WOOLOOGA SOLAR FARM: STAGE 1
LOWER WONGA, QUEENSLAND (EPBC 2019/8554)

Offset Management Plan

147105
V8.0
21 June 2021

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Document status

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Approval for issue

Mark Aitkens  11 June 2021

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1 INTRODUCTION

RPS has been engaged by Lightsource bp (the 'proponent') to prepare an Offset Management Plan (OMP) to provide a management framework necessary for delivering amelioration measures for impacts incurred on Koala (*Phascolarctos cinereus*) and Grey-headed Flying-fox (*Pteropus poliocephalus*) arising from the development of a photovoltaic (PV) solar farm (hereafter referred to as the 'Project') over land at Wide Bay Highway, Lower Wonga. The Project is approximately 30 km north-west of Gympie within the Gympie Regional Local Government Area (LGA). The following land parcels are hereafter collectively referred to as the 'Project site':

- Woolooga 1 – at 1580, 1496, 1612, and 1418 Wide Bay Highway, Lower Wonga (Lot 158 LX327, Lots 159 and 90 SP237339 and Lot 86 LX472): and
- Woolooga 2 Site B –at 1706 Wide Bay Highway, Woolooga (Lot 157 in LX2424).

The development footprint associated with these sites is hereafter termed the 'Project footprint'. Within the Project site and adjoining to the north of the Project footprint is the 'Offset site'. This OMP applies to the area referred to as the 'Offset site', as shown in **Figure 1**.

1.1 Need for an OMP

The Department of Agriculture, Water and the Environment (DAWE) declared the Project as a controlled action on 12 March 2020 and is to be assessed via Preliminary Documentation. In a letter dated 17 April 2020, DAWE specified the additional information requirements in relation to the Preliminary Documentation (RPS 2020) for the Project, EPBC Referral (Reference 2019/8554).

The primary concerns identified by DAWE pertain to potential impacts on:

- Koala (*Phascolarctos cinereus*; EPBC Act: Vulnerable); and
- Grey-headed Flying-fox (*Pteropus poliocephalus*; EPBC Act: Vulnerable).

Pending on Project receiving approval under the EPBC Act, it is likely that the conditions of the approval will require that the approval holder must submit an OMP for the Minister's written approval. As such, this OMP was prepared pre-empting the scope of the OMP (based on similar and recent Projects), which is outlined in **Section 1.2**.

This OMP was prepared with reference to the *Environmental Management Plan Guidelines* (DoE; 2014), and the *EPBC Act Environmental Offset Policy* (2012).

1.2 Scope of OMP

The scope for the preparation of an OMP and areas these criteria are addressed is summarised in **Table 1**.

Table 1: Indicative Conditions to be addressed in OMP

Scope		Section addressed in OMP
a.	Detail of the Offset site(s) required to address the loss of Koala and Grey-headed Flying-fox foraging habitat consistent with the Offset Strategy.	**Section 2**
b.	Detail of the proposed legal mechanism and timeframes for securing the Offset site(s).	**Section 1.3**
c.	A map of the Offset site(s) in relation to other habitats and biodiversity corridors.	**Figure 3**
d.	Information about how the Offset site(s) provide connectivity with other Koala habitat and biodiversity corridors.	**Section 2.7.2**
e.	A description of the current condition (prior to any management activities) of the Offset site(s), including baseline survey data.	**Section 2; Appendix A**
f.	A description of the management measures (including timing, frequency and longevity) that will be implemented, including	**Section 3**

Scope		Section addressed in OMP
	discussion of how measures outlined take into account relevant conservation advice.	
g.	Performance and completion criteria for evaluating the management of the Offset site(s), and detailed criteria that will trigger corrective actions.	**Section 3**
h.	A detailed program to monitor and report on the effectiveness of these measures, and progress against the performance and completion criteria.	**Section 4**
i.	Potential risks to the successful implementation of the plan, and a description of the contingency measures that would be implemented to mitigate against these risks, including bushfire management plan and a pest species management plan.	**Section 3**

1.3 Legal protection mechanism and timeframes

The proposed Offset site is within the landholding boundary of the Project, which will all come under the freehold ownership and control of the Project proponent prior to construction. Therefore, the offset will be secured on-site. The Project site covers 5 lots which will be amalgamated within one year of commencement of use (i.e. commercial operation of the solar farm) as conditioned by the Development Approval. It is proposed that following the amalgamation of the lots, the Offset site will then be legally secured into perpetuity in accordance with the EPBC Act OMP. The legal mechanism of securing the offset is proposed to be a Voluntary Declaration under the *Vegetation Management Act 1999* (hereafter referred to as a V-Dec). This will be required to be in place for the duration of the impact until another suitable mechanism is established, and evidence of this is provided to the DAWE. Following the duration of the impact associated with the life of the Project, the Offset site will be transferred to a wildlife refuge thereafter. The management of the Offset site will continue to be managed for conservation in accordance with the OMP for the life of the Project.

1.3.1 General restrictions

To achieve the management outcomes, it is necessary to restrict or promote certain activities and access to ensure the management outcomes are achieved. In this instance, the management outcome is to improve, expand and maintain the area of remnant vegetation and to revegetate another area. Management programs will broadly include:

- weed management program;
- control of feral pests, such as pigs and wild dogs;
- fencing to control stock access;
- managing vegetation in accordance with the management plan;
- stabilising areas prone to land degradation; and
- fire regimes appropriate to the vegetation.

1.3.2 Exempt clearing work

Clearing can still occur in declared areas within the offset site mapped as Category A (vegetation that is subject to compliance notices, offsets and voluntary declarations). For this reason, it is important that the V-Dec management plans contain sufficient restrictions to ensure that clearing does not erode the intended protection.

