the Offset Area shown in it.

Signed: _____

Landholder name: DAVID WRIGHT

Signed: _____

Queensland Department of Resources representative: _____

Abbreviations

Abbreviation	Description
ABN	Australian Business Number
ACN	Australian Corporation Number
BPA	Biodiversity Planning Assessment
BVG	Broad Vegetation Group
DAF	Department of Agriculture and Fisheries
DAWE	Department of Agriculture, Water and the Environment
DBH	Diameter at Breast Height
DEHP	Department of Environment and Heritage Protection
DES	Department of Environment and Science
DEWHA	Department of Environment, Heritage, Water and The Arts
DNRME	Department of Natural Resources, Mines and Energy
DoE	Department of Environment
DoEE	Department of The Environment and Energy
EDL	Ecologically Dominant Layer
EO Act	Environmental Offsets Act 2014
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
ha	Hectares
km	Kilometres
MNES	Matters of National Environmental Significance
m	Metres
NC Act	Nature Conservation Act 1992
OAMP	Offset Area Management Plan
RE	Regional Ecosystem
SPRAT	Species Profile and Threats Database
VM Act	Vegetation Management Act 1999

1.0 Introduction

Base Consulting Group (Base) was commissioned by Stanmore IP Coal Pty Ltd (Stanmore) to prepare this Offset Area Management Plan (OAMP) to address offset obligations for impacts to listed Commonwealth fauna species from operations at the Issacs Plains East Extension (IPEE) Project (the Project). Stanmore is the operator of the Isaac Plains Complex (IPC), which comprises the Isaac Plains Mine (IPM) and Isaac Plains East (IPE) mining areas. Stanmore is proposing to extend the current mining area of the existing IPE beyond the current approved disturbance footprint and increase production capacity at the IPM coal handling and preparation plant (CHPP).

The existing IPE Project was approved under the Environmental Protection and Biodiversity Conservation Act 1999 (EBPC Act) (EPBC Approval 2016/7827). While the proposed extension is immediately adjacent to the existing IPE, the IPEE area extends beyond the approved impact boundary. Therefore, the IPEE was referred to Commonwealth Department of Agriculture, Water and Environment (DAWE) for a determination as to whether the project required assessment and approval under the EPBC Act. The DAWE notified Stanmore that the IPEE would be a controlled action and assessed via a Public Environment Report (PER). The IPEE PER Guideline (EPBC reference: 2019/8548) allows for the development of a draft OAMP where a suitable offset area has been identified.

The OAMP includes habitat mapping, habitat quality scores and the locations of the observed MNES that require offsetting within an identified offset area of 838 ha within Lot 4SP277438 which is the 4811 ha in size. Management actions, performance criteria and competition criteria for the offset area are also outlined.

1.1 Background

The IPC is an operating metallurgical open cut coal mine located approximately 5 km northeast of Moranbah in Central Queensland (see Figure 1). Mining operations are carried out under an existing State Government approved environmental authority (EA) and occurs across several approved mining leases (ML), namely ML 70342, ML 700016, ML 700017, ML 700018 and ML 700019.

The IPM originally commenced operation in 2006 and produced approximately 2.8 million tonnes per annum (Mtpa) of coking coal for export to international markets. The IPM was put into care and maintenance by the previous owners and was acquired by Stanmore in late 2015, who recommenced operations from the existing open cut pit. In 2018, approval was received from State and Commonwealth Governments for the IPE project which involved mining on ML 700016, ML 700017, ML 700018, ML 700019 (see Figure 2). State and Commonwealth approvals for the IPE Project limited the disturbance footprint of proposed activities within the approved mining leases.

The IPEE is immediately adjacent to the existing IPE mining area and involves additional disturbance areas, an increase to the total production volume and extends the duration of mining. The extension involves the expansion of the IPE open cut pits to the east which is estimated to extend the mining life by approximately four years. Additional supporting infrastructure such as haul roads, power lines and water management infrastructure are required to facilitate the extension and an existing upgrade to the CHPP and associated coal stockpiling areas within the IPM is proposed. While the IPEE footprint is located beyond the existing and approved IPE mining area, the extension areas are wholly contained within the existing mining leases (i.e. ML 70342, ML 700016, ML 700017, ML 700018 and ML 700019) (see Figure 2 for disturbance footprints and existing habitat mapping).

1.2 Report Scope and Purpose

The IPEE project is immediately adjacent to the previously approved IPE. The assessment of significance of residual impacts for the IPEE Project (EcoSM, 2020) identified that the MNES for which offsets are required are the same as those required for the IPE project (Koala, Greater Glider and Squatter Pigeon as outlined in Section 4 of the PER Guidelines).

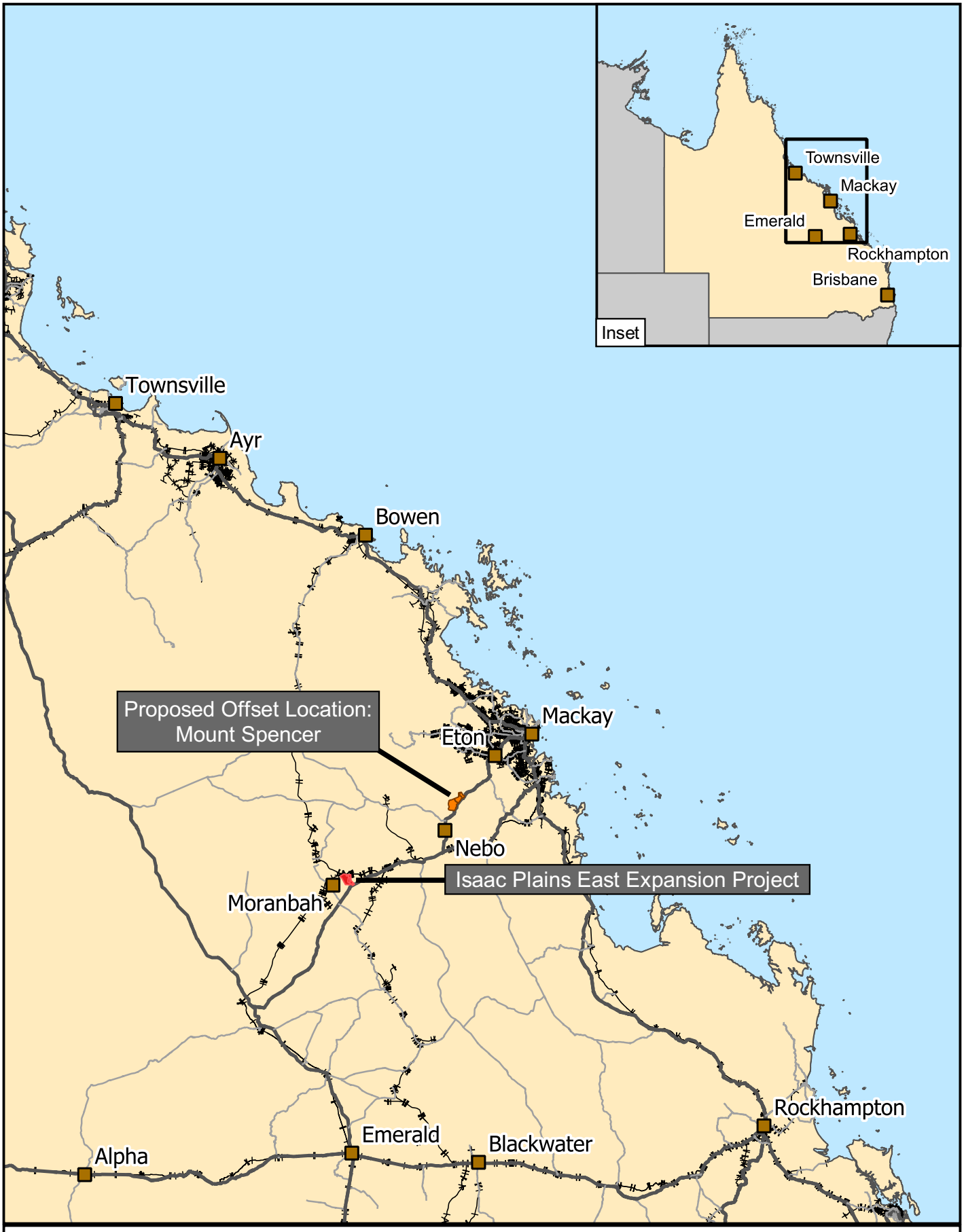
The purpose of this OAMP (IPEE) is to offset significant residual impacts to the Koala, Greater Glider and Squatter Pigeon (breeding and foraging habitat) for the IPEE project. This OAMP proposes to legally secure offset areas within Mt Spencer Station (Figure 3) as an offset for authorised residual impacts to 208 ha of Koala and Greater Glider habitat, 117.1 ha of Squatter Pigeon breeding habitat and 63.6 ha of Squatter Pigeon foraging habitat (refer to Table 1). While this OAMP focuses on offsetting the IPEE, it is the intent of Stanmore to also locate offsets required for impacts to the Koala, Greater Glider and Squatter Pigeon for the IPE and Isaac Downs Projects within Lot 4SP277438 which is part of the wider Mt Spencer Station (Figure 3). To this end, a larger approximately 2000ha offset investigation area has been identified for the IPE and other future Stanmore projects that adjoins the IPEE offset area to the south.

This OAMP proposes ongoing management and monitoring of the offset area to satisfy the requirements of the Commonwealth's Offset Policy and expected approval conditions. In accordance with the Commonwealth Offset Policy, management of the offset area in accordance with this plan is for the life 20 year period.

Table 1 MNES impacted by the Project for which offsets will be delivered

MNES	EPBC Act status	Impact area requiring offsets (ha)	Required offset area (ha)
Koala *(Phascolarctos cinereus)*	Vulnerable	207.8	722
Greater Glider *(Petauroides volans)*	Vulnerable	207.8	482
Squatter Pigeon (Southern) *(Geophaps scripta scripta)*	Vulnerable	117.1 (breeding) 63.6 (foraging)	838

Detailed ecological field investigations of the impact area (i.e. IPE and IPEE areas) have been undertaken to support the initial IPE project but to also assess impacts from the IPEE project. As part of these investigations, habitat quality assessments were undertaken to inform the offset requirements for the IPE project. These habitat quality scores are also relevant to this draft OAMP and are included to provide an overview of habitat quality in the impact area and to describe the process undertaken to determine the habitat quality scores.



0 30 60 km

Scale @ A3: 1 : 2500000
Date: 19/10/2020
Drawn: Josh T

DATA SOURCE
BASE CONSULTING GROUP 2020; QSPATIAL 2020; The State of Queensland (Department of Natural Resource and Mines) 2020;

Figure 1: Mine and Proposed Offset Site Context

Legend

- Towns
- Highways
- Roads
- Rail Network
- Isaac Plains East
- Mount Spencer (Lot 4SP277438)

BASE/

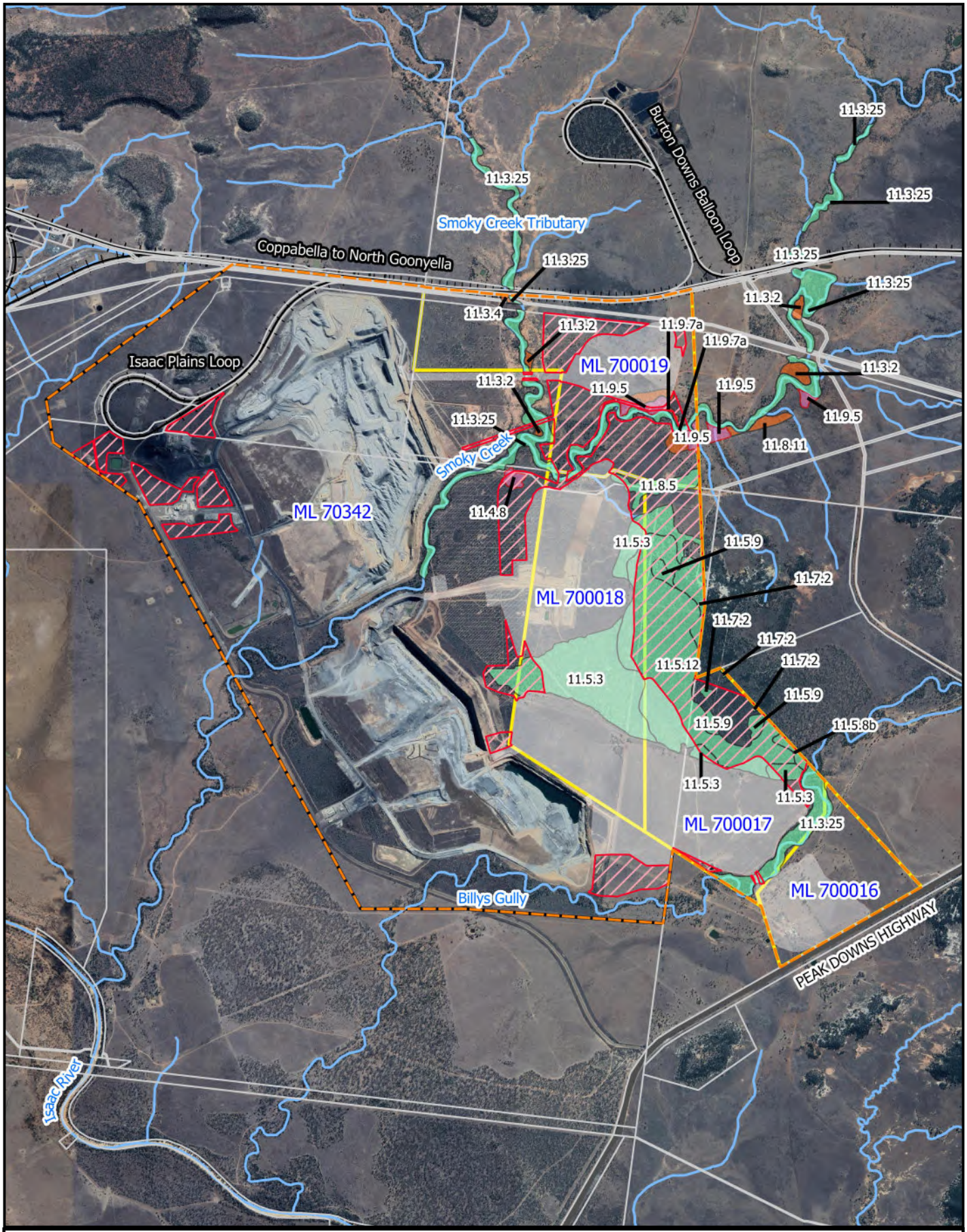


Figure 2: Regional Ecosystems Within The Disturbance Footprint

0 1 km

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Date: 24/07/2020
Drawn: Josh T

DATA SOURCE
BASE CONSULTING GROUP 2020; QSPATIAL 2020
The State of Queensland (Department of Natural Resource and Mines) 2020

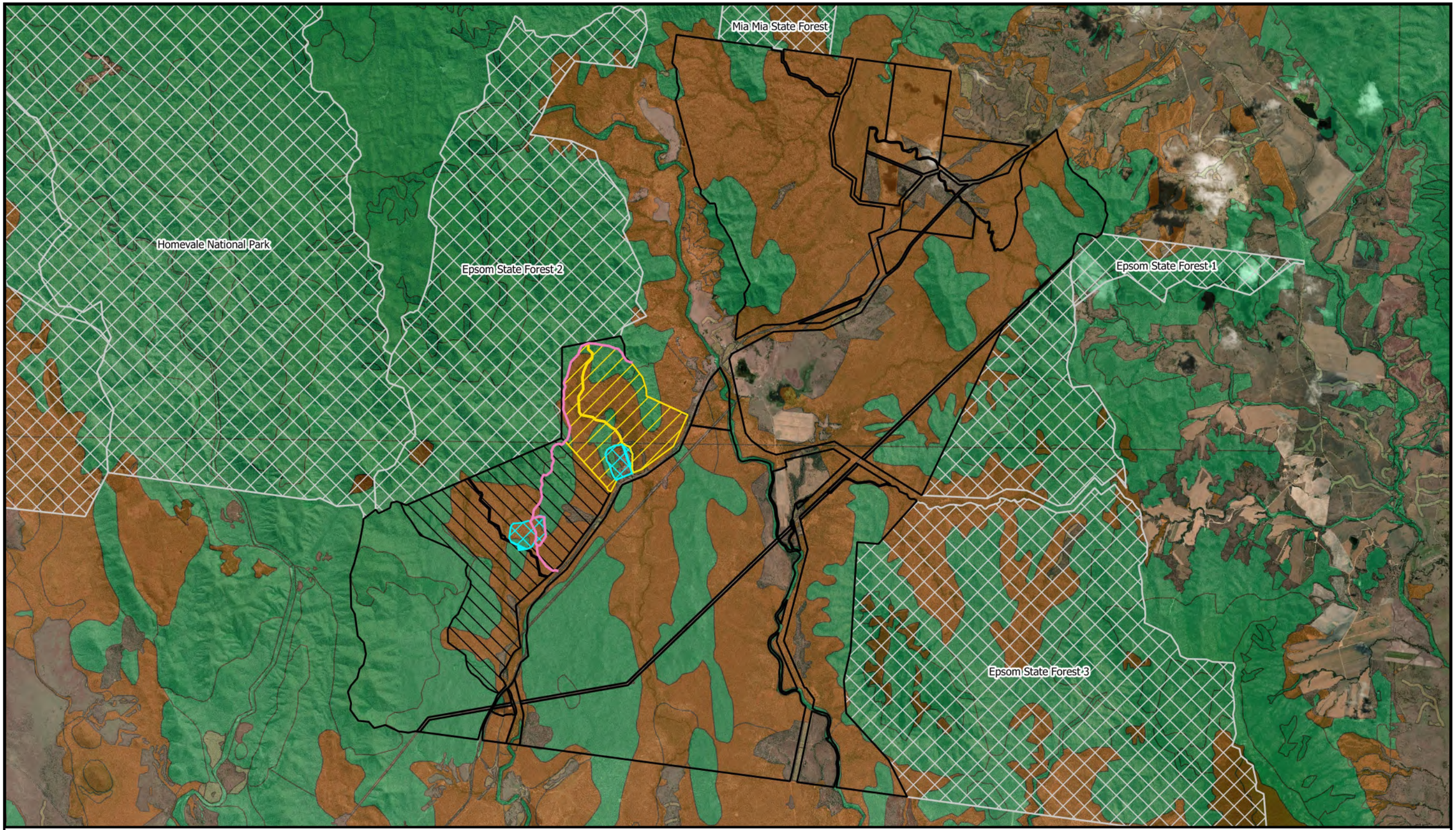
Legend

- Railway
- Watercourses
- Highways
- Isaac Plains Complex
- Existing Isaac Plains Mine
- IPE Mine Lease
- IPE Impact Area
- IPE Extension Project Area

Regional Ecosystem
- Remnant Vegetation: Least Concern
- Remnant Vegetation: Of Concern

High Value Regrowth
- Endangered

BASE



0 3 6 km

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Date: 17/11/2020
Drawn: Josh T

Figure 3: Mount Spencer Station with Offset Investigation Area

Legend

- Existing Fencelines
- Mount Spencer Station Boundaries
- Protected Areas
- Offset Investigation Area
- IPEE Offset Area
- Holding Yards

Regional Ecosystem Mapping

- Category A or B: Of Concern
- Category A or B: Least Concern
- Category C: Least Concern
- Category C: Of Concern

BASE/

2.0 Regulatory Framework

2.1 *Environment Protection and Biodiversity Conservation Act 1999* – Commonwealth

The EPBC Act is the Commonwealth Government's principal piece of environmental legislation and is administered by the DAWE. The EPBC Act is designed to protect MNES, which include threatened species of flora and fauna, threatened ecological communities (TECs), migratory species as well as other protected matters. The Act includes EPBC categories of threat for threatened flora and fauna, identifies key threatening processes to their survival and provides for the preparation of recovery plans for threatened flora and fauna.

Approval is required under the EPBC Act for any action (development) that has the potential to significantly impact MNES. Proponents of projects that are likely to have a significant impact refer the project to the DAWE for a determination on whether the proposed activity requires assessment under the EPBC Act via a controlled action, and if so, the level of assessment required. For controlled actions, five different levels of assessment are possible and include assessment based on information provided in the referral, assessment by preliminary documentation, assessment by an Environmental Impact Statement (EIS), assessment by a Public Environment Report (PER) and assessment by public enquiry.

The IPEE project was referred to the DAWE on 27 September 2019. The DAWE determined on 31 January 2020 that the IPEE project would be a controlled action and assessed via a PER with the PER Guidelines issued on 14 April 2020 (DAWE, 2020). This draft OAMP addresses the relevant requirements of Section 4 of the PER Guidelines as they relate to the OAMP.

2.1.1 PER Environmental Offsets

Section 4 of the PER Guideline relates to the requirements to develop a draft Biodiversity Offsets Strategy (which was previously submitted to DAWE) and a draft OAMP when an offset area has been identified (although noting a Biodiversity Offsets Strategy was a requirement of the PER, not an OAMP). The PER requirements as they relate to this OAMP (reproduced in full from the PER guideline) and where they have been addressed in this draft OAMP are outlined in Table 2. Habitat definitions from the PER Guideline for each MNES listed in the PER Guidelines are shown in Table 3. Note, this OAMP only addresses offset requirements for the Koala, Greater Glider and Squatter Pigeon.

Table 2 PER guideline requirements for inclusion in this OAMP

Summary of guideline requirements	Relevant section
Where offset area/s have been nominated, include a draft Offset Area Management Plan (OAMP) that includes information to demonstrate how the environmental offset/s compensate for residual significant impacts of the proposed action on relevant MNES, and/or their habitat, in accordance with the principles of the *EPBC Act Environmental Offsets Policy* and all requirements of the *Offsets assessment guide*.	This document.
Please note, the Department is likely to require that the OAMP be approved and implemented prior to the commencement of the action to align with the EPBC Act Environmental Offsets Policy. Legal security of the offset area is generally required within 12 months of the date of approval of the OAMP.	Noted

Summary of guideline requirements	Relevant section
The draft OAMP must include, at a minimum: • A description of the offset area/s, including location, size, condition, environmental values present and surrounding land uses;	Refer to section 0
• Baseline data and other supporting evidence, including the ecological field data, that documents the presence of the relevant MNES, and the quality of their habitat within the offset area/s;	Refer to section 0
• An assessment of the site habitat quality for the offset area/s using an appropriate methodology, with justification and supporting evidence, (e.g. using the Queensland Guide to determining terrestrial habitat quality: A toolkit for assessing land based offsets under the *Queensland Environmental Offsets Policy*;	Refer to section 4.3.1
• Details of how the offset area/s will provide connectivity with other habitats and biodiversity corridors and/or will contribute to a larger strategic offset for the relevant listed threatened species and communities;	Refer to section 4.3
• Maps and shapefiles to clearly define the location and boundaries of the offset area/s, accompanied by the offset attributes (e.g. physical address of the offset area/s, coordinates of the boundary points in decimal degrees, the listed threatened species and communities that the environmental offset/s compensates for, and the size of the environmental offset/s in hectares);	Refer to sections 3.2 and 0
• Specific offset completion criteria derived from the site habitat quality to demonstrate the improvement in the quality of habitat in the offset area/s over a 20-year period;	Refer to section 5.1
• Details of the management actions, and timeframes for implementation, to be carried out to meet the offset completion criteria;	Refer to section 6.0
• Interim milestones that set targets at 5-yearly intervals for progress towards achieving the offset completion criteria;	Refer to section 5.1
• Details of the nature, timing and frequency of monitoring to inform progress against achieving the 5-yearly interim milestones (the frequency of monitoring must be sufficient to track progress towards each set of milestones, and sufficient to determine whether the offset area/s are likely to achieve those milestones in adequate time to implement all necessary corrective actions);	Refer to section 7.0 and 8.0
• Proposed timing for the submission of monitoring reports which provide evidence demonstrating whether the interim milestones have been achieved;	Refer to section 8.0
• Timing for the implementation of corrective actions if monitoring activities indicate the interim milestones have not been achieved;	Refer to section 6.0
• 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,	Refer to section 9.0

Summary of guideline requirements	Relevant section
including a rating of all initial and post-mitigation residual risks in accordance with a risk assessment matrix;	
• If proposed for listed threatened species and communities, 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; and	Refer to section 5.0
• Details of the legal mechanism for legally securing the proposed offset area/s, such that legal security remains in force over the offset area/s for at least 20 years to provide enduring protection for the offset area/s against development incompatible with conservation.	Refer to section 4.6 and 8.3
Please note, the Department expects that an EPBC Act protected matter is present in the proposed offset area/s if it is present in the project site to align with the *EPBC Act Environmental Offsets Policy*.	Refer to section 3.2
The draft Offset Management Plan must be prepared by a suitably qualified person and in accordance with the Department's *Environmental Management Plan Guidelines* (2014), available at: www.environment.gov.au/epbc/publications/environmental-management-plan- guidelines.	Refer to Appendix A.
Supporting evidence must be included in the draft OAMP to justify how proposed management action/s are additional to the existing requirements of the landholder in managing their land (e.g. weed and pest management requirements under the *Biosecurity Act 2014* (Qld), existing grazing regimes, etc.) as required by the *EPBC Act Environmental Offsets Policy*.	Refer to section 4.8
The draft OAMP must include robust scientific evidence (e.g. published research, pilot studies, previously successful projects/programs, etc.) to demonstrate how success of proposed measures will be achieved to create, revegetate, regenerate and/or improve habitat (e.g. tree planting, artificial hollows (nest boxes), watering points, etc.) in the proposed offset area/s for a listed threatened species or ecological community.	Refer to section 6.0
Where the proposed offset area/s supports an environmental offset for multiple MNES, proposed management action/s for one protected matter must not be detrimental (i.e. have an impact) to other protected matters.	Refer to section 6.0
Where an offset is proposed, with a completed *Offsets assessment guide* calculation, all inputs must be supported by robust scientific evidence and/or supporting evidence (e.g. historical grazing regimes, satellite imagery, statements from landholders, etc.).	Refer to section 0

Summary of guideline requirements	Relevant section
Please note, it is the Department's expectation that the agreed inputs into the *Offsets assessment guide* are specified in the conditions of approval where the action is approved, subject to conditions, under the EPBC Act.	Noted

Section 2.1.5 of the PER Guideline includes habitat definitions for the Koala, Greater Glider and Squatter Pigeon. These definitions are reproduced in Table 3 and were used during the ecological assessment of the offset investigation area to assess the potentially available offset habitat in the initial larger investigation area and also within the final 838 ha offset area.

Table 3 PER guideline habitat definition

MNES habitat	Habitat description
Koala habitat	Any forest or woodland (including remnant, regrowth and modified vegetation communities) containing species that are Koala food trees or any shrubland with emergent Koala food trees.
Greater Glider habitat	All areas of Eucalypt forests or woodlands that contain hollow-bearing trees (e.g. riparian vegetation and dry eucalypt woodland).
Squatter Pigeon (southern) breeding 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 (including, but not limited to, areas mapped as Queensland land zones 3, 5 or 7) and where groundcover vegetation is less than 33% of the ground area, within 1 km of a suitable, permanent or seasonal waterbody.
Squatter Pigeon (southern) 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 (including, but not limited to, areas mapped as Queensland land zones 3, 5 or 7) and where groundcover vegetation is less than 33% of the ground area, within 3 km of a suitable, permanent or seasonal waterbody.
Squatter Pigeon (southern) dispersal habitat	Any forest or woodland occurring between patches of foraging or breeding habitat that facilitates movement between patches of foraging habitat, breeding habitat and/or waterbodies, and areas of cleared land less than 100 m wide linking areas of suitable breeding and/or foraging habitat.

Under the *Environment Protection and Biodiversity Conservation* 1999 (EPBC Act) Environmental Offsets Policy, offsets are required where a residual impact is likely to occur after avoidance, mitigation and management measures have been undertaken. For this project, offsets for residual impacts are to be legally secured for the MNES (Table 1).

2.2 Policy Principles

The EPBC Act Environmental Offsets Policy (October 2012), has five key aims that involve:

- Ensuring the use of offsets are efficient, effective, timely, transparent and scientifically robust;
- Providing all stakeholders with greater certainty on how offsets are determined and provided;
- Delivering improved environmental outcomes;
- Outlining the appropriate nature and scale of offsets; and
- Providing guidance on acceptable offsets and their delivery.

The Policy also provides eight key principles that are applied in determining the suitability of offsets as follows. These principles are addressed in further detail in Section 4.7.

- Deliver an overall conservation outcome that improves or maintains the viability of the MNES in question;
- Be primarily built around direct offsets but may also include other compensatory measures;
- Be in proportion to the level of statutory protection that applies to the MNES;
- Be of a size and scale proportionate to the residual impacts on the protected matter;
- Account for and manage the risks of the offset not succeeding;
- Be additional to what is already required under law or regulations;
- Be efficient, effective, timely, transparent, scientifically robust and reasonable; and
- Have transparent governance arrangements including management actions, monitoring and auditing.

Lot 4SP277438 which is part of Mt Spencer Station, has approximately 4700 ha of remnant vegetation that has the potential to provide offsets for impacts to the MNES. Further, Mt Spencer Station (inclusive of Lot 4) covers 22,712 ha which includes approximately 20,190 ha of remnant vegetation that has the potential to provide offsets for impacts to the MNES.

The identified 838 ha offset area, to which this OAMP applies, is located on the north-eastern boundary of the property and has the potential to provide offsets that offer additional environmental values over and above those required (Figure 3). Offsets for all three MNES have been co-located within the 838 ha Squatter Pigeon offset area and it is the intent of Stanmore to manage the total offset area as a whole. The exception being the installation of artificial nest boxes and their ongoing management and maintenance. These boxes will generally be confined to the riparian area of RE 11.3.4 and a yet to be defined buffer area. The width of the buffer area will be determined during the first comprehensive ecological survey and will be based on the habitat features that support nest box installation. An overview of the Mt Spencer Station offset area is described in Section 4.3.

3.0 Biodiversity Values Requiring Offsets

As part of the Project's State and Commonwealth approvals process, several detailed ecological surveys and assessments have been undertaken across the IPEE project area and include studies undertaken as part of the IPE approval process in 2015/2016 (EcoSM 2020). Surveys completed as part of the existing IPE project cover all areas of the IPEE footprint that are located to the east of the IPM (i.e. approximately 90% of the IPEE footprint).

Detailed and targeted ecological assessments were undertaken as part of the 2015/2016 surveys. Subsequent surveys undertaken in 2018 and focussed on habitat quality assessments for the Koala, Greater Glider and Squatter Pigeon. Habitat quality assessments are discussed further in Section 4.1 and Section 4.2 A consolidated assessment report by Ecological Survey and Management, 2020 (EcoSM, 2020) that includes all surveys and assessments undertaken to date is include in Appendix 11 of the PER.

Collectively, these surveys and assessments were undertaken, in order to:

- Determine the presence/absence of listed flora and fauna species within the Project area;
- Assess the vegetation characteristics and the presence of ecological communities within the Project area;
- Describe the likely adverse impacts on MNES within the Project area;
- Describe measures that would be implemented to avoid and mitigate impacts on those MNES; and

Assess the baseline habitat quality of the impact area for the MNES requiring offsets.

This section provides a summary of the ecological assessments undertaken to determine the likelihood of occurrence of fauna MNES to occur or potentially occur, within the IPEE Project area and to assess the potential impacts to those MNES.

3.1 Impact Assessment Ecological Survey Effort

A variety of flora and fauna survey methods were used to detect MNES during the assessment surveys (EcoSM, 2020). Flora surveys were undertaken in accordance with the Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland, Version 3.2 (Nelder et al., 2012). These surveys are the most detailed ecological assessments undertaken across the IPC and approximately 90% of the IPEE area is located within the previous IPE survey boundary.

Assessment sites were undertaken across the entire Project area and included both vegetation assessment sites and photo monitoring points within each vegetation community type as outlined below.

Numbers in parentheses indicates the number of sites that fall within the IPEE footprint:

- 101 vegetation assessment sites in total comprising;
    - 30 (12) detailed secondary sites
    - 35 (21) tertiary sites
    - 36 (17) modified quaternary sites
    - 36 (19) photo monitoring sites

Fauna assessments were undertaken for the IPE surveys undertaken in 2015 and 2016 and included systematic trap sites, spotlighting, call playback, infrared cameras, active

searching, supplementary survey sites, harp traps, Anabat survey sites, Koala transects and observation (e.g. bird surveys and opportunistic observations). The survey techniques were applied across eight systematic trap sites and a range of supplementary sites and involved a total of:

- 800 Elliott A trap nights;
- 112 pitfall trap nights;
- 224 funnel trap nights;
- 24.5 hrs of spotlighting;
- 10 hrs nocturnal owl and Koala call playback sessions;
- 207 infrared camera trap nights;
- 55 hrs targeted diurnal bird survey hours;
- 180 hrs opportunistic incidental bird survey hours;
- 22 hrs active searching hours;
- 16 Anabat survey nights;
- 14 harp trap nights; and
- 12 Koala transects totalling 104.2 ha or survey area.

Survey methods were undertaken in accordance with applicable Commonwealth and Queensland threatened species and communities survey guidelines including:

- Commonwealth guidelines;
    - Survey guidelines for Australia's threatened birds (DEWHA, 2010a)
    - Survey guidelines for Australia's threatened bats (DEWHA, 2010b)
    - Survey guidelines for Australia's threatened reptiles (SEWPaC, 2011a)
    - Survey guidelines for Australia's threatened mammals (SEWPaC, 2011b)
    - EPBC Act referral guidelines for the vulnerable Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) (DotE, 2014)
    - SPRAT databases for relevant EPBC Act listed species and communities (as of July 2016)
- Queensland guidelines;
    - Flora Survey Guidelines – Protected Plants *Nature Conservation Act 1992* (EHP, 2014)
    - Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (Eyre et al., 2014).

3.2 MNES Requiring Offsets

The ecological assessments identified three fauna species (Koala, Greater Glider and Squatter Pigeon) listed as vulnerable under the EPBC Act as requiring offsets due to residual impacts occurring to the species habitat. Note, no significant residual impact to Squatter Pigeon dispersal habitat is predicted and as such, no offsets are proposed for impacts to this habitat. Offsets are proposed for impacts to Squatter Pigeon breeding and foraging habitat

Those MNES for which this draft OAMP applies as outlined in the PER, and the corresponding impacts areas are shown in Table 4.

Table 4 MNES impacted by the Project for which offsets will be required

MNES	EPBC Act status	Impact area requiring offsets (ha)	Required offset area (ha)
Koala *(Phascolarctos cinereus)*	Vulnerable	207.8	722
Greater Glider *(Petauroides volans)*	Vulnerable	207.8	482
Squatter Pigeon (Southern) *(Geophaps scripta scripta)*	Vulnerable	117.1 (breeding) 63.6 (foraging)	838

3.2.1 Koala (*Phascolarctos cinereus*)

Description

The Koala is one of Australia's most distinctive wildlife species (TSSC, 2012). It is a large grey, arboreal mammal with woolly fur, long black claws, a large black nose, fluffy ears, and no tail (van Dyck & Strahan, 2008). They have a head and body length of approximately 65-74 cm depending on sex with males larger than females and they can weigh up to 9 kg (van Dyck & Strahan, 2008).

Distribution

The Koala is found in eastern Australia in fragmented populations, from the temperate south to the tropical north. In Queensland, the Koala is widespread in sclerophyll forest and woodlands on foothills and plains on both sides of the Great Dividing Range from about Chillagoe, Queensland to Mt Lofty Ranges in South Australia (Menkhorst & Knight, 2011).

Habitat

Koala's use a range of habitats, including temperate, sub-tropical and tropical forest, woodland and semi-arid communities dominated by Eucalyptus species. However, they are strongly associated with eucalypt forests which it feeds on (van Dyck & Strahan, 2008). This species feeds on approximately 50 different eucalypt species across its range, with food preferences varying locally and across regions (Krockenberger et. al., 2012). The South East Queensland Koala Conservation State Planning Regulatory Provisions define Koala

food trees as species of the *Corymbia*, *Melaleuca*, *Lophostemon* or *Eucalyptus* genera (DES, 2017; DotEE, 2017c).

Any forest or woodland containing species that are known Koala food trees, or shrubland with emergent food trees provides potential Koala habitat. The Koala is also known to occur in modified or regenerating native vegetation communities (DoEE, 2017c).

It has been suggested that shelter (non-food) trees are important to Koalas, with Crowther et. al. (2013) indicating that shelter trees are equally important as food tree. Shelter trees play an essential role in thermoregulation and are likely to be selected based on height, canopy cover and elevation, with large trees occurring in gullies being preferable (Crowther et. al., 2013).

Suitable Habitat Within the Offset Area

Based on the SPRAT habitat description and the habitat definition included in the PER Guideline, any forest or woodlands, including remnant, regrowth and modified communities that contain Koala food trees or shrublands with emergent food trees are all potential Koala habitat. This is further supported by Atlas of Living Australia records which show Koalas have been previously found immediately adjacent to the investigation area and along the Peak Downs Highway (Figure 4). The presence of Koalas is also supported by anecdotal evidence from the landowner who has indicated that Koalas have previously been seen within the investigation area and throughout the wider Mt Spencer Station (A. Key *pers comm.*).

Field assessments undertaken in June, July and October confirmed the presence of the Koala throughout of broader offset investigation area including the 838 ha offset area for which this OAMP applies. Over the three field visits, 13 instances of Koala sightings (Figure 5) were recorded and throughout the offset investigation area as were evidence of Koala's in the form of tree scratches and scats.

The minimum offset area required for the Koala is 722 ha and will be co-located within the larger 838 ha area which is required to offset impacts to the Squatter Pigeon (Figure 7). The intent is to manage the 838 ha offset area as a whole rather than piecemeal for each species, unless species specific management actions are required. Field verified Regional Ecosystem mapping shows the offset management area consists of a Eucalypt Woodland BVG comprising two (2) REs and non-remnant ecosystems. The offset area is dominated by vegetation consistent with REs 11.12.1 and 11.3.4 and the area is considered appropriate habitat for Koala as these REs support known Koala food trees and is consistent with the habitat definitions within the PER guideline.

Habitat quality calculations for the Koala within the 838 ha offset area averaged a 5 out of 10. An increase in habitat quality will be realised through various management actions outlined in section 6.0.

Key Threats

Wildfire and drought are semi-natural processes that are considered to threaten Koala populations, particularly in dryland areas where water sources and the availability of shelter trees have been anthropogenically altered (TSSC, 2012). Other threats to the Koala are the loss and fragmentation of habitat resulting in loss of food and shelter trees, increased risk of vehicle strike, dog attacks and isolation of populations (TSSC, 2012). Habitat fragmentation results in isolated high-density population areas where the risk of disease transmission is increased and the potential to recolonise dryland areas post-drought is impeded (TSSC, 2012).

3.2.2 Greater Glider (*Petauroides volans*)

Description

The Greater Glider is the largest gliding possum in Australia, with a head and body length of approximately 35-46 cm and a long furry tail measuring approximately 45-60 cm. The Greater Glider has thick fur that is white or cream below and varies from dark grey, dusky brown through to light mottled grey and cream above (TSSC, 2016). The Greater Glider is nocturnal and uses tree hollows during the day to rest and/or nest (van Dyck & Strahan, 2008).

Distribution

Greater Gliders are restricted to eastern Australia, between Windsor Tableland in north Queensland and Wombat State Forest in central Victoria and occurs from sea level up to 1,200 m above sea level. Two isolated subpopulations exist in Queensland, one in the Gregory Range west of Townsville and another in the Einasleigh Uplands (TSSC, 2016).

Habitat

The Greater Glider occurs in a range of eucalypt-dominated habitats, including low open forests on the coast to tall forests in the ranges and low woodland to the west of the Dividing Range. It does not use rainforest habitats (van Dyck & Strahan 2008; van Dyck et. al., 2013). This species favours taller, montane, moist eucalypt forests with relatively old trees and abundant hollows and a diversity of eucalypt species (TSSC, 2016).

The Greater Glider has an almost exclusive diet of eucalypt leaves but also feeds occasionally on flowers or buds (van Dyck & Strahan, 2008; TSSC, 2016). Although the species is known to feed on a range of eucalypt species, in any area it is likely to only forage on a select number of species (van Dyck & Strahan, 2008).

Suitable Habitat Within the Offset Area

The approved conservation advice for the Greater Glider (TSSC, 2016) along with habitat definitions included in the PER Guidelines, indicate that Greater Glider habitat overlaps Koala habitat. As such, Eucalypt Forests and Woodlands that contain hollow bearing trees, particularly in riparian areas, are all potential Greater Glider habitat.

Desktop assessment including the Atlas of Living Australia database, showed the multiple Greater Glider records approximately 8 km to the west of the offset investigation in similar habitat within the large and unfragmented Epsom State Forest and the adjacent which directly connects to the offset area (see Figure 4). Greater Gliders have also been recorded along the Peak Downs Highway in the vicinity of Mt Spencer during the DTMR Koala Research Project (Melzer et al. 2018).