The declared area may be subject to exempt clearing work under schedule 21 of the *Planning Regulation 2017* for the following activities:

- weed control;

- public safety;
- fodder harvesting;
- managing thickened vegetation;
- clearing for encroachment;
- necessary environmental clearing; and
- clearing to establish a necessary fence, firebreak, road or vehicular track, where the clearing cannot reasonably be avoided or minimised.

1.4 Environmental outcomes and objectives

In accordance with the (pending) EPBC Act approval, the following outcomes will be achieved through the implementation of the OMP:

- Maintain and improve Koala and Grey-headed Flying-fox habitat across the Offset site;
- Regenerate remnant zones and revegetate non-remnant zones within the Offset site;
- Ensure quality of remnant vegetation is maintained through implementing an appropriately designed Vegetation Management Plan;
- Implement adaptive management techniques to ensure effective ecological outcomes. These will include applying milestone targets and monitoring programs tailored to each management action; and
- Undertake Annual Compliance Report (ACR). The ACR will outline how implementation, management and achievements contribute towards accomplishing the performance and completion criteria.

In alignment with the *EPBC Act Environmental Offsets Policy* (2012), the management objectives for the Offset site will:

- Provide a positive conservation outcome for the habitat quality of Koala and Grey-headed Flying-fox. This will be achieved by maintaining, improving, and expanding remnant vegetation;
- Provide a direct offset that is in proportion with the level of statutory protection that applies to both Koala and Grey-headed Flying-fox habitat;
- Be of a size and scale that is proportionate to the residual impacts of the Koala and Grey-headed Flying-fox;
- Account for and manage the risk of the offset not being successful within the allocated timeframe;
- Exceed current conservation gain benchmarks outlined by a duty of care, or by any environmental planning laws at each government level; and
- Be efficient, effective, timely, transparent, scientifically robust, and reasonable with appropriate transparent governance arrangements in place for measuring, monitoring, auditing and enforcing the management of the Offset site.

1.5 Roles and responsibilities

Eight key roles responsible for the implementation of this OMP are outlined in **Table 2**.

Table 2: OMP roles and responsibilities

Role	Qualification	Responsibility
Project Conservation Manager	• Minimum Diploma or Degree in Natural resource management or related discipline. • 10 or more years' experience.	• Implementation of OMP • Point of contact.
Project Ecologist	• Tertiary qualifications in ecology. • 10 or more years' experience.	• Forest enrichment • Monitoring • OMP compliance (audit).

Role	Qualification	Responsibility
Bush regeneration specialist	• Minimum Diploma or Degree in Natural resource management or related discipline. • 10 or more years' experience.	• Weed management.
Project Pest Management Specialist	• Minimum Certificate III in Vertebrate Pest Management. • 10 or more years' experience.	• Preparation of Pest Management Plan.
Licensed seed collector	• Protected Plant Harvesting Licence (Section 14(b) – Nature Conservation (Administration) Regulation 2017) to collect and propagate seed.	• Seed collection • Propagation.
Project Bushfire Specialist	• FPAA - Building Planning & Design Level 2 Accredited.	• Preparation of BFMP • Oversee delivery of fuel load maintenance.
Project Forester	• Degree in forest sciences and management or equivalent. • Five or more years' experience.	• Forest revegetation works.
Land Holder (the proponent)	• N/A.	• Implementation of this plan in consultation with suitably experienced and qualified service providers.

1.6 Implementation

The primary objective of the OMP is to implement and complete the relevant mitigation measures specified in Conditions of the (pending) EPBC Act approval, as necessary, for the establishment of a long term positive ecological outcome for the Koala and Grey-headed Flying-fox. The OMP is to be implemented prior to works commencing within the Development footprint.

It is proposed to complete these works with a 20-year management time horizon. The OMP is designed to continue in perpetuity, guided by evidence-based evaluation of performance criteria against monitoring results that demonstrate completion.

The evaluation of performance targets (see **Section 3**) is to be performed annually using data obtained from the monitoring program and associated analysis of results (see **Section 4**). The decision framework used to evaluate the efficacy of the OMP is described in **Section 4.8** (i.e. Adaptive Management Framework; AMF), which also allows for the introduction of adjustments, where necessary, to maintain a timely delivery on the OMPs objectives. The evaluation of OMP performance will be conducted annually and reported with the annual monitoring results to DAWE via an ACR, as detailed in **Section 5.1**. Based on the outcomes of monitoring in accordance with the relevant Trigger Action Response Plan (TARP; see **Section 3**), the OMP will be updated as required (see **Section 5.2**).

1.7 Relationship with other Management Plans

The proponent will enter into an integrated management framework, involving the implementation of this OMP in association with a Council-approved Biodiversity Management Plan (BMP; RPS, 2020a), prepared for the Project site. The BMP focuses on the impact footprint and outlines the management actions required for minimising the effects of native vegetation and habitat loss from within that Project footprint. Given the proximity of the Project footprint to the Offset site, objectives stated in the BMP that relevant to this OMP are listed below:

- Protect remnant native vegetation and habitat outside the approved disturbance areas;
- Manage remnant vegetation and fauna habitat within the Project site;
- Minimise impacts to fauna within the Project site;
- Rehabilitate and revegetate temporary disturbance areas to protect soil and minimise erosion; and
- Maximise the salvage of vegetative and soil resources within the approved disturbance area.

The BMP provides guidance on the performing of pre-clearance flora and fauna management protocols, which have the purpose of minimising impacts on biodiversity. These measures will be adopted within the OMP where impacts to biodiversity are required in the establishment and maintenance of the Offset site, with relevant sections of the BMP referred to in this OMP. Preparatory works designed to accommodate the relocation of any fauna removed