Two Greater Gliders were confirmed as present within the middle section of the broader offset investigation area during the October field assessments and approximately 1500m south of boundary of the IPEE 838 ha offset area (Figure 5). Although the Greater Glider was not physically confirmed as present within the IPEE offset area, sightings of Glider sp. with similar morphology to Greater Gliders, were observed along the Cut Creek riparian corridor within the IPEE offset area and within habitat – RE 11.3.4 – that is known to support the Greater Glider (CDM Smith, 2018; ecosure, 2018). Yellow-bellied Gliders were positively identified in this area during the July survey but no confirmed sightings or calling activity were recorded in the October survey event. Yellow-bellied Gliders are known to be boisterous and the lack of calling activity adds weight to the unconfirmed Glider sp. in the IPEE area being a Greater Glider. Although Greater Gliders were not confirmed within the boundary of the IPEE offset area, several large tree hollows were observed along the

riparian corridor of Cut Creek which will provide suitable nesting and shelter habitat. As such and given the proximity of confirmed Greater Gliders to the IPEE boundary, the home range size of Greater Gliders in concert with the unconfirmed records along Cut Creek, Greater Gliders have a very high probability of occurring within the IPEE offset area. Nevertheless, for the purposes of input metrics into determining habitat quality scoring, current species stocking rate of the Greater Glider within the IPEE offset area was assessed as zero (0).

The minimum offset area required for the Greater Glider is 482 ha and will be co-located within the larger 838 ha area required for the Squatter Pigeon (Figure 7). On-ground assessments to remap the offset area confirmed the area comprises a Eucalypt Woodland BVG that is dominated by vegetation communities consistent with REs 11.12.1 and 11.3.4. These communities are considered appropriate habitat for the Greater Glider as the diverse Eucalypt community supports known Greater Glider habitat food and foraging trees. The intent is to manage the 838 ha offset area as a whole rather than piecemeal for each species. The exception being the installation, management and monitoring of artificial nest boxes which will be concentrated on the riparian area of RE 11.3.4 and the immediate surrounding woodland habitat of RE 11.12.1.

Across the investigative area, habitat quality for the Greater Glider averaged a 4 out of 10. An increase in habitat quality will be realised through various management actions including; Increasing habitat features, access and fencing, monitoring vehicle access, vegetation clearing, grazing management, fire management, pest animal management and weed management (see section 6.0 for further details). Further, these management actions along with installation of targeted artificial nest boxes are expected to increase the stocking rate from zero (0) to one (1) over the life of the offset.

Key Threats

Key threats to Greater Gliders are habitat loss leading to increased habitat fragmentation and loss of nesting habitat in tree hollows, predation by owls and frequent and intense bushfires. Loss of hollow bearing trees and distance between habitat patches in particular is thought to have contributed to the decline of Greater Gliders in central Queensland over the last 20 years (TSSC, 2016).

3.2.3 Squatter Pigeon - southern sub-species (*Geophaps scripta scripta*)

Description

EPBC Act = Vulnerable

The Squatter Pigeon (southern) is a medium-sized ground dwelling pigeon approximately 30 cm long. Adults of both sexes are generally grey-brown with black and white stripes on the face and throat, have iridescent green or violet patches on the wings, a blue-grey lower breast and white flanks and lower belly. The southern Squatter Pigeon sub-species has a patch of blue-grey skin around the eye, whereas the northern Squatter Pigeon has an orange-red orbital skin patch (TSSC, 2015).

Distribution

Squatter Pigeons are largely restricted to Queensland with the southern sub-species of the Squatter Pigeon known to occur north of the Burdekin River, east to Townsville and Proserpine and south to the Queensland-New South Wales Border and west as far as Longreach. Where Squatter Pigeon occurs, it can be locally abundant (Reis, 2012). The known distribution of the southern sub-species overlaps with the known distribution of the northern subspecies (DotEE, 2018).

The estimated extent of occurrence is approximately 440,000 km^2 (DotEE, 2018). The estimated total population of the species is an estimate as no systematic surveys have been undertaken. However, in 2000 the population was estimated at 40,000 breeding birds (Garnett & Crowley, 2000). Given the Squatter Pigeon's ubiquitous nature and relative abundance, the population is thought to be stable at present. It is also thought this species occurs as a single, contiguous (i.e. inter- breeding) population (DotEE, 2018).

Squatter Pigeons can occur in tropical dry, open sclerophyll woodlands and occasionally in savannah habitats with overstorey species of *Eucalyptus*, *Corymbia*, *Acacia* or *Callitris*. Patchy groundcover layer is typical and generally consists of native, perennial tussock grasses or a mix of grasses and low shrubs or forbs. The groundcover layer rarely exceeds 33% of the ground area. It appears to favour sandy soil dissected with low gravely ridges and is less common on heavier soils with dense grass cover (DotEE, 2018). As outlined in the PER Guidelines, Squatter Pigeons are regularly found in close proximity (within 3 km) of a suitable, permanent or seasonal waterbody (DAWE, 2020) which can include farm dams and cattle watering points, wetlands and waterways.

Breeding Habitat

Squatter Pigeons nest on the ground, usually laying two eggs in sheltered positions amongst vegetation which are incubated for about 17 days. (Crome, 1976; Frith, 1982). Their breeding habitat is 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 (including, but not limited to, areas mapped as Queensland land zones 3, 5 or 7) and where groundcover vegetation is less than 33% of the ground area, within 1 km of a suitable, permanent or seasonal waterbody (DAWE, 2020).

Squatter Pigeons typically breed from April to October, although this is variable and highly dependent on food availability (Frith, 1982, Squatter Pigeon Workshop, 2011). Nests are depressions scraped into the ground beneath a tussock of grass, bush, fallen tree or log, and sparsely lined with grass (Frith, 1982). Chicks remain in the nest for two to three weeks and are dependent on their parents for around four weeks (DotEE, 2018a).

Foraging Habitat

As per the PER guideline (DAWE, 2020), Squatter Pigeon foraging habitat is 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 (including, but not limited to, areas mapped as Queensland land zones 3, 5 or 7) and where groundcover vegetation is less than 33% of the ground area, within 3 km of a suitable, permanent or seasonal waterbody (DAWE, 2020). It feeds primarily on seeds of grasses, herbs and shrubs but is also known to consume legumes, herbs and forbs, acacia seeds, insects and ticks (DotEE, 2018a).

Dispersal Habitat

Any forest or woodland occurring between patches of foraging or breeding habitat that facilitates movement between patches of foraging habitat, breeding habitat and/or waterbodies, and areas of cleared land less than 100 m wide linking areas of suitable breeding and/or foraging habitat (DAWE, 2020).

Suitable Habitat Within the Offset Area

Squatter Pigeons have been previously found throughout Mt Spencer during previous property visits (A. Key *pers. comm.*). Based on the PER habitat definition, the preliminary desktop assessment of the investigation area using current DNRME mapping suggests the majority of the broader offset investigation area has the potential to provide breeding and foraging habitat.

Field assessment in June and July 2020 located Squatter Pigeons throughout the broader offset investigation area and within the 838 ha IPEE offset area. Squatter Pigeons were observed at five (5) separate locations during the June survey in the south-eastern section of the property and within a range of differing habitat types. Six (6) instances of Squatter Pigeons were recorded during the detailed survey in July and occurred in the southern, middle and north-east section of the offset investigation area, including the proposed IPEE offset area (Figure 5). Squatter Pigeons were found in various habitat types including the RE 11.3.4 and RE 11.12.1 as well as the non-remnant areas. Squatter Pigeons were also observed inhabiting vegetation with cover exceeding 33% and approximating 60% cover.

Squatter Pigeon breeding habitat covers the full IPEE offset area as defined within the PER guidelines and constrained to 1 km of permanent or semi-permanent waterways. Cut Creek is a significant waterway that runs through the middle of the offset area provides a reliable source of semi-permanent water and cattle watering points also occur throughout the offset area. By definition, the 838 ha offset area is also within 3 km of a permanent or semi-permanent waterway. Hence, the 838 ha offset area comprises both breeding and foraging habitat for the Squatter Pigeon.

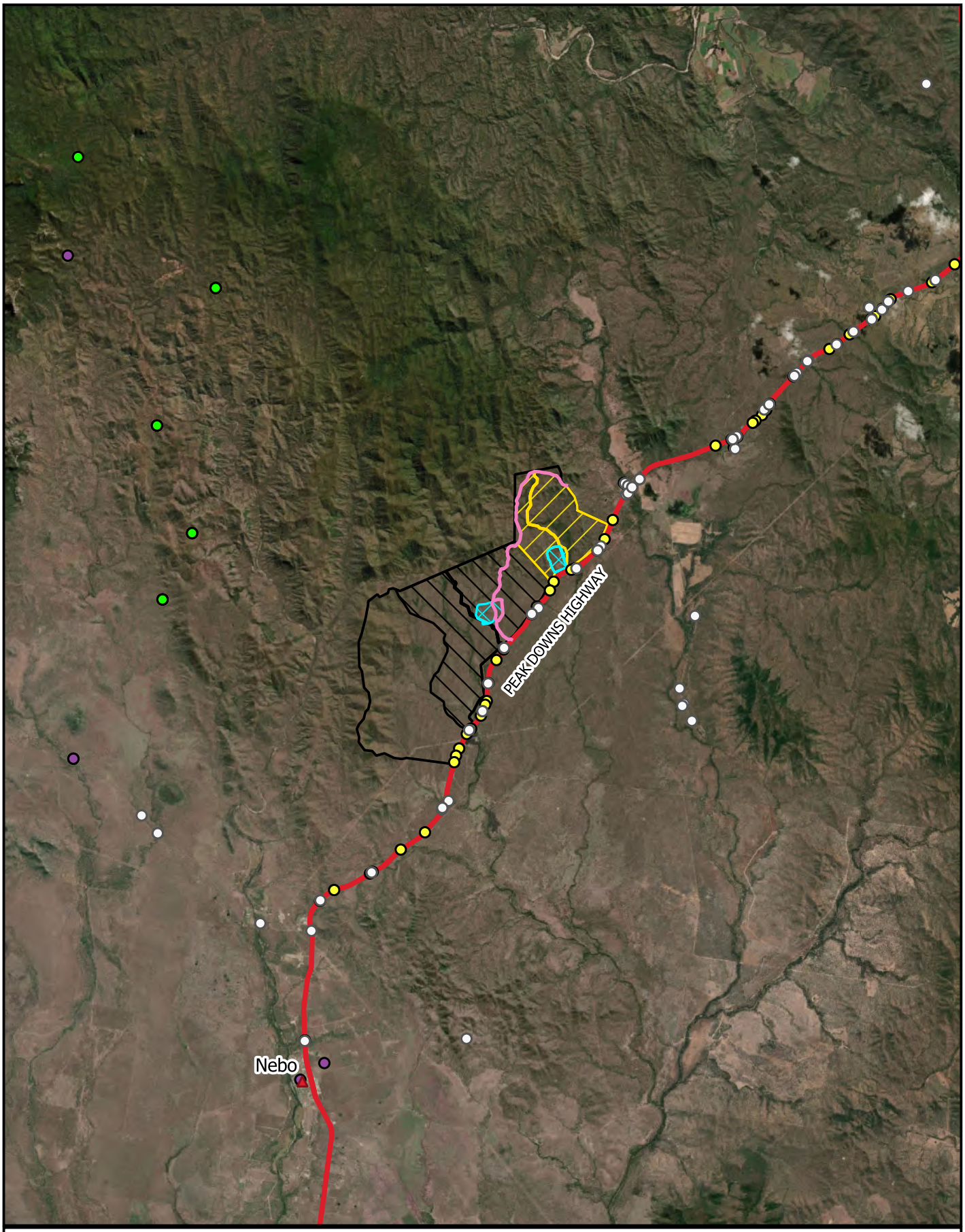
Based on the EPBC habitat definition, RE 11.12.1 and 11.3.4 are considered appropriate habitat as they support a rich and diverse understorey comprised primarily of grasses that are known to provide foraging habitat and are known to support Squatter Pigeons. The majority of the offset area is within 1 km of a semi-permanent water source (including artificial water sources) and numerous waterways and is therefore classed as breeding and foraging habitat (Figure 7). Further, Squatter Pigeons have been observed on several different occasions during all survey events undertaken to date inhabiting areas of landzone 12 and 3 (Figure 5). Of the 11 observations made of Squatter Pigeons during field surveys, four observations were in landzone 12.

The minimum offset area for the Squatter Pigeon is 838 ha and includes offsets for breeding and foraging habitat. Given the overlap between suitable habitat, Squatter Pigeon offsets can be collocated with offsets for the Koala and Greater Glider (Figure 5).

The Squatter Pigeon offset area had an average habitat quality score of 5 out of 10 (Section 4.3). An increase in habitat quality for the Squatter Pigeon will be realised through strategic grazing aimed at managing understory cover and fuel loads, and targeted control of rabbits which will assist in increasing foraging habitat such as perennial grass cover. The Squatter Pigeon will also benefit from control of feral predators including Wild Dogs, Feral Cats and Foxes.

Key Threats

The primary threats to the Squatter Pigeon (southern) are ongoing habitat clearing, overgrazing of habitat by livestock and feral herbivores such as rabbits, thickening of understorey vegetation, and predation by invasive mammals such as cats and foxes (TSSC, 2015). Their habit of remaining stationary when disturbed makes them particularly vulnerable to predation and vehicle strikes. Other known threats include fragmentation of habitat, trampling of nests by domestic stock and feral herbivores, invasion of habitat by weeds such as *Cenchrus ciliaris* (Buffel Grass), drought, and bushfires (TSSC, 2015). Changes in hydrological regimes can also affect Squatter Pigeons by changing the distance between water sources and feeding habitat, affecting their movement through the landscape (Reis, 2012).



0 2 4 km

Scale @ A3: 1 : 200000
Date: 17/11/2020
Drawn: Josh T

DATA SOURCE
BASE CONSULTING GROUP 2020; QSPATIAL 2020; The State of Queensland (Department of Natural Resource and Mines) 2020; Sources: Esri, Maxar, Earthstar Geographics, CNES/Airbus DS, USDA FSA, USGS, Aerogrid, IGN, IGP, and the GIS User Community

Figure 4: Historical Fauna Records Within 20 Km of Lot 4SP277438

Legend

- Towns
- **ALA & Wildnet Records**
- Greater Glider
- Koala ALA
- Squatter Pigeon
- DTMR: Koala Records
- Highways
- Existing Fenceline
- Lot 4SP277438 Boundary
- Offset Investigation Area
- IPEE Offset Area
- Holding Yards

BASE/

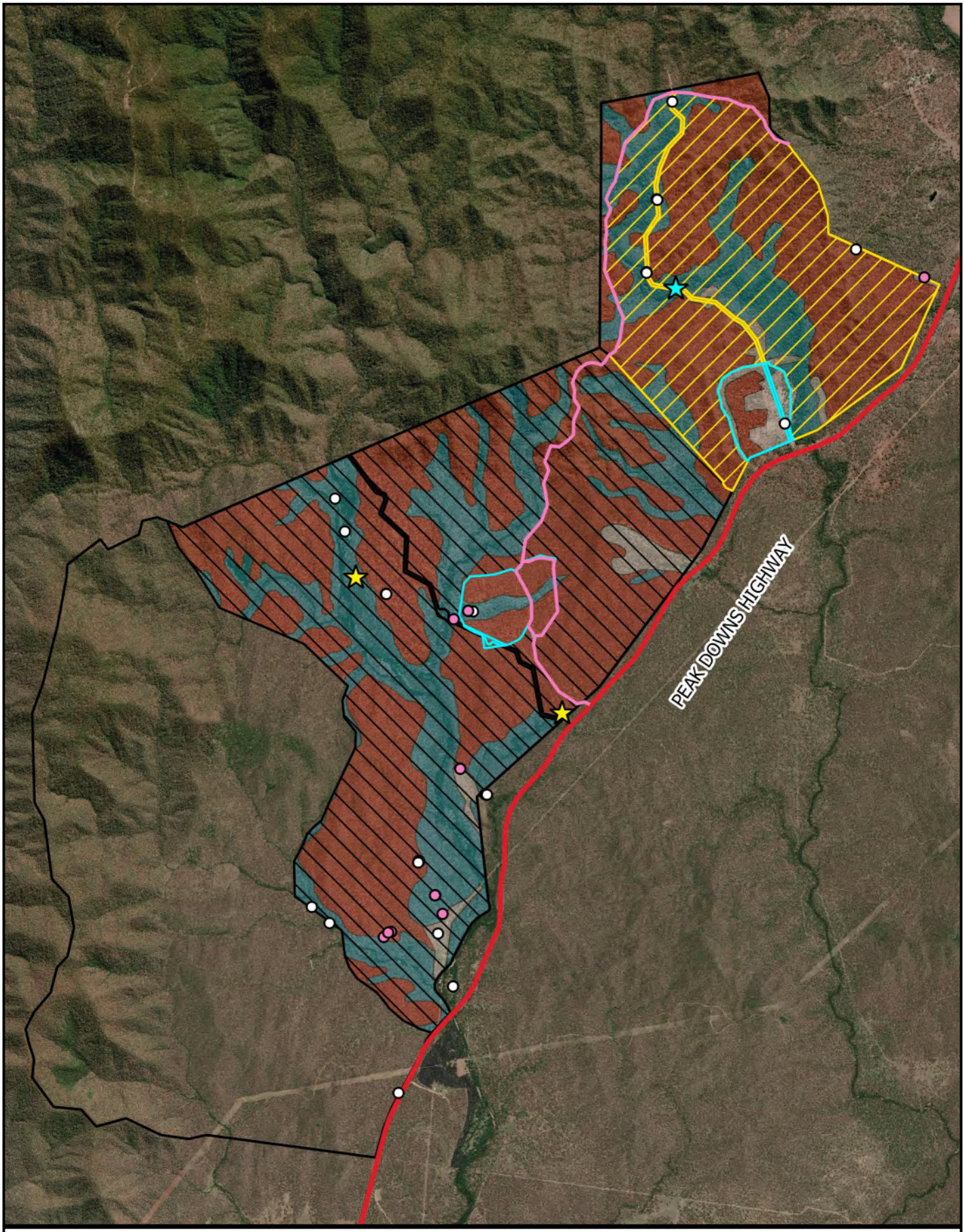


Figure 5: Species Occurance Within Lot 4SP277438

0 1 km

Scale @ A3: 1 : 55000
Date: 21/10/2020
Drawn: Josh T

DATA SOURCE
BASE CONSULTING GROUP 2020; QSPATIAL 2020; The State of Queensland (Department of Natural Resource and Mines) 2020; Source: Esri, Maxar, Earthstar Geographics, CNES/Airbus DS, USDA FSA, USGS, Aerogrid, IGN, IGP, and the GIS User Community

Legend

- Koala/Koala Scats
- Greater Glider
- Squatter Pigeon
- Greater Glider (Unconfirmed)
- Lot 4SP277438 Boundary
- IPEE Offset Area
- Offset Investigation Area
- Holding Yards

Field Verified RE Mapping

- 11.12.1
- 11.3.4
- Non-Remnant

BASE/

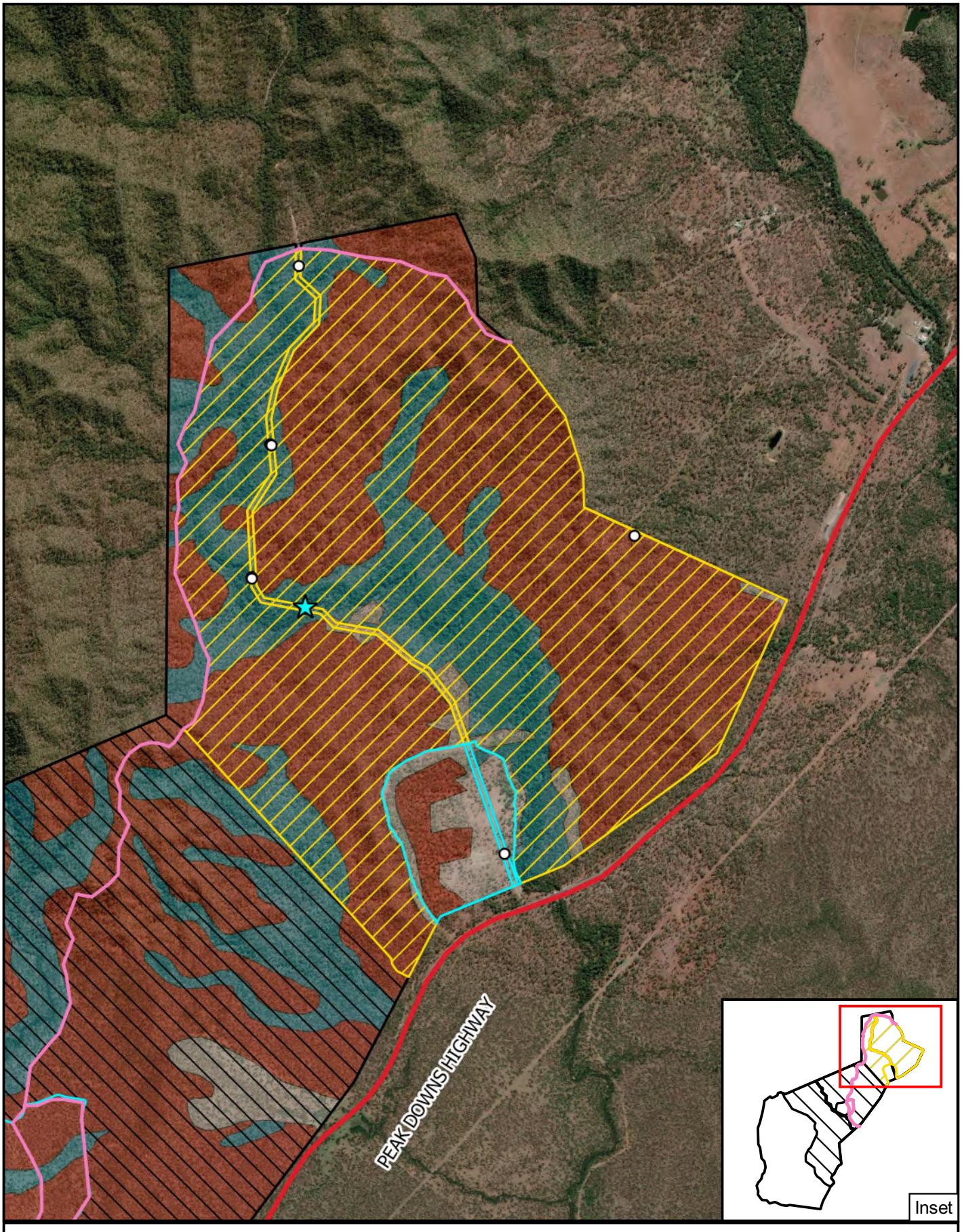


Figure 6: Koala and Greater Glider Habitat Within IPEE Offset Area

0 250 500 750 m

Scale @ A3: 1 : 30000
Date: 18/11/2020
Drawn: Josh T

DATA SOURCE
BASE CONSULTING GROUP 2020; QSPATIAL 2020; The State of Queensland (Department of Natural Resource and Mines) 2020; Sources: Esri, Maxar, Earthstar Geographics, CNES/Airbus DS, USDA FSA, USGS, Aerogrid, IGN, IGP, and the GIS User Community

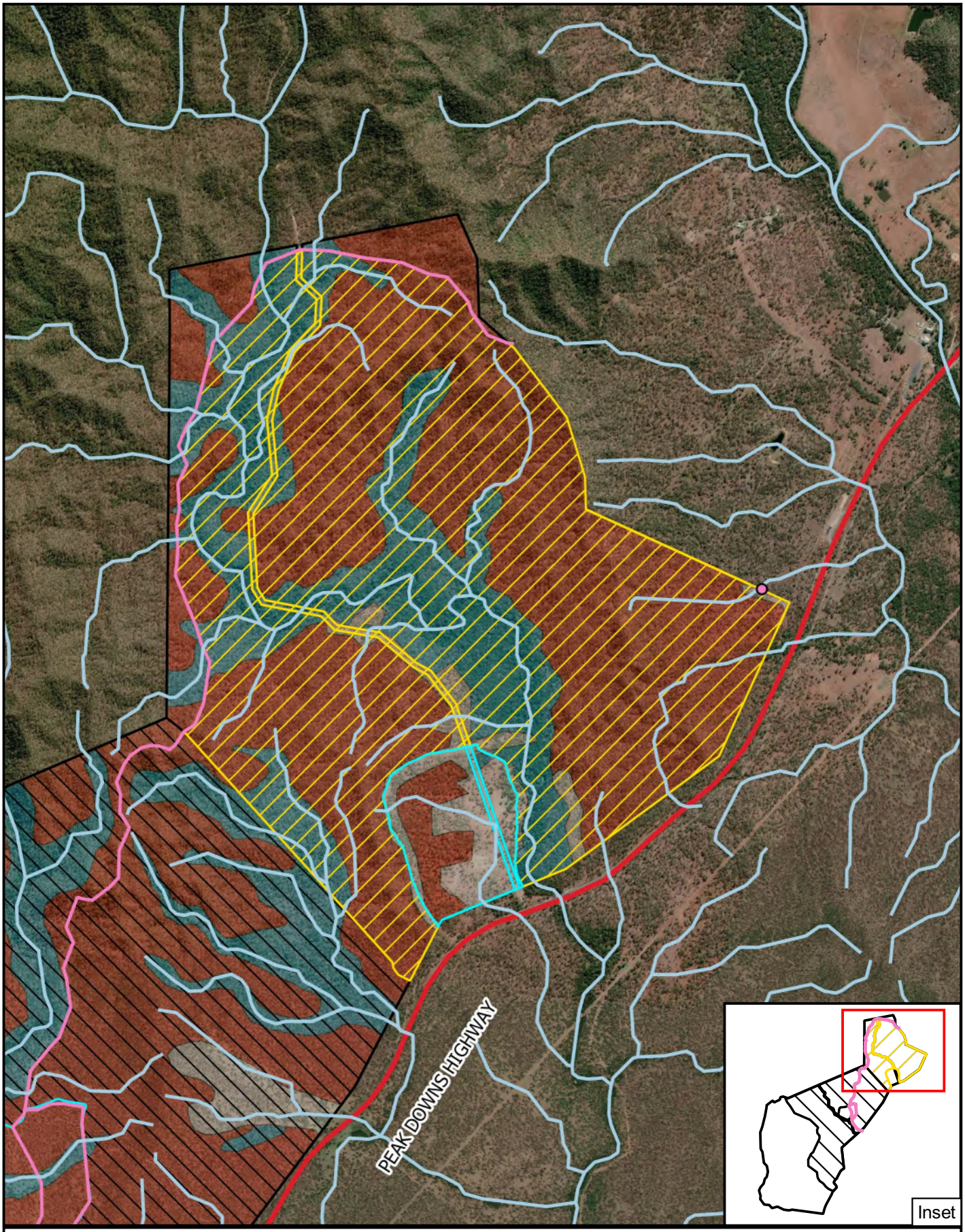
Legend

- Koala/Koala Scat
- Greater Glider
- Greater Glider (Unconfirmed)
- Existing Fenceline
- Lot 4SP277438 Boundary
- Offset Investigation Area
- Koala and Greater Glider Habitat
- Holding Yards

Field Verified RE Mapping

- 11.12.1
- 11.3.4
- Non-Remnant

BASE/



0 250 500 750 m

Scale @ A3: 1 : 30000
Date: 18/11/2020
Drawn: Josh T

DATA SOURCE
BASE CONSULTING GROUP 2020; QSPATIAL 2020; The State of Queensland (Department of Natural Resource and Mines) 2020; Sources: Esri, Maxar, Earthstar Geographics, CNES/Airbus DS, USDA FSA, USGS, Aerogrid, IGN, IGP, and the GIS User Community

Figure 7: Squatter Pigeon Habitat Within IPEE Offset Area

Legend

- Squatter Pigeon
- Existing Fenceline
- Watercourses
- Lot 4SP277438 Boundary
- Offset Investigation Area
- Squatter Pigeon Foraging and Breeding Habitat
- Holding Yards

Field Verified RE Mapping

- 11.12.1
- 11.3.4
- Non-Remnant

BASE/

4.0 Proposed Offsets

4.1 Habitat Quality Methodology and Scoring

As part of the Project's approvals process, detailed ecological assessments were undertaken to determine the presence/absence of listed fauna species within the Project (Impact) area and to assess and determine the level of residual impacts for listed species that had the potential to require offsets (EcoSM, 2020). Assessments for the purposes of determining habitat quality were undertaken in accordance with version 1.2 of the Queensland's Department of the Environment and Science (DES) Guide to Determining Terrestrial Habitat Quality (DES, 2017) (herein referred to as the Guide) determined the impact area was restricted to ten (10) assessment units.

The previous ecological surveys undertaken for the initial IPE project included detailed habitat quality assessments in 2018 for Koala, Greater Glider and Squatter Pigeon which were included in the IPE Offset Management Plan, which was approved by DAWE in October 2018. As the IPEE area is largely contained within the boundary of the IPE Project survey area, the previous habitat quality assessment results/scores are still considered valid and are used here to assess the impact area habitat quality.

Habitat quality for the impact and offset site was assessed using the Guide which, being based on the Queensland BioCondition survey methodology, uses a range of habitat indicators to measure the ecological viability and habitat values of a site and its capacity to support fauna. The process used for assessing habitat quality is designed so that it is repeatable and relatively simple and uses a combination of field attributes associated with vegetative structure, GIS assessment of the site in reference to its location in the landscape and species-specific habitat requirements.

As stated in the Guide, the assessment must measure habitat quality at the impact site and the offset site in order to quantify and compare the scores. Each of the three indicators are scored then summed to derive a final score out of 10 (refer to the Guide for calculation methodology). The key indicators for determining habitat quality of a land-based impact site or an offset site are:

- Site condition: a general condition assessment of vegetation compared to a benchmark site;
- Site context: an analysis of the site in relation to the surrounding environment; and
- Species habitat index: the ability of the site to support a given species.

Habitat quality of the impact and offset sites for the purposes of providing inputs into the EPBC offsets calculator were calculated following advice from the-then DoEE (now DAWE) during July 2018). To assess habitat quality, the majority of the attributes from the three indicators were used but partitioned differently with the majority of the species habitat index attributes being partitioned between site condition and site context as follows.

- Site Condition (15 attributes):
    - Recruitment of woody perennial species in EDL
    - Native plant species richness - trees
    - Native plant species richness - shrubs
    - Native plant species richness - grasses
    - Native plant species richness - forbs
    - Tree canopy height
    - Tree canopy cover

  - Shrub canopy cover
  - Native perennial grass cover
  - Organic litter
  - Large trees
  - Coarse woody debris
  - Non-native plant cover
  - Quality and availability of food and foraging habitat
  - Quality and availability of shelter
- Site Context (7 attributes):
  - Size of patch
  - Connectedness
  - Context
  - Ecological Corridors
  - Threat to Species
  - Species mobility capacity
  - Role of site location to overall population

Species stocking rate as outlined in the EPBC offsets calculator guide, replaces species habitat index as a measure of the presence of a species at the impact and offset site. As directed by then DoEE (now DAWE), species stocking rate for this OAMP is to be assessed on a scale of 0 - 4 as categorised below:

- 0: No evidence the species is present at the site;
- 1: Evidence of species presence at the site during surveys conducted for the purpose of the EPBC environmental assessment;
- 2: There is a statistically significant increase in species density relative to the species density determined for a score of 1 or species density is equal to or greater than the species density at a reference site (not required to be an important population);
- 3: Equivalent to the species density at a reference site associated with an important population; and
- 4: Equivalent to the maximum species density measured at a DAWE agreed number of reference sites associated with important populations.

To achieve an overall habitat quality score out of 10, site condition and site context are multiplied by a weighting factor out of 10 based on the level of importance attributed to site condition, site context and stocking rate for the MNES in question. The DAWE determined the weighting factors for these MNES will be 30% for site condition, 30% for site context and 40% for species stocking rate.

4.2 Impact Area Assessments

Habitat quality scores for the impact area were determined from surveys undertaken in March 2018 (for the Koala, Greater Glider and Squatter Pigeon) from survey sites within the

field verified assessment units and in accordance with the methods outlined in the Guide[1]. These surveys were undertaken specifically to determine habitat quality of the impact site for input into the EPBC Offsets Calculator to calculate offset areas for the Koala, Greater Glider and Squatter Pigeon for the approved IPE OAMP. Scores were based on survey site data that corresponded to the species-specific habitats to be impacted as outlined in this OAMP.

Where multiple survey sites occurred within an assessment unit, the corresponding habitat quality score was derived from averaging site condition and site context from the survey sites. The average scores were then summed and divided by the corresponding maximum possible scores.

Site condition and site context were determined for each offset matter using data collected from only those habitats that were deemed as being suitable during the ecological assessments undertaken to support the approvals process. Stocking rate was determined based on the outcomes of the ecological surveys and the presence of MNES. The IPEE site condition and site context scores that were used to derive the impact area habitat quality scores for the Koala, Greater Glider and Squatter Pigeon are outlined in Appendix 11 of the PER and shown in Table 5, Table 6 and Table 7.

Table 5 Impact area habitat quality scores and habitat descriptions for the Koala

Offset Attribute	Value	Description
Habitat Quality	**3/10** (rounded up from 2.9)	**Site Condition = 1.8 (raw score = 5.9 multiplied by 30% weighting).** The wider impact area is fragmented and degraded through previous habitat clearing. Ground-truthing confirmed that only approximately 40% of the Project area is mapped as remnant vegetation and regrowth vegetation and the current RE mapping is largely correct and consists of nine remnant REs and two regrowth REs. Habitat quality of potential Koala habitat showed the structural complexity of vegetation is relatively good with multiple vegetation layers being present. This habitat consists of a moderately intact canopy layer (ranging from 5-47 %) of medium sized trees with canopy heights ranging from 12-20 m high. In general, there was a low abundance of large *Eucalyptus* trees over 40 cm diameter at breast height (dbh) with values ranging from one (1) tree per ha to a maximum of nine (9) per ha. The surveys showed varying structural complexity compared with benchmark (undisturbed) sites with higher species richness of shrubs, grasses and forbs compared with benchmark sites. Compared to benchmark, the impact area was also characterised by higher levels of organic litter and non-native plant cover, but lower levels of native grass cover, coarse woody debris and native plant species richness. Although the impact site currently has moderate recruitments levels, the abundance of large trees is limited. Nevertheless, foraging and shelter tree species are present, and the remaining vegetation is of moderate quality **Site Context = 1.1 (raw score = 3.8 multiplied by 30% weighting).** DES Biodiversity Planning Assessments (BPA) mapping indicates that some areas in the north of the impact area are classified as

[1] Note. The impact area habitat quality surveys were undertaken in accordance with the methods outlined in version 1.2 (April 2017) of the Guide. As outlined in the version 1.3 (February 2020), if a previous version of the Guide was used to undertake a baseline assessment for an impact or offset site, the same version of the methodology must be used for all subsequent assessments.

Offset Attribute	Value	Description
		being of State Biodiversity Significance. The impact area contributes to a regional landscape of moderate to high habitat fragmentation with intermittently connected local tracts of remnant vegetation near to larger State Biodiversity Corridors (e.g. the Isaac River to the south-west of the Project area). Due to absence of Koala's within the impact area and the availability of Koala trees within the wider area, the clearing of Koala habitat is unlikely to critically impact the occurrence of the species within the region. **Species Stocking Rate = 0.** Koala's were not found within the impact area; however, Koala habitat was confirmed as occurring. A stocking rate of 0 was chosen as no evidence of Koala's occurring within the impact area were found during the ecological assessments (EcoSM, 2020).

Table 6 Impact area habitat quality scores and habitat descriptions for the Greater Glider

Offset Attribute	Value	Description
Habitat Quality	**4/10** (rounded up from 3.8)	**Site Condition = 1.8 (raw score = 5.8 multiplied by 30% weighting).** In general, the structural complexity of vegetation is relatively good with multiple vegetation layers and leaf litter. This habitat consists of an intact canopy layer (average 47 %) of medium sized trees with canopy heights ranging from 14-15 m high. In general, there was a low abundance of large Eucalypt trees over 41 cm diameter at breast height (dbh) with values ranging from one (1) tree per ha to a maximum of seven (7) per ha with a similar pattern for large non-Eucalypt species ranging from 2-4 trees per ha. Surveys showed varying structural complexity compared with benchmark (undisturbed) sites with higher species richness of native tree species, shrubs, grasses and forbs compared with benchmark sites. The impact area was also characterised by higher levels of organic litter and non-native plant cover, but lower levels of coarse woody debris and lower native grass cover. The Greater Glider was found within the riparian corridors of Smoky Creek and Billy's Gully within RE 11.3.25. These corridors provide moderate levels of foraging and shelter habitat where the abundance of large old hollow bearing trees and the diversity of Eucalypt species are the greatest. **Site Context = 1.0 (raw score = 3.5 multiplied by 30% weighting).** Suitable habitat for the Greater Glider was largely restricted to narrow riparian corridors with limited connectivity. However, the riparian corridor associated with Smoky Creek does form part of a narrow corridor of State Biodiversity Significance. Although these habitats provide some ecological benefit, they are unlikely to support a large population of Greater Gliders and are not considered to critically impact the occurrence of the species within the region when considered in the context of habitat availability in the wider region. **Species Stocking Rate = 1.** The Greater Glider was found within the riparian corridors of Smoky Creek and Billy's Gully within RE 11.3.25 which comprised 2.8 ha of the total impact area. As such, the Greater Glider was given a species stocking rate score of 1 and was allocated a weighting of 40%.

Table 7 Impact area habitat quality scores and habitat descriptions for the Squatter Pigeon

Offset Attribute	Value	Description
Habitat Quality	**4/10** (rounded down from 4.3)	**Site Condition = 1.8 (raw score = 6.0 multiplied by 30% weighting).** Squatter Pigeons occurred in both remnant and non-remnant vegetation with site condition surveys sites in RE 11.3.25, RE 11.5.3 and RE 11.5.12. Compared to benchmark sites, the survey sites were, in general, similar and with relatively good structural complexity These habitats consisted of a moderately intact canopy layer (ranging from 20-48 %) of medium sized trees with canopy heights ranging from 14-20 m high. The understory consisted of similar grass species richness compared to benchmark, considerably lower cover of native grasses and generally higher organic litter cover and non-native plant cover. The presence of Squatter Pigeons in the area is mainly due to their broad habitat requirements and the presence of grasslands which provide abundant food resources. **Site Context = 1.5 (raw score = 5.1 multiplied by 30% weighting).** The impact area was within the fragmented Northern Bowen Basin Subregion of the Brigalow Belt. The habitats that are most suitable for the Squatter Pigeon, namely RE 11.3.25, RE 11.5.3 and RE 11.5.12 correspond to vegetation patches that are either larger in size or have greater connectivity to adjacent vegetation patches relative to other vegetation communities within the Project area. As Squatter Pigeons can occupy non-remnant vegetation habitats as well as remnant, site context is less restricted relative to the Koala and Greater Glider. However, threats to Squatter Pigeons are considerable due to the presence of known predators including feral cats and foxes. Due to the large areas of suitable habitat elsewhere within the area and the mobility of Squatter Pigeons, the approved clearing is not considered to critically impact the occurrence of the species within the region. **Species Stocking Rate = 1.** Squatter Pigeons were observed throughout the impact and wider Project area as was expected based on their habitat requirements and their ubiquitousness in the wider area. Therefore, the Squatter Pigeon was given a species stocking score of 1.

4.3 Overview of Offset Property and Offset Area

The identified 838 ha offset area is in the northern end of Lot 4SP277438 within the Mt Spencer Station property (Figure 1 and Figure 3). Lot 4SP277438 encompasses 4,810 ha of which 4,693 ha is currently mapped as remnant vegetation that has the potential to provide offsets for impacts to the MNES. Further, Mt Spencer Station (inclusive of Lot 4) covers 22,712 ha which includes approximately 20,190 ha of remnant vegetation that has the potential to provide offsets for impacts to the MNES.

Mt Spencer Station is a beef cattle and cropping property located between the Brigalow Belt (the majority of the IPEE offset area) and Central Queensland Coast (small sections to the north-west of the offset area) bioregions straddling the Clarke-Connors ranges (in the western section) and the Nebo-Connors Ranges (in the eastern section). The Clarke-Connors Ranges sub-region is currently classified as an intact landscape which reflect the minimal levels of habitat fragmentation that have occurred relative to other bioregions in Queensland. However, the Nebo-Connors Ranges sub-region in contrast is currently classified as a fragmented landscape which generally reflects higher levels of historic

disturbance and habitat fragmentation. Vegetation surveys undertaken in July and October determined the on-ground vegetation communities do not vary either side of the bioregion boundary and as such, the RE vegetation community that accurately matched the on-ground vegetation (11.3.4 and 11.12.1) was used for the purposes of remapping the vegetation and calculating the habitat quality scores.

The Biodiversity Planning Assessment (BPA) mapping shows the majority of Mt Spencer Station has been mapped as containing areas of State Significance. In particular, the riparian area of Cut Creek which bisects the IPEE offset area is State Habitat for endangered, vulnerable and near threatened species. Linear areas along the Peak Downs Highway (which bisects the whole of Mt Spencer Station) also includes areas of State and Regional Habitat for Endangered, Vulnerable and Near Threatened (EVNT) fauna. This area also corresponds to areas mapped as Essential Habitat.

The eastern boundary of the investigation area is bordered by non-remnant vegetation characterised by the Peak Downs Highway (although remnant vegetation occurs on the eastern side of the Highway and connectivity occurs via road underpasses). The remaining northern, western, and southern boundaries are bordered by large tracts of remnant vegetation that include protected areas such as the Epsom State Forest and Homevale National Park (Figure 3). The IPEE offset area is completely bordered by the Epsom State Forest to the west. Discussions with the landowner revealed the cadastre boundary with the adjoining Epsom State Forest is not fenced exactly along the cadastral boundary line and fence line boundaries have been used to delineate the offset area within the Lot 4 boundary, rather than the cadastral boundary with the State Forest. When calculating the IPEE offset area, this fence line was used rather than the cadastre boundary.

The identified IPEE offset area is also bisected by a road licence that runs in parallel to the riparian corridor of Cut Creek. This licence area is still managed as part of Lot 4 and allows the landowner to restrict access such that no general (public) access is permitted. Although the road is included in the day to day management of Lot 4, it has been excised from the IPEE offset area, as it is a separate cadastral area.

There is a small section in the east of Lot 4 which is currently used as cattle holding yards, linked with the road licence, and this has been excised from the IPEE offset area.

4.3.1 Offset Area Habitat Quality

The proposed 838 ha offset area contains suitable habitat and environmental values to offset the required impacts to the Koala, Greater Glider and Squatter Pigeon and was chosen such that all required offsets for the three MNES could be co-located within the one offset area. Three field investigations were undertaken in June, July and October 2020 (Refer to Appendix B for the ecological survey report). The June event was primarily a general reconnaissance survey to assess where the most suitable offset areas occurred within Lot 4. Opportunistic fauna observations were also recorded, and sightings of the Koala and Squatter were observed while suitable Greater Glider habitat and tree hollows were noted.

The July and October 2020 surveys were targeted towards confirming the presence of all three species as well as collecting habitat quality data. As the July survey did not detect the Greater Glider within the offset investigation area, DAWE suggested a further survey should be undertaken to target this species. This targeted survey was undertaken in October and the ecologists took opportunity to collect further habitat quality data and to confirm the boundaries of the remapped REs.

The July and October surveys confirmed the broader offset investigation area and including the IPEE offset area, comprises a Eucalypt Woodland BVG that is dominated by vegetation consistent with REs 11.12.1 and 11.3.4 and interspersed with small and isolated non-remnant patches. These vegetation communities are considered appropriate for Koala as these REs support known Koala food trees, Greater Glider habitat and Squatter Pigeon breeding and foraging habitat. The proposed offset site is shown in Figure 3-7. As outlined

above, the IPEE offset area straddles both Bioregion 11 and Bioregion 8, but the offset area is dominated by Bioregion 11 (approximately 90% of the area is in Bioregion 11 – Brigalow Belt). The on-ground vegetation communities and REs were the same in either side of the Bioregion boundary and as such, the RE description that most closely matched the on-ground vegetation communities (RE 11.12.1 and RE 11.3.4) were used as benchmark REs to for calculating the habitat quality scores.

The July and October field assessments determined the baseline habitat quality of the offset area in accordance with the Guide and assessed the species stocking rate (presence) of the Koala Greater Glider, and Squatter Pigeon. Habitat quality of the offset area, was determined in accordance with the methods outlined in Section 4.1 and in the same manner for the impact site as directed by the-then DoEE (now DAWE). Data from 15 habitat quality plots were used to determine the starting habitat quality of the IPEE offset site and to assess the management actions required to achieve an ecological gain within the offset site. The number of habitat quality plots within each of the assessment units is shown in Table 8.

Table 8 Assessment units and corresponding count of habitat quality plots

Assessment unit	RE	Area of RE (ha)	Number of HQPs
AU1	11.12.1	570	7
AU2	11.3.4	253	6
AU3	Non-remnant	15	2
Total		**838**	**15**

Habitat quality score metrics for each of the MNES are summarised in Table 9. Individual scores from each of the offset area survey sites are outlined in Appendix A. Offset area habitat quality descriptions are provided in Table 11 to 13 for the Koala, Greater Glider and Squatter Pigeon, respectively.

Representative photos of the offset investigation area are shown in Plates 1-2.

Plate 1 Representative photo from AU1 (RE 11.12.1) within the offset site

Plate 2 Representative photo of riparian vegetation within the offset site from AU2.

Table 9 Summary of habitat quality of the offset site to be secured on Mount Spencer Station

MNES	Site condition[2]	Site context[3]	Species stocking rate[4]	Starting habitat quality score (HBS)[5]	AU area weighted HBS
Koala *(Phascolarctos cinereus)*	2.1	1.6	1	5/10 (rounded up from 4.7)	5/10 (rounded up from 4.8)
Greater Glider *(Petauroides Volans)*	2.2	2.0	0	4/10 (rounded up from 3.8)	4/10 (rounded down from 4.3)
Squatter Pigeon (Southern) *(Geophaps scripta scripta)*	2.1	1.9	1	5/10 (no rounding required)	5/10 (rounded down from 5.2)

[2] Average from all three assessment units after applying DAWEs weighting of 30%
[3] Average from all three assessment units after applying DAWEs weighting of 30%
[4] Average from all three assessment units after applying DAWEs weighting of 40%
[5] Weighted habitat quality score as calculated from the DAWE modified QLD habitat Quality Spreadsheet

4.3.2 EPBC Offset Area Calculator Attributes

In accordance with the EPBC Act Environmental Offsets Policy, the results of the field survey and calculation of habitat quality as outlined in Section 4.1, were used to provide inputs into the EPBC Offset Assessment Guide calculator to determine the offset area required and the percent of impact that could be offset within the proposed offset area for each of the MNES. Based on the results of these analyses, Table 10 outlines the impact areas of the Project, the offset area required to be secured, the habitat quality score as calculated using the methods outlined in Section 4.1 and the percent of the impact that is offset. The habitat quality scores of the impact site are included in Appendix 11 of the PER and in Appendix C for the offset area.

The input values used for the calculation are provided below and reflect a realistic assessment of the area to provide offsets into the future as well as the likely future habitat quality in the absence of offsets. The EPBC Offset Assessment Guide calculator results indicate that the proposed 838 ha offset area will fully meet offset requirements for the Koala, Greater Glider and Squatter Pigeon. Although the offsets area is completely encompassed by remnant vegetation and habitat suitable for the MNES, the area also includes several threatening processes that is limiting the habitat values of the area for those MNES.

Table 11, Table 12 and Table 13 provide descriptions of the input values for each MNES and the output worksheets from the EPBC Offset Assessment Guide calculator are included in Appendix D. Table 14 summarises separately the risk of loss, confidence and time to ecological benefit for the offset area as these attributes are consistent for all three MNES.

Table 10 Summary of the offset area to be secured on Mount Spencer Station

Offset Matter	Impact area (ha)	Offset area (ha)	Baseline habitat quality score	Future habitat quality with management	Percent acquitted
Koala	208	722	5/10	6/10	100.06
Greater Glider	208	482	4/10	6/10	100.19
Squatter Pigeon	181	838	5/10	6/10	100.09

Table 11 Species specific habitat quality offsets calculator metrics and habitat details for the Koala offset area

Offset Calculator Input	Score	Comment
Quality of impact area	3	Although the Koala was not confirmed as present within the impact area, Koala habitat was confirmed as present. The overall habitat quality of the impact area is somewhat limited due to past processes such as habitat clearing, grazing, fire and disturbance by feral animals and weed species. The impact area does support a moderate abundance of foraging habitat for the Koala which was observed primarily along Smoky Creek and Billy's Gully. As all Eucalypt trees are considered Koala habitat, the full clearing extent of 207.8 ha is considered to impact Koala habitat. The quality of the impact area was assessed in accordance with the Guide and the methods outlined in Section 4.1 which identified a habitat quality score of 2.9/10.
Starting quality of offset area	5	The offset area is dominated RE 11.12.1 and 11.3.4. These Eucalypt dominated REs are considered suitable

Offset Calculator Input	Score	Comment
		habitat for the Koala as they support known or potential habitat trees required for shelter and foraging. Although evidence of recruitment of canopy trees was observed in the offset area, this did not equate to establishment of large canopy trees which showed low abundance relative to the impact area and benchmark sites. Therefore, the offset site has a lower level of foraging and shelter habitat relative to both the impact area and benchmark. The offset area is currently used for livestock grazing and has moderate levels of disturbance caused by feral animals, past fire practices and incursion by invasive weed containing species known to occur within 11.3.4 including Lantana, Rubber Vine and Parthenium. Combined, these threatening processes result in a habitat that is moderately degraded with low-moderate levels of floristic diversity within the ground mid-story layers. The quality of the Koala offset area was assessed in accordance with the Guide and the methods outlined in Section 4.1 which and identified a habitat quality score of 5/10.
Future quality of the offset area without offset management	5	An assessment of the likely habitat quality of the offset area was undertaken and considered the current habitat quality as determined by and assessed in accordance with, the DES Guide, the threatening processes to the Koala and the effect of these processes on the future habitat quality. In addition, Queensland's *Planning Act 2016* (PA Act) includes a range of exemptions for landholders to manage vegetation including establishing new infrastructure, fences, roads, tracks, fire management lines and firebreaks. Approval to thin vegetation can also be sought. The implementation of these actions will not result in the entire removal of vegetation; however, coupled with cattle stocking rates has the potential to degrade woodland habitats, such as a further reduction in habitat quality associated with the ground and mid-canopy layers. The current processes and the presence of known invasive weeds of State and National significance, particularly Lantana would continue to have a detrimental impact on tree species recruitment (and establishment) native plant habitat quality via a decrease in species richness for grasses, shrubs, and forbs, a decrease in native grass cover and an increase in non-native plant cover. Specifically, the offset area was found to contain a variety of WONS including Rubber Vine, Lantana, Velvety tree pear and Parthenium (within the offset Ecology Report in Appendix B). These species are highly invasive and coupled with habitat degradation by feral animals including Feral Pigs, Feral Horses and Rabbits may create heightened conditions for the spread and establishment of these invasive weeds. Associated impacts are likely to include increased erosion which can lead to a further habitat disturbance.

Offset Calculator Input	Score	Comment
		These processes and land management actions, whilst primarily on the ground and mid-storey floristic structural layers, have the potential to degrade the quality and availability of food and foraging habitat for the Koala and an increased threat to Koala's from predators accessing the area. The current threats from traffic related deaths along the Peak Downs Highway are likely to continue which will continue to be a risk to the species. However, DTMR have recently installed Koala fencing at Cut Creek and if this fencing is successful in funnelling Koalas under the Peak Downs Highway, threats from traffic related deaths may decrease. Taking into consideration the above threatening processes, the predicted effects of these processes, current management practices and obligations on all landowners under Queensland biosecurity legislation to appropriately control invasive weeds and pest animals, no decrease in habitat quality is anticipated for the offset site without the offset being in place.
Future quality of the offset area with offset management	6	The quality of Koala habitat will be improved and maintained through the establishment of the proposed offset area. Future quality of the offset represents the ecological gain that can be achieved over 20 years of active land management aimed at improving the ecological condition of habitat for specifically for the species. Detailed management actions are outlined in Section 6.0 and are specifically targeted towards providing enhanced habitat values for the Koala .The management actions will reduce pest animal abundance, increase flora species richness, enhance recruitment of large canopy trees, increased quality of food and shelter habitat and Koala's again inhabiting the area. Management actions include: • A pest management control program to reduce the number of pest animals, including Feral Pigs and Rabbits which may degrade the area and constraining vegetation recruitment and prompting weed infestations; and Wild Dogs, Foxes and Feral Cats which can prey on Koala's as they move between habitat trees and dispersing Koala's; • Cattle grazing management to improve the condition of habitat through improved flora recruitment and strategic grazing to reduced weed infestations and excessive ground cover; • Weed management to reduce the infestation of weeds that currently out-compete native tree species; and • Fire management to maximise recruitment and establishment of large canopy trees and increasing canopy cover. Maximising the establishment of canopy trees will increase foraging habitat and increased tree canopy and sub-canopy cover will provide additional shelter habitat.

Offset Calculator Input	Score	Comment
		Fire management will be a key management action as properly managed fire regimes that promote cooler fires and avid hot and intense fires which are known to destroy fauna habitat including shelter and food resources. Removing and controlling Lantana will also minimise the potential for hot fires as significant stands of Lantana occur along the riparian and surrounding vegetation and these stands promote fire to funnel up to the tree canopies

Table 12 Species specific habitat quality offsets calculator metrics and habitat details for the Greater Glider offset area

Offset Calculator Input	Score	Comment
Quality of impact area	4	The Greater Glider was confirmed as present within riparian corridors adjacent to the impact area. The overall habitat quality of the impact area is somewhat limited due to the habitat of the Greater Glider being primarily restricted to the riparian vegetation and the levels of habitat fragmentation as well past processes such as grazing and disturbance by feral animals and weed species. The impact area generally has lower levels of habitat connectivity compared to intact landscapes and lower densities of large hollow bearing trees which provide shelter and nesting habitat for the Greater Glider. The quality of impact area was assessed using the Guide and the methods outlined in Section 4.1 which identified a habitat quality score of 3.8/10.
Starting quality of offset area	4	The offset area for the Greater Glider will be collocated entirely within the Koala offset area. The offset area occurs within the single mixed RE polygon dominated by RE 11.12.1 and RE 11.3.4 and habitat quality scores were derived from the methods outlined in the DES Guide. Although these Eucalypt dominated REs are considered suitable habitat for the Greater Glider and individuals were found in the vicinity of the offset area, the species was not confirmed with the IPEE offset area. The 11.3.4 vegetation community is considered important drought refuge and wildlife corridors for arboreal animals and 11.12.1 can provide important nesting habitat for arboreal animals via the general prevalence of tree hollows. Although evidence of recruitment of canopy trees was observed in the offset area, this did not equate to an abundance of large canopy trees which have the greatest potential to provide shelter and nesting habitat for Greater Gliders. In both 11.3.4 and 11.12.1, the number of large canopy trees was only 52% and 34% of Benchmark REs, respectively. In addition, within RE 11.12.1, the majority of vegetation attributes exhibited lower habitat quality scores compared to Benchmark. Habitat quality scores from RE 11.3.4 were variable with some attributes considerably higher than Benchmark values and others lower. The offset area is currently used for livestock grazing and has moderate levels of disturbance caused by feral animals and incursion by invasive weed species, particularly Lantana. Combined, these threatening

Offset Calculator Input	Score	Comment
		processes result in a habitat that is moderately degraded with restricted habitat values at present. The quality of habitat within the Greater Glider offset area was 4/10.
Future quality of the offset area without offset management	4	Future habitat quality without an offset in place was assessed by taking into consideration the current habitat quality as determined by and assessed in accordance with, the DES Guide, the current threatening processes and the effect of these processes on the habitat quality scores as determined by the accepted habitat quality scoring process outlined in the DES Guide. Queensland's *Planning Act 2016* (PA Act) includes a range of exemptions for landholders to manage vegetation including establishing new infrastructure, fences, roads, tracks, fire management lines and firebreaks. Approval to thin vegetation can also be sought. The implementation of these actions will not result in the entire removal of vegetation; however, coupled with cattle stocking rates has the potential to degrade woodland habitats, such as a further reduction in habitat quality associated with the ground and mid-canopy layers. The main threatening process that are contributing the habitat quality of the site are the loss and degradation of foraging and shelter/nesting habitat by feral animals, fire regimes and the presence of known invasive weeds of State and National significance. These processes would continue to have a detrimental impact on several site condition attributes including decreasing tree species recruitment (and establishment), decrease in species richness grasses, shrubs, and forbs, a decrease in native grass cover and an increase in non-native plant cover. The project area was found to contain a variety of WONS including Rubber Vine, Velvety tree pear and Lantana. These species are highly invasive and coupled with habitat degradation by feral animals including Feral Pigs and Rabbits is expected to exacerbate the spread and establishment of these invasive weeds. Associated impacts may include increased erosion which can lead to further habitat disturbance. Over an extended period, this would lead to a decrease in sub-canopy and canopy floristics and abundance and in turn, limit the potential for nesting and foraging habitat. These processes, whilst primarily restricted to the ground and mid-storey floristic layers, may degrade the quality and availability of food and foraging habitat and an increased threat from predators accessing the area. In addition, these processes would likely lead to hotter and more intense fires which could prevent the offset site from increasing in habitat quality. Further degradation to the 11.12.1 vegetation (which can provide important nesting habitat for arboreal animals via the general prevalence of tree hollows) would decrease the ecological values of the area. Taking into consideration the above threatening processes the predicted effects of these processes, current

Offset Calculator Input	Score	Comment
		management practices and obligations on all landowners under Queensland biosecurity legislation to appropriately control invasive weeds and pest animals, no decrease in habitat quality is anticipated for the offset site without the offset being in place.
Future quality of the offset area with offset management	6	The quality of the Greater Glider habitat will be improved and maintained through the establishment of the proposed offset area. Future quality of the offset represents the ecological gain that can be achieved over 20 years of active land management practices to improve the ecological condition of habitat for the species. It has been conservatively calculated that by implementing the detailed management actions outlined in Section 6.0 of this OAMP and with the addition of targeted nest boxes, the habitat quality score can increase from 4/10 to 6/10 (an increase in habitat quality of 1 and an increase in species stocking rate of 1). The management actions are aimed at increasing canopy tree recruitment and minimising disturbance such that the presence of trees and shelter habitat can be established. In addition, artificial tree hollows (nest boxes) will be installed and maintained at a rate of at least one (1) for every 10 ha to achieve an increase in habitat quality. The nest boxes will be installed within the 482 ha offset area and primarily within RE 11.3.4 but also within an approximate 100 m buffer in the adjacent RE 11.12.1. Further, the size, configuration, location and spatial configuration of next boxes will be undertaken in accordance with expert advice and preliminary discussion have been held with Associate professor Ross Goldingay with regard to these matters. Management actions include: • A pest management control program to reduce and the number pest animals, including Feral Pigs, Feral Horses and Rabbits that are currently degrading the area and constraining vegetation recruitment and prompting weed infestations and Foxes, Feral Cats and Wild Dogs which are known predators of the MNES. Feral cats were observed traversing the offset area during spotlighting and on one occasion, a Feral Cat was seen adjacent to a tree hollow with the observed behaviour consistent with predatory behaviour; • Cattle grazing management to improve the condition of habitat through improved floral recruitment and strategic grazing to reduced weed infestations and excessive ground cover; • Weed management to reduce the infestation of weeds that currently out-compete native tree species; and • Fire management to maximise recruitment allow mid to upper storey habitat trees to mature and promote the establishment of tree hollows. Using appropriate fire regimes will also minimise the incidence of hot and damaging fires which would likely destroy existing

Offset Calculator Input	Score	Comment
		hollow bearing trees and retard the establishment of new hollows. Maximising the establishment of hollow bearing trees will provide roosting habitat opportunities and increased tree canopy and sub-canopy cover will provide additional habitat for the Greater Glider. Implementation of this OAMP must increase habitat quality over the 20 year period from 4/10 to 6/10 at a minimum.

Table 13 Species specific habitat quality offsets calculator metrics and habitat details for the Squatter Pigeon offset area

Offset Calculator Input	Score	Comment
Quality of impact area	4	Extensive areas of habitat for the Squatter Pigeon were present throughout the Project area. Habitat was in moderate condition with impacted areas of Eucalypt Woodlands on land zones 3 and 5 including (RE 11.3.25, RE 11.5.3 and RE, 11.5.12) that were generally within 1 km of a permanent water offering the highest value habitat for the Squatter Pigeon (breeding habitat). Although the impact area was fragmented, and threatening processes were observed, the relatively broad habitat utilised by Squatter Pigeons resulted in a habitat quality score of 4.3/10.
Starting quality of offset area	5	The offset area for the Squatter Pigeon is 838 ha. This offset area occurs will include offsets for the Koala and Greater Glider as shown on Figures 3-5. Eucalypt dominated REs are considered suitable habitat for the Squatter Pigeon as they are within an area of known Squatter Pigeon records, are consistent with the foraging and breeding habitat definitions included on the SPRAT profile and PER Guideline and they support a rich and diverse grassy understorey and is within an area of known Squatter Pigeon records. In addition, all of the offset area is within 1 km of waterways and permanent water sources including artificial stock watering points. On a number of occasions including the RE groundtruthing survey event in June 2020 and the detailed ecological survey events in July 2020, Squatter Pigeons were found in a range of habitat types including RE 11.12.1 and varying level of groundcover. Within the offset area, landzone 12 primarily consists on soils and geology that is deeply weathered that is similar to that found on landzone seven (7) and landzone five (5) and is consistent with known Squatter Pigeon foraging and breeding habitat. As such, this habitat is considered suitable Squatter Pigeon habitat based on the observations made over two different sampling events, confirmed sightings over many years by the landowners, over 12 months, topography, soils and geology and understorey microhabitats. The offset area is currently used for livestock grazing and has moderate levels of disturbance caused by feral animals (Feral Pigs and Rabbits), past fire practices and incursion by weed species. Combined, these threatening

Offset Calculator Input	Score	Comment
		processes result in an altered understorey habitat that is moderately degraded with restricted habitat values at present. The quality of habitat within the offset area was 5.0/10.
Future quality of the offset area without offset management	5	The main threatening process that are contributing the habitat quality of the site are the loss and degradation of the ground layer which directly impacts the Squatter Pigeon by degrading their preferred foraging and breeding/nesting habitat through. Habitat degradation is occurring by feral animals, fires and the presence of invasive weeds of State and National significance. These processes, without being controlled by the landowner, would have a detrimental impact on several site condition attributes important to Squatter Pigeons including decreasing species richness and cover of grasses, shrubs, and forbs, an increase in non-native plant cover and a decrease in quality and availability of food and foraging habitat. The offset area contains a variety of WONS including Rubber Vine, Parthenium, Velvety tree pear and Lantana (within the offset Ecology Report in Appendix B), and which are subject to general biosecurity obligations. These species are highly invasive and coupled with habitat degradation by feral animals including Feral Pigs and Rabbits would exacerbate the spread and establishment of these invasive weeds. Associated impacts are likely to include increased erosion which can lead to further habitat disturbance. Further, increased erosion and could lead to altered hydrological regimes and drainage, particularly in the alluvial soils, which is known to impact on nesting and foraging habitat. In addition, Queensland legalisation allows for land managers to manage vegetation including establishing new infrastructure, fences, roads, tracks, fire management lines, firebreaks and thinning. When combined with cattle grazing, weed invasion and disturbance by feral animals, these actions would degrade woodland habitats, such as a further reduction in habitat quality associated with the ground layer and as such, Squatter Pigeon breeding, nesting, foraging and bathing habitat. Taking into consideration the above threatening processes the predicted effects of these processes, current management practices and obligations on all landowners under Queensland biosecurity legislation to appropriately control invasive weeds and pest animals, no decrease in habitat quality is anticipated for the offset site without the offset being in place.
Future quality of the offset area with offset management	6	The quality of Squatter Pigeon habitat will be improved and maintained through the establishment of the proposed offset area. Future quality of the offset represents the ecological gain that can be achieved over 20 years of active land management practices to improve the ecological condition of habitat for the species.

Offset Calculator Input	Score	Comment
		Detailed management actions are outlined in Section 6.0 of this OAMP and are specifically targeted towards providing enhanced habitat values and include: • A pest management control program to reduce and the number pest animals, including Feral Pigs, Feral Horses and Rabbits that are currently degrading the offset area and promoting weed infestations and reducing native grasses and Foxes, Feral Cats and Wild Dogs which are known predators of the MNES; • Cattle grazing management to improve the condition of ground cover habitat and strategic grazing to reduced weed infestations and excessive ground cover; • Weed management to reduce the infestation of weeds that currently out-compete native ground cover species, particularly the significant stands of Lantana within RE 11.3.4; and • Fire management to maintain a suitable ground cover biomass. Implementation of this OAMP must increase habitat quality over the 20 year period from 5/10 to 6/10 at a minimum.

Table 14 Generic habitat quality offsets calculator metrics (Confidence, Risk and time until benefit)

Confidence, Risk and Timeline	Score	Comments
Confidence in the offset achieving the predicted quality score	90 %	Implementing the actions outlined in this OAMP will provide a high degree of confidence that a conservative increase in future habitat quality of one (1) from the current condition can be achieved. Annual reporting will be undertaken for compliance with the management action outlined in the OAMP. This will allow for timely identification of any corrective actions required. Biodiversity monitoring will also be conducted as part of the OAMP (refer to Sections 7.2 and 1.1) to measure the progress of the offset area and ensure the offset area achieves its required offset obligations. It should be noted that an increase in future habitat quality of one (1) is conservative and is based on assessing the current habitat quality scores and those scores that could realistically be achieved through implementation of the management actions. An assessment has been undertaken and considered the current habitat score, the proposed management actions and the resulting changes to the habitat quality scoring. The proposed management actions are predicted to increase tree species recruitment, native plant species richness for trees, shrubs, decrease non-native plant cover, increase quality and availability of food and foraging habitat, increase the quality and availability of shelter and decrease threats to the species. Not all the scores listed are required to be reached to achieve a score of 6.

Confidence, Risk and Timeline	Score	Comments
Risk of loss without the offset	0 %	Without the offset there is considered to be a zero (0) % risk that the vegetation communities will be lost (i.e. cleared) particularly with restrictions implemented by the Queensland Government on vegetation clearing for agricultural purposes. Although there are a number of threatening processes occurring within the offset area, these processes are likely to result in a loss of habitat quality rather than a loss of habitat *per se.* Based on these factors, zero (0) % is considered a reasonable estimate of the risk of loss without the offset.
Risk of loss with the offset	0 %	Risk of loss with offset is estimated to be zero (0) %. The offset area is proposed to be protected through a Voluntary Declaration which will prevent clearing. By definition, the risk of loss under a protection mechanism must be less than or equal to the risk of loss in the absence of such a mechanism. Therefore, a risk of loss with protection is also zero (0) %. The offset area will be declared as an area of high nature conservation value under section 19F of the *Vegetation Management Act 1999* (VM Act).
Confidence in the risk of loss predictions	90 %	The legally binding Voluntary Declaration will be registered on the land title and will be binding on all current and future landowners to ensure that the habitat is protected in perpetuity. The legally binding mechanism precludes development unless the Queensland Government authorises an activity. However, for the activity to be authorised, offsets must be provided for the original offset obligation as well as any additional offsets that are required by the new activity. This process is very costly both economically and in time and provides a strong deterrent for development within a protected offset area.
Time over which the risk of loss is averted	20 years	The offset area will be protected by a legally binding mechanism which will remain in effect in perpetuity as required by the applicable State and Commonwealth legislative requirements. Therefore, the time over which loss is averted is considered to be the maximum allowable time of 20 years as per the EPBC Offset Assessment Guide calculator.
Time until ecological benefit	20 years	It is estimated that to achieve an improved habitat quality score of one (1) unit for all three MNES could take up to 20 years but improvements could occur in as little as 10 years. An improvement of one (1) unit is achievable via increasing habitat quality. The improvement of habitat quality will be achieved by implementing a range of management actions (refer to Section 6.0) aimed at managing the current threatening processes that are constraining habitat improvement. Such actions will involve managing fire, grazing, weed and pest management and are aimed at increasing recruitment and establishment of large canopy trees which will increase foraging and shelter habitat as well as decreasing potential threats from feral animals and weeds.

Confidence, Risk and Timeline	Score	Comments
		These management actions will result in an improvement in the habitat quality score within the 20 year timeframe.

4.4 Property Details

Landowner and relevant property details for the IPEE offset area can be provided on request.

4.5 Registered Interests

There are currently no registered interests, no mining interests (exploration or production) and no petroleum interests (exploration or production) over the offset area.

4.6 Offset Area Protection Mechanism

The offset will be secured by a Voluntary Declaration under section 19E and 19F of the VM Act as an area of high nature conservation value within 12 months of the date of the approval. It is Stanmore's intention that the Voluntary Declaration will be declared over the proposed 838 ha offset area for Koala, Greater Glider and Squatter Pigeon. The Voluntary Declaration will be registered on the property's title and will be binding on current and future landholders. Once the declaration has been registered on the property title, the offset area will be mapped as a Category A area on the Property Map of Assessable Vegetation (PMAV) which is shown as red and described as an "Area subject to compliance notices, offsets and voluntary declarations". Category A areas have a similar level of protection as endangered REs.

A Voluntary Declaration under the VM Act is an authorised legally binding mechanism and is considered an appropriate mechanism to legally secure MNES values and protect the area from vegetation clearing. The Voluntary Declaration will remain in place in perpetuity and may only be removed if the chief executive of the Queensland Department of Natural Resources and Mines considers it is necessary.

However, Queensland's Guide to Voluntary Declarations under the VM Act states that under Section 19L of the VM Act, a declaration cannot end (i.e. be removed from the property title) until the management outcomes of the management plan have been achieved. Hence, the legally binding mechanism, and by extension implementation of this OAMP, will remain in effect for the period of the EPBC Act approval. The EPBC Act Environmental Offset Policy states the offset must be provided for duration of the impact, which is in this instance indefinitely.

4.7 Environmental Offsets Framework

An overview of how the proposed offset area outlined in Section 4.3 meets the requirements of the EPBC Act Environmental Offsets Policy is outlined in Table 15.

The offset area meets the requirements of the Environmental Offsets Policy (EOP). Consideration was also given to property plans and any potential conflicting future use of the property to minimise the potential for conflicting land use pressures within and around the IPEE offset area.

Table 15 EPBC Act environmental offsets policy requirements

Policy Requirements	Project Offsets
Deliver an overall conservation outcome that improves or maintains the viability of the MNES in question	The proposed offset area within Mt Spencer Station fully acquits the offset requirements for the approved impacts to the Koala, Greater Glider and Squatter Pigeon. The proposed offset area currently poses a number of threatening process that limit the habitat value of the area, in particular the low tree species recruitment levels, low abundance of large trees, degraded ground cover and presence of pest animals and weeds. The proposed offset area will be managed to improve habitat condition and the viability of all three MNES in accordance with EPBC Act offset obligations and the management action outlined in this OAMP. The offset area will be managed and monitored for 20 years following approval of this OAMP to ensure the future habitat condition improves to the predicted future habitat quality scores outlined in Table 11 Species specific habitat quality offsets calculator metrics and habitat details for the Koala offset area Locating the offset on Lot 4 of Mt Spencer will also allow this Lot to receive greater management focus by the landowner relative to other sections of the wider Mt Spencer property. This in turn will allow the habitat quality for all three species to improve.
Be primarily built around direct offsets but may also include other compensatory measures	Mt Spencer Station is able to fully acquit the offset requirements for Koala, Greater Glider and Squatter Pigeon. Therefore, no other compensatory requirements are necessary.
Be in proportion to the level of statutory protection that applies to the MNES	The threat status of the Koala, Greater Glider and Squatter Pigeon is taken into account by the EPBC Offset Assessment Guide calculator in determining the area of the offset to be provided and was taken into account during the approval of the Project's impact.
Be of a size and scale proportionate to the residual impacts on the protected matter	The size of the proposed offset area has been calculated in accordance with the EPBC Act Environmental Offsets Policy and the EPBC Offset Assessment Guide calculator. Inputs and justifications are based on the results of the detailed field assessments that were undertaken within the impact and offset areas with the corresponding habitat quality calculated in accordance with the DES Guide and the methods outlined in Section 4.1.
Account for and manage the risks of the offset not succeeding	The suitability of the offset area has been calculated in accordance with EPBC Act Environmental Offsets Policy and the EPBC Offset Assessment Guide calculator which takes into consideration a number of metrics including confidence in the offset succeeding. The inputs and justifications are shown in Table 11, Table 12, Table 13 and Table 14. Risks associated with the offset have been assessed (refer to Table 25) and appropriate mitigation and management measures are provided in Table 25. Further, locating the offsets within Mt Spencer Station provides a further level of certainty of success as the property is multi-generational and is also used as a rehabilitation site for returning injured wildlife, including Koalas to the wild. Hence, the management actions required to enhance habitat values and protect fauna species are well known.
Be additional to what is already required	The proposed IPEE offset area is zoned rural under the Nebo Shire Planning Scheme 2008 and is located within the Isaac

Policy Requirements	Project Offsets
	Regional Council Local Government Area. These areas have been historically used for cattle grazing with improvements including sheds, accommodation, water storages, fencing and dirt roads. The landowner is currently obliged to appropriately manage pest animals and invasive weed species to protect environmental values (amongst other values) under state government general biosecurity obligations. However, the proposed pest animal and weed management activities are additional to those required under the *Biosecurity Act 2014* (Qld). See Section 6.7 and 6.8 for further detail.
Be efficient, effective, timely, transparent, scientifically robust and reasonable	The proposed offset area has been identified and its suitability assessed using standard practices approved by both Commonwealth and State Governments and were undertaken by suitably qualified ecologists using an evidence-based and scientifically robust approach. Stanmore commits to legally securing the offset area within 12 months or as required by DAWE and the assumed EPBC approval conditions. This OAMP outlines a transparent and scientifically robust ongoing monitoring program (refer to Section 7.0) that can be readily audited to assess its effectiveness of assessing the success of the offset area in achieving the required offset obligations. Further, this OAMP supports an efficient, effective, timely, transparent, scientifically robust and reasonable approach to providing offsets
Have transparent governance arrangements including management actions, monitoring and auditing	This OAMP outlines a clear governance framework and delivery pathway to legally secure the offset area and a transparent and scientifically robust monitoring and reporting program. The OAMP also provides an auditing framework that allows for continual improvement to ensure the offset area achieves the required offset obligations.

4.8 Additional Management and Protection

Establishing the offset on the proposed area would add additional protection for biodiversity values from clearing and provide additional biosecurity management. However, remnant vegetation is still subject to limited clearing for essential management as well as removal/thinning of undergrowth vegetation and removal of fallen woody debris. Further, the VM Act does not require landholders to maintain the existing condition of regulated vegetation or fauna habitat areas. Establishing the offset would therefore provide additional protection and management for both remnant and the non-remnant vegetation.

Queensland's *Biosecurity Act 2014* imposes a 'general biosecurity obligation' on all people to manage biosecurity risks that area under their control and that they know about or could reasonably be expected to know about. In general terms, this means that for livestock owners, the owners are expected to stay informed about pests and diseases that could affect or be carried by the animals, as well as weeds and pest animals that could be present on their property. Landowners are also expected to manage them appropriately. For landowners, there is an expectation that they will stay informed about the weeds and pest animals (such as feral dogs, cats, pigs etc.) that could be on their property. There is also an expectation that appropriate management will be undertaken.

The obligations outlined in this OAMP are additional to these general *Biosecurity Act 2014* obligations. For example, ongoing feral animal control will be undertaken to minimise the numbers of al feral animals with the goal to end goal being eradication, where possible. This is above and beyond the requirements of the *Biosecurity Act* as is the reduction of weed species to less than 10% weed cover within the offset area over the life of the OAMP.

5.0 Management Objectives

The environmental outcomes sought by this OAMP are to improve the condition and ecological values of the vegetation communities for the Koala, Greater Glider and Squatter Pigeon within the offset area. These environmental outcomes will be realised by achieving the completion criteria for each matter defined in Table 17.

Implementation of this OAMP will also effectively manage risks to the Koala, Greater Glider and Squatter Pigeon and implement adaptive management actions to continually refine, revise and update the management actions as additional data on the success of the offset area is collected.

As outlined in Table 16, the specific management objectives of this OAMP are to:

- Strategically graze cattle to reduce and manage understorey fuel loads and, native and non-native flora densities;
- Reduce the risk of unplanned fire causing adverse impacts to MNES through strategic fire management;
- Minimise habitat degradation caused by Feral Pigs (*Sus scrofa*) and Rabbits (*Oryctolagus cuniculus*), Feral Horses *(Equus caballus*) to reduce impacts on habitat variables for MNES including tree species recruitment and understorey vegetation composition;
- Restrict unauthorised access and prevent alternate land-use;
- Control invasive weed species to reduce impacts on MNES from an overdominance of non-native floristic abundance in the understorey; and
- Minimise predation risk to MNES by Feral Cats (*Felis catus*), Wild Dogs (*Canis domesticus*) and Foxes (*Vulpes vulpes*).

These management objectives and the corresponding management actions outlined in Section 6.0 and Table 18 are specific to the 838 ha offset area and based on the MNES requiring offsetting, with consideration of identified threats and recovery actions specific to each species as outlined in the Commonwealth listing and conservation advice, recovery plans and other relevant documents (Table 16).

Table 16 Relevant conservation advice, recovery plans and threat abatement plans

MNES	Relevant conservation advice and plans	Main threats and recommended actions	Measures proposed in this OAMP
Koala	• Approved Conservation Advice for *Phascolarctos cinereus*, Koala (combined populations in Queensland, New South Wales and the Australian Capital Territory), (SEWPaC, 2012); • Threat abatement plan for predation by feral cats (Commonwealth of Australia, 2015); and • Threat abatement plan for predation by the	• Habitat fragmentation, vehicle strike and predation. • Feral Cat control strategies. • European Fox control strategies.	• Avoidance of habitat clearing by using existing tracks and fence lines. • Vehicle access and movement restrictions. • Restricted offset area access and educational awareness of MNES. • Feral animal control strategies.

MNES	Relevant conservation advice and plans	Main threats and recommended actions	Measures proposed in this OAMP
	European red fox (DEWHA 2008a).		
Greater Glider	• Conservation Advice for *Petauroides Volans*, Greater Glider (TSSC, 2016).	• Habitat loss, fires and predation from owls.	• Avoidance of habitat clearing by using existing tracks and fence lines. • Fire management regimes. • Installation of artificial hollows to provide shelter habitat.
Squatter Pigeon (Southern)	• Approved Conservation Advice for *Geophaps scripta scripta* (Squatter Pigeon (southern)) (TSSC, 2015); • Threat abatement plan for predation by feral cats (Commonwealth of Australia, 2015); • Threat abatement plan for competition and land degradation by rabbits (Commonwealth of Australia, 2016); and • Threat abatement plan for predation by the European red fox (DEWHA 2008a).	• Habitat clearing. • Livestock and feral herbivore grazing. • Predation, by Feral Cats and European Foxes. • Feral Cat control strategies. • European Fox control strategies	• Avoidance of habitat clearing by using existing tracks and fence lines. • Strategic grazing practices. • Grazing exclusion periods. • Feral animal control strategies.

5.1 Completion Criteria and Interim Performance Targets

The EPBC Act EOP states that an offset area must deliver an overall conservation outcome that improves or maintains the viability of the MNES as if the action had not occurred. In

accordance with the EOP the final habitat quality score (offset completion criteria) at the offset site must be equal or greater than the habitat quality score of the impact area.

Completion criteria and interim performance targets associated for each MNES are summarised in Table 17 and have been developed as a measure to assess and ensure that the final habitat quality scores as outlined for each of the offset matters in Section 4.3.2, are achieved. Interim performance targets are also included in Table 17. The intent of these targets is to assess, revise and if required, amend the OAMP to allow the completion criteria to be achieved within the proposed 20-year time frame. The interim performance targets will help to assist the management and improvement of the offset area.

The completion criteria and corresponding increase in habitat quality scores will be reached by the implementation of the management actions outlined in Table 18 and ongoing monitoring of the effectiveness of those actions. Annual reports will provide transparency regarding the implementation of the management measures and where relevant, identify any non-compliance with the OAMP and *force majeure* events that impact the offset area. Failing to meet the interim performance targets will prompt adaptive management and the landowner will apply various mitigation measures to ensure the completion criteria will be met. The need for additional mitigation measures will be addressed during the annual compliance reporting of the OAMP.

The interim performance targets and completion criteria in the form of habitat quality scores for each of the MNES are outlined in Table 17 and have been developed as a measure to assess and ensure that the final habitat quality scores (competition criteria) as outlined for each of the offset matters in Section 4.3.2, are achieved. The completion criteria and corresponding increase in habitat quality scores will be reached by implementing the management actions outlined in Table 18 and monitoring of those actions (refer to Section 7.0).

The intent of the interim performance targets is to assess, revise and if required, amend the OAMP such that the completion criteria can be attained within the proposed 20 year time frame. Corrective actions that must be undertaken if interim performance targets are not met are outlined in Table 18.

Table 17 Completion Criteria and Interim Values

Assessment Unit	Starting Habitat Quality Score	Interim Performance Targets			Final Habitat Quality (Year 20) – Completion Criteria
		Year 5	Year 10	Year 15	
Koala					
AU1 - RE 11.12.1	5	5	5	6	6
AU2 - RE 11.3.4	4	5	5	6	6
AU3 - RE 11.3.4 non-remnant	4	5	5	6	6
Weighted total	5	5	5	6	6
Greater Glider					
AU1 - RE 11.12.1	4	5	5	6	6
AU2 - RE 11.3.4	4	5	5	6	6
AU3 - RE 11.3.4 non-remnant	4	5	5	6	6
Weighted total	4	5	5	6	6
Squatter Pigeon					
AU1 - RE 11.12.1	5	5	5	6	6
AU2 - RE 11.3.4	5	5	5	6	6
AU3 - RE 11.3.4 non-remnant	5	5	5	6	6
Weighted total	5	5	5	6	6
*Note that interim and complete scores will be calculated using methodology consistent with the initial surveys see section 4.1					

The completion criteria and final habitat scores for each MNES, will be calculated using the scoring method described in Section 4.1. The specific attributes of site condition, site context and species stocking rate that are expected to change over the life of the approval and lead to the final habitat score/competition criteria may change from those outlined below. However, the calculation method will remain unchanged and the final habitat quality/completion criteria scores remain as outlined in Table 17.

It is anticipated that with the management measures described in section 6.0, habitat quality improvements will be made be as follows:

- Remnant RE 11.3.4 and 11.12.1 will improve in habitat quality score of one (1) point from predicted increase in habitat quality scores by
    - Increasing recruitment of Woody perennials in the EDL by reducing competition from non-native shrub species, cattle grazing management to reduce the effects of cattle grazing such as trampling and over-grazing. and controlled burning to abate the effects of hot fires. Fire regime should be in accordance with the fire management guidelines for these RE type that are designed to maintain and enhance biodiversity.
    - Increasing native perennial richness of shrubs and forbs.
    - Increasing shrub cover and recruitment.
    - Increasing native grass species richness
    - Organic litter cover and course woody debris increase is expected from the growth of above ground biomass of tree species over time and the application of the appropriate fire regime.

- The number of large trees are expected to increase through natural growth of canopy and subcanopy trees by excluding any selective harvesting of both Eucalypt and non-Eucalypts trees and implementing controlled burns.
- Increasing large trees and controlling the potential for hot fires, coarse woody debris is expected to increase.
- Exotic cover (weeds) is expected to be reduced within the first 5 years by mechanical removal, spraying and an appropriate fire regimes. The control of exotic species will be applied throughout the life (20 years of the offset to maintain weed cover at <10%).

- Non-remnant RE 11.3.4[6] will improve in habitat quality score of one (1) point from predicted increase in BioCondition scores by:
  - Minimising the removal of Eucalypt and non-Eucalypt regrowth and mature paddock trees.
  - Increasing native perennial richness of shrubs and forbs.
  - Increasing shrub cover and recruitment.
  - Increasing native grass species richness
  - Exotic cover of shrub layer species is expected to reduce within the first 5 years by mechanical removal, spraying and an appropriate fire regime.

In addition to the above habitat attributes, threats to the MNES can be reduced by:

- Koala: Threats to koalas can be reduced by feral animal control of predatory species including Feral Dogs, a reduction of hot fires by reducing fuel loads especially exotic shrub layer species including Lantana. This would reduce the ability of fire to ladder into the canopies of the tree layers that are utilized as food and refuge trees.
- Greater Glider: Threats to Greater Gliders can be reduced by feral animal control of predatory species including Feral Cats, reducing hot and intense fires by reducing fuel loads especially exotic shrub layer species including Lantana. This would reduce the ability of fire to ladder into the canopies of the tree layers that are utilized as food and nesting trees. This includes the direct destruction of suitable tree hollows and tree hollows that may provide suitable habitat over time.
- Squatter Pigeon: Threats to Squatter Pigeons can be reduced by feral animal control of predatory species including Feral Cats, Feral Dogs and Feral Pigs and increase shrub and canopy cover to provide cover/shelter from predatory birds.

Installation of species specific artificial nest boxes that are targeted specifically to the Greater Glider will be installed at a density of at least one (1) box per 10 ha or approximately 48 boxes within the 482 ha offset area and primarily within RE 11.3.4 and the surrounding habitat of RE 11.12.1. Further, careful consideration will be given to the location, spatial configuration of the installed boxes. It is expected that with these measures, Greater Gliders will occupy the IPEE offset area.

Overall, the increases in habitat quality scores will increase the quality of Koala, Greater Glider and Squatter Pigeon habitat by improving the quality of the grassy areas and woodlands and decreasing the weed cover.

[6] This non-remnant vegetation community includes species consistent with RE 11.3.4.

6.0 Management Actions

This OAMP is based on the principles of adaptive management, and management objectives and actions that have been developed based on field surveys. The ongoing suitability of the management actions will be informed by the results of the monitoring activities outlined in Section 7.0. This OAMP will be adapted and updated annually, if required as determined by any corrective actions as outlined in Table 18.

This section of the OAMP outlines the management actions that will be implemented within the offset area to abate the identified threats to the Koala, Greater Glider and Squatter Pigeon and to protect and enhance the habitat values of the offset area. The management actions focus on the key threatening processes of these species as outlined in Section 6.0 and described in the DAWE SPRAT species profiles and relevant National Recovery Plans for the species. Additional threats that are known to degrade habitat have also been taken into consideration.

Detailed management actions for the offset area are outlined in Table 18 and should be read in conjunction with Section 6.1 to Section 6.8. These sections provide the detail on how the management actions will be implemented. The majority of the ongoing and routine management actions are expected to be undertaken by the registered landowner (e.g. grazing management, fire management, feral animal and weed management) under agreement with Stanmore. Ongoing ecological monitoring will be undertaken by suitably qualified ecologists also under agreement with Stanmore. Artificial nest boxes will be designed and installed in consultation with expert advice including that of Associate professor Ross Goldingay at Southern cross University.

Should the results of ongoing monitoring identify that the relevant management action(s) have been unsuccessful, corrective action(s) will be undertaken and the management actions reviewed and updated accordingly as shown in Table 18.

Table 18 Management actions, triggers for further action and corrective actions

Habitat management objectives	Management and mitigation measures	Trigger for further action	Monitoring	Corrective actions
Habitat or vegetation loss through unplanned land clearing	• No unapproved and/or intentional clearing of vegetation within the offset area, except for clearing that is required for fencing, access, firebreaks or public safety. • Signs and fences will be erected within three months of the offset being legally secured. They will be erected at all entrances and potential access points to the site identifying the area as an environmental offset and stating that access to the site is forbidden. • Fences will be maintained to prevent unauthorised access, to minimise incursions by feral herbivores and to control stock presence • Ecological thinning may be carried out, but only in accordance with the advice of a suitably qualified expert and only as approved by the Department of Agriculture, Water and the Environment.	• Any activities that are in contravention of the Voluntary Declaration. • Detection of damaged fences associated with vehicle access roads/tracks • Detection of prohibited forestry operations, native timber harvesting or clearing outside of established access tracks, fire control lines and fence lines (existing infrastructure).	• Monitoring and inspections will monitor and document if there is evidence of recent forestry or timber harvesting activities or illegal clearing. • Monitoring will also document vegetation clearing that has occurred for fire break, access road or fence line maintenance. • Refer to Section 7.0 for detail on required monitoring. • The annual compliance report will document any illegal/ unauthorised land clearing.	• **Notify the Department within 10 business days of clearing** • Upon being notified or becoming aware of prohibited forestry operations, native timber harvesting or clearing outside of existing infrastructure, the landholder is to assess how unauthorised persons accessed the site • Review existing access restrictions and inspect signage and offset area fencing within one fortnight of detection of the clearing. • Corrective actions will be implemented immediately and if appropriate the OAMP will be revised and updated if required. • Any changes to the OAMP will be reported to the Minister for approval prior to changes in management. •
Control invasive weed species to reduce impacts on MNES from an overdominance of	• Access to the offset site will be restricted to authorised persons only.	• An increase in the average percent (%) cover score of weed species from baseline	• Monitoring of weeds and non-native plants will be undertaken during the habitat quality assessment	• Any increase in the relative abundance of invasive or other weed populations from those recorded during the

Habitat management objectives	Management and mitigation measures	Trigger for further action	Monitoring	Corrective actions
non-native floristic abundance in the understorey.	• Weed management and weed hygiene restrictions will be implemented across the offset site to reduce the extent of existing weeds and to control the potential introduction of other exotic weed species. • Weed hygiene and management will be undertaken in consultation with the landowner. • Chemical and/or mechanical control of declared weed species will be undertaken in accordance with the control measures outlined in the Biosecurity Queensland Fact Sheets or other sources of information. • Refer to section 6.8 for further details on weed management.	and/or previous monitoring events. • Outbreak of infestations of weed species not previously recorded in the Project area during baseline and/or previous monitoring events. • An increase in the presence of weeds (relative abundance and/or area of occurrence) as determined from photo monitoring results. • An interim performance target is not attained, or a completion criterion is not attained and/or maintained.	surveys using the same methodology used to the baseline habitat quality as outlined in the DES Guide to Determining Terrestrial Habitat Quality, as well as incidental observations as part of routine management. • The annual compliance report will document the presence of weeds, weed control measures and extent of weed cover during the reporting period, and the relevant responsive actions.	baseline survey, or subsequent monitoring events will trigger the following corrective actions that must be undertaken: ○ Review adherence to current weed hygiene procedures to ensure compliance and to update restrictions. ○ Review timing and frequency of weed management measures, and implement alternative weed management timeframes. ○ Investigate alternative weed management control actions (e.g. spot spraying and/or injection of herbicides) and implement. ○ Undertake additional weed management measures until weed populations are reduced. • Suitably qualified ecologist to review the OAMP within one month and update if required.
Strategic cattle grazing to reduce and manage understorey fuel loads	• Stock management will be undertaken in consultation with the landowner and as required to achieve the	• Livestock located in the offset areas outside of strategic grazing events.	• Regular inspections of the offset area will be undertaken during normal land management and	• Amend livestock management practices including amendment of stocking rates, and/or timing,

Habitat management objectives	Management and mitigation measures	Trigger for further action	Monitoring	Corrective actions
and, native and non-native flora densities.	performance objectives and completion criteria. • Where new fencing is required to demarcate the offset area, ensure fencing is permanent and prohibit unintended grazing by cattle. • Squatter Pigeon breeding period can vary depending on localised site conditions but generally peaks in the early to mid-dry season (May-July). Grazing will be excluded during the peak Squatter Pigeon breeding and egg laying periods in the early to mid-dry season.	• Livestock located in the offset areas during breeding season (May to and including July). • Damaged fencing is observed • Habitat Quality assessments indicate native grass groundcover is <30% or >55%. • If ecological surveys indicate an extended or varied peak breeding period outside the early to mid-dry season.	farming practices to examine fence lines when stock are grazing in the offset area and/or adjacent to the offset area. • Records will be kept of when and how many cattle graze in offset areas. • Regular inspections will be undertaken to assess signs of overgrazing and pugging. • Habitat quality assessments will be undertaken in accordance with this OAMP and will include assessment of percentage cover of native perennial grasses.	and/or duration and/or frequency of strategic grazing events until native grass cover is >30% <55%. • Repair offset area boundary fencing if damaged within one week of detection. • Removing stock when excessive pugging or overgrazing is observed such that native grass cover is <30%. • Remove stock from Squatter Pigeon breeding habitat where found to be grazing in Squatter Pigeon breeding season. • Construct additional fencing if required. • Should monitoring activities identify triggers for further action, the OAMP will be reviewed by a suitably qualified within one month and updated if required. • Any corrective action identified will be implemented within 1 month of the OAMP being updated.
Minimise habitat degradation caused by feral animals including	• Pest animal management will be undertaken in consultation with the landowner and in	• Any increase in sightings/signs (tracks) and/or the relative abundance of pest animals	• Feral animal presence will be monitored as a minimum through visual signs recorded during monitoring	• Review adherence to pest animal management actions. • Investigate potential sources or reasons for an increase in

Habitat management objectives	Management and mitigation measures	Trigger for further action	Monitoring	Corrective actions
Feral Pigs and Feral Horses.	accordance with general pest management processes. Refer to Section 6.7 for details. • Pest management will include a range of best management practice actions including shooting, trapping, fencing and baiting, and will be undertaken in accordance with Queensland's Department of Agriculture and Fisheries (DAF) guidelines[7] and the requirements of the *Biosecurity Act 2014.* • If an increase in feral pest species is noted above trigger levels, additional pest management/control measures will be instigated until the increased activity has ceased.	above baseline levels and/or previous monitoring event. • Observation of, or signs of, a feral animal not identified as occurring within the Project area during the baseline surveys. • Habitat quality scores for interim performance targets are not achieved for one or more offset values by: o Year 5 o Year 10 o Year 15 o Year 20	and direct observations. Remote camera monitoring will also be used to assess the presence of feral animals. • Feral animal monitoring results, and associated actions, will be included in annual reporting to the Department. • Monitoring of offset value habitat quality scores will be undertaken. The results of monitoring events will be compared against baseline habitat quality scores, interim performance targets and completion criteria to determine the progress of the offset area and recorded as part of reporting.	pest animal numbers and rectify. • Increase the frequency or revise the type of invasive pest animal control efforts in accordance with DAF guidelines, and in conjunction with neighbouring landowners. • Suitably qualified ecologist to review the OAMP within one month and update if required.
Reduce the risk of unplanned fire causing adverse impacts to MNES by strategic fire management[8].	• Controlled burns will be undertaken in consultation with the landowner and in accordance with the recommended fire management guidelines for	• Unplanned fire within the offset area. • Planned fires become out of control or the required	• Fire breaks are to be inspected annually in September • Visual inspection of signs of fire during routine land	• Occurrences of fire are to be recorded during the visual inspections undertaken during routine land management.

[7] https://www.daf.qld.gov.au/business-priorities/plants/weeds-pest-animals-ants
[8] https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/fire-management

Habitat management objectives	Management and mitigation measures	Trigger for further action	Monitoring	Corrective actions
	Regional Ecosystems and will involve a range of burn strategies including patchwork burns. • Fire is to be excluded from the offset area except for planned and strategic burns as required to reduce understorey fuel loads having a detrimental impact on canopy tree recruitment and establishment and to maintain existing fire breaks. • Create firebreaks around the offset area boundary to minimise unplanned fire from adjacent lands. • Firebreaks are to be co-located, where possible, with roads, fence lines and vehicle access tracks. No areas of MNES will be cleared unless necessary for safety management and without consideration to the impacts and Department requirements.	burning regime is not achieved. • Habitat Quality assessments indicate native grass groundcover is <30% or >55%.	management and during the habitat quality assessments. • Fuel loads will be monitored through monitoring of ground cover and to inform fire management strategies.	• If an uncontrolled bushfire has impacted the offset area (including if controlled burning becomes out of control), review the grazing management and fire management strategies and adherence to these strategies and exclude cattle for at least three months. All fire breaks will be inspected, maintained, and repaired if required. • To ensure compliance, with performance criteria, undertake remedial action including: ○ Alteration to stocking rates, and/or duration and frequency of strategic grazing events; and/or ○ Amendments to fire management practices as required including fire safety and containment management. • Suitably qualified ecologist to review the OAMP within one month and update if required.
Habitat degradation and direct impact to MNES due to	• All signs and fences will be erected within three months of the offset being legally secured.	• Evidence of unauthorised or unplanned access by persons, vehicles, and/or	• Monitoring of fence lines will be undertaken by the Landholder or suitable qualified person appointed by the approval holder within	• Upon being notified or becoming aware of prohibited access to the offset area, the approval holder is to reassess access

Habitat management objectives	Management and mitigation measures	Trigger for further action	Monitoring	Corrective actions
unauthorised access to offset site.	• Signs will be erected at all entrances and potential access points to the site stating that access to the site is forbidden. • Fences will be maintained to prevent unauthorised access, to minimise incursions by feral herbivores and to control stock presence.	stock is detected during exclusion periods. • Evidence of stock is detected at any point during exclusion times. Damage is detected to any fence or sign.	3 months of the offset area being legally secured and during quarterly inspections. • Inspections will monitor and document damage or loss of signs and evidence of unauthorised access to the offset area.	protocols for any lessees etc., signage and general access within one fortnight. • Damage to signage and fences will be repaired within one month of noting the damage. • If there are areas that have been negatively impacted by unauthorised access, the regeneration of those areas will be undertaken, and these areas added to the ongoing monitoring sites. • Signage will be repaired and maintained as required by the Landholder or suitable qualified person appointed by the approval holder.
Offset fails to achieve the interim performance targets and completion criteria within the anticipated 5, 10, 15 and/or 20-year time intervals.	• All management actions outlined in this OAMP will be implemented to ensure that the interim performance targets and competition criteria are achieved. • The Voluntary Declaration under the VM Act will ensure that the landholder remains obliged to undertake active management of the offset until all completion criteria are achieved. • Monitoring will continue for the life of the approval to	• Interim performance targets are not achieved by year 5, 10 or 15. • Completion criteria are not achieved by year 20.	• Habitat quality score assessments will be undertaken for each 5-year period, as a minimum. • Monitoring of the offset area will be undertaken in accordance with the methods outlined in this OAMP. • Monitoring results will be compared against the interim performance targets and completion criteria to assess progress of offset area in	• Within one month of detection of the trigger, complete an investigation into the reasons why the interim performance targets or the completion criteria were not achieved within the specified timeframes. This investigation must re-evaluate the suitability of the relevant management actions and identify appropriate corrective actions. • As soon as practicable, and within six months of

Habitat management objectives	Management and mitigation measures	Trigger for further action	Monitoring	Corrective actions
	ensure that completion criteria have been met and maintained.		achieving the requirements of this OAMP.	detection of the trigger, implement revised corrective actions. These may include (but not limited to): ○ Increasing the frequency and intensity of pest animal and weed control measures or revising the type of measures to be implemented. ○ Modify fire management measures, to better support enhancement of offset values. ○ If the investigation outlined above requires changes to the management actions, then as soon as possible, and within six months of detection of the trigger, implement a revised OAMP, as approved by the Minister, incorporating those recommended changes. • Additional offsets will need to be sought by the approval holder, and approved by the Minister, should the above corrective actions not be successful.

6.1 Supplemental Habitat Features

Supplemental habitat features such as the installation of artificial watering points for Squatter Pigeons and artificial hollows (nest boxes) for the Greater Glider will be added throughout the offset area to maximise the potential for this species to occur in the offset area and their populations to increase.

For supplemental watering points, an additional two (2) will be installed artificial in areas where existing permanent water sources are not available. The final number, method and location of these watering points will be determined by suitably qualified ecologists and the landholder during the year 1 comprehensive survey. In practice, the watering points could be installation of new water bores, new water holding tanks supplied by overland pipes from existing bores or the installation of new dams to collect overland flow.

For nest boxes, the potential for Greater Glider to occupy boxes will depend heavily on the size of the entrance and dimensions of the boxes as well as the location and spatial configuration in the landscape. The design, location of nest boxes is yet to be determined but will be done in consultation with experts in the field of nest box design for arboreal mammals. At a minimum, at least one (1) nest box per 10 ha will be installed within the 482 ha offset area (e.g. 48 boxes) and installation will be centred around the riparian zone of RE 11.3.4 but also within the adjacent RE 11.12.1. Ongoing and detailed monitoring of the installed nest boxes will be undertaken to confirm utilisation and operability (refer to Section 7.0) and included in required monitoring reporting. Any nonoperational boxes (damaged) will either be repaired or replaced, and these actions will be included in required reporting.

6.2 Access and Fencing

Access to the offset area is restricted to authorised personnel only including the landowner and persons authorised by the landowner and Stanmore to undertake monitoring programs and maintenance. Although a road licence easement traverses the IPEE offset area (and has been excluded from the offset area), the landowner is permitted to restrict access and this permission will be enforced. Existing and new fences, if required, will be used to restrict access into offset areas. Signs will be erected in prominent locations (i.e. at access points into the offset site) which recognize that the area is protected for conservation purposes and that access into these areas is restricted to authorised personnel only. Signs will be installed prior to commencement of the action. Environmental awareness training will be provided to all workers as part of site induction and will include specific topics on MNES, risks and protective measures, and identification of the MNES

Existing access tracks will be used to enable management, monitoring and maintenance to be undertaken. In the event that existing access tracks become impassable (e.g. from erosion, flooding or vegetation regrowth), maintenance and remediation of the existing access tracks will be undertaken. Any new access tracks will be noted in revisions of this OAMP and the offset area increased accordingly. Should new tracks be required, consultation will be undertaken with DAWE prior to construction to ensure appropriate approvals, if required, are obtained including Minister approval of any revised OAMP.

6.3 Vehicles

Vehicle access will be restricted to vehicles (e.g. quad bikes) approved by the landowner/offset area manager and Stanmore. Vehicle movement will be limited to designated access tracks in the offset area and vehicles will travel to track conditions and as advised by the landowner/offset area manager in order to minimise the risk of injury to MNES, particularly Koala's and Squatter Pigeons, or habitat degradation by vehicles and/or recovery machinery should vehicles become bogged or accidents occur. Speed limits of 30 km/h will be enforced by the landowner on access tracks throughout the offset area and access to the offset area along the road licence easement will be restricted by the landowner.

Persons entering the offset area will be required to ensure all vehicles and equipment are certified weed free. Any authorised personnel (e.g. contractors) entering the offset area will be required to hold a current weed hygiene certificate and be approved to access the area by the landowner/offset area manager. Evidence is to be provided on request to the landowner that vehicles and any machinery are weed and seed free prior to entry to minimise potential weed spread. Records of people entering the offset area and evidence of certified weed free must be kept and provided to the Department upon request.

All vehicles entering the offset area will be required to stay on the formed tracks and be issued with weed inspection certificates and all staff or contractors entering offset areas are to be made aware of, and provided access to, this OAMP.

6.4 Vegetation Clearing

Vegetation clearing is not permitted within the offset area. With the exception of clearing that is exempt under Queensland's VM Act and is required for:

- Maintenance of currently established access tracks and/or fire breaks;
- As directed by emergency management response personnel in the event of uncontrolled bushfire or other emergency procedures. Any native vegetation cleared from the offset area in this circumstance will be revegetated using the same species that were cleared. The OAMP will be revised to include revegetation works and submitted to DAWE within 3 months of this clearing occurring.

6.5 Grazing Management

The offset area has historically been used for cattle grazing and there was evidence of grazing throughout the offset area. To optimise canopy tree recruitment and establishment and to achieve the interim performance targets and final completion criteria of ground layer species richness and cover, grazing will be strategically controlled to allow the ecological communities/species habitat to continue to improve, to minimise unplanned fires adversely impacting the offset area, and to minimise soil compaction and erosion.

Existing fences will be used to manage access to and demarcate the offset area, including management of strategic grazing activities. Where additional fencing is required to be installed, it should preferably be constructed of 1.4 m high, 4-strand barbed-wire, with plain wire as the top strand and the bottom wire set 350 mm from the ground to allow native wildlife access, or an alternate and equally suitable fence design as determined by the landowner. Restricted access will also be established prior to commencement of the action to prevent unauthorised access.

Grazing will be permitted throughout the offset area under strict controls in order to reduce fuel loads, to control exotic flora and to increase native species richness of the ground layer. Following grazing, the offset area will be spelled in accordance with the current land management practices undertaken on Mt Spencer Station to allow for grasses to seed and to facilitate recovery of perennial grasses and the herbaceous layer while mitigating wildfire risk by restricting fuel loads. The suitability of conditions for undertaking a grazing event outside of the wet season will be directed by the landowner/offset area manager and based on sound environmentally practices.

To minimise erosion and subsequent impacts on water quality that may in turn impact on Squatter Pigeon habitat and/or affect attainment of the interim performance targets and/or completion criteria, strategic grazing will be excluded where rainfall causes inundated or waterlogged soils. Grazing will also be restricted within the offset area during the peak breeding and egg laying season for the Squatter Pigeon which is the early to mid-dry season (i.e. May-July). The location and extent of grazing exclusion areas will be reviewed annually based on the results of management and monitoring events.

Strategic grazing will be determined by biomass monitoring described in Section 7.8.

6.6 Fire Management

Fuel loads in the offset area and in the surrounding paddocks will be controlled through a combination of strategic grazing, weed control measures and fuel reduction burns to minimise the risk and impacts of unplanned and hot and intense fires and to improve habitat quality through controlling weeds and increased recruitment and establishment of native plants.

Regular maintenance (e.g. grading and vegetation spraying) of firebreaks, roads and tracks will an integral part of fire management to mitigate the risks associated with unplanned fire. Ground cover monitoring will be undertaken annually as part of fire management activities to assess fuel loads, determine the risk of unplanned fires to the offset area and inform fire management strategies (Section 7.8).

Fire management will be consistent with the recommend fire management regime for REs within the offset area as recommended in the Fire Management Guidelines produced by the Queensland Herbarium (refer to Appendix E for the relevant fire management regime for each of the REs composing the mixed RE vegetation community of the offset area).

All of the REs within the offset area benefit from controlled burns of low intensity fires that occur in the early dry season where there is good soil moisture. Controlled burns will be low intensity with the aim of reducing fuel loads and promoting understorey growth. Moderate to high intensity fires will be avoided as they can degrade vegetation structure and destroy fauna habitats, particularly tree hollows and kill native fauna.

Good fire management within offset areas should be based on maintaining vegetation composition, structural diversity, animal habitats (in particular hollow-bearing trees and logs) and preventing extensive wildfires. The recommended control burn intervals vary depending on the RE and range from every 2-7 years for RE 11.3.4 to every 6-15 years for RE 11.12.1. Shorter intervals between burns for RE 11.12.1 of 5-10 years can be undertaken but should be greater than every three (3) years. To cover the requirements of the REs and MNES within the offset area, controlled burns will be undertaken every 5-10 years depending on fuel loads and groundcover and undertaken in general accordance with the Fire Management Guidelines. Burn intervals for conservation purposes will differ from that for grazing purposes with the latter generally being much shorter. For riparian vegetation such as RE 11.3.4, fires will be ignited from the upper ridges so that they burn downwards towards the lower slopes.

6.7 Pest Animal Management

Several pest animals have been recorded in the offset area and include Wild Dogs, Feral Pigs, Rabbits, Feral Cats, Feral Horses and Foxes. These pest animals pose threats to the MNES including predation (Wild Dogs, Feral Cats and Foxes) and habitat degradation (Feral Pigs, Feral Horses and Rabbits).

Additional assessments of pest animals will be undertaken as part of a comprehensive baseline habitat quality assessment that will be undertaken in year one (1) (refer to Sections 7.2 and 7.7). These assessments will form part of the ongoing monitoring program and will consist of surveys to assess the presence, and extent of, pest animals within the offset area and to also assess impacts to fauna habitat values and vegetation condition (refer to Section 7.0 for monitoring schedules). Results from these assessments will inform the most appropriate species-specific control measures and management activities. These results and any additional management actions will be included in an updated OAMP and as part of the annual compliance report.

Pest animal controls will be undertaken in accordance with the *Biosecurity Act 2014*, DAF guidelines and in conjunction with neighbouring landowners and include the following control methods as approved by DAF:

- Wild Dogs (DAF, 2017): Shooting, trapping, baiting and fencing. Baiting and trapping will be undertaken at peak activity times including breeding (March/May) and rearing of young (September/November) and will target watering locations. Dingoes will not be

shot or trapped. One or a combination of the control methods outlined below will be implemented to reduce the abundance of Wild Dogs accessing/utilising the offset area.

  - Shooting is an opportunistic method, mostly used for control of small populations or individual problem animals.
  - Trapping is predominantly used in areas with low populations and to control 'problem' Wild Dogs. Foot-hold traps will be used at times of the year corresponding with peak activity, with traps placed in high activity areas and poisoned with strychnine for humane reasons and to prevent escape. Lures such as scents can be used to attract dogs to the traps.
  - Baiting can be used in conjunction with other control tools. Poison baits using 1080 and strychnine and fresh meat baits are delivered by hand, from vehicles or aircraft.

- Feral Pigs (DAF, 2016a): Control of Feral Pigs will be by implementing a collaborative approach with surrounding landowners and will include;
  - Poisoning with 1080 baits. Generalised feeding with non-poisoned bait will be performed for several days prior to laying poisoned baits to attract animals.
  - Shooting is an opportunistic method, mostly used for control of small populations or individual problem animals.
  - Trapping in smaller areas to control remaining individuals from poisoning programmes.
- Rabbits (DAF, 2016b): An integrated control approach, combining different control methods in concert with land management practices, will be implemented to control Rabbits and includes:
  - Destroying (ripping) rabbit warrens. All warrens within 1 km of a permanent water sources will be ripped.
  - Baiting using 1080-sodium fluoroacetate or Pindone in the non-breeding season and when food sources are low. Pre-feeding should be undertaken to accustom Rabbits to the new food sources.
  - Trapping using a mix of cage traps and barrel traps, followed by humanly euthanizing. Traps will be put in place and left open for 2-3 days to allow Rabbits to be accustomed to the trap before trapping begins.
  - Shooting as a means to target remaining individuals following other control measures. Shooting is most effective when rabbits are active (early afternoon, late afternoon or night).
- Feral Cats (DAF, 2016c): Control programs will be comprised of multiple methods, including night shooting, poisoning, trapping and fencing, combined with land management practices.
  - Shooting at night when Cats are foraging.
  - Poisoning using fresh meat baits containing 1080 (sodium fluoroacetate).
  - Rubber-jawed and leg-hold traps will be set at territorial markers such as faecal deposits and pole-clawing are present.
  - Trapping using a cage traps baited with meat or fish.
- Foxes: (DAF, 2016d): Control methods include shooting, trapping and baiting combined with land management.
  - Shooting used opportunistically to control small populations of problem individuals.

- Trapping using paddled or offset laminated jawed traps are acceptable for use. Generally effective when done in conjunction with other control techniques.
- Poison baits using 1080 and strychnine and fresh meat baits are an effective control strategy and can be distributed by hand, from vehicles or aircraft. Baits will be placed along tracks and fence lines, approximately 200-500 m apart and buried approximately 8-10 cm underground and covered with loose soil. Bating is best undertaken in spring followed by June/July when food demand is highest.

6.8 Weed Management

Several weed species were identified from the offset area and adjacent paddocks during the July and October 2020 field assessments. Of the weeds observed, five (5) are classified as category 3 Restricted Matters under the Biosecurity Act 2014 and all five weeds are also classified as Weeds of National Significance and include the following. Several other species of invasive plants were also identified (refer to the offset Ecology Report in Appendix B) including.

- Rubber Vine (Cryptostegia grandiflora);
- Parthenium (Parthenium hysterophorus);
- Sicklepods (Senna obtusifolia);
- Lantana (Lantana camara);
- Chinee Apple (Ziziphus mauritiana); and
- Velvety Tree Pear (Opuntia tomentosa).

These weeds and invasive plants pose a considerable threat to habitat quality in the offset area due to the increase in groundcover biomass and the risk of uncontrolled fires. The highest distribution of weeds and invasive plants were generally confined to areas of prior disturbance, riparian corridors, waterway and drainage lines and along existing access tracks.

Additional comprehensive surveys of the offset site will be undertaken in year 1 to determine distribution and abundance of weeds species. Results of these comprehensive surveys will inform the most appropriate species-specific weed control measures, location and timing for management activities. In general, however, weed management will be undertaken in accordance with the current management practices implemented at Mt Spencer Station

General visual inspections will also be undertaken to monitor the distribution and abundance of weed species and invasive plants within the offset area. Weed infestations will be controlled and managed by preventing seed set and dispersal in accordance with Queensland's DAF recommended control measures. Species-specific control measures including timing of management activities will be reviewed by a suitably qualified ecologist on an annual basis based on the results of ongoing weed monitoring in the offset area.

For Mt Spencer Station, weed management will include spot spraying weeds within riparian corridors, waterways and drainage lines, and along existing access tracks and fence lines as well as mechanical removal and the strategic use of fire. Spraying will occur in the early dry season following periods of active growth. Strategic spraying of small isolated patches of invasive species will be undertaken and follow-up inspection and treatment will be implemented two to four weeks later if regrowth is evident, including mechanical removal of woody weeds. Woody weeds will be managed through a combination of herbicide and mechanical techniques.

Weed hygiene measures will also be implemented to prevent the movement of weed material into the offset area (Section 6.3). Prior to entering the offset area, all vehicles and equipment will be inspected for weeds, and will only be permitted access if approved by the landowner

and accompanied by a weed inspection certificate. To further restrict the spread of weeds, vehicles will be restricted to designated access tracks.

Ongoing regular maintenance of firebreaks, roads and tracks will also help reduce the risk of weed incursion by preventing traffic into intact grasslands and other habitat for MNES.

7.0 Monitoring

Stanmore commits to implementing a monitoring program to assess the effectiveness of management measures outlined in Section 6.0 and to make timely decisions on corrective actions to ensure the performance criteria outlined in Sections 5.1 and 6.0 are achieved.

The monitoring methods are:

- Specific to the interim performance targets and competition criteria being assessed and will determine whether the performance criteria have been achieved or whether corrective actions are needed; and
- Quantitative and repeatable such that the monitoring assessments can be compared to each other which provides for changes between sampling events to be detected.

The overarching objectives of the monitoring program are to:

- Evaluate performance of the OAMP against interim performance targets and competition criteria;
- Ensure management triggers are defined and can be detected;
- Develop and implement corrective actions when management triggers are detected;
- Inform subsequent reviews and amendments to the OAMP and associated management plans.

7.1 General Site and Visual Inspections

Offset area inspection visits will be conducted at least biannually (prior to and following the wet season) by the land manager/offset area manager to inspect the offset area and assess the following:

- Fencing and signage condition (Note: fencing will be inspected every four weeks when stock are adjacent to the offset area);
- Evidence of excessive pugging or areas of overgrazing while stock are in the offset area;
- Condition of firebreaks;
- Fuel loads;
- Damage and/or degradation resulting from pest animal activity within the offset area;
- New weed outbreaks;
- Signs of unplanned fires; and
- Incidental fauna observations and any additional risks to offset values (i.e. evidence of predation of MNES)

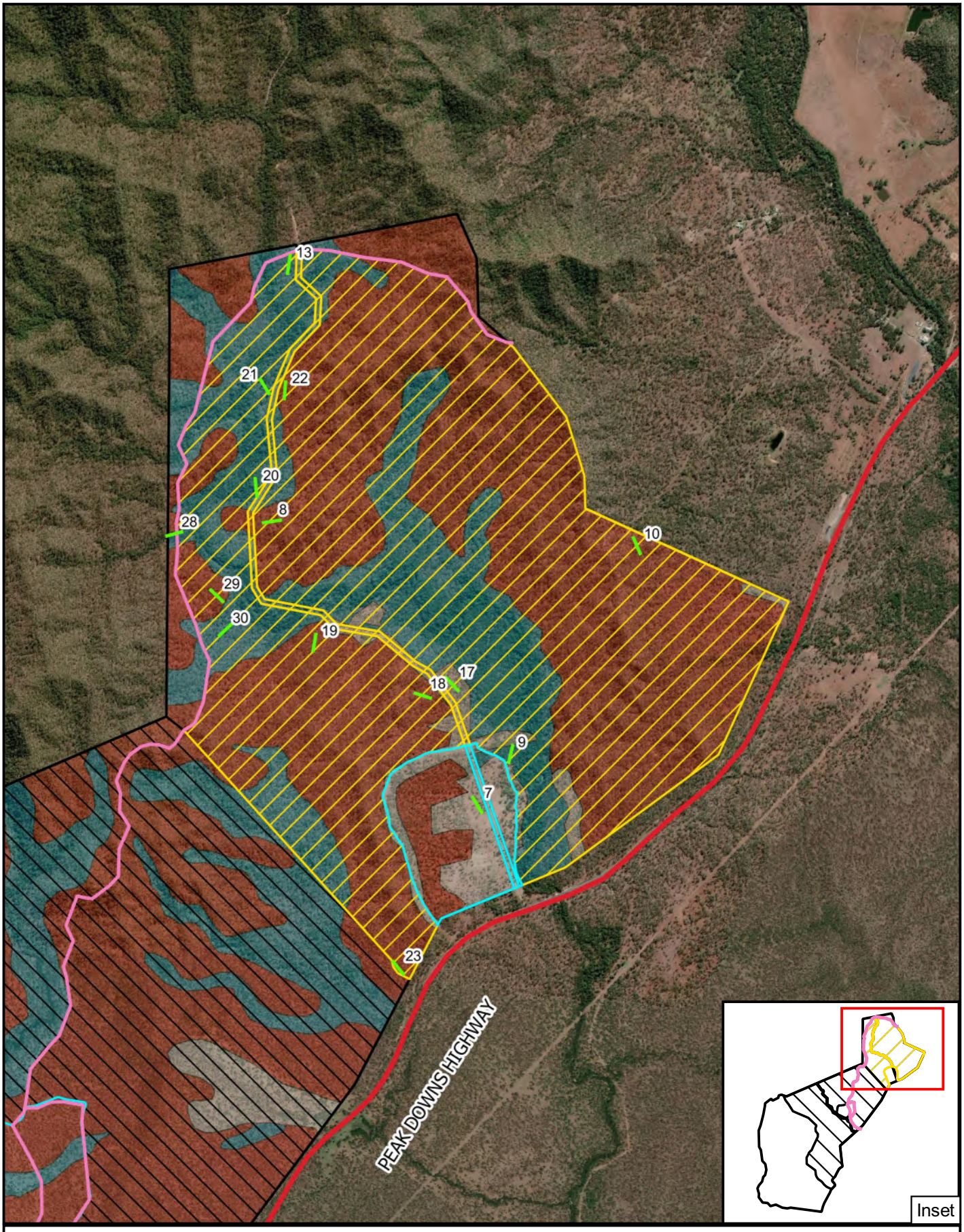
7.2 Habitat Quality Monitoring Sites

Permanent habitat monitoring sites within the offset area will be established. As a starting point, the July and October 2020 habitat quality surveys used 15 detailed survey locations within the IPEE offset area, of which seven (7) were in RE 11.12.1, six (6) in RE 11.3.4 and two (2) in non-remnant vegetation (see Figure 8). The final number and location of ongoing monitoring survey locations will be determined following approval of the offset area by DAWE and the suitably qualified ecologists that will undertake the detailed survey in Year 1. The final number and location of the survey sites (if they differ from the current habitat quality sites) will be in accordance with QLD guidelines and methodologies used in this OAMP and will have sufficient sample sites and spatial coverage to assess any variation in condition across the offset area and effectively assess key habitat features for each offset matter.

All habitat monitoring sites will be used to assess habitat quality for all three MNES as relevant habitat overlaps where offsets for all three MNES are collocated. Each monitoring site will include a 100 m transect, with the start and central points to be marked with permanent markers (i.e. star picket) and the GPS location recorded. The final monitoring locations will be included in the first annual compliance report for the offset area. Photo monitoring will also be undertaken with photographs taken from north, south, east and west directions. All subsequent monitoring events will be undertaken at the same locations.

The permanent habitat quality monitoring sites will be utilised as part of the following monitoring activities:

- Habitat quality assessments undertaken in accordance with the Guide and the methods outlined in Section 4.1;
- Fauna assessments including bird surveys, spotlighting and Koala Spot Assessment Technique (SAT) surveys;
- Photo monitoring, undertaken at the ends of each of the habitat monitoring site transects;
- Presence of feral animals;
- Presence of weeds and invasive plants; and
- Signs of fire.



0 250 500 750 m

Scale @ A3: 1 : 30000
Date: 18/11/2020
Drawn: Josh T

DATA SOURCE
BASE CONSULTING GROUP 2020; QSPATIAL 2020; The State of Queensland (Department of Natural Resource and Mines) 2020; Sources: Esri, Maxar, Earthstar Geographics, CNES/Airbus DS, USDA FSA, USGS, Aerogrid, IGN, IGP, and the GIS User Community

Figure 8: Habitat Quality Transects within IPEE Offset Area

Legend

- Existing Fenceline
- Highways
- Habitat Quality Transect
- Lot 4SP277438 Boundary
- Offset Investigation Area
- IPEE Offset Area
- Holding Yards

Field Verified RE Mapping

- 11.12.1
- 11.3.4
- Non-Remnant

BASE/

7.3 Habitat Quality and Fauna Monitoring

Initial baseline habitat quality assessments were undertaken in July and October 2020. A comprehensive habitat quality and fauna assessment will be undertaken in year 1 during or immediately following the wet season, nominally March/April/May (depending on rainfall intensity, duration and accessibility), with subsequent assessments undertaken every five (5) years and then at the end of approval. Habitat quality and targeted fauna surveys will be undertaken to compare the offset against the interim performance targets and the completion criteria.

If habitat quality and fauna monitoring indicate a decline in habitat quality and/or a reduction in the abundance or distribution of the MNES in the offset area, monitoring may increase in frequency (e.g. every two years) until trends indicate an increase in habitat quality and/or abundance of the MNES.

The Guide will be used to assess habitat quality for each MNES and is based on the methodology set out in the BioCondition Assessment Manual and BioCondition benchmarks (Eyre et., al. 2015). A range of habitat variables are assessed using standard methods and compared to benchmarks (undisturbed) sites as a measure of how well a terrestrial ecosystem is functioning for biodiversity.

The guide allows for a habitat quality score to be calculated for each MNES based on three key indicators as outlined in Section 4.1 and include:

- Site condition: assessment of vegetation compared to benchmark (undisturbed) areas;
- Site context: a geospatial analysis of the assessment area in relation to the surrounding environment; and
- Species habitat index: the ability of assessment area site to support a species.

To assess habitat quality in line with the EPBC Offsets Policy, the attributes from the three indicators are used but partitioned as outlined in Section 4.1 which uses 15 attributes for site condition and 7 attributes for site context.

For inputs into the EPBC offsets calculator, species stocking rate as outlined in the EPBC offsets calculator guide, replaces species habitat index as a measure of the presence of a species at the impact and offset site. As recommended by DAWE to meet the requirements of the offsets policy, species stocking rate for this OAMP is to be assessed on a scale of 0-4 as outlined in Section 4.1:

The habitat quality assessment will include targeted fauna surveys for the Koala, Greater Glider and Squatter Pigeon and will be undertaken in accordance with the relevant Survey Guidelines as outlined in

Table 19. Fauna surveys as well as the habitat quality assessment will be undertaken by suitably qualified ecologists generally during the late wet season (nominally March/April/May) which corresponds to peak species activity and detectability. The habitat quality assessments will also include assessments of weed abundance and distribution and an assessment on the presence of pest animals.

Table 19 Survey techniques for MNES

MNES	Survey	Survey guideline
Koala	Direct observations: • Nocturnal surveys for Koalas will be undertaken using nocturnal spotlighting techniques described in the EPBC Act referral guidelines for the vulnerable Koala, which uses spotlighting to identify the presence/absence of the species within the sampling area. Indirect Survey Methods • Surveys for Koalas will be undertaken using the Spot Assessment Technique (SAT) methodology (Phillips & Callaghan, 2001), which uses a tree-based scat sampling methodology to provide presence/absence data. • SAT surveys will be randomly throughout the offset area at each of the habitat quality monitoring sites. The exact number of survey sites will be determined by the suitably qualified expert and will be guided by the final offset area configuration. • The location of any tree scratches or observed koalas will also be recorded and photographed as part of the koala surveys or incidentally (Eyre et. al. 2014). • Where the presence of Koalas have been identified within the offset area either through direct survey or incidental observation, a minimum of two (2) 400 m x 50 m (i.e. two (2) ha) transects will be randomly established in proximity to the siting location. The final location, length and orientation of the transects will be determined by the suitably qualified expert. The number of Koalas encountered within each of the transect will be noted and converted to density/ha.	• Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (Eyre et. al. 2018). • EPBC Act referral guidelines for the vulnerable Koala (DotE, 2014). • Survey guidelines for Australia's threatened mammals (SEWPaC, 2011). • Spot Assessment Technique (SAT) methodology (Phillips & Callaghan, 2001). • Regularised, grid-based SAT (RGB-SAT) sampling (Biolink Ecological Consultants, 2008).
Greater Glider	• Nocturnal spotlight searches will be conducted over a minimum of five (5) survey days and nights during periods of known peak activity (wet season) around suitable habitat including tree hollows and riparian areas. • Greater Glider scats observed during the Koala SAT surveys will also be recorded. • Searches will be undertaken along designated transects determined through field survey and identified as potential habitat for the species. Nocturnal surveys will record the presence of Greater Gliders within 25 m of the centre line (i.e. 50 m wide). The transects will be traversed slowly with approximately 100 m traversed every 10 minutes. • Where Greater Gliders have been identified within the transects, the number of Greater Gliders encountered will be noted and converted to density/ha.	• Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (Eyre et. al., 2018). • Greater Glider Survey Standards (MacHunter et. al., 2011)

MNES	Survey	Survey guideline
	• Nest box utilisation will be determined from visual inspection of all nest boxes and generally undertaken using a camera attached to an extendable pole.	
Squatter Pigeon	• Surveys will be undertaken over a minimum of 3 days during the breeding season (between Spring and Summer). In accordance with the Survey Guidelines for Australia's Threatened Birds squatter pigeons will be passively surveyed by flushing them while traversing by vehicle and on foot. The number and abundance of Squatter Pigeons will be recorded during survey events. • Squatter Pigeon densities will be determined from ten (10) 50 m x 10 m transects by converting numbers to density/ha.	• Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (Eyre et. al., 2018). • Survey guidelines for Australia's threatened birds (DEWHA, 2010).

Where the habitat quality assessments do not demonstrate improvements in each of the individual site condition and site context attributes, and the overall habitat quality/interim performance targets and/or the completion criteria for the offset area, the adaptive management framework allows for a review of management actions and corrective actions to be undertaken to assess if additional management measures or corrective actions are required. If the review deems additional actions are required, the OAMP will be revised and approval of the revised OAMP sought from the Minister.

As outlined in Table 17, a period of 20 years has been chosen as the time period of which the final habitat quality, and hence, increased habitat values of the MNES will be reached (i.e. 2040-2041). This time period was chosen as 20 years is the nominated time until ecological benefit used in offsets calculations and is the time required for large canopy trees to become established and for additional tree hollows to form. Habitat quality site assessments are scheduled every five (5) years through to the end of the approval. The final assessment will be undertaken in approximately 2040-2041 (depending on the length of the approval) to demonstrate that the final habitat quality of the offset area conforms to that outlined in this OAMP and that the competition criteria has been achieved.

Where the overall habitat quality score identified in the offset calculator (i.e. 'Habitat Quality with Offset') and shown in Tables 11-13 is not achieved by the end of the approval, management actions will continue until the offset requirements are realised. In contrast, if the completion criteria are met prior to the end of the approval, all management actions and monitoring will continue until the end of the approval to ensure the completion criteria and habitat quality is maintained throughout the life of the approval.

7.4 Supplemental Habitat Features

Monitoring of the installed watering points will be undertaken during all site surveys and inspections including the five yearly detailed habitat quality surveys and during routine land management as detailed in Section 8.3. Visual inspection will include checking for leaks from pipes or tanks and confirming any pumps are functional and working as intended.

Monitoring of nest boxes is crucial to assessing utilisation and occupancy success and to ensure the installed boxes are functional. Nest boxes will be visually inspected twice yearly prior to and following the wet season. Visual inspections will also be undertaken following severe weather events that could destroy the boxes such as fire or cyclones. Inspections will be undertaken using a pole mounted camera or direct access via a ladder. Evidence of the presence of Greater Gliders as well as other observed species will be recorded and reported to the Department.

7.5 Photo Point Monitoring

Photo monitoring will be undertaken at each monitoring location during the habitat quality assessments to allow habitat changes to be visually assessed over time. Photos at each photo monitoring point will be taken in a north, east, south and westerly direction. A permanent feature will be included within the photo frame to provide a fixed reference point. A record of the photographs will be maintained, including GPS location, date, time, direction and the height above the ground at which the photograph was taken. Data from habitat quality assessments and photo monitoring will be recorded on survey sheets and these will be attached to annual monitoring reports.

7.6 Weeds

The offset area will be monitored for weeds and invasive plants and will include a comprehensive weed survey in year 1 which will map the distribution and density of weed infestations in the early dry season. The final mapping methodology will be determined by the suitably qualified ecologist prior to and during the comprehensive year 1 surveys. Ongoing seasonal weed monitoring surveys will be undertaken in conjunction with the habitat quality monitoring surveys outlined in Sections 7.2. Comprehensive weeds surveys aimed at re-mapping the distribution and density of weed will be undertaken every five (5) years.

Assessing the presence and abundance of weed cover will be done in accordance with the methodology outlined in the Guide for assessing non-native plant cover (DES, 2017). Briefly, this method involves establishing a 50 m x 10 m plot and dividing this plot into 20 smaller 5 m x 5 m sub-plots. Percent (%) weed cover will be assessed in each of the 20 sub-plots and the total percent weed cover determined by taking the average from the 20 plots. Photo monitoring will also be undertaken within each plot in the same manner described in Section 7.4.

In addition to the permanent weed monitoring sites, incidental observations will be recorded from the offset area during general observations during routine land management. This will provide instances of weed infestations that occur away from the permanent weed monitoring sites. If trigger levels for weeds are met or exceeded, additional monitoring will be undertaken and will occur in conjunction with appropriate weed management measures outlined in Section 6.8, until the presence and distribution of weeds reduces to baseline levels or below.

7.7 Feral Animals

The offset area will be monitored for pest animals and will include a comprehensive survey in year 1 which will map the presence of feral animals. Ongoing feral animal monitoring surveys will be undertaken in conjunction with the habitat quality monitoring surveys outlined in Section 7.2 and at the same surveys locations as the habitat quality assessment surveys in Figure 8. Monitoring will primarily entail standardised timed visual observations in a similar manner undertaken for bird surveys as well as camera trap monitoring and nocturnal spotlighting surveys. Evidence of faecal samples and damage cause by pest animals will also be recorded. The final methodology will be determined by the suitably qualified ecologist during the initial comprehensive survey in year 1. Exact monitoring methods will be determined by the suitably qualified ecologist engaged to undertake the monitoring.

Feral animals will also be opportunistically surveyed throughout the year outside of monitoring times, including observations for potential new pest animal species that have not been previously recorded, and which are known to prey on MNES and/or degrade MNES habitat (e.g. Feral Goats). Any evidence of mortality or injury to MNES as a result of pest animals will also be recorded during the surveys. If trigger levels for any pest animal species are met or exceeded, additional monitoring will be undertaken and will occur in conjunction with appropriate feral animal management measures until pest animal presence reduces to baseline levels or below.

7.8 Fuel Loads

Fuel load monitoring for fire management will be undertaken annually in the early dry season when biomass (i.e. ground cover) is at its greatest, to determine the risk of fire to the offset site and to inform fire management strategies. Groundcover will be monitored at the same permanent habitat quality monitoring sites established as part of the comprehensive baseline surveys in year 1.

Fuel loads will be managed through strategic grazing events if the percent cover of native grasses exceeds 55%. For strategic grazing, the cattle stocking rate will be determined by the percent ground cover vegetation and native grass cover in particular as outlined in Table 18.

8.0 Data Management, Reporting, Implementation and Auditing

8.1 Data Management

Stanmore or their authorised representative, will be responsible for overseeing and managing the monitoring activities required as part of this OAMP. This will include maintaining data records to confirm all activities associated with the management actions in this OAMP have been undertaken as outlined in this OAMP and/or any approval conditions. These records will be made available to DAWE as required.

8.2 Reporting

A reporting schedule is shown in Table 21 and this process will enable assessment of changes in vegetation condition/habitat quality relative to baseline data and determine progress towards the offset completion criteria (see Section 5.1). Reporting will also determine the success of the management actions and note any changes due to climatic conditions and will inform the type and frequency of management measures required in the upcoming monitoring period.

The results of the monitoring activities will be documented by suitably qualified ecologists in stand-alone progress reports and combined into an annual compliance report.

The reports will include the following information:

- EPBC approval number;
- General description of the climatic conditions for the monitoring period (e.g. rainfall, duration of the wet season etc.);
- All activities undertaken during the monitoring period including monitoring undertaken and the entity who undertook the monitoring and results of the monitoring undertaken;
- Location (GPS coordinates) and details of all confirmed sitings of Greater Glider, Koala and Squatter Pigeon identified during surveys and monitoring;
- Location (GPS coordinates) and details/condition of water points and nest boxes;
- An indication of whether any additional risks/threats over and above those outlined in the final approved OAMP are apparent and management actions to be employed to manage those risks;
- If any triggers were detected, and if so, the corrective actions that were implemented;
- Discussion on progress towards achieving the management objective and offset obligations outlined in the OAMP;
- Recommendations for improving/updating the OAMP in accordance with adaptive management.

8.3 Implementation

As outlined in Section 4 of the PER Guidelines, it is the expectation of DAWE that, Stanmore must not commence clearing of habitat for the MNES listed Table 1 of this OAMP, until the OAMP has been approved. Following approval, the OAMP will be implemented and will be remain effective for the life of the approval. Stanmore commits to implementing management actions under this OAMP prior to clearing habitat for the MNES and legally securing the environmental offsets within 12 months from the commencement of clearing habitat for the MNES outlined in Table 1 of this OAMP. Stanmore commits to commencing components of this OAMP (e.g. year 1 baseline monitoring) of the offset area following approval of this OAMP and prior to formal legal security if agreed by the landowner and Stanmore. The schedule of monitoring activities is shown at Table 20 and the schedule of reporting is shown at Table 21.

Table 20 Proposed monitoring schedule of offset area

Monitoring Type	Monitoring Attributes	Monitoring Frequency	Monitoring Method	Monitoring Locations
Habitat Quality surveys undertaken by suitably qualified ecologists				
Initial habitat quality assessment	Site condition, site context and species stocking rates as outlined in this OAMP.	Initial and baseline assessment was completed in July and October 2020.	Visual inspections and detailed habitat quality assessment as per the Guide and as outlined in this OAMP.	Assessment sites outlined in Section 7.2.
Ecological Condition	Recruitment of woody perennial species in the ecologically dominant layer (EDL)	Year 1 (following approval of this OAMP and securing the offset area), then every 5 years until the end of the approval.	As per the methods outlined in the Guide and in Section 4.1. Visual observations and, where relevant, methods outlined in the Guide to determining terrestrial habitat quality and with reference to interim criteria as per Table 17 for the relevant RE and AU being monitored.	
	Native plant species richness – trees			
	Native plant species richness – shrubs			
	Native plant species richness – grasses			
	Native plant species richness – forbs			
	Tree canopy height			
	Tree canopy cover			
	Shrub canopy cover			
	Native perennial grass cover			
	Organic litter			
	Large trees			
	Course woody debris			
	Non-native plant cover (i.e. weeds)			
	Quality and availability of food and foraging habitat (e.g. tree canopy height and cover,			

Monitoring Type	Monitoring Attributes	Monitoring Frequency	Monitoring Method	Monitoring Locations
	organic litter, tree and shrub species richness).			
	Quality and availability of shelter (e.g. presence of tree hollows).			
Site context[9]	Threats to species (e.g. lack of EDL recruitment, presence of feral animals and weeds etc.).			
	Threats to mobility capacity.			
Species stocking rates/targeted fauna surveys for the MNES	Presence/absence of MNES. MNES abundance and density (where relevant).	Every five (5) years until the completion criteria have been achieved. The survey frequency is justified as changes to vegetation communities and ecosystems and the fauna that inhabit those communities takes time and is generally a relatively slow process.	Refer to 4.1.	Refer to Section 7.2.
Nest boxes	Presence of Greater Gliders and functionality of each box.	Twice yearly for the first 5 years then yearly until the end of the approval.	Refer to Section 7.4.	At nest box locations[10]
Visual inspection surveys undertaken by the landowner or authorised landowner representative and targeted weed and feral animal surveys undertaken by suitably qualified ecologists.				
Photo points	General vegetation condition and vegetation cover.	Year 1 (following approval of this OAMP and securing the offset area), then every 5 years until the end of the approval.	Photographs of offset area to be taken from the same location and direction for each monitoring event.	Assessment sites outlined in Section 7.2.

[9] Non-GIS attributes that can be measured in the field.
[10] To be determined during the year 1 comprehensive survey.

Monitoring Type	Monitoring Attributes	Monitoring Frequency	Monitoring Method	Monitoring Locations
Grazing	Stocking rates, ground cover and fencing.	Stocking rates will be routinely monitored until the end of the approval. Biomass will be monitored annually in the early dry season. Fencing will be monitored during routine land management of the offset area and at least quarterly.	Assessments of the offset area will be undertaken by the landowner/land manager or authorised representative to observe and record grass cover, presence of weeds and pest animals, evidence of fire and evidence of unauthorised access. Fire break and fence maintenance activities will be recorded for inclusion in the annual report. Any unplanned fires will also be recorded as well as monitoring results for any planned cool or mosaic burns on habitat. Weed cover will be recorded as per the Level 2B methodology described in the Land Manager's Monitoring Guide (DERM, 2010) (or any subsequent published version of this document or similar recognised methods). This methodology is suitable for landowners to rapidly assess whether weed management measures need to be conducted within the offset area. Detailed assessments as outlined in Section 7.0 will also be undertaken in conjunction with the habitat quality assessments.	Throughout the offset area.
Fire	Presence of fire and extent of burning. Condition of fire breaks.	At least quarterly and following known fire events. Biomass will be monitored annually in the early dry season.		
Feral animals	Presence of pest animals, control measures undertaken and success of the control measures.	Visual inspections undertaken during routine land management. Year 1 (following approval of this OAMP and securing the offset area), then every 5 years until the end of the approval.		
Weeds/ pest plants	Presence of weeds, control measures undertaken and success of the control measures.	Visual inspections undertaken during routine land management. Year 1 (following approval of this OAMP and securing the offset area), then every 5 years until the end of the approval.		
Fencing and site access	Condition of fencing and access tracks.	Visual inspections undertaken during routine land management.		
Unauthorised impacts to vegetation from activities such as illegal	Unauthorised clearing or disturbances.	Visual inspections undertaken during routine land management and undertaken at least quarterly.	Observe and record accessibility to the offset site (i.e. condition of fencing), evidence and location of illegal clearing, fire and/or pest animal incursion.	Throughout the offset area and particularly along and adjacent to the road licence easement and the

Monitoring Type	Monitoring Attributes	Monitoring Frequency	Monitoring Method	Monitoring Locations
harvesting and illegal access.				boundary to the Epsom State Forest.
Cyclone events	Condition and damage to vegetation and any dead or injured fauna.	Following cyclones or large tropical rainfall events.	Visual throughout the offset area.	Throughout the offset area.

Table 21 Proposed reporting schedule of offset area

Report	Reporting period	Responsibility	Submission period
EPBC Act Annual Compliance Report which will report on compliance with the EPBC Act approval.	Every 12 months for the duration of the approval or until otherwise advised by the Minister	Stanmore	Within 3 months of every 12 month anniversary of the commencement of the action.
Offset Area Report that will outline the results and the effectiveness of the management actions outlined in this OAMP, including against habitat quality score criteria. This report will include all monitoring results, management actions, investigations and any corrective actions taken.	Every 12 months from approval	Generally, Stanmore but with inputs from relevant suitably qualified persons and/or the landowner.	The report will be an appendix to the Compliance Report
Ecological Condition Assessment Report that provides results of the habitat quality surveys.	In year 1 and then every 5 years from the approval for the life of the approval	Suitably qualified person.	The report will be an appendix to the Compliance Report
Internal Audit Report that confirms compliance and effectiveness of the OAMP. This report will also provide any necessary corrective actions of management action improvements.	In year 1 and then every 5 years from the grant of the VDec for the life of the approval.	Stanmore	Within 3 months of the submission of the Ecological Condition Assessment Report
External Audit Report confirming compliance with the approval conditions.	As and if required by DAWE	Generally, Stanmore but with inputs from relevant suitably qualified persons.	As and if required by DAWE
Revised OAMP as approved by the Minister to document any required changes to the management actions of the offset area due to the interim habitat quality values or completion criteria not being met.	Only required if the management actions in the OAMP needs to be amended to ensure the interim and/or completion criteria are met, or should additional offsets be required in the event that completion criteria cannot be achieved.	Stanmore	Within 6 months of failing to meet the interim habitat quality values or completion criteria where the management actions require amending.
Notification of illegal timber harvesting or clearing to the relevant Queensland Government Departments and	Only required if illegal clearing or timber harvesting occurs within the offset area	Stanmore.	Within 10 business days of detection of illegal timber harvesting or clearing.

Report	Reporting period	Responsibility	Submission period
Queensland Police (as relevant).			

8.4 Auditing and Review

Internal audits/reviews of management and monitoring activities will be undertaken in response to a trigger for further action (outlined in Table 18) being triggered and non-compliances with the OAMP requirements. External auditing will be undertaken as required by the approval conditions and will be published in annual compliance reports that will include details on the progress towards achieving the interim performance targets and/or completion criteria specified in this OAMP.

The effectiveness of actions within this OAMP will be reviewed annually and amended (if required) to incorporate changes identified through management activities and monitoring activities. Any changes to this OAMP, including but not limited to monitoring and management measures must be approved in the form of a revised OAMP by the Minister, prior to implementing changes practices. Changes may include amendments to management actions, identification of additional monitoring activities and responses to adaptive management triggers. If the completion criteria have been attained prior to the end of the approval, the OAMP will continue to be implemented and reviewed to ensure the completion criteria are maintained until the approval expires.

9.0 Risk Assessment

A risk assessment was undertaken using the risk assessment process provided by the DAWE to assess the risks associated with failing to achieve the objectives outlined in this OAMP for mitigating impacts to MNES. For each identified risk, the potential consequence of the risk (Table 22) was assessed against the likelihood of that risk occurring (Table 23) to determine an overall risk rating using the matrix in Table 24. The consequence and likelihood of each risk occurring was reassessed following the implementation of the management and mitigation measures (i.e. control measures) to provide a residual risk rating (Table 25).

Table 22 Consequence classification

Qualitative measure of consequences (what will be the consequence/result if the issue does occur)	
Minor (Mi)	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 (Mo)	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 (H)	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 (Ma)	The plan's objectives are unlikely to be achieved, with significant legislative, technical, ecological and/or administrative barriers to attainment that have no evidenced mitigation strategies.
Critical (C)	The plan's objectives are unable to be achieved, with no evidenced mitigation strategies.

Table 23 Likelihood classification

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 (Hi)	Is expected to occur in most circumstances.
Likely (L)	Will probably occur during the life of the project.
Possible (P)	Might occur during the life of the project.
Unlikely (U)	Could occur but considered unlikely or doubtful.
Rare (R)	May occur in exceptional circumstances.

Table 24 Risk rating matrix

		Consequence				
Likelihood		1. Minor	2. Moderate	3. High	4. Major	5. Critical
	5. Highly Likely	Medium	High	High	Severe	Severe
	4. Likely	Low	Medium	High	High	Severe
	3. Possible	Low	Medium	Medium	High	Severe
	2. Unlikely	Low	Low	Medium	High	High
	1. Rare	Low	Low	Low	Medium	High

For the purposes of this risk assessment, the risk levels are defined as follows:

- Severe: Unacceptable risk that must not proceed until suitable and comprehensive control measures have been adopted to reduce the level of risk.
- High: Moderate to critical consequences. Works should not proceed without considerations of additional actions to minimising the risk.
- Medium: Acceptable with formal review. Medium level risks require active monitoring due to the level of risk being acceptable.
- Low: Acceptable with active management not considered required.

Table 25 Risk assessment and management

Risk Event	Risk Description	Initial Risk Ranking			Management Measures / Actions	Residual Risk Ranking			Performance Criteria	Management Triggers	Corrective Actions	Monitoring Mechanisms
		Likelihood[1]	Consequence[2]	Result[3]		Likelihood[1]	Consequence[2]	Result[3]				
Standard Risks												
Habitat or vegetation loss through unplanned clearing	As the offset site occurs within a beef production property, it is possible for unplanned/ illegal clearing to occur. This is unlikely as the landholder will enter into an offset arrangement with the approval holder. Clearing can also occur by vehicles traversing the area off designated roads/tracks This is also considered improbable as	U	Mj	H	No unapproved and/or intentional clearing of vegetation within the offset area, except for clearing that is required for fencing, access, firebreaks or public safety. Ecological thinning may be carried out, but only in accordance with the advice of a suitably qualified expert and only after approval by the Department.	R	Mj	M	No unauthorised access. No evidence of clearing within the offset area. Offset Area is mapped as Category A on PMAV.	Any activities that are in contravention of the Voluntary Declaration. Detection of prohibited clearing outside of established access tracks, fire control lines and fence lines (existing infrastructure).	Upon being notified or becoming aware of clearing outside of existing infrastructure, the landholder is to assess how any unauthorised clearing occurred and, where relevant, any unauthorised persons accessed the site Report breach to the Department within 10 business days. Review existing access restrictions and inspect signage and offset area fencing within one fortnight of detection of the clearing.	Monitoring and inspections will monitor and document if there is evidence of recent illegal clearing. Monitoring will also document vegetation clearing that has occurred for fire break, access road or fence line maintenance.

Risk Event	Risk Description	Initial Risk Ranking			Management Measures / Actions	Residual Risk Ranking			Performance Criteria	Management Triggers	Corrective Actions	Monitoring Mechanisms
		Likelihood[1]	Consequence[2]	Result[3]		Likelihood[1]	Consequence[2]	Result[3]				
	access to the site will be restricted. Potential unplanned clearing could come from application of chemicals on adjacent properties which stray across the offset site boundary.										Any corrective action identified will be implemented within 1 month of the OAMP being updated.	
Timber harvesting /collection	Unauthorised access to the offset area may result in timber harvesting/ collection. Such actions can remove important habitat features and harm the structure of the vegetation communities	U	Mo	L	All signs and fences will be erected within three months of the offset being legally secured. Signs will be erected at all entrances and potential access points to the site identifying the area as an	R	Mo	L	No unauthorised access to the offset site. No evidence of unapproved clearing within the offset area. Offset area mapped as Category A on PMAV.	Damaged fences associated with vehicle access. Detection of prohibited forestry operations, native timber harvesting or clearing outside of existing access tracks, fire control lines and fence lines	Upon being notified or becoming aware of prohibited forestry operations, native timber harvesting or clearing outside of existing infrastructure, the landholder is to assess who and how unauthorised persons accessed the site	The annual compliance report will document any illegal/unauthorised timber harvesting. All field monitoring will report on the presence of any unauthorised access and clearing.

Risk Event	Risk Description	Initial Risk Ranking			Management Measures / Actions	Residual Risk Ranking			Performance Criteria	Management Triggers	Corrective Actions	Monitoring Mechanisms
		Likelihood[1]	Consequence[2]	Result[3]		Likelihood[1]	Consequence[2]	Result[3]				
	and habitat for the Koala, Greater Glider and Squatter Pigeon.				environmental offset and stating that access to the site is forbidden. Fences will be maintained to prevent unauthorised access, to minimise incursions by feral herbivores and to control stock presence					(existing infrastructure).	Report breach to the Department within 10 business days. The approval holder is to reassess access protocols for any lessees etc., signage and general access within one fortnight.	
Control invasive weed species to reduce impacts on MNES.	Infestation of previously unidentified weeds within the offset area. Expansion of range and abundance of existing weed species within the offset site. Left unchecked, weed invasion and proliferation	L	H	H	Access to site will be restricted to authorised persons. Weed management and weed hygiene restrictions will be implemented across the offset site to reduce the extent of existing weeds and to control the potential introduction of new	U	Mi	L	No infestations of new species in the offset area, covering more than 100m². No increase in the average percent (%) cover score weed species from baseline and/or previous Outbreak of infestations of weed species not previously recorded in the Project area	An increase in the average percent (%) cover score weed species from baseline and/or previous monitoring events.	Review adherence to weed hygiene procedures to ensure compliance and to update restrictions where required. Review timing and frequency of weed management measures, and implement alternative weed management timeframes as required.	Monitoring of weeds and non-native plants will be undertaken during the habitat quality assessment surveys using the same methodology used to the baseline habitat quality as outlined in the DES Guide to Determining

Risk Event	Risk Description	Initial Risk Ranking			Management Measures / Actions	Residual Risk Ranking			Performance Criteria	Management Triggers	Corrective Actions	Monitoring Mechanisms
		Likelihood[1]	Consequence[2]	Result[3]		Likelihood[1]	Consequence[2]	Result[3]				
	could cause significant deterioration of the offset site.				exotic weed species. Weed hygiene and management will be undertaken in consultation with the landowner. Chemical and/or mechanical control of all declared weeds in accordance with the control measures outlined in the Biosecurity Queensland Fact Sheets or other sources of information.				monitoring events.	during baseline and/or previous monitoring events. An increase in the presence of weeds (relative abundance and/or area of occurrence) from photo monitoring results. An interim performance target is not attained, or a completion criterion is not attained and/or maintained.	Investigate alternative weed management control actions (e.g. spot spraying and/or injection of herbicides, as well as intensification for most affected areas) and implement as required. Undertake additional weed control measures and continue until weed cover is below baseline levels and in accordance with performance criteria. Update OAMP as required.	Terrestrial Habitat Quality, as well as incidental observations as part of routine management. The annual report will document the weed presence, weed control measures and extent of weed cover during the reporting period and relevant responsive actions.
Inappropriate grazing regimes	Inappropriate cattle grazing destroys shrubs and native grass cover and slows or reverses the	P	H	M	Stock will be managed in accordance with Section 6.5. Where new fencing is required to	U	Mi	L	Stock are removed from the offset area for it to be spelled in accordance with	Stock are observed on site in exclusion times, outside of strategic grazing events.	Amend livestock management practices including amendment of stocking rates, and/or timing, and/or	Regular site inspections by landowner during exclusion periods as well as to assess for signs

Risk Event	Risk Description	Initial Risk Ranking			Management Measures / Actions	Residual Risk Ranking			Performance Criteria	Management Triggers	Corrective Actions	Monitoring Mechanisms
		Likelihood[1]	Consequence[2]	Result[3]		Likelihood[1]	Consequence[2]	Result[3]				
	regeneration of threatened fauna habitat. Grazing can also lead to the trampling of Squatter Pigeon (southern) nests, impairing breeding. reduce and manage understorey fuel loads and, native and non-native flora densities.				demarcate the offset area, ensure fencing is permanent and prohibit unintended grazing by cattle. Squatter Pigeon breeding period can vary depending on localised site conditions but generally peaks in the early to mid-dry season (May-July). Grazing will be restricted at least during the peak Squatter Pigeon breeding and egg laying periods in the early to mid-dry season.				the current land management practices undertaken on Mt Spencer Station to allow for grasses to seed and to facilitate recovery of perennial grasses and the herbaceous layer while mitigating wildfire risk by restricting fuel loads. Ground cover always remains above the minimum cover limits. Native grass groundcover is <30% or >55%.	Livestock located in the offset areas outside of strategic grazing events. Livestock located in Squatter Pigeon breeding habitat during breeding season. Damaged fencing is observed Habitat Quality assessments indicate native grass groundcover is <30% or >55%. If ecological surveys indicate an extended or varied peak breeding period outside the early to mid-dry season.	duration and/or frequency of strategic grazing events until native grass cover is >30% or <55%. Repair offset area boundary fencing if damaged. Remove stock from Squatter Pigeon breeding habitat. Removing stock when excessive pugging or overgrazing is observed such that native grass cover is <30%. Construct additional fencing if required. Additional fencing will not clear areas of MNES habitat. Should monitoring activities identify	of overgrazing and pugging. Regular inspections of the offset area will be undertaken during normal land management and farming practices to examine fence lines when stock are grazing in the offset area and/or adjacent to the offset area. Habitat quality assessments will be undertaken in accordance with this OAMP and will include assessment of percentage cover of native perennial grasses The annual offset compliance report

Risk Event	Risk Description	Initial Risk Ranking			Management Measures / Actions	Residual Risk Ranking			Performance Criteria	Management Triggers	Corrective Actions	Monitoring Mechanisms
		Likelihood[1]	Consequence[2]	Result[3]		Likelihood[1]	Consequence[2]	Result[3]				
											triggers for further action, the OAMP will be reviewed by a suitably qualified ecologist within one month and update if required. Any corrective action identified will be implemented within 1 month of the OAMP being updated.	will document vegetation condition.
Increased population of feral animals in the offset area causing habitat degradation or direct impacts to MNES	Pest animals pose threats to the MNES including predation (Wild Dogs, Feral Cats and Foxes) and habitat degradation (Feral Pigs, Feral Horses and Rabbits). Feral Pigs and rabbits can impact on Koala	P	H	M	Pest animal management will be undertaken in consultation with the landowner and in accordance with general pest management processes. Pest management will include a range of best management practice actions including shooting,	P	Mi	L	No increase in abundance of feral animals. Maintain pest animal control program. No evidence of new pest species.	Observed increase in sightings/signs and/or the relative abundance of pest animals above baseline levels and/or previous monitoring event (whichever is lower). Observation of, or signs of, a feral animal not	Review adherence to pest animal management. Investigate potential sources or reasons for an increase in pest animal numbers and rectify Increase the frequency or revise the type of invasive pest animal control efforts in accordance with DAF guidelines, and in conjunction	Review adherence to pest animal management actions. Investigate potential sources or reasons for an increase in pest animal numbers and rectify. Increase the frequency or revise the type of invasive pest

Risk Event	Risk Description	Initial Risk Ranking			Management Measures / Actions	Residual Risk Ranking			Performance Criteria	Management Triggers	Corrective Actions	Monitoring Mechanisms
		Likelihood[1]	Consequence[2]	Result[3]		Likelihood[1]	Consequence[2]	Result[3]				
	habitat including tree species recruitment and understorey vegetation composition.				trapping, fencing and baiting, and will be undertaken in accordance with Queensland's Department of Agriculture and Fisheries (DAF) guidelines[11] and the requirements of the *Biosecurity Act 2014.* If an increase in feral pest species is noted, additional pest management/control measures will be instigated until the increased activity has ceased.					identified as occurring within the Project area during the baseline surveys. Habitat quality scores for interim performance targets are not achieved for one or more offset values by, Year 5, Year 10, Year 15 and Year 20.	with neighbouring landowners. Update OAMP if required.	animal control efforts in accordance with DAF guidelines, and in conjunction with neighbouring landowners. Suitably qualified ecologist to review the OAMP within one month and update if required

[11] https://www.daf.qld.gov.au/business-priorities/plants/weeds-pest-animals-ants

Risk Event	Risk Description	Initial Risk Ranking			Management Measures / Actions	Residual Risk Ranking			Performance Criteria	Management Triggers	Corrective Actions	Monitoring Mechanisms
		Likelihood[1]	Consequence[2]	Result[3]		Likelihood[1]	Consequence[2]	Result[3]				
Unauthorised access	Access to the offset site by any unauthorised persons poses risks to the MNES through habitat degradation (introduction of new weeds), incursion by feral herbivores if gates are left open, MNES mortality through vehicle strike.	P	Mo	M	All signs and fences will be erected within three months of the offset being legally secured. Signs will be erected at all entrances and potential access points to the site stating that access to the site is forbidden. Fences will be maintained to prevent unauthorised access, to minimise incursions by feral herbivores and to control stock presence.	U	Mo	L	No unauthorised access to the offset site.	Evidence of unauthorised or unplanned access by persons, vehicles, and/or stock is detected during exclusion periods. Evidence of stock is detected at any point during exclusion times. Damage is detected to any fence or sign.	Upon being notified or becoming aware of prohibited access to the offset area, the approval holder is to reassess access protocols for any lessees etc., signage and general access within one fortnight. Damage to signage will be repaired within one month of noting the damage. If there are areas that have been negatively impacted by unauthorised access, the regeneration of those areas will be added to the ongoing monitoring sites. Signage will be repaired and maintained as required by the Landholder or	Monitoring of fence lines will be undertaken by the Landholder or suitable qualified person appointed by the approval holder within 3 months of the offset area being legally secured and during quarterly inspections. Inspections will monitor and document damage or loss of signs and evidence of unauthorised access to the offset area.

Risk Event	Risk Description	Initial Risk Ranking			Management Measures / Actions	Residual Risk Ranking			Performance Criteria	Management Triggers	Corrective Actions	Monitoring Mechanisms
		Likelihood[1]	Consequence[2]	Result[3]		Likelihood[1]	Consequence[2]	Result[3]				
											suitable qualified person appointed by the approval holder.	
Bushfire (unplanned)	If unchecked bushfire may degrade some or all of the offset site and increase related risks such as erosion. Fire late in the management period would also reduce the environmental improvement achieved at the offset site.	P	H	M	Controlled burns will be undertaken in consultation with the landowner and in accordance with the recommended fire management guidelines for Regional Ecosystems and will involve a range of burn strategies including patchwork burns. Fire is to be excluded from the offset area except for planned and strategic burns as required to reduce understorey fuel loads having a detrimental impact on canopy tree recruitment and	U	H	M		Unplanned fire within the offset area. Planned fires become out of control or the required burning regime is not achieved. Habitat Quality assessments indicate native grass groundcover is <30% or >55%.	Occurrences of fire are to be recorded during the visual inspections undertaken during routine land management. If an uncontrolled bushfire has impacted the offset area (including if controlled burning becomes out of control), review the grazing management and fire management strategies and adherence to these strategies and exclude cattle for at least three months. All fire breaks will be inspected,	Fire breaks are to be inspected annually in September Visual inspection of signs of fire during routine land management and during the habitat quality assessments. Fuel loads will be monitored through monitoring of ground cover and to inform fire management strategies.

Risk Event	Risk Description	Initial Risk Ranking			Management Measures / Actions	Residual Risk Ranking			Performance Criteria	Management Triggers	Corrective Actions	Monitoring Mechanisms
		Likelihood[1]	Consequence[2]	Result[3]		Likelihood[1]	Consequence[2]	Result[3]				
					establishment and to maintain existing fire breaks. Create firebreaks around the offset area boundary to minimise unplanned fire from adjacent lands. Firebreaks are to be co-located, where possible, with roads, fence lines and vehicle access tracks. No areas of MNES will be cleared unless necessary or safety management.						maintained, and repaired if required. To ensure compliance, with performance criteria, undertake remedial action including: • Alteration to stocking rates, and/or duration and frequency of strategic grazing events; and/or • Amendments to fire management practices as required including fire safety and containment management. Suitably qualified ecologist to review the OAMP within one month and update if required.	

Risk Event	Risk Description	Initial Risk Ranking			Management Measures / Actions	Residual Risk Ranking			Performance Criteria	Management Triggers	Corrective Actions	Monitoring Mechanisms
		Likelihood[1]	Consequence[2]	Result[3]		Likelihood[1]	Consequence[2]	Result[3]				
Offset fails to achieve the interim performance targets and completion criteria within the 5, 10, 15 and/or 20-year time intervals. Offset site initially achieves the completion criteria but declines before the end of the approval.	The offset site has not met the requirement of the offset policy or this OAMP, nor achieved the outcomes that were key to the rationale for the approval decision.	R	C	H	The Voluntary Declaration under the VM Act will ensure that the landholder remains obliged to undertake active management of the offset until all completion criteria are achieved, leading to further management.	R	Md	Low	Completion criteria are achieved, by the timeframes established and through to the end of the approval.	Interim performance targets are not achieved by year 5, 10 or 15. Completion criteria are not achieved by year 20.	Within one month of detection of the trigger, complete an investigation into the reasons why the interim performance targets or the completion criteria were not achieved within the specified timeframes. This investigation must re-evaluate the suitability of the relevant management actions and identify appropriate corrective actions. As soon as practicable, and within six months of detection of the trigger, implement revised corrective actions. These may include (but not limited to):	Monitoring of the offset area will be undertaken in accordance with this OAMP. Monitoring results will be compared against the interim performance targets and completion criteria to assess progress of offset area in achieving the requirements of this OAMP.

Risk Event	Risk Description	Initial Risk Ranking			Management Measures / Actions	Residual Risk Ranking			Performance Criteria	Management Triggers	Corrective Actions	Monitoring Mechanisms
		Likelihood[1]	Consequence[2]	Result[3]		Likelihood[1]	Consequence[2]	Result[3]				
											• Increasing the frequency and intensity of pest animal and weed control measures or revising the type of measures to be implemented. • Modify fire management measures, to better support enhancement of offset values. • If the investigation outlined above requires changes to the management actions, then as soon as possible, and within six months of detection of the trigger, implement a	

Risk Event	Risk Description	Initial Risk Ranking			Management Measures / Actions	Residual Risk Ranking			Performance Criteria	Management Triggers	Corrective Actions	Monitoring Mechanisms
		Likelihood[1]	Consequence[2]	Result[3]		Likelihood[1]	Consequence[2]	Result[3]				
											revised OAMP, as approved by the Minister, incorporating those recommended changes. Additional offsets will need to be sought by the approval holder, and approved by the Minister, should the above corrective actions not be successful.	
Force Majeure Events												
Drought	The risk posed by drought is a decrease in groundcover, an increase in the likelihood of unplanned fire due to the dry conditions from lightning strikes and an increase	L	Mo	M	Limited mitigation measures can be implemented. Should the offset be deemed by the approval holder or the Department to have been delayed, all parties will work together to determine to	L	Mo	M	Achievement of 20-year completion criteria.	Drought declaration.	Allow offset area to recover post drought, particularly through the control of weeds as per Section 6.8. Exclude stock grazing until groundcover improves to >55% immediately prior to	The annual offset compliance report will document vegetation condition and report on drought impacts.

Risk Event	Risk Description	Initial Risk Ranking			Management Measures / Actions	Residual Risk Ranking			Performance Criteria	Management Triggers	Corrective Actions	Monitoring Mechanisms
		Likelihood[1]	Consequence[2]	Result[3]		Likelihood[1]	Consequence[2]	Result[3]				
	in weed cover when rainfall is received. Reduced/ retarded plant growth may would be expected, depending on the severity of drought. This may prevent affect achieving interim performance targets or the completion criteria within the 20-year period.				determine an appropriate response.						the annual grazing period. Within one month of determining that the outcomes of the OAMP are likely to be delayed, consultation between Stanmore, the landowner and DAWE will be undertaken to develop an appropriate response.	
Cyclone/ severe tropical lows/ flooding	The most significant impact from tropical cyclones or tropical lows is typically flooding and	L	Mo	M	Limited mitigation measures can be implemented. Part of the offset site is relatively flat and may experience flooding	L	Mo	M	The subsequent monitoring event (as per Section 7.0) will include habitat quality surveys and supplemented habitat features	Any incident of cyclone or flood impacting the site.	As soon as reasonably practicable and safe following the cyclone or flood, undertake a monitoring event as per Section 7.0 and implement	The annual offset compliance report will document vegetation condition and report on cyclone/ flood impacts.

Risk Event	Risk Description	Initial Risk Ranking			Management Measures / Actions	Residual Risk Ranking			Performance Criteria	Management Triggers	Corrective Actions	Monitoring Mechanisms
		Likelihood[1]	Consequence[2]	Result[3]		Likelihood[1]	Consequence[2]	Result[3]				
	destruction of habitat The season for such weather events is between December and April.				from the nearby waterways. However, cyclones and sever tropical lows are relatively infrequent (although likely to occur at some point during the life of the offset). Although flooding is not expected to be of sufficient duration, wind speed has the potential to be severe and may to cause substantial long-term harm to the site. Additionally, the increased availability of soil moisture following flood is expected to increase the growth rates of vegetation, and thus facilitate repair to damage to vegetation,				assessments, as soon as is safe and reasonably practicable to do so following any cyclone or flood. Appropriate weed management measures will be implemented, as required.		management measures as required. This may include additional planting of fauna habitat trees as determined by suitably qualified ecologists.	

Risk Event	Risk Description	Initial Risk Ranking			Management Measures / Actions	Residual Risk Ranking			Performance Criteria	Management Triggers	Corrective Actions	Monitoring Mechanisms
		Likelihood[1]	Consequence[2]	Result[3]		Likelihood[1]	Consequence[2]	Result[3]				
					following subsidence of flood waters. Increased soil moisture may assist weed growth. The subsequent monitoring event (as per Section 7.0) will include groundcover survey to detect any areas of increased weed density.							

[1] Hl - Highly Likely; L - Likely; P - Possible; U - Unlikely; R - Rare

[2] Mi - Minor; Mo - Moderate; H - High; Mj - Major; C - Critical

[3] L - Low; M - Medium; H - High; S - Severe

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Appendix A

Suitably Qualified Persons

Dr Craig Streatfeild

Principal Environmental Scientist

Craig is a Principal Environmental Scientist with over 20 years' experience in providing leadership and technical expertise in environmental impact assessments, environmental legislation, permitting and approvals, preparation of environmental management plans and environmental management, monitoring and compliance. Craig has also been responsible for fauna and flora assessments and mitigating impacts to fauna. He has undertaken training in quality, environmental management and health and safety systems auditing, erosion and sediment control and conflict resolution.

Craig has extensive experience with environmental approvals and permitting under Commonwealth and State environmental legislation and has developed an understanding of the permitting requirements associated with a range of industries. He has also undertaken numerous environmental assessments primarily ecological and fauna related but also for soils, surface water and sediment and groundwater.

Lincoln Smith

Principal Ecologist

Lincoln is a Commonwealth Government approved Terrestrial Ecologist. He has significant experience with site environmental management including the coordination of vegetation clearing, fauna spotting and weed mapping and management. He has undertaken numerous ecology surveys for land development, mining and infrastructure projects across Queensland and northern NSW. Recently, Lincoln has provided ecology services for the Carmichael Rail Project including the coordination of vegetation clearing and access track construction of the detailed geotechnical investigation program. This included supervising access construction across waterways and areas of challenging terrain to ensure compliance with approval conditions, applicable exemptions and general environmental duty. Lincoln also fulfilled a site Environmental Advisor / Ecologist role for Santos on the GLNG Project.

Andrew Craig

Senior Ecologist

Andrew is a Senior Ecologist with over 20 years practical experience in the areas of flora and fauna surveys throughout Queensland and the Northern Territory. Andrew's main area of expertise is the identification and classification of flora and fauna and the management of threatened species and communities as listed under the *Environment Protection and Biodiversity Conservation Act 1999*, *Nature Conservation Act 1992* and *Vegetation Management Act 1999.*

Andrew has significant experience in some of Queensland's largest infrastructure projects including coordinating geotechnical surveys for rail and gas projects, on-ground flora assessments and development of weed and vegetation management and rehabilitation strategies.

BASE/

Appendix B

Habitat Quality Ecological Report – Offset Area

Ecological Assessment Report

Mount Spencer Station Offsets Investigation Area

BASE/

Client: Stanmore Coal Pty Ltd

Reference: J0053

Document Control

Title:	Mount Spencer Ecological Assessment Report
Address:	Mount Spencer Property (Lot 4 SP277438)
Job Number:	J0053 Biodiversity Offset Management Plan (Stanmore)
Client:	Stanmore IP Coal Pty Ltd

Document Issue

Issue	Date	Prepared By	Reviewed By
DRAFT 1	2/9/2020	IW/LS	CS
DRAFT 2	6/10/2020	JH/IW	CS
FINAL DRAFT	23/10/2020	JH	CS

Contents

1.0 Introduction

1.1 Project Background

The Isaac Plains Complex (IPC) is an operating metallurgical open cut coal mine located approximately 5 km northeast of Moranbah in Central Queensland (see Figure 1). Mining operations are carried out under an existing State Government approved environmental authority (EA) and occurs across several approved mining leases (ML), namely ML 70342, ML 700016, ML 700017, ML 700018 and ML 700019.

The Isaac Plains Mine (IPM) originally commenced operation in 2006 and produced approximately 2.8 million tonnes per annum (Mtpa) of coking coal for export to international markets. The IPM was put into care and maintenance by the previous owners and was acquired by Stanmore IP Coal Pty Ltd (Stanmore) in late 2015, who recommenced operations from the existing open cut pit. In 2018, approval was received from State and Commonwealth Governments for the Isaac Plains Extension (IPE) project which involved mining on ML 700016, ML 700017, ML 700018, ML 700019. State and Commonwealth approvals for the IPE Project limited the disturbance footprint of proposed activities within the approved mining leases.

Additionally, the Isaac Plains East Extension (IPEE) is immediately adjacent to the existing IPE mining area and involves additional disturbance areas, an increase to the total production volume and extends the duration of mining. The extension involves the expansion of the IPE open cut pits to the east which is estimated to extend the mining life by approximately four years. Additional supporting infrastructure such as haul roads, power lines and water management infrastructure are required to facilitate the extension and an existing upgrade to the CHPP and associated coal stockpiling areas within the IPM is proposed.

Stanmore Coal also proposes to develop the Isaac Downs Project, an open cut metallurgical coal mine expected to produce up to approximately 35Mt of ROM coal over 16 years. Isaac Downs is located adjacent to the IPE and IPEE projects and is expected to extend the life of the company's assets at the Isaac Plains Complex. The project will limit its footprint by using Stanmore's existing coal processing plant and rail infrastructure.

For these projects, offsets are required for significant residual impacts to Matters of National Environmental Significance (MNES) including the Koala (Phascolarctos cinereus), Greater Glider (Petauroides volans), and Squatter Pigeon (southern) (Geophaps scripta scripta). Stanmore proposes to legally secure offsets for impacts to the Koala, Greater Glider and Squatter Pigeon within Lot 4 SP277438 which is part of Mt Spencer Station (Figure 2) as outlined in

Table ***1*** in Section 2.2. It is the intent of Stanmore to collocate all required offsets within an area of 2900.68 ha within Mount Spencer Station.

Base Consulting Group (Base) was commissioned by Stanmore IP Coal Pty Ltd (Stanmore) to prepare this ecological assessment report to support the offsets process and to outline the extent of habitat (in hectares) and habitat condition for the Koala, Greater Glider and Squatter Pigeon within the Mount Spencer Station. Data collected during the ecology surveys will provide the baseline habitat quality information to inform the Projects Offset Area Management Plans (OAMP).

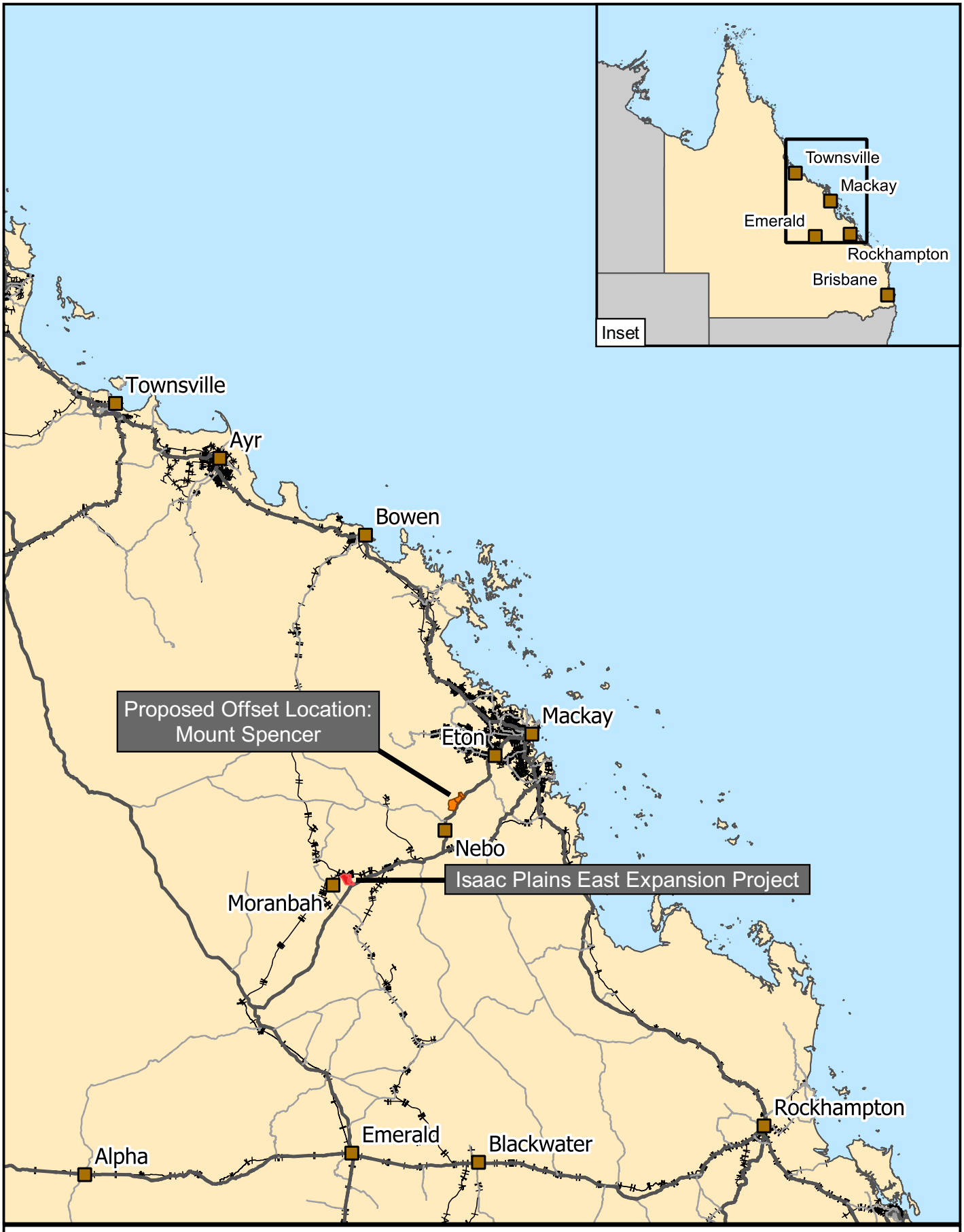
1.2 Scope and Purpose of Report

This ecological assessment report was prepared as a requirement of the Commonwealth approval conditions (for the IPE) and the Commonwealth approval process for the IPEE and ID projects. The purpose of the baseline survey was to measure the habitat quality of the field-verified vegetation communities within the proposed offset investigation area (herein referred to as the 'study site'). This report identifies the ecological values of the proposed offset site, relevant to MNES and presents the results of habitat quality assessments for threatened species and habitat. This information will be incorporated into the Project OAMP.

1.3 Location

The offset investigation area is located on Lot 4 SP277438 which forms part of the larger Mount Spencer Station. Lot 4SP277438 encompasses 4,810 ha of which 4,693 ha is currently mapped as remnant vegetation. Further, Mt Spencer Station (inclusive of Lot 4) covers 22,712 ha which includes approximately 20,190 ha of remnant vegetation. Lot 4 is approximately 105 km to the northeast of the IPEE project and lies within the Isaac Regional Council Local Government Area.

Lot 4 straddles the Brigalow Belt and Central Queensland Coast bioregions with the offset investigation area also straddling the Clarke-Connors ranges (in the western section) and the Nebo -Connors Ranges (in the eastern section). The offset investigation area is located in the central and northern section of Lot 4 SP277438 within the larger Mount Spencer Station (Figure 2).



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Date: 19/10/2020
Drawn: Josh T

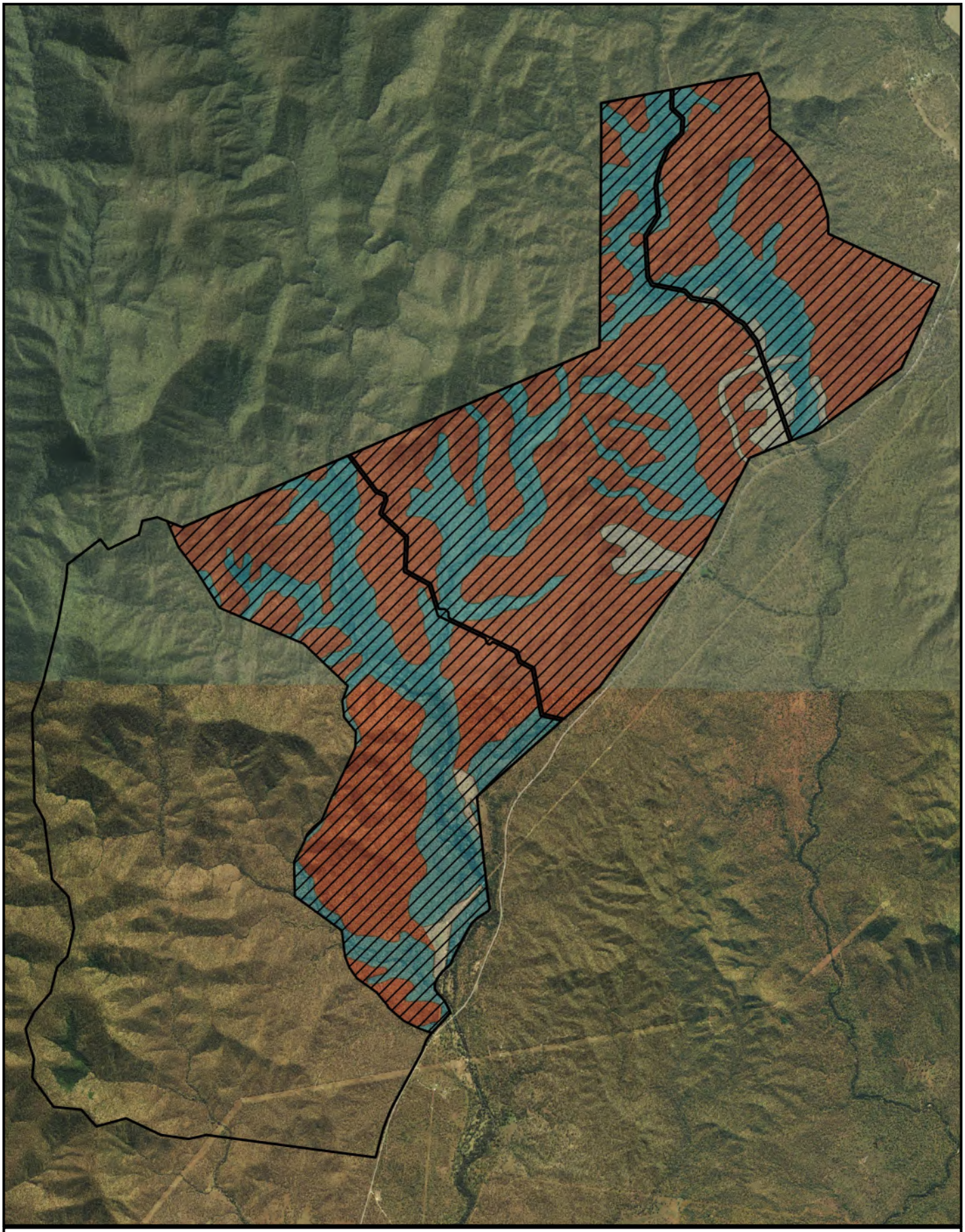
DATA SOURCE
BASE CONSULTING GROUP 2020; QSPATIAL 2020; The State of Queensland (Department of Natural Resource and Mines) 2020;

Figure 1: Mine and Proposed Offset Site Context

Legend

- Towns
- Highways
- Roads
- Rail Network
- Isaac Plains East
- Mount Spencer (Lot 4SP277438)

BASE/



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Date: 19/10/2020
Drawn: Josh T

DATA SOURCE
BASE CONSULTING GROUP 2020; QSPATIAL 2020; The State of Queensland (Department of Natural Resource and Mines) 2020;

Figure 2: Mount Spencer Offset Investigation Area

Legend

- Lot 4 Property Boundary
- Offset Investigation Area

Field Verified Regional Ecosystem

- 11.12.1
- 11.3.4
- Non-Remnant

BASE/

2.0 Offset Requirements and Offset Area

Under the Environment Protection and Biodiversity Conservation 1999 (EPBC Act) Environmental Offsets Policy, offsets are required where a residual impact is likely to occur after avoidance, mitigation and management measures have been undertaken. For this project, offsets for residual impacts are to be legally secured for the MNES in Table 1.

2.1 Policy Principles

The EPBC Act Environmental Offsets Policy (October 2012), has five key aims that involve:

- Ensuring the use of offsets are efficient, effective, timely, transparent and scientifically robust;
- Providing all stakeholders with greater certainty on how offsets are determined and provided;
- Delivering improved environmental outcomes;
- Outlining the appropriate nature and scale of offsets; and
- Providing guidance on acceptable offsets and their delivery.

The Policy also provides eight key principles that are applied in determining the suitability of offsets. The principles relevant to the ecological assessment are as follows.

- Deliver an overall conservation outcome that improves or maintains the viability of the MNES in question;
- Be primarily built around direct offsets but may also include other compensatory measures;
- Be in proportion to the level of statutory protection that applies to the MNES;
- Be of a size and scale proportionate to the residual impacts on the protected matter;

Considering the above policy principles and the offsets required, ecological assessments have been undertaken on Mount Spencer Station to assess the site's potential as an offset area.

Mount Spencer Station has approximately 4,693 ha of remnant vegetation that has the potential to provide offsets for impacts to the MNES.

2.2 Summary of Project Impacts

Potential direct and indirect impacts within and adjacent to the IPE, IPEE and ID projects has been described in the various approval documents. These impacts include the direct loss of native vegetation, habitat and resources as a result of vegetation clearing within the Project footprint. The area of direct impact encompasses potential habitat for three (3) MNES protected under the EPBC Act. The potential impacts on these environmental values are summarised in Table 1.

Offsets are required for the three (3) MNES to account significant residual impacts as a result of the Project. In accordance with the EPBC Environmental Offsets Policy, it is necessary to assess the quality of these areas to accurately calculate the offset obligations.

Table 1 MNES impacted by the Project for which offsets will be sourced from the offset investigation area

MNES	EPBC Act status	Impact area requiring offsets (ha)		
		IPE	IPEE	ID
Koala *(Phascolarctos cinereus)*	Vulnerable	125	207.8	138
Greater Glider *(Petauroides volans)*	Vulnerable	125	207.8	68
Squatter Pigeon (Southern) *(Geophaps scripta scripta)*	Vulnerable	74	117.1 (breeding) 63.6 (foraging)	246

3.0 Methodology

3.1 Approach

A combined desktop and field-based program was undertaken to determine the habitat quality of the offset investigation area.

3.2 Desktop Assessment

3.2.1 Literature Review

The following literature was reviewed as part of the desktop assessment for the Survey Area.

- Isaac Plains East Project Habitat Quality Assessments Report for Stanmore Coal prepared by Ecological Survey and Management, July 2018
- Guide to determining terrestrial habitat quality: A toolkit for assessing land-based offsets under the Queensland Environmental Offsets Policy, Version 1.2 April 2017
- Guide to determining terrestrial habitat quality: Methods for assessing habitat quality under the Queensland Environmental Offsets Policy, Version 1.3 February 2020
- Eyre, T.J., Kelly, A.L, Neldner, V.J., Wilson, B.A., Ferguson, D.J., Laidlaw, M.J. and Franks, A.J. (2015). BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland. Assessment Manual. Version 2.2. Queensland Herbarium, Department of Science, Information Technology, Innovation and Arts, Brisbane
- Survey Guidelines for Australia's threatened mammals (Guidelines for detecting Guidelines for detecting mammals listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999)
- SPRAT profiles, referral guidelines, Threatened Species Scientific Committee Conservation and Listing Advice.

3.2.2 Desktop Review

Desktop assessment was conducted to assess the suitability of the offset investigation area as an offset site, to assist in determining target areas for the field surveys and to provide data for the determination of the quality of habitat for MNES within the offset investigation area.

The following resources were reviewed as part of the desktop assessment for the offset investigation area to:

- Wildlife Online Search (20 km buffer of central point co-ordinates -21.52418, 148.75140)
- Existing vegetation mapping released under the provisions of the Vegetation Management Act 1999
- Queensland Herbarium (2019) Regional Ecosystem Description Database (REDD), Version 11.1 (April 2019) (DES, Brisbane)
- Department of Natural Resources, Mines and Energy (DNRME) Vegetation Management Regional Ecosystem and Remnant Map spatial layer (version 10.1)
- Queensland Herbarium BioCondition Benchmarks for Regional Ecosystem Condition Assessment, Department of Environment and Science, Brisbane

3.3 Field Assessment

3.3.1 Timing and Climatic Conditions

An initial field-based assessment was undertaken on June 29 and 30 to determine the suitability of the property to provide potential offsets for habitat for the Koala, Greater Glider and Squatter Pigeon, and to determine if the current DNRME mapping was correct. This assessment focused on the southern portion of the Lot; however, the western section of this area was determined as unsuitable for Squatter Pigeon and the detailed ecological and habitat quality survey focused on the remainder of the Lot to the north. This initial assessment also recorded opportunistic sighting of the MNES.

Further field assessments to determine habitat quality were undertaken over two separate events by two suitably qualified ecologists as follows:

- Survey event 1: Seven (7) days from July 23 and July 29, 2020
- Survey event 1: Four (4) days from October 5 to October 8, 2020

Survey event 1 included field verifying the on-ground vegetation communities, undertaking habitat quality assessments within the field verified communities and targeted fauna surveys for the Koala, Greater Glider and Squatter Pigeon across the total offset investigation area. Survey event 2 was undertaken to specifically target the presence of the Greater Glider and to supplement the habitat quality assessment undertaken in survey event 1.

Weather conditions during and leading up to the July survey period were relatively dry and mild, with maximum day time temperatures reaching mid to high 20's and night-time temperatures between 4 and 13˚C. Total rainfall for the region leading up to the field survey was substantially less than average, except in January, February and May 2020, as shown in Table 2. Weather data was retrieved from the Moranbah Airport Weather Station (034035).

Table 2 Monthly rainfall (mm) recorded at Moranbah Airport prior to and following the July survey

Month	2019					2020						
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
Average (all years)	7	7.3	24.4	42	56	87.6	100.15	92.4	23.8	30.2	16.7	27.9
Actual Rainfall Total	5.4	0.2	13.4	16.6	9.0	100.2	76.4	53.2	5.2	52.6	11.8	15.4

Source: BOM accessed 24th August 2020 (http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=139&p_display_type=dataFile&p_stn_num=034035).

Weather conditions during and leading up to the October survey period were dry and warm, with maximum day time temperatures reaching low 30's and night-time temperatures between 14 and 16˚C. Total rainfall for the region leading up to the field survey was substantially less than average, except in January, February and May 2020, as shown in Table 3. Weather data was retrieved from the Moranbah Airport Weather Station (034035).

Table 3 Monthly rainfall (mm) recorded at Moranbah Airport prior to and following the October survey

Month	2019			2020								
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Average (all years)	24.4	42.0	56.0	87.6	100.1	92.4	23.8	30.2	16.7	27.9	7	7.3
Actual Rainfall Total	13.4	16.6	9.0	100.2	76.4	53.2	5.2	52.6	11.8	15.4	15.0	16.0

Source: BOM accessed 14th October 2020 (http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=139&p_display_type=dataFile&p_stn_num=034035).

3.3.2 Determining Habitat Quality Assessment Units

The Department of Natural Resources, Mining and Environment (DNRME) vegetation management regional ecosystem mapping was used to initially determine the likely number and location of habitat assessment plots. These plots were refined following field verification of the mapped vegetation which was undertaken in accordance with the 'Methodology for Survey and Mapping of Regional Ecosystems (RE) and Vegetation Communities in Queensland' (Neldner et. al. 2020). RE classification was determined on the vegetation, soil and landform characteristics identified in the field, geological mapping for the region and the Regional Ecosystem Description Database (REDD).

Regional ecosystem polygons were assigned to remnant or non-remnant status as defined by the Vegetation Management Act 1999 (VM Act). Reference benchmarks for these criteria were obtained from published data (Queensland Herbarium, 2019).

Three (3) assessment units were defined for the offset investigation area following field verification of the on-ground vegetation. During the July survey event, 16 habitat quality plots (HQPs) were assessed across the three (3) assessment units and a further 15 HQPs were assessed during the October survey event (refer Figure 3). The number of HQPs were selected to comply with the Queensland's Department of the Environment and Science (DES) Guide to determining terrestrial habitat quality: A toolkit for assessing land based offsets under the Queensland Environmental Offsets Policy, Version 1.2 (EHP, 2017) (the 'Guide').

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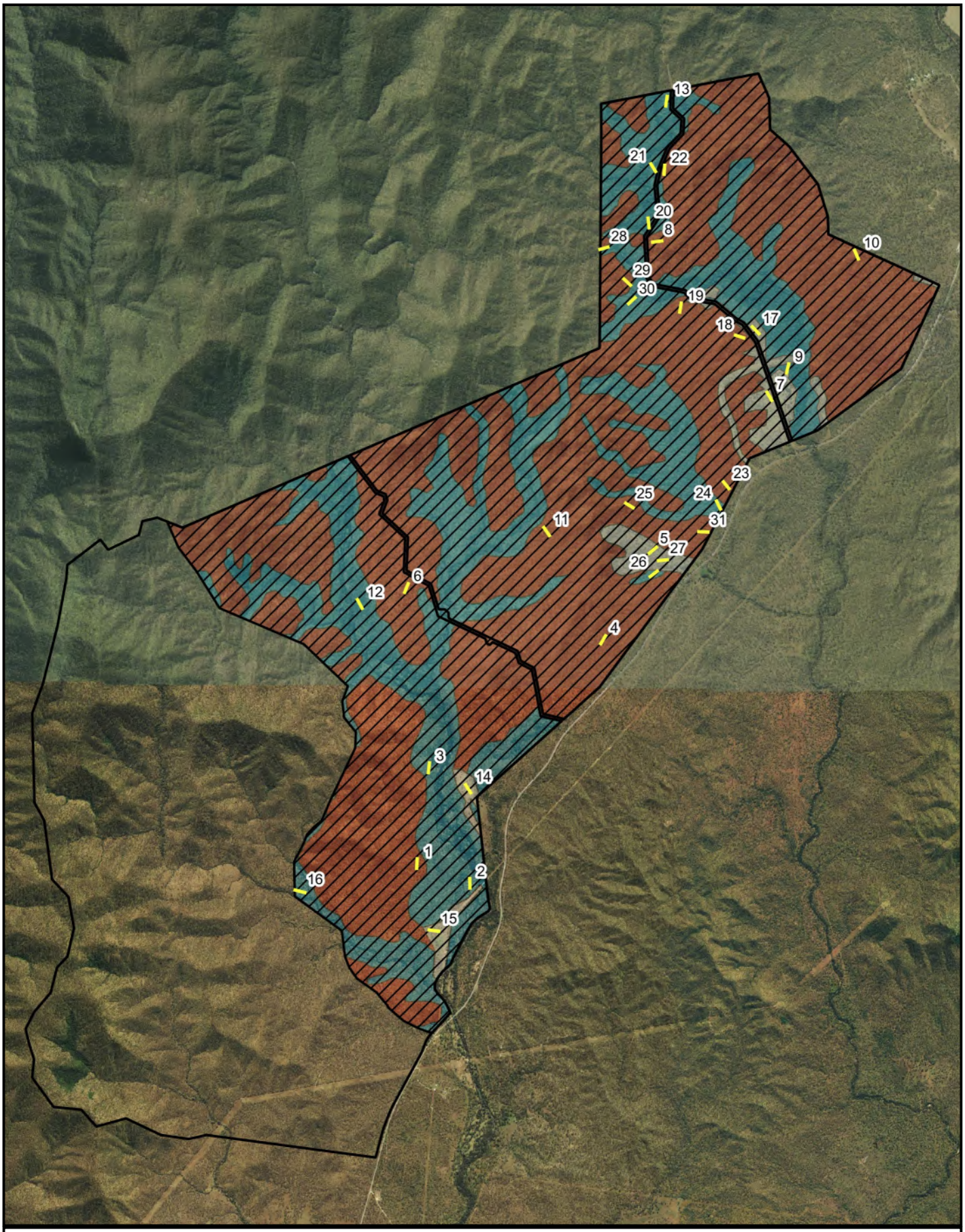


0 500 1000 1500 m

Scale @ A3: 1 : 55000
Date: 19/10/2020
Drawn: Josh T

DATA SOURCE
BASE CONSULTING GROUP 2020; QSPATIAL 2020; The State of Queensland (Department of Natural Resource and Mines) 2020;

Figure 3: Assessment Units and Habitat Quality Plots

Legend

- Habitat Quality Transect
- Property Boundary
- Offset Investigation Area

Field Verified Regional Ecosystem

- (AU 1) 11.12.1
- (AU 2) 11.3.4
- (AU 3) Non-Remnant

BASE/

3.3.3 Habitat Quality and Scoring

Habitat quality and ecological assessments to assess habitat quality were undertaken within the field verified REs and assessment units as per the requirements of the Guide. The Guide which uses a range of habitat indicators to measure the ecological viability and habitat values of a site and its capacity to support fauna and are separated into three main categories: Site condition, species habitat indices and site context. The first two categories use data collected in the field whereas site context is a geospatial exercise.

Habitat quality within the offset investigation area and the potential of the area to support fauna species including Koala, Squatter Pigeon (southern) and Greater Glider was assessed from 31 habitat quality plots from surveys undertaken in July and October 2020 (Section 3.3.2). Data on the following habitat variables were collected during the field survey:

- Site Condition
- Recruitment of woody perennial species in EDL
- Native plant species richness - trees
- Native plant species richness - shrubs
- Native plant species richness - grasses
- Native plant species richness - forbs
- Tree canopy height
- Tree canopy cover
- Shrub canopy cover
- Native perennial grass cover
- Organic litter
- Large trees
- Coarse woody debris
- Non-native plant cover
- Quality and availability of food and foraging habitat
- Quality and availability of shelter
- Threat to Species
- Species mobility capacity

3.3.4 Photo monitoring points

Photographs were taken within each assessment plot for the purposes of providing baseline imagery for ongoing monitoring. Photographs were taken along the Biocondition transect centreline at the ends of each plot (e.g. at 0 m and 100 m), and in the order: north (0°), east (90°), south (180°) and west (270°) at the centre of the plot (e.g. at 50 m mark) Photos of the groundcover intersected by the centreline tape and soils were also taken at some HQPs 50 m along the plot. These photos are provided in Appendix C.

3.3.5 Targeted Fauna Surveys and Spotlighting

Diurnal bird surveys, diurnal koala searches nocturnal spotlighting surveys were undertaken on the nights of the 23rd and 27th July 2020, and again between October 5 and 8, 2020. Surveys were undertaken in accordance with the relevant survey guidelines and modified were required based ecological experience in maximizing the detection of the Koala, Greater Glider and Squatter Pigeon. Diurnal searches for Koala's and Squatter Pigeon were undertaken during the habitat quality assessment and whilst traversing between the HQP. For spotlighting, a minimum of two person hours was spent per night, using a combination of high-powered spotlights and head torches. Visual surveys were undertaken in target habitat, searching trees, shrubs and understory habitats for the Koala and Greater Glider.

To maximise the likelihood of detecting the Koala and Greater Glider the search effort was targeted within remnant vegetation supporting koala food trees and trees bearing hollow's large enough for the Greater Glider. Target areas included areas of remnant RE 11.3.4 on floodplains and fringing major watercourses. All opportunistic records were also recorded as were signs of the Koala including tree scratches and scats.

3.3.6 Weed and pest surveys

Active and opportunistic searches were used to identify weed and pest species presence. Weed species were recorded within HQPs and opportunistically while traversing the offset investigation area. Pest species were also opportunistically surveyed throughout the offset investigation area during the day and at night while undertaking nocturnal surveys and spotlighting (refer section 3.3.5).

4.0 Results

The initial field based resulted in the exclusion of the southern and south-western portion of Lot 4 as suitable habitat for the Squatter Pigeon. The Koala and Squatter Pigeon (southern) were positively identified within the south-eastern and middle sections of the Lot and suitable habitat for Greater Glider in the form of large tree hollows were also identified along the riparian areas. The initial survey also determined the current DNRME mapping was also likely to be incorrect based on the clear distinctions between the riparian zones and the adjacent woodlands. However, a remapping exercise was not undertaken but deferred to the detailed ecological and habitat quality survey.

4.1 Vegetation mapping

Desktop assessment of the current DNRME Regional Ecosystem mapping identified four (4) REs within the offset investigation area with small, isolated sections of non-remnant also present. The riparian areas were represented by mixed polygons of 11.12.1 and 11.3.4 (Table 4).

Field verification of the offset investigation area identified two (2) REs (11.3.4 and 11.12.1) as being present and confirmed the non-remnant areas as correct. The field verification could also separate the mixed 1.12.1/11.3.4 polygons based on the clear separation of the underlying landzone. The preliminary field verified RE mapping was later refined using aerial photography and contour data. Figure 3 shows the field verified RE mapping over the offset investigation area.

The two (2) field verified REs along with the non-remnant area were used as the assessment units for the purposes of calculating the number of habitat quality plots required.

Table 4 Regional ecosystems within the offset investigation area

RE	Short Description	VM Act Status
11.12.1/11.3.4	*Eucalyptus tereticornis* and/or *Eucalyptus* spp. woodland on alluvial plains	Of concern
11.12.1a	*Eucalyptus crebra* woodland on igneous rocks	Least concern
11.12.6a	*Corymbia citriodora* open forest on igneous rocks (granite)	Least concern
8.12.7	*Corymbia citriodora* +/- *Eucalyptus portuensis* +/- *E. drepanophylla* (or *E. crebra*) open forest on hill slopes and undulating plateaus, on Mesozoic to Proterozoic igneous	Least concern
Non-remnant	-	None

Based on the size of the assessment units and the requirements of The Guide, 31 HQPs were assessed across the three (3) assessment units (Table 5 and Figure 3).

Table 5 Habitat quality plots and corresponding RE

Assessment Unit	RE	Number HQPs
AU1	11.12.1	13
AU2	11.3.4	12
AU3	Non-remnant	6
Total		**31**

4.2 Habitat Quality Scoring

The field data recorded at each of the HQPs for each assessment unit was used in combination with geospatial information to determine a habitat quality score for habitat in the offset investigation area. Data collected from each of the 31 HQPs was compared with the BioCondition benchmarks for the corresponding REs and converted to a score out of 10 using the Department of Agriculture, Water and the Environment (DAWE) Modified Habitat Quality Spreadsheet.

The offset area habitat quality scores for each of the three species for the whole of the offset investigation area before any sub-division of the area into specific project boundaries is:

- Koala – 5/10 (rounded up from 4.8);
- Greater Glider – 5/10 (rounded from 5.2); and
- Squatter Pigeon – 5/10 (rounded from 5.2).

4.3 Targeted Fauna Surveys and Spotlighting

4.3.1 Desktop results

Based on the SPRAT habitat description and the habitat definition included in the IPEE Public Environmental Review (PER) Guideline, any forest or woodlands, including remnant, regrowth and modified communities that contain Koala food trees or shrublands with emergent food trees are all potential Koala habitat. Desktop assessment identified Koalas have been previously found immediately adjacent to the investigation area and along the Peak Downs Highway (Figure 4). The presence of Koalas within the offset investigation areas is also supported by anecdotal evidence from the landowner who has indicated that Koalas have previously been seen within the investigation area and throughout the wider Mt Spencer Station (A. Key *pers comm*. and D. Wright *pers comm*.).

The approved conservation advice for the Greater Glider (TSSC, 2016) along with habitat definitions included in the PER Guidelines, indicate that Greater Glider habitat overlaps Koala habitat. As such, Eucalypt Forests and Woodlands that contain hollow bearing trees, particularly in riparian areas, are all potential Greater Glider habitat. Desktop assessment including the Atlas of Living Australia database, showed the multiple Greater Glider records approximately 8km to the west of the offset investigation in similar habitat within the large and unfragmented Epsom State Forest and the adjacent which directly connects to the offset area (see Figure 4). Greater Gliders have also been recorded along the Peak Downs Highway in the vicinity of Mt Spencer during the DTMR Koala Research Project (Melzer et al. 2018).

Squatter Pigeon records within the vicinity of the offsets investigation area are limited with the nearest occurring approximately 8km to the west and south-west (Figure 4). Anecdotal evidence from the landowner has indicated that Squatter Pigeons have previously been seen within the investigation area and throughout the wider Mt Spencer Station (D. Wright *pers comm*.). Based on the PER habitat definition, the preliminary desktop assessment of the investigation area using current DNRME mapping suggests the majority of the broader offset investigation area has the potential to provide breeding and foraging habitat For the Squatter Pigeon.

4.3.2 Field results

The presence of the Koala was confirmed during the initial site visit in late June and the subsequent detailed ecological and habitat quality surveys in July and October. One Koala was sighted during the June site visit, three Koala's were sighted during the detailed survey in July and nine (9) Koala's were sighted in the October survey. These sightings occurred in the south-eastern, middle and north-eastern section of the investigation area. Evidence in the form of tree scratches and scats were also observed during all surveys throughout the offset investigation area (Figure 5, Plate 1). Further, numerous instances of Koala road kills have been recorded along the Peak Downs Highway adjacent to the offset investigation area and several road kills were observed during the July survey period. As the Koala sightings over the three field

assessment are likely to be repeat sightings of some of the same individuals, an estimate of the actual numbers of individual Koalas is not possible at this stage.

During the initial survey in June and the detailed July the Greater Glider was not confirmed present, although surveys recorded numerous instances of large tree hollows along the riparian zones of RE 11.3.4 and desktop. The presence of the Greater Glider was confirmed during the October survey which was undertaken to specifically target the species, and occurred in the southern/middle section of the offset investigation area (Figure 5; Plate 2). An additional sighting of a Glider sp. with similar morphology to the Greater Glider, was observed along the Cut Creek riparian corridor in the northeastern section of the offset investigation area the and within habitat RE 11.3.4 that is known to support the Greater Glider.

Squatter Pigeons (southern) were also observed throughout the investigation area during the June and July survey periods. Squatter Pigeons were observed at five (5) separate locations during the June survey and was confined to the south-eastern section of the investigation area and in a arrange of differing habitat types including remnant and non-remnant vegetation with varying extents of ground cover (Figure 5; Plate 3). Six (6) instances of Squatter Pigeons (southern) were recorded during the detailed survey in July and occurred in the southern, middle and north-east section of the offset investigation area. Squatter pigeons were not observed in the October surveys.

The following additional species were identified during spotlighting surveys:

- Yellow-bellied Glider (*Petaurus australis*)
- Rufous Bettong (*Aepyprymnus rufescens*)
- Brushtail Possums (*Trichosurus vulpecula*)
- Stony-creek Frog (call) (*Litoria wilcoxi*)

Plate 1 Koala scat (left) and individual koala observed in a Eucalyptus crebra tree (right) during the July 2020 field surveys

Plate 2 Greater Glider observed in Corymbia erythrophloia during the October 2020 surveys

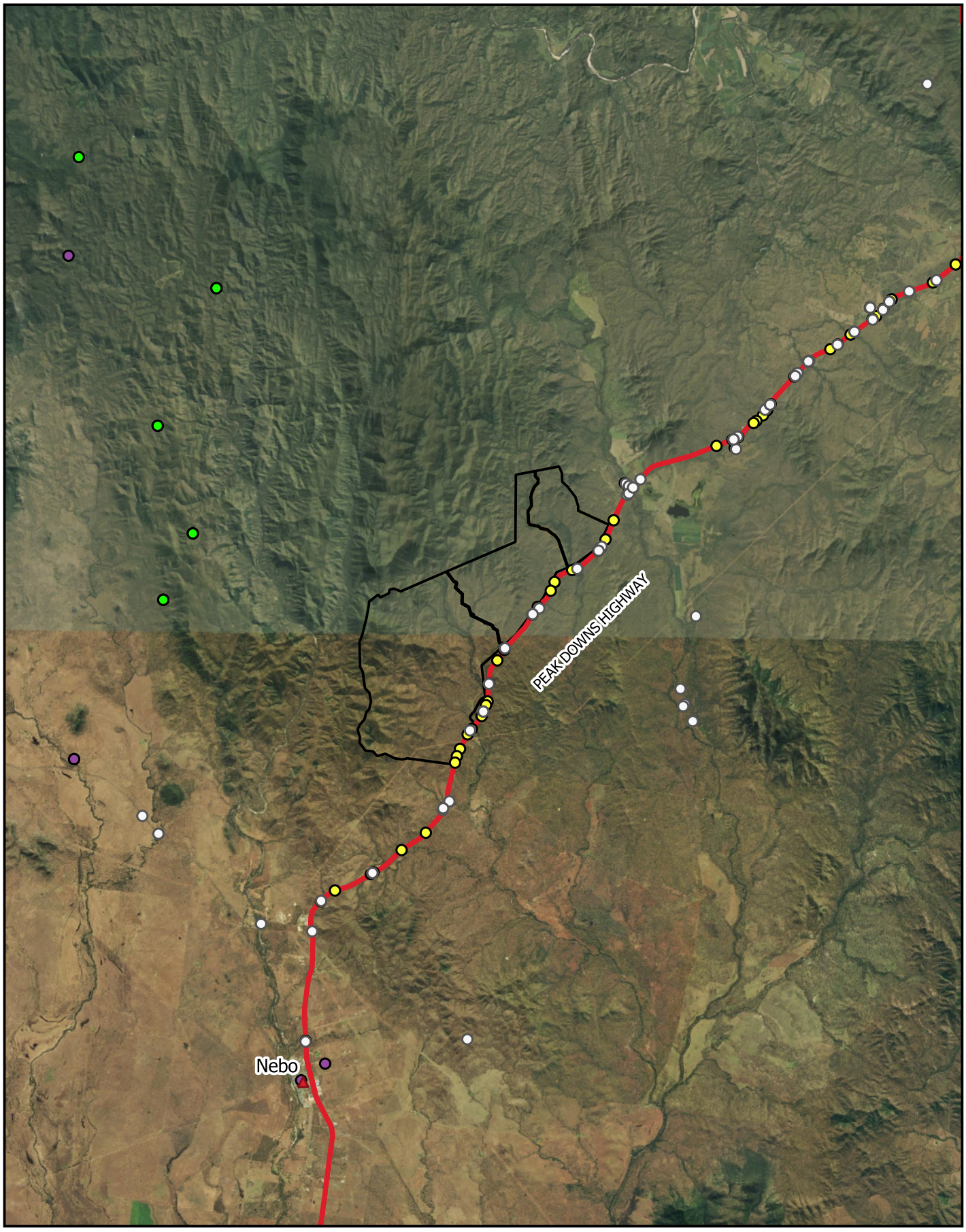
Plate 3 Squatter Pigeon observed during the June 2020 field surveys

4.4 Weeds and pests

A total of 34 weed species were recorded within the offset investigation area, of which five (5) are 'restricted matters' under the Queensland Biosecurity Act 2014. Of these five (5) species, four (4) are Weeds of National Significance (WoNS). *Lantana camara* was observed throughout the majority of the HQPs and was most abundant within RE 11.3.4 especially along the banks of watercourses. Johnston grass (*Sorghum halepense*) was observed throughout a select few HQPs, high abundance was recorded when observed indicating seeding for fodder.

Introduced fauna species were identified either directly or via their traces (e.g. scats, tracks, diggings). A total of eight (8) introduced fauna species were identified, including six (6) that are 'Restricted Matters' under the Queensland *Biosecurity Act 2014*.

The full list of weeds and pests is provided in Appendix B.



0 2 4 km

Scale @ A3: 1 : 200000
Date: 21/10/2020
Drawn: Josh T

DATA SOURCE
BASE CONSULTING GROUP 2020; QSPATIAL 2020; The State of Queensland (Department of Natural Resource and Mines) 2020;

Figure 4: Historical Fauna Records Within 20 Km of Lot 4SP277438

Legend

- Towns
- **ALA & Wildnet Records**
- Greater Glider
- Koala ALA
- Squatter Pigeon
- DTMR: Koala Records
- Highways
- Lot 4SP277438 Boundary
- Offset Investigation Area

BASE/

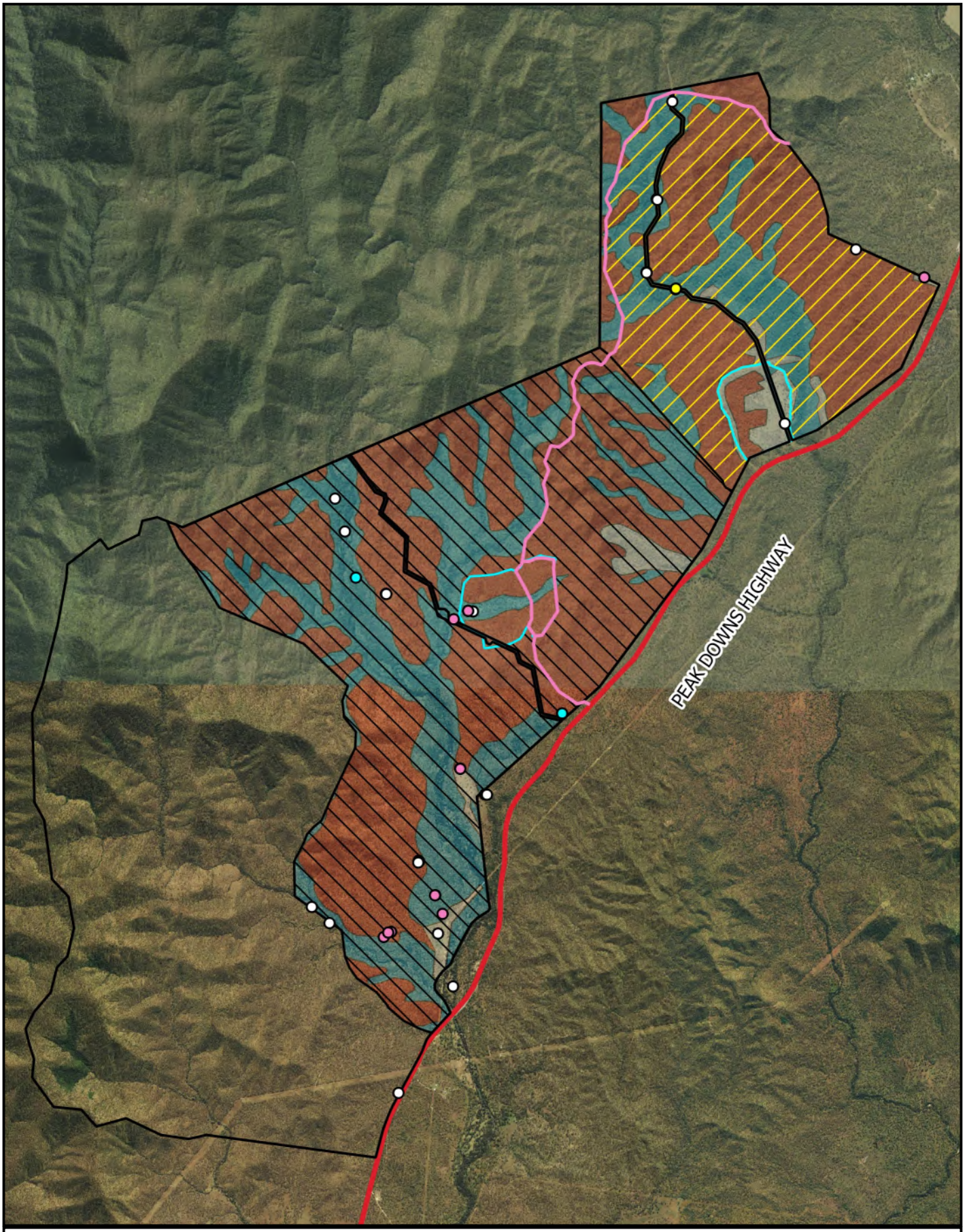


Figure 5: Species Occurrence Within Lot 4SP277438

0 1 km

Scale @ A3: 1 : 55000
Date: 21/10/2020
Drawn: Josh T

DATA SOURCE
BASE CONSULTING GROUP 2020; QSPATIAL 2020; The State of Queensland (Department of Natural Resource and Mines) 2020;

Legend

- Koala/Koala Scats
- Greater Glider
- Greater Glider (Unconfirmed)
- Squatter Pigeon
- Lot 4SP277438 Boundary
- IPEE Offset Area
- Offset Investigation Area
- Holding Yards

Field Verified RE Mapping

- 11.12.1
- 11.3.4
- Non-Remnant

BASE/

5.0 Conclusion

In order to assess the suitability of Lot 4 within Mt Spencer Station to provide suitable offsets for impact to Koala, Greater Glider and Squatter Pigeon from impacts associated with the development of the IPE, IPEE and ID projects, a combined desktop and field-assessment was undertaken to determine the habitat quality of the Mount Spencer Station offset investigation area and to determine the presence of the three MNES within the offset investigation area.

Remnant vegetation was present across most of the offset investigation area and was assessed as providing suitable habitat for the three (3) target species. Additionally, all three (3) target species were confirmed present during the three (3) survey events.

Assessment Units located within suitable habitat areas in which habitat quality assessments were undertaken, and a habitat quality score calculated.

The offset area habitat quality scores for each of the three species for the whole of the offset investigation area before any sub-division of the area into specific project boundaries is:

- Koala – 5/10 (rounded up from 4.8);
- Greater Glider – 5/10 (rounded from 5.2); and
- Squatter Pigeon – 5/10 (rounded from 5.2).

Given the moderate quality of the habitat and the confirmed presence of the three (3) target species within the offset investigation area, the proposed offset area is considered suitable to offset the residual impacts of the IPE, IPEE and ID projects on the Koala, Greater Glider and Squatter Pigeon.

6.0 References

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Appendix A Targeted Fauna Species Records

Attribute	Count	Date	Latitude	Longitude
Koala Scat	-	28/07/2020	-21.5557	148.7529
Squatter Pigeon	1	28/07/2020	-21.4918	148.8023
Squatter Pigeon	1	28/07/2020	-21.5519	148.7526
Squatter Pigeon	1	23/07/2020	-21.5556	148.7478
Koala in *Casuarina cristata*	1	28/07/2020	-21.5422	148.7578
Koala Scat	-	23/07/2020	-21.5532	148.7399
Koala	1	26/07/2020	-21.4891	148.7952
Squatter Pigeon	1	27/07/2020	-21.5253	148.7542
Squatter Pigeons	2	29/06/2020	-21.5555	148.7481
Squatter Pigeons	10	29/06/2020	-21.556	148.7473
Koala scats	-	29/06/2020	-21.5548	148.7417
Koala scats	-	29/06/2020	-21.5607	148.7545
Koala scats	-	29/06/2020	-21.5229	148.747
Squatter Pigeon	1	29/06/2020	-21.5397	148.755
Squatter Pigeons	7	29/06/2020	-21.5397	148.755
Squatter Pigeons	5	29/06/2020	-21.5537	148.7534
Dead Koala	1	25/07/2020	-21.6197	148.7096
Koala in *Casuarina cunninghamiana*	1	28/07/2020	-21.5422	148.7576
Koala scats	-	30/06/2020	-21.5711	148.749
Squatter Pigeons	5	30/06/2020	-21.5244	148.7557
Fresh Koala Scat	-	30/06/2020	-21.5245	148.7562
Dead Koala	1	25/07/2020	-21.6197	148.7097

Koala	1	29/06/2020	-21.5229	148.7472
Koala	1	28/07/2020	-21.5486	148.7508
Dead Koala	1	28/07/2020	-21.6162	148.716
Koala	1	29/06/2020	-21.5229	148.7472
Squatter Pigeons	3	30/06/2020	-21.5245	148.7557
Squatter Pigeon	1	28/07/2020	-21.552	148.7526
Koala	1	28/07/2020	-21.5488	148.7508
Koala	1	28/07/2020	-21.5487	148.7509
Greater Glider	1	6/10/2020	-21.5343	148.7655
Greater Glider	1	6/10/2020	-21.5214	148.744
Koala	2	5/10/2020	-21.4751	148.7761
Koala	1	6/10/2020	-21.5169	148.7428
Koala	1	5/10/2020	-21.4845	148.7746
Koala	1	5/10/2020	-21.4846	148.7747
Greater Glider (unconfirmed)	1	5/10/2020	-21.4931	148.7767
Koala	1	5/10/2020	-21.506	148.7881
Koala	1	5/10/2020	-21.4932	148.7767
Koala	1	5/10/2020	-21.4916	148.7737
Koala	1	5/10/2020	-21.4916	148.7737
Koala	1	6/10/2020	-21.5138	148.7418

Appendix B Weed and Pest Species List

Scientific name	Common Name	Status	
		WoNS	Biosecurity Act 2014 Restricted Matter Category
Weeds			
Ageratum houstonianum	Blue-billy goat weed	-	-
Alysicarpus ovalifolius	Oval-leafed Alysicarpus	-	-
Asclepias curassavica	red-head cotton bush	-	-
Bidens pilosa	Cobbler's pegs	-	-
Bothriochloa pertusa	Indian couch	-	-
Cenchrus ciliaris	Buffel grass	-	-
Cirsium vulgare	Spear thistle	-	-
Cryptostegia grandiflora	Rubber vine	Yes	Category 3
Cyclospermum leptophyllum	Wild celery	-	-
Cyperus esculantus	Yellow nutsedge	-	-
Emilia sonchifolia	Sow thistle	-	-
Gomphocarpus physocarpus	Ballon cotton bush	-	-
Justicia betonica	Paper plume	-	-
Lantana camara	Lantana	Yes	Category 3
Lepidium africanum	African pepperwort	-	-
Malvastrum americanum	Spiked malvastrum	-	-
Megathyrsus maximus	Green panic	-	-
Melenis repens	Red natal	-	-
Opuntia tomentosa	Velvety tree pear	Yes	Category 3
Oxalis corniculata	Creeping woodsorrel	-	-
Parthenium hysterophorus	Parthenium	Yes	Category 3
Passiflora suberosa	Corky passionflower	-	-
Portulaca pilosa	Hairy portulaca	-	-
Praxelis clematidea	Praxelis	-	-
Richardia brasiliensis	White eye	-	-
Richardia stellaris	Field madder	-	-
Senna obtusifolia	Sicklepods	-	Category 3
Senna occidentalis	Coffee senna	-	-

Scientific name	Common Name	Status	
		WoNS	Biosecurity Act 2014 Restricted Matter Category
Sida cordifolia	Flannel weed	-	-
Sida rhombifolia	Paddy's lucerne	-	-
Sorghum halepense	Johnstone grass	-	-
Sonchus oleraceus	Common sowthistle	-	-
Stylosanthes scabra	Shrubby stylo	-	-
Themeda quadrivalvis	Grader grass	-	-
Urochloa decumbens	Sabi grass	-	-
Pests			
Oryctolagus cuniculus	Rabbit		Categories 3,4,5,6
Sus scrofa	Feral pig		Categories 3,4,6
Canis lupus familiaris	Wild dog		Categories 3,4,6
Canis lupus dingo	Dingo		Categories 3,4,5,6
Vulpes vulpes	European Fox		Categories 3,4,5,6
Equus caballus	Feral horse		N/A
Bufo marinus	Cane toad		N/A
Felis catus	Feral cat		Categories 3,4,6

Appendix C Habitat Quality Plot photos

Habitat Quality Plot 1		
		
Start of transect (0m) - North-North east	Centre point (50m) - North	Centre point (50m) - East
		
Centre point (50m) - South	Centre point (50m) - West	End of transect (100m) - South

Habitat Quality Plot 2		
		
Start of transect (0m) - North	Centre point (50m) - North	Centre point (50m) - East
		
Centre point (50m) - South	Centre point (50m) - West	End of transect (100m) - South

Habitat Quality Plot 3		
		
Start of transect (0m) - North	Centre point (50m) - North	Centre point (50m) - East
		
Centre point (50m) - South	Centre point (50m) - West	End of transect (100m) - South

Habitat Quality Plot 4		
		**PHOTO NOT AVAILABLE**
Start of transect (0m) - North	Centre point (50m) - North	Centre point (50m) - East
		
Centre point (50m) - South	Centre point (50m) - West	End of transect (100m) - South

Habitat Quality Plot 5		
		
Start of transect (0m) - North	Centre point (50m) - North	Centre point (50m) - East
		
Centre point (50m) - South	Centre point (50m) - West	End of transect (100m) - South

Habitat Quality Plot 6		
		
Start of transect (0m) - North	Centre point (50m) - North	Centre point (50m) - East
		
Centre point (50m) - South	Centre point (50m) - West	End of transect (100m) - South

Habitat Quality Plot 7		
		
Start of transect (0m) - North	Centre point (50m) - North	Centre point (50m) - East
		
Centre point (50m) - South	Centre point (50m) - West	End of transect (100m) - South

Habitat Quality Plot 8		
		
Start of transect (0m) - North	Centre point (50m) - North	Centre point (50m) - East
		
Centre point (50m) - South	Centre point (50m) - West	End of transect (100m) - South

Habitat Quality Plot 9		
		
Start of transect (0m) - North	Centre point (50m) - North	Centre point (50m) - East
		
Centre point (50m) - South	Centre point (50m) - West	End of transect (100m) - South

Habitat Quality Plot 10		
		
Start of transect (0m) - North	Centre point (50m) - North	Centre point (50m) - East
		
Centre point (50m) - South	Centre point (50m) - West	End of transect (100m) - South

Habitat Quality Plot 11		
		
Start of transect (0m) - North	Centre point (50m) - North	Centre point (50m) - East
	**PHOTO NOT AVAILABLE**	
Centre point (50m) - South	Centre point (50m) - West	End of transect (100m) - South

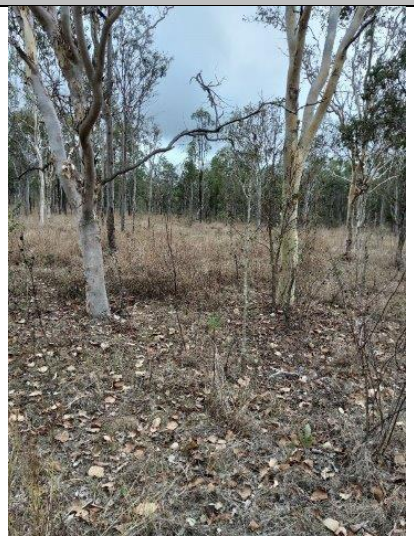
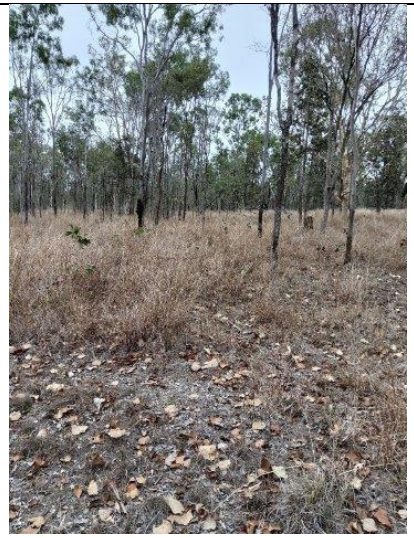
Habitat Quality Plot 12		
		
Start of transect (0m) - North	Centre point (50m) - North	Centre point (50m) - East
		
Centre point (50m) - South	Centre point (50m) - West	End of transect (100m) - South

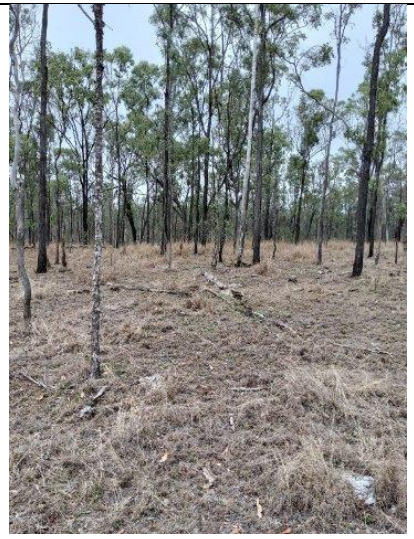
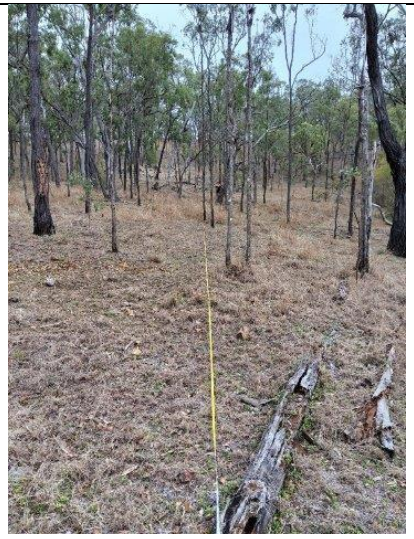
Habitat Quality Plot 13		
		
Start of transect (0m) - North	Centre point (50m) - North	Centre point (50m) - East
		
Centre point (50m) - South	Centre point (50m) - West	End of transect (100m) - South

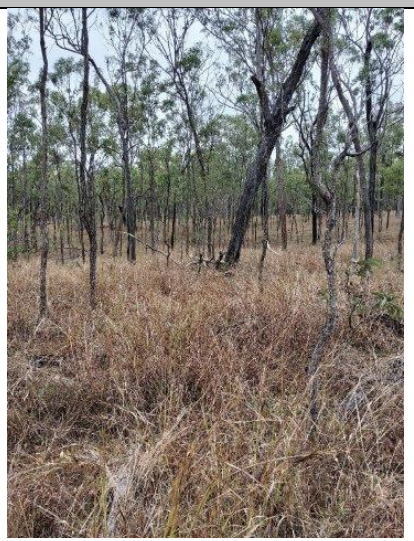
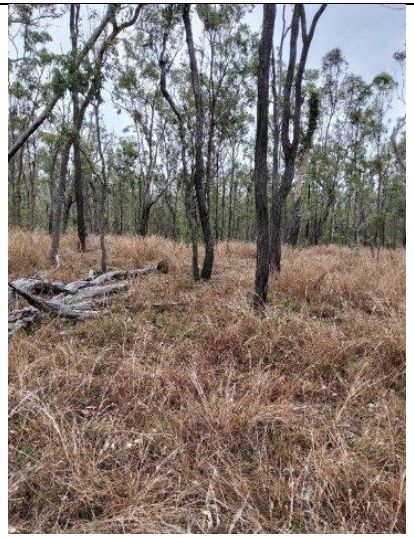
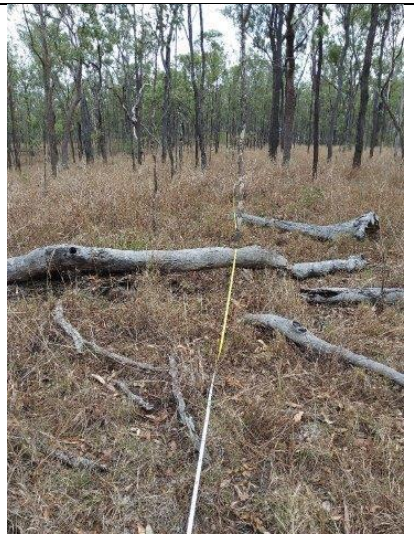
Habitat Quality Plot 14		
PHOTO NOT AVAILABLE Start of transect (0m)	 Centre point (50m) - North	 Centre point (50m) - East
 Centre point (50m) - South	 Centre point (50m) - West	**PHOTO NOT AVAILABLE** End of transect (100m)

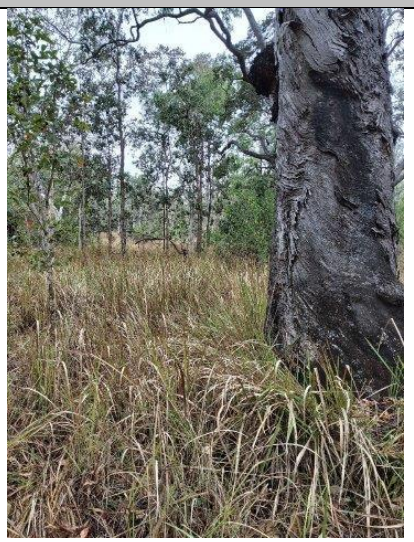
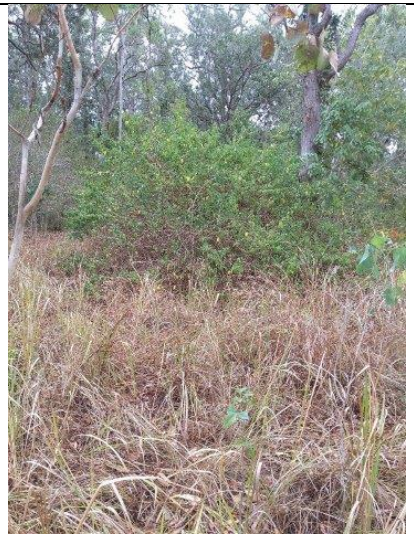
Habitat Quality Plot 15		
 Start of transect (0m) - East	**PHOTO NOT AVAILABLE** Centre point (50m) - North	 Centre point (50m) - East
 Centre point (50m) - South	**PHOTO NOT AVAILABLE** Centre point (50m) - West	 End of transect (100m) - South

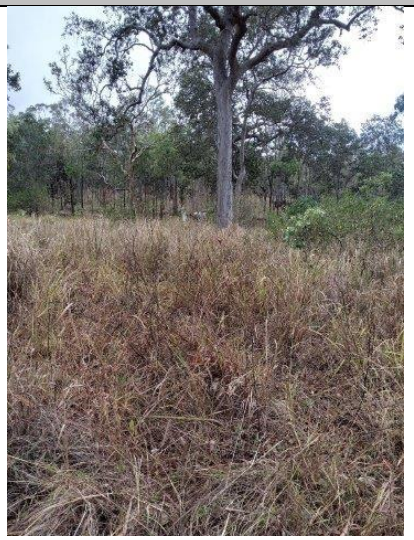
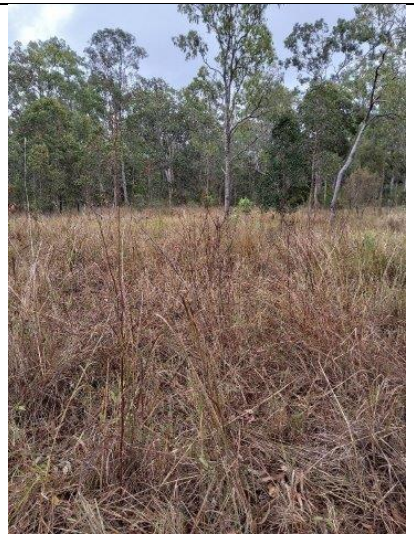
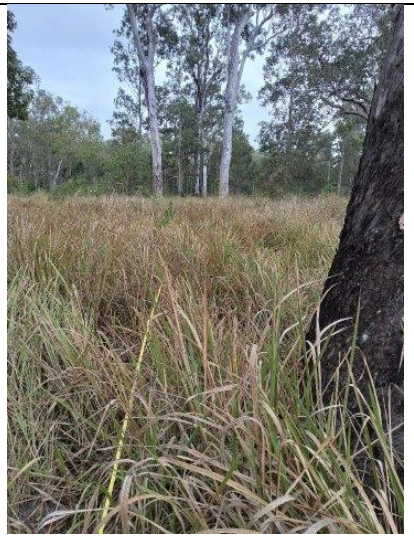
Habitat Quality Plot 16		
 Start of transect (0m) - North	**PHOTO NOT AVAILABLE** Centre point (50m) - North	 Centre point (50m) - East
 Centre point (50m) - South	 Centre point (50m) - West	 End of transect (100m) - South

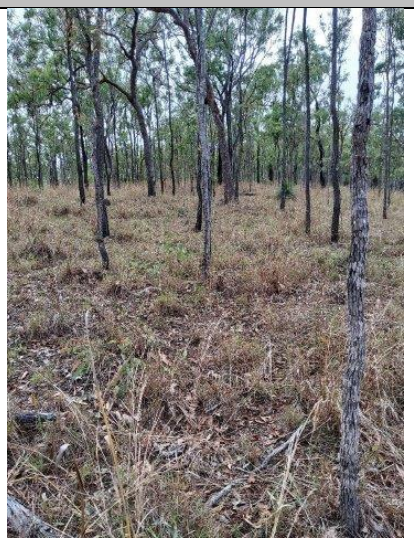
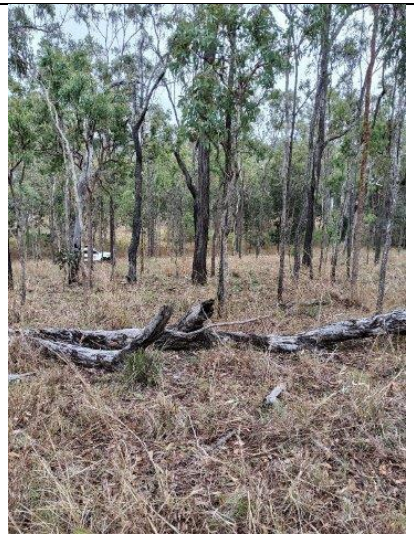
Habitat Quality Plot 17		
 Start of transect (0m)	 Centre point (50m) - North	 Centre point (50m) - East
 Centre point (50m) - South	 Centre point (50m) - West	**Photo not available** End of transect (100m)

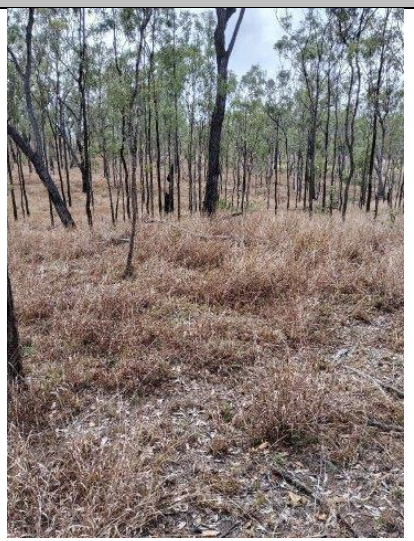
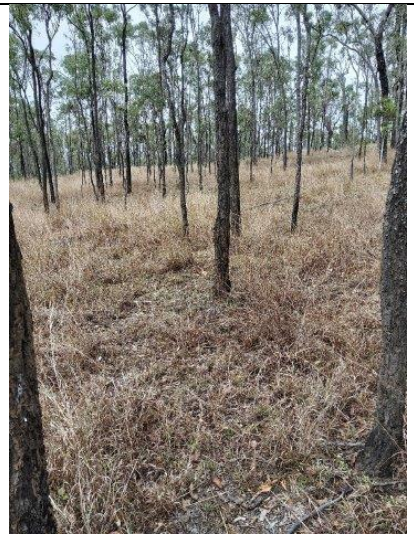
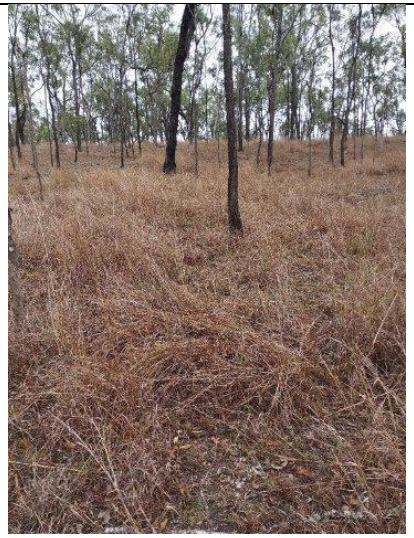
Habitat Quality Plot 18		
		
Start of transect (0m)	Centre point (50m) - North	Centre point (50m) - East
		
Centre point (50m) - South	Centre point (50m) - West	End of transect (100m)

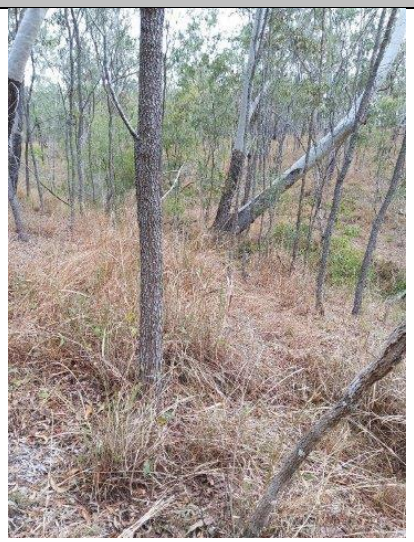
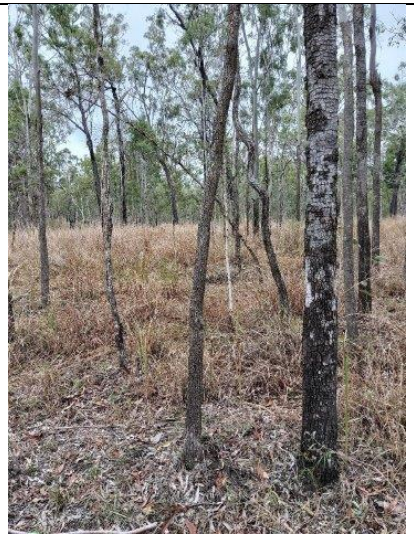
Habitat Quality Plot 19		
		
Start of transect (0m)	Centre point (50m) - North	Centre point (50m) - East
		
Centre point (50m) - South	Centre point (50m) - West	End of transect (100m)

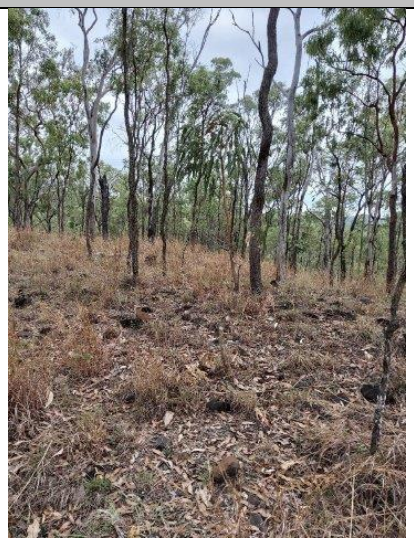
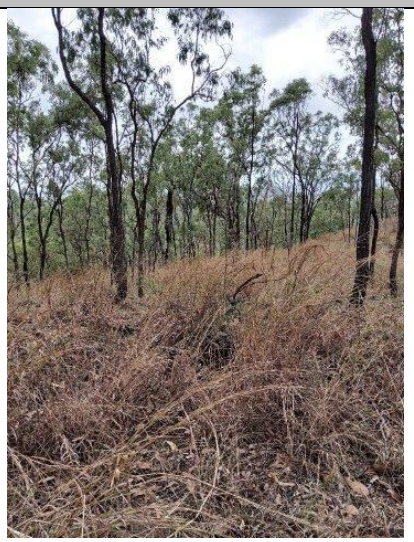
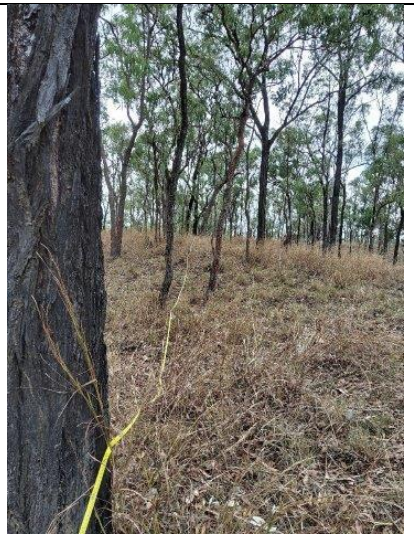
Habitat Quality Plot 20		
		
Start of transect (0m)	Centre point (50m) - North	Centre point (50m) - East
		
Centre point (50m) - South	Centre point (50m) - West	End of transect (100m)

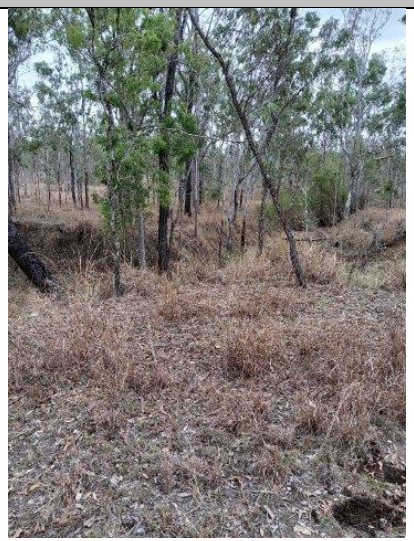
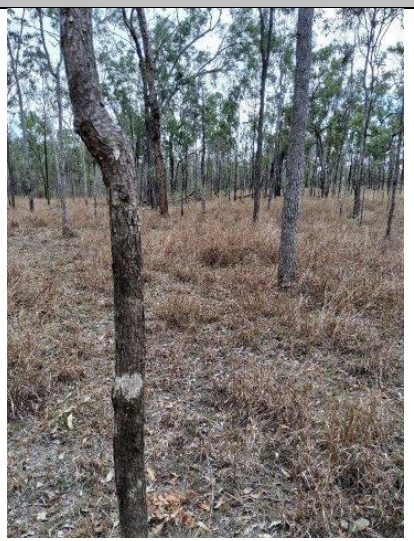
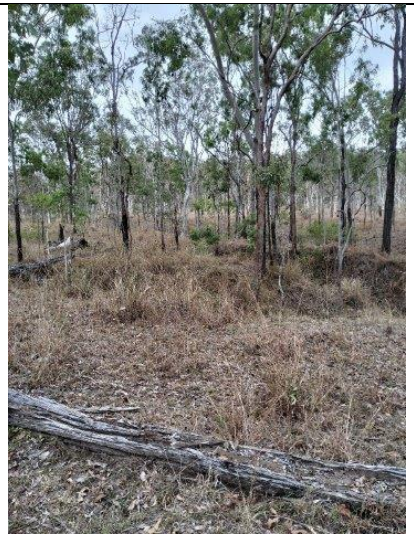
Habitat Quality Plot 21		
		
Start of transect (0m)	Centre point (50m) - North	Centre point (50m) - East
		
Centre point (50m) - South	Centre point (50m) - West	End of transect (100m)

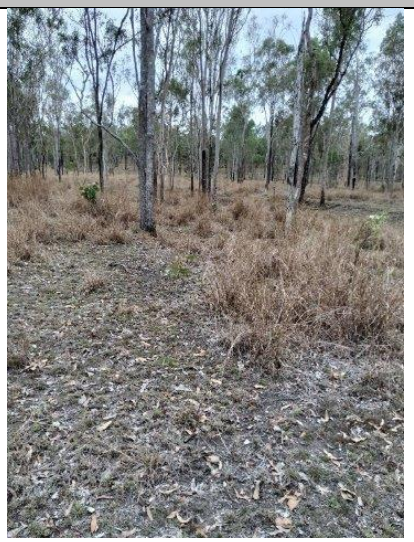
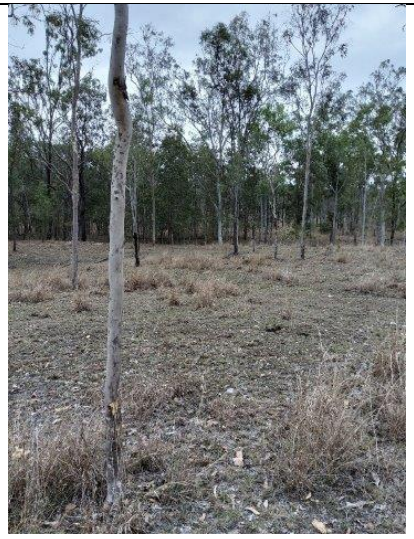
Habitat Quality Plot 22		
		
Start of transect (0m)	Centre point (50m) - North	Centre point (50m) - East
		
Centre point (50m) - South	Centre point (50m) - West	End of transect (100m)

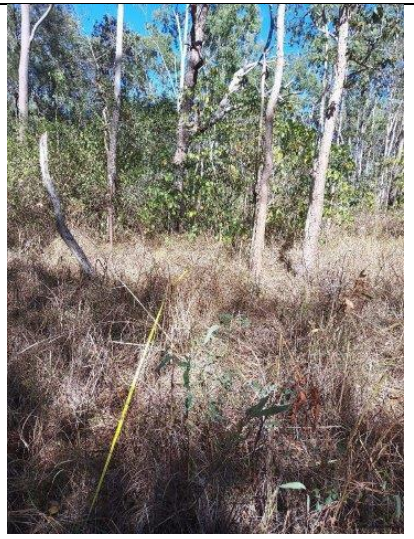
Habitat Quality Plot 23		
		
Start of transect (0m)	Centre point (50m) - North	Centre point (50m) - East
		
Centre point (50m) - South	Centre point (50m) - West	End of transect (100m)

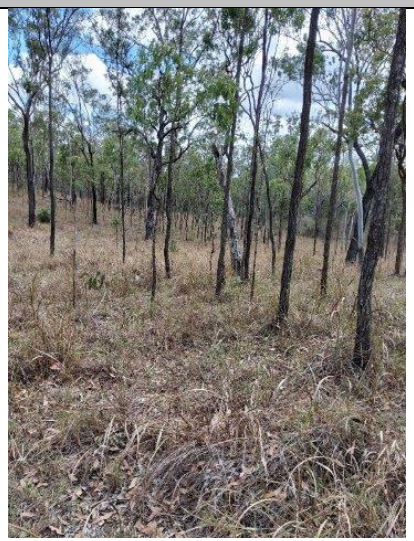
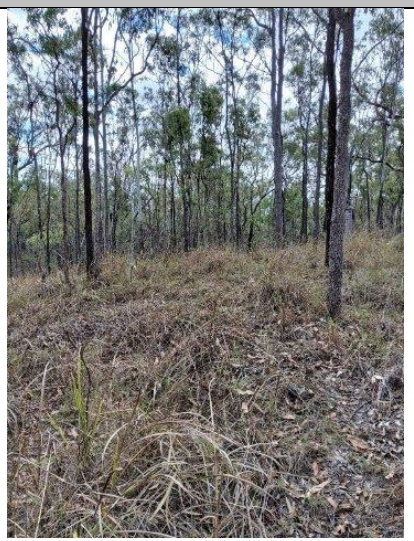
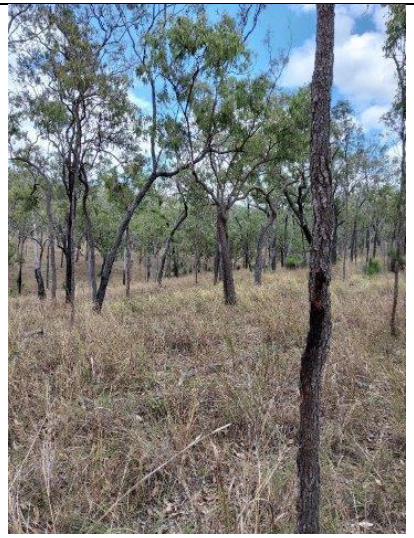
Habitat Quality Plot 24		
		
Start of transect (0m)	Centre point (50m) - North	Centre point (50m) - East
		
Centre point (50m) - South	Centre point (50m) - West	End of transect (100m)

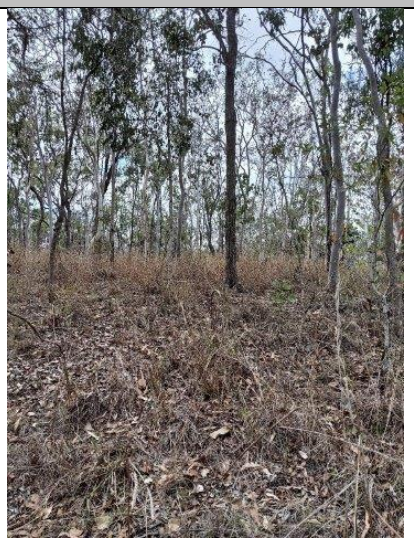
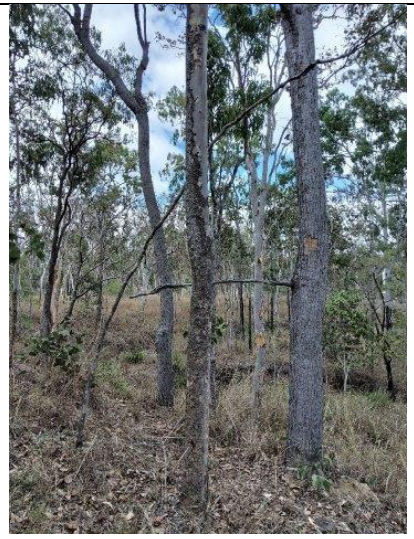
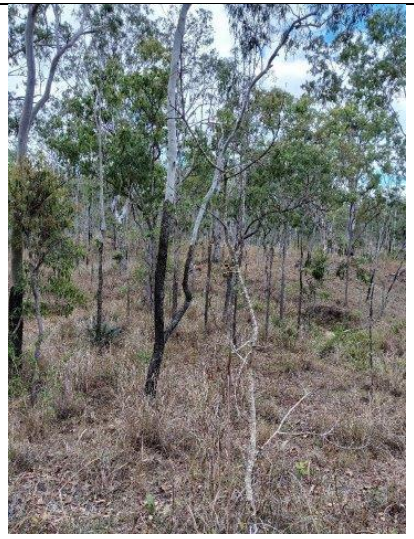
Habitat Quality Plot 25		
		
Start of transect (0m)	Centre point (50m) - North	Centre point (50m) - East
		
Centre point (50m) - South	Centre point (50m) - West	End of transect (100m)

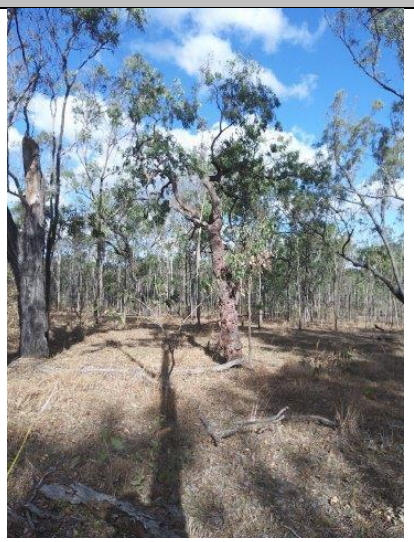
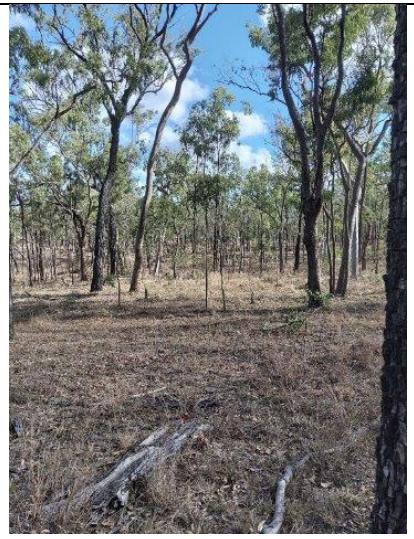
Habitat Quality Plot 26		
		
Start of transect (0m)	Centre point (50m) - North	Centre point (50m) - East
		
Centre point (50m) - South	Centre point (50m) - West	End of transect (100m)

Habitat Quality Plot 27		
		
Start of transect (0m)	Centre point (50m) - North	Centre point (50m) - East
		
Centre point (50m) - South	Centre point (50m) - West	End of transect (100m)

Habitat Quality Plot 28		
		
Start of transect (0m)	Centre point (50m) - North	Centre point (50m) - East
		
Centre point (50m) - South	Centre point (50m) - West	End of transect (100m)

Habitat Quality Plot 29		
		
Start of transect (0m)	Centre point (50m) - North	Centre point (50m) - East
		
Centre point (50m) - South	Centre point (50m) - West	End of transect (100m)

Habitat Quality Plot 30		
		
Start of transect (0m)	Centre point (50m) - North	Centre point (50m) - East
		
Centre point (50m) - South	Centre point (50m) - West	End of transect (100m)

Habitat Quality Plot 31		
		
Start of transect (0m)	Centre point (50m) - North	Centre point (50m) - East
		
Centre point (50m) - South	Centre point (50m) - West	End of transect (100m)

Appendix C

Offset Site Habitat Quality Scores

OFFSET SCORES - Koala

Assessment Unit - Regional Ecosystem	AU 1 - RE 11.12.1 remnant																							
Site Reference	Benchmark	MSB8			MSB10			MSB18			MSB19			MSB22			MSB23			MSB29			Average %	Average
	11.12.1	Raw Data	% Benchmark	Score	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	benchmar	Score
Site Condition																								
Recruitment of woody perennial species in EDL	**100**	50	50.00	3	100	100.00	5	100	100.00	5	66.6	66.60	3	75	75.00	5	100	100.00	5	60	60.00	3	69%	4.1
Native plant species richness - trees	**3**	3	100.00	5	2	66.67	3	3	100.00	5	6	200.00	5	4	133.33	5	4	133.33	5	5	166.67	5	113%	4.7
Native plant species richness - shrubs	**6**	1	16.67	2.5	2	33.33	3	3	50.00	3	4	66.67	3	2	33.33	3	2	33.33	3	3	50.00	3	35%	2.9
Native plant species richness - grasses	**8**	4	50.00	3	4	50.00	3	5	62.50	3	5	62.50	3	6	75.00	3	4	50.00	3	6	75.00	3	53%	3.0
Native plant species richness - forbes	**13**	8	61.54	3	8	61.54	3	11	84.62	3	10	76.92	3	10	76.92	3	6	46.15	3	10	76.92	3	61%	3.0
Tree canopy height (average of emergent, canopy, sub-canopy)	**12.5**	13.55	108.40	5	14.6	116.80	5	13.35	106.80	5	13	104.00	5	14.8	118.40	5	15	120.00	5	14	112.00	5	98%	5.0
Tree canopy cover (average of emergent, canopy, sub-canopy)	**21**	33.1	157.62	5	12.35	58.81	5	13.9	66.19	5	13.45	64.05	5	24.1	114.76	5	13.75	65.48	5	24.25	115.48	5	80%	5.0
Shrub canopy cover	**4**	0.4	10.00	3	3.7	92.50	5	0	0.00	0	1.6	40.00	3	0	0.00	0	0	0.00	0	0	0.00	0	18%	1.6
Native grass cover	**41**	76	185.37	5	52	126.83	5	46	112.20	5	46	112.20	5	43	104.88	5	52	126.83	5	49	119.51	5	111%	5.0
Organic litter	**28**	16	57.14	3	33	117.86	5	22	78.57	3	22	78.57	3	45	160.71	5	30	107.14	5	44	157.14	5	95%	4.1
Large trees (euc plus non-euc)	**20**	6	30.00	5	14	70.00	10	10	50.00	10	6	30.00	5	4	20.00	5	10	50.00	10	4	20.00	5	34%	7.1
Coarse woody debris	**408**	192	47.06	2	248	60.78	5	1050	257.35	3	880	215.69	3	542	132.84	5	392	96.08	5	375	91.91	5	113%	4.0
Non-native plant cover	**1**	2		10	6		5	5		5	5		5	5		5	5		5	20		5		5.7
Quality and availability of food and foraging habitat				10			10			10			10			10			10			10		10
Quality and availability of shelter				10			10			10			10			10			10			10		10
Site Condition Score				74.5			82			75			71			74			79			72		75.4
MAX Site Condition Score				*100*			*100*			*100*			*100*			*100*			*100*			*100*		*100*
Site Condition Score - out of 3																								**2.26**
Site Context																								
Size of patch				10			10			10			10			10			10			10		10.0
Connectedness				5			5			5			5			5			5			5		5.0
Context				5			5			5			5			5			5			5		5.0
Ecological Corridors				0			5			0			0			0			0			0		0.7
Threats to the species				1			1			1			1			1			1			1		1.0
Species mobility capacity				4			7			7			7			7			7			7		6.6
Role of site location to species overall population in the state				1			1			1			1			1			1			1		1.0
Site Context Score				26			34			29			29			29			29			29		29.28571
MAX Site Context Score				*56*			*56*			*56*			*56*			*56*			*56*			*56*		*56*
Site Context Score - out of 3																								**1.57**

Species Stocking Rate (SSR)						
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	Score	0	5	10		
		No	Yes - adjacent	Yes - on site		
Species usage of the site (habitat type & evidenced usage)	Score	0	5	10	15	
		Not habitat	Dispersal	Foraging	Breeding	
Approximate density (per ha)	Score	0	10	20	30	
		0%				
Role/importance of species population on site*	Score (*Total from supplementary table below*)	0	5	10	15	
		0	5 - 15	20 - 35	40 - 45	
Total SRR score (out of 70)						
SRR Score (out of 4)						

***SSR Supplementary Table**			
*Key source population for breeding	Score	0	10
		No	Yes/ Possibly
*Key source population for dispersal	Score	0	5
		No	Yes/ Possibly
*Necessary for maintaining genetic diversity	Score	0	15
		No	Yes/ Possibly
*Near the limit of the species range	Score	0	15
		No	Yes

Final habitat quality score (weighted)	**AU1**	**AU2**	**AU3**	**Average/Final**
Site Condition score (out of 3)	2.26	2.27	1.78	2.10
Site Context Score (out of 3)	1.57	1.61	1.55	1.58
Species Stocking Rate Score (out of 4)	1	1	1	1.00
Habitat Quality score (out of 10)	*4.8*	*4.9*	*4.3*	*4.68*
Assessment Unit area (ha)	571	253	15	
Total offset area (ha)	839	839	839	
Size Weighting	0.68	0.30	0.02	
Weighted Habitat Quality Score	***3.29***	***1.47***	***0.08***	***4.83***

OFFSET SCORES - Koala

AU 2 - RE 11.3.4 remnant																	AU 3 - RE 11.3.4 non-remnant									average %	score
Benchmarl	MSB13			MSB20			MSB21			MSB28			MSB30			Average %	Average	Benchmarl	MSB7			MSB17			Average %	Average		
11.3.4	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	benchmar	Score	11.3.4	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	benchmar	Score		
100	66	66.00	3	100	100.00	5	100	100.00	5	75	75.00	5	80	80.00	5	84%	4.6	100	50	50.00	3	100	100.00	5	50%	4.0	79%	3.93
4	4	100.00	5	8	200.00	5	8	200.00	5	7	175.00	5	6	150.00	5	165%	5.0	4	3	100.00	5	4	133.33	5	100%	5.0	140%	4.50
2	3	150.00	5	6	300.00	5	2	100.00	5	7	350.00	5	9	450.00	5	270%	5.0	2	1	16.67	2.5	2	33.33	3	17%	2.8	127%	3.43
7	5	71.43	3	4	57.14	3	5	71.43	3	6	85.71	3	4	57.14	3	69%	3.0	7	5	62.50	3	4	50.00	3	63%	3.0	64%	2.79
10	6	60.00	3	8	80.00	3	8	80.00	3	12	120.00	5	7	70.00	3	82%	3.4	10	7	53.85	3	5	38.46	3	54%	3.0	73%	2.93
17	14.4	84.71	5	20.4	120.00	5	21.6	127.06	5	33.6	197.65	5	16.8	98.82	5	126%	5.0	17	9.6	76.80	5	12.72	101.76	5	77%	5.0	115%	4.64
11	33.6	305.45	3	42.9	390.00	3	20.65	187.73	5	24.7	224.55	3	26.5	240.91	3	270%	3.4	11	11.2	53.33	5	11.4	54.29	5	53%	5.0	157%	4.07
1	6.1	610.00	3	2.7	270.00	3	0	0.00	0	15	1500.00	3	0.9	90.00	5	494%	2.8	1	0	0.00	0	0.6	15.00	3	0%	1.5	201%	1.79
43	60	139.53	5	46	106.98	5	20	46.51	1	14	32.56	1	32	74.42	3	80%	3.0	43	5	12.20	1	71	173.17	5	12%	3.0	100%	3.64
20	27	135.00	5	22	110.00	5	28	140.00	5	56	280.00	5	46	230.00	5	179%	5.0	20	8.6	30.71	1	23	82.14	3	31%	2.0	129%	3.93
26	16	61.54	10	20	76.92	10	20	76.92	10	4	15.38	5	8	30.77	5	52%	8.0	26	0	0.00	0	0	0.00	0	0%	0.0	41%	6.43
384	141	36.72	2	340	88.54	5	270	70.31	5	265	69.01	5	70	18.23	2	57%	3.8	384	28	6.86	0	31	7.60	0	7%	0.0	92%	3.36
0	10		5	20		5	60		0	30		3	5		5		3.6	0	2		10	51		0		5.0	13%	4.86
			10			10			10			10			10		10				10			10		10.0		10.00
			10			10			10			10			10		10				10			10		10.0		10.00
			77			82			72			73			74		75.6				58.5			60		59.25		74.15
			100			*100*			*100*			*100*			*100*		*100*				*100*			*100*		*100*		*100*
																	2.27									**1.78**		**2.22**
			10			10			10			10			10		10.0				10			10		10.0		10.00
			5			5			5			5			5		5.0				5			5		5.0		5.00
			5			5			5			5			5		5.0				5			5		5.0		5.00
			5			0			0			0			0		1.0				0			0		0.0		0.77
			1			1			1			1			1		1.0				1			1		1.0		1.00
			7			7			7			7			7		7.0				7			4		7.0		6.77
			1			1			1			1			1		1.0				1			1		1.0		1.00
			34			29			29			29			29		30				29			26		29		29.5
			56			*56*			*56*			*56*			*56*		*56*				*56*			*56*		*56*		*56*
																	1.61									**1.55**		**1.58**

OFFSET SCORES - Greater Glider

Assessment Unit - Regional Ecosystem	AU 1 - RE 11.12.1 remnant																							
Site Reference	Benchmark	MSB8			MSB10			MSB18			MSB19			MSB22			MSB23			MSB29			Average %	Average
	11.12.1	Raw Data	% Benchmark	Score	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	benchmar	Score
Site Condition																								
Recruitment of woody perennial species in EDL	**100**	50	50.00	3	100	100.00	5	100	100.00	5	66.6	66.60	3	75	75.00	5	100	100.00	5	60	60.00	3	69%	4.1
Native plant species richness - trees	**3**	3	100.00	5	2	66.67	3	3	100.00	5	6	200.00	5	4	133.33	5	4	133.33	5	5	166.67	5	113%	4.7
Native plant species richness - shrubs	**6**	1	16.67	2.5	2	33.33	3	3	50.00	3	4	66.67	3	2	33.33	3	2	33.33	3	3	50.00	3	35%	2.9
Native plant species richness - grasses	**8**	4	50.00	3	4	50.00	3	5	62.50	3	5	62.50	3	6	75.00	3	4	50.00	3	6	75.00	3	53%	3.0
Native plant species richness - forbes	**13**	8	61.54	3	8	61.54	3	11	84.62	3	10	76.92	3	10	76.92	3	6	46.15	3	10	76.92	3	61%	3.0
Tree canopy height (average of emergent, canopy, sub-canopy)	**12.5**	13.55	108.40	5	14.6	116.80	5	13.35	106.80	5	13	104.00	5	14.8	118.40	5	15	120.00	5	14	112.00	5	98%	5.0
Tree canopy cover (average of emergent, canopy, sub-canopy)	**21**	33.1	157.62	5	12.35	58.81	5	13.9	66.19	5	13.45	64.05	5	24.1	114.76	5	13.75	65.48	5	24.25	115.48	5	80%	5.0
Shrub canopy cover	**4**	0.4	10.00	3	3.7	92.50	5	0	0.00	0	1.6	40.00	3	0	0.00	0	0	0.00	0	0	0.00	0	18%	1.6
Native grass cover	**41**	76	185.37	5	52	126.83	5	46	112.20	5	46	112.20	5	43	104.88	5	52	126.83	5	49	119.51	5	111%	5.0
Organic litter	**28**	16	57.14	3	33	117.86	5	22	78.57	3	22	78.57	3	45	160.71	5	30	107.14	5	44	157.14	5	95%	4.1
Large trees (euc plus non-euc)	**20**	6	30.00	5	14	70.00	10	10	50.00	10	6	30.00	5	4	20.00	5	10	50.00	10	4	20.00	5	34%	7.1
Coarse woody debris	**408**	192	47.06	2	248	60.78	5	1050	257.35	3	880	215.69	3	542	132.84	5	392	96.08	5	375	91.91	5	113%	4.0
Non-native plant cover	**1**	2		10	6		5	5		5	5		5	5		5	5		5	20		5		5.7
Quality and availability of food and foraging habitat				10			10			10			10			10			10			10		10
Quality and availability of shelter				10			10			10			10			10			10			10		10
Site Condition Score				74.5			82			75			71			74			79			72		75.4
MAX Site Condition Score				*100*			*100*			*100*			*100*			*100*			*100*			*100*		*100*
Site Condition Score - out of 3																								**2.26**
Site Context																								
Size of patch				10			10			10			10			10			10			10		10.0
Connectedness				5			5			5			5			5			5			5		5.0
Context				5			5			5			5			5			5			5		5.0
Ecological Corridors				0			0			0			0			0			0			0		0.0
Threats to the species				7			7			7			7			7			7			7		7.0
Species mobility capacity				10			10			10			10			10			10			10		10.0
Role of site location to species overall population in the state				1			1			1			1			1			1			1		1.0
Site Context Score				38			38			38			38			38			38			38		38
MAX Site Context Score				*56*			*56*			*56*			*56*			*56*			*56*			*56*		*56*
Site Context Score - out of 3																								**2.04**

Species Stocking Rate (SSR)						
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	Score	0		5		10
		No		Yes - adjacent		Yes - on site
Species usage of the site (habitat type & evidenced usage)	Score	0	5	10		15
		Not habitat	Dispersal	Foraging		Breeding
Approximate density (per ha)	Score	0	10	20		30
		0%				
Role/importance of species population on site*	Score (*Total from supplementary table below*)	0	5		10	15
		0	5 - 15	20 - 35		40 - 45
Total SRR score (out of 70)						
SRR Score (out of 4)						

***SSR Supplementary Table**			
*Key source population for breeding	Score	0	10
		No	Yes/ Possibly
*Key source population for dispersal	Score	0	5
		No	Yes/ Possibly
*Necessary for maintaining genetic diversity	Score	0	15
		No	Yes/ Possibly
*Near the limit of the species range	Score	0	15
		No	Yes

Final habitat quality score (weighted)	**AU1**	**AU2**	**AU3**	**Average/Final**
Site Condition score (out of 3)	2.26	2.27	1.98	2.17
Site Context Score (out of 3)	2.04	2.05	1.88	1.99
Species Stocking Rate Score (out of 4)	0	0	0	0.00
Habitat Quality score (out of 10)	*4.3*	*4.3*	*3.9*	*4.16*
Assessment Unit area (ha)	571	253	15	
Total offset area (ha)	839	839	839	
Size Weighting	0.68	0.30	0.02	
Weighted Habitat Quality Score	***2.92***	***1.30***	***0.07***	***4.29***

OFFSET SCORES - Greater Glider

AU 2 - RE 11.3.4 remnant																	AU 3 - RE 11.3.4 non-remnant									Total	Total average
Benchmark	MSB13			MSB20			MSB21			MSB28			MSB30			Average %	Average	Benchmark	MSB7			MSB17			Average %	Average		
11.3.4	Raw Data	% Benchma	Score	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Raw Data	% Benchma	Score	benchmar	Score	11.3.4	Raw Data	% Benchma	Score	Raw Data	% Benchma	Score	benchmark	Score		
100	66	66.00	3	100	100.00	5	100	100.00	5	75	75.00	5	80	80.00	5	84%	4.6	100	50	50.00	3	100	100.00	5	100%	5.0	83%	4.07
4	4	100.00	5	8	200.00	5	8	200.00	5	7	175.00	5	6	150.00	5	165%	5.0	4	3	100.00	5	4	100.00	5	100%	5.0	140%	4.50
2	3	150.00	5	6	300.00	5	2	100.00	5	7	350.00	5	9	450.00	5	270%	5.0	2	1	16.67	2.5	2	100.00	5	100%	5.0	133%	3.61
7	5	71.43	3	4	57.14	3	5	71.43	3	6	85.71	3	4	57.14	3	69%	3.0	7	5	62.50	3	4	57.14	3	57%	3.0	63%	2.79
10	6	60.00	3	8	80.00	3	8	80.00	3	12	120.00	5	7	70.00	3	82%	3.4	10	7	53.85	3	5	50.00	3	50%	3.0	73%	2.93
17	14.4	84.71	5	20.4	120.00	5	21.6	127.06	5	33.6	197.65	5	16.8	98.82	5	126%	5.0	17	9.6	76.80	5	12.72	74.82	5	75%	5.0	115%	4.64
11	33.6	305.45	3	42.9	390.00	3	20.65	187.73	5	24.7	224.55	3	26.5	240.91	3	270%	3.4	11	11.2	53.33	5	11.4	103.64	5	104%	5.0	161%	4.07
1	6.1	610.00	3	2.7	270.00	3	0	0.00	0	15	1500.00	3	0.9	90.00	5	494%	2.8	1	0	0.00	0	0.6	60.00	5	60%	5.0	206%	2.14
43	60	139.53	5	46	106.98	5	20	46.51	1	14	32.56	1	32	74.42	3	80%	3.0	43	5	12.20	1	71	165.12	5	165%	5.0	112%	3.93
20	27	135.00	5	22	110.00	5	28	140.00	5	56	280.00	5	46	230.00	5	179%	5.0	20	8.6	30.71	1	23	115.00	5	115%	5.0	136%	4.21
26	16	61.54	10	20	76.92	10	20	76.92	10	4	15.38	5	8	30.77	5	52%	8.0	26	0	0.00	0	0	0.00	0	0%	0.0	41%	6.43
384	141	36.72	2	340	88.54	5	270	70.31	5	265	69.01	5	70	18.23	2	57%	3.8	384	28	6.86	0	31	8.07	0	8%	0.0	92%	3.36
0	10		5	20		5	60		0	30		3	5		5		3.6	0	2		10	51		0		0.0		4.14
			10			10			10			10			10		10				10			10		10.0		10.00
			10			10			10			10			10		10				10			10		10.0		10.00
			77			82			72			73			74		75.6				58.5			66		66		74.73
			100			*100*			*100*			*100*			*100*		*100*				*100*			*100*		*100*		*100*
																	2.27									**1.98**		**2.24**
			10			10			10			10			10		10.0				10			10		10.0		10.00
			5			5			5			5			5		5.0				5			5		5.0		5.00
			5			5			5			5			5		5.0				5			5		5.0		5.00
			5			5			0			0			0		2.0				0			0		0.0		0.77
			1			7			7			7			7		5.8				7			7		7.0		6.54
			10			10			10			10			7		9.4				7			7		7.0		9.54
			1			1			1			1			1		1.0				1			1		1.0		1.00
			37			43			38			38			35		38.2				35			35		35		37.8
			56			*56*			*56*			*56*			*56*		*56*				*56*			*56*		*56*		*56*
																	2.05									**1.88**		**2.03**

OFFSET SCORES - Squatter Pigeon

Assessment Unit - Regional Ecosystem	AU 1 - RE 11.12.1 remnant																							
Site Reference	Benchmark	MSB8			MSB10			MSB18			MSB19			MSB22			MSB23			MSB29			Average %	Average
	11.12.1	Raw Data	% Benchmark	Score	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	benchmar	Score
Site Condition																								
Recruitment of woody perennial species in EDL	**100**	50	50.00	3	100	100.00	5	100	100.00	5	66.6	66.60	3	75	75.00	5	100	100.00	5	60	60.00	3	69%	4.1
Native plant species richness - trees	**3**	3	100.00	5	2	66.67	3	3	100.00	5	6	200.00	5	4	133.33	5	4	133.33	5	5	166.67	5	113%	4.7
Native plant species richness - shrubs	**6**	1	16.67	2.5	2	33.33	3	3	50.00	3	4	66.67	3	2	33.33	3	2	33.33	3	3	50.00	3	35%	2.9
Native plant species richness - grasses	**8**	4	50.00	3	4	50.00	3	5	62.50	3	5	62.50	3	6	75.00	3	4	50.00	3	6	75.00	3	53%	3.0
Native plant species richness - forbes	**13**	8	61.54	3	8	61.54	3	11	84.62	3	10	76.92	3	10	76.92	3	6	46.15	3	10	76.92	3	61%	3.0
Tree canopy height (average of emergent, canopy, sub-canopy)	**12.5**	13.55	108.40	5	14.6	116.80	5	13.35	106.80	5	13	104.00	5	14.8	118.40	5	15	120.00	5	14	112.00	5	98%	5.0
Tree canopy cover (average of emergent, canopy, sub-canopy)	**21**	33.1	157.62	5	12.35	58.81	5	13.9	66.19	5	13.45	64.05	5	24.1	114.76	5	13.75	65.48	5	24.25	115.48	5	80%	5.0
Shrub canopy cover	**4**	0.4	10.00	3	3.7	92.50	5	0	0.00	0	1.6	40.00	3	0	0.00	0	0	0.00	0	0	0.00	0	18%	1.6
Native grass cover	**41**	76	185.37	5	52	126.83	5	46	112.20	5	46	112.20	5	43	104.88	5	52	126.83	5	49	119.51	5	111%	5.0
Organic litter	**28**	16	57.14	3	33	117.86	5	22	78.57	3	22	78.57	3	45	160.71	5	30	107.14	5	44	157.14	5	95%	4.1
Large trees (euc plus non-euc)	**20**	6	30.00	5	14	70.00	10	10	50.00	10	6	30.00	5	4	20.00	5	10	50.00	10	4	20.00	5	34%	7.1
Coarse woody debris	**408**	192	47.06	2	248	60.78	5	1050	257.35	3	880	215.69	3	542	132.84	5	392	96.08	5	375	91.91	5	113%	4.0
Non-native plant cover	**1**	2		10	6		5	5		5	5		5	5		5	5		5	20		5		5.7
Quality and availability of food and foraging habitat				10			10			10			10			10			10			10		10
Quality and availability of shelter				10			10			10			10			10			10			10		10
Site Condition Score				74.5			82			75			71			74			79			72		75.4
MAX Site Condition Score				*100*			*100*			*100*			*100*			*100*			*100*			*100*		*100*
Site Condition Score - out of 3																								**2.26**
Site Context																								
Size of patch				10			10			10			10			10			10			10		10
Connectedness				5			5			5			5			5			5			5		5
Context				5			5			5			5			5			5			5		5
Ecological Corridors				0			5			0			0			0			0			0		0.714286
Threats to the species				7			7			7			7			7			7			7		7
Species mobility capacity				7			7			7			7			7			7			7		7
Role of site location to species overall population in the state				1			1			1			1			1			1			1		1
Site Context Score				35			40			35			35			35			35			35		35.71429
MAX Site Context Score				*56*			*56*			*56*			*56*			*56*			*56*			*56*		*56*
Site Context Score - out of 3																								**1.91**

Species Stocking Rate (SSR)						
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	Score	0		5		10
		No		Yes - adjacent		Yes - on site
Species usage of the site (habitat type & evidenced usage)	Score	0	5	10		15
		Not habitat	Dispersal	Foraging		Breeding
Approximate density (per ha)	Score	0	10	20		30
		0%				
Role/importance of species population on site*	Score (*Total from supplementary table below*)	0	5		10	15
		0	5 - 15	20 - 35		40 - 45
Total SRR score (out of 70)						
SRR Score (out of 4)						

***SSR Supplementary Table**			
*Key source population for breeding	Score	0	10
		No	Yes/ Possibly
*Key source population for dispersal	Score	0	5
		No	Yes/ Possibly
*Necessary for maintaining genetic diversity	Score	0	15
		No	Yes/ Possibly
*Near the limit of the species range	Score	0	15
		No	Yes

Final habitat quality score (weighted)	**AU1**	**AU2**	**AU3**	**Average/Final**
Site Condition score (out of 3)	2.26	2.27	1.87	2.13
Site Context Score (out of 3)	1.91	1.93	1.88	1.91
Species Stocking Rate Score (out of 4)	1	1	1	1.00
Habitat Quality score (out of 10)	*5.2*	*5.2*	*4.7*	*5.04*
Assessment Unit area (ha)	571	253	15	
Total offset area (ha)	839	839	839	
Size Weighting	0.68	0.30	0.02	
Weighted Habitat Quality Score	***3.52***	***1.57***	***0.08***	***5.17***

OFFSET SCORES - Squatter Pigeon

AU 2 - RE 11.3.4 remnant																		AU 3 - RE 11.3.4 non-remnant									Total	Total
Benchmark	MSB13			MSB20			MSB21			MSB28			MSB30			Average %	Average	Benchmark	MSB7			MSB17			Average %	Average	average %	average
11.3.4	Raw Data	% Benchma	Score	Raw Data	% Benchma	Score	Raw Data	% Benchma	Score	Raw Data	% Benchma	Score	Raw Data	% Benchma	Score	benchmar	Score	11.3.4	Raw Data	% Benchma	Score	Raw Data	% Benchma	Score	benchmar	Score	benchmark	score
100	66	66.00	3	100	100.00	5	100	100.00	5	75	75.00	5	80	80.00	5	84%	4.6	100	50	50.00	3	100	100.00	5	100%	4.0	83%	7.64
4	4	100.00	5	8	200.00	5	8	200.00	5	7	175.00	5	6	150.00	5	165%	5.0	4	3	100.00	5	4	100.00	5	100%	5.0	140%	11.64
2	3	150.00	5	6	300.00	5	2	100.00	5	7	350.00	5	9	450.00	5	270%	5.0	2	1	16.67	2.5	2	100.00	5	100%	3.8	133%	4.80
7	5	71.43	3	4	57.14	3	5	71.43	3	6	85.71	3	4	57.14	3	69%	3.0	7	5	62.50	3	4	57.14	3	57%	3.0	63%	7.25
10	6	60.00	3	8	80.00	3	8	80.00	3	12	120.00	5	7	70.00	3	82%	3.4	10	7	53.85	3	5	50.00	3	50%	3.0	73%	6.77
17	14.4	84.71	5	20.4	120.00	5	21.6	127.06	5	33.6	197.65	5	16.8	98.82	5	126%	5.0	17	9.6	76.80	5	12.72	74.82	5	75%	5.0	115%	10.13
11	33.6	305.45	3	42.9	390.00	3	20.65	187.73	5	24.7	224.55	3	26.5	240.91	3	270%	3.4	11	11.2	53.33	5	11.4	103.64	5	104%	5.0	161%	7.88
1	6.1	610.00	3	2.7	270.00	3	0	0.00	0	15	1500.00	3	0.9	90.00	5	494%	2.8	1	0	0.00	0	0.6	60.00	5	60%	2.5	206%	2.14
43	60	139.53	5	46	106.98	5	20	46.51	1	14	32.56	1	32	74.42	3	80%	3.0	43	5	12.20	1	71	165.12	5	165%	3.0	112%	4.80
20	27	135.00	5	22	110.00	5	28	140.00	5	56	280.00	5	46	230.00	5	179%	5.0	20	8.6	30.71	1	23	115.00	5	115%	3.0	136%	6.41
26	16	61.54	10	20	76.92	10	20	76.92	10	4	15.38	5	8	30.77	5	52%	8.0	26	0	0.00	0	0	0.00	0	0%	0.0	41%	6.43
384	141	36.72	2	340	88.54	5	270	70.31	5	265	69.01	5	70	18.23	2	57%	3.8	384	28	6.86	0	31	8.07	0	8%	0.0	92%	3.85
0	10		5	20		5	60		0	30		3	5		5		3.6	0	2		10	51		0		5.0		4.46
			10			10			10			10			10		10				10			10		10.0		10.00
			10			10			10			10			10		10				10			10		10.0		10.00
			77			82			72			73			74		75.6				58.5			66		62.3		73.57
			100			*100*			*100*			*100*			*100*		*100*				*100*			*100*		*100*		*100*
																	2.27									**1.87**		**2.21**
			10			10			10			10			10		10				10			10		10		10.00
			5			5			5			5			5		5				5			5		5		5.00
			5			5			5			5			5		5				5			5		5		5.00
			5			0			0			0			0		1				0			0		0		0.77
			7			7			7			7			7		7				7			7		7		7.00
			7			7			7			7			7		7				7			7		7		7.00
			1			1			1			1			1		1				1			1		1		1.00
			40			35			35			35			35		36				35			35		35		35.8
			56			*56*			*56*			*56*			*56*		*56*				*56*			*56*		*56*		*56*
																	1.93									**1.88**		**1.92**

Appendix D

EPBC Offset Calculator Results

BASE/

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Koala
EPBC Act status	Vulnerable
Annual probability of extinction Based on IUCN category definitions	**0.2%**

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes	Refer to supporting documentation	**Area**	208	Hectares	Refer to supporting documentation
			Quality	**3**	Scale 0-10	
			Total quantum of impact	62.40	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				**Risk-related time horizon (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**									
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0								
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**									
Threatened species habitat																				
Area of habitat	Yes	62.40	Adjusted hectares	Refer to supporting documentation	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	722	**Risk of loss (%) without offset**	0%	**Risk of loss (%) with offset**	0%	0.00	90%	0.00	0.00	62.43	100.06%	Yes	
									Future area without offset (adjusted hectares)	722.0	**Future area with offset (adjusted hectares)**	722.0								
					Time until ecological benefit	20	**Start quality (scale of 0-10)**	5	**Future quality without offset (scale of 0-10)**	5	**Future quality with offset (scale of 0-10)**	6	1.00	90%	0.90	0.86				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Greater Glider
EPBC Act status	Vulnerable
Annual probability of extinction Based on IUCN category definitions	**0.2%**

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes	Refer to supporting documentation	**Area**	208	Hectares	Refer to supporting documentation
			Quality	**4**	Scale 0-10	
			Total quantum of impact	83.20	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				**Risk-related time horizon (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**									
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0								
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**									
Threatened species habitat																				
Area of habitat	Yes	83.20	Adjusted hectares	Refer to supporting documentation	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	482	**Risk of loss (%) without offset**	0%	**Risk of loss (%) with offset**	0%	0.00	90%	0.00	0.00	83.36	100.19%	Yes	
									Future area without offset (adjusted hectares)	482.0	**Future area with offset (adjusted hectares)**	482.0								
					Time until ecological benefit	20	**Start quality (scale of 0-10)**	4	**Future quality without offset (scale of 0-10)**	4	**Future quality with offset (scale of 0-10)**	6	2.00	90%	1.80	1.73				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Squatter Pigeon
EPBC Act status	Vulnerable
Annual probability of extinction Based on IUCN category definitions	**0.2%**

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes		**Area**	181	Hectares	Refer to supporting documentation
			Quality	**4**	Scale 0-10	
			Total quantum of impact	72.40	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				**Risk-related time horizon (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**									
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0								
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**									
Threatened species habitat																				
Area of habitat	Yes	72.40	Adjusted hectares	Refer to supporting documentation	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	838	**Risk of loss (%) without offset**	0%	**Risk of loss (%) with offset**	0%	0.00	90%	0.00	0.00	72.47	100.09%	Yes	
									Future area without offset (adjusted hectares)	838.0	**Future area with offset (adjusted hectares)**	838.0								
					Time until ecological benefit	20	**Start quality (scale of 0-10)**	**5**	**Future quality without offset (scale of 0-10)**	**5**	**Future quality with offset (scale of 0-10)**	**6**	1.00	90%	0.90	0.86				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

Appendix E

Regional Ecosystem Fire Management Guidelines

BASE/

RE index	Bioregion	Regional Ecosystem	Description label	Fire guidelines
110304	BRB	11.3.4	Eucalyptus tereticornis and/or Eucalyptus spp. woodland on alluvial plains	SEASON: Late wet to early dry season when there is good soil moisture. Early storm season or after good spring rains. INTENSITY: Low to moderate. INTERVAL: 6-10 years (shorter in north of bioregion: 2 - 7 years). STRATEGY: Restrict to less than 30% in any year. Burn under conditions of good soil moisture and when plants are actively growing. Sometimes a small amount of wind may move the fire front quickly so that burn intensity is not too severe to destroy habitat trees. ISSUES: Burn interval for conservation purposes will differ from that for grazing purposes; the latter being much shorter. Management of this vegetation type should be based on maintaining vegetation composition, structural diversity, fauna habitats (in particular hollow-bearing trees and logs) and preventing extensive wildfire. Maintaining a fire mosaic will help ensure protection of habitat and mitigate against wildfires. Fire can control shrub invasives (e.g., Eremophila spp. and A. stenophylla in the red soil country in particular). Fire will also control cypress. Low to moderate intensity burns with good soil moisture are necessary to minimise loss of hollow trees. Avoid burning riparian communities as these can be critical habitat for some species. Culturally significant (scar) trees may need protection, such as rake removal of ground fuels. Planned burns have traditionally been carried out in the winter dry season; further research required.
111201	BRB	11.12.1	Eucalyptus crebra woodland on igneous rocks	SEASON: Late wet to early dry season when there is good soil moisture. Early storm season or after good spring rains. INTENSITY: Various. b, c: Various. Mainly low, but also moderate. INTERVAL: 6-15 years (shorter intervals north of bioregion 5 - 10 years). b, c: >3years. STRATEGY: 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. b, c: 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. ISSUES: Management of this fire tolerant vegetation type should 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; further research required. b, c: Fire can be used to control weed invasions, although there are also risks of promoting weeds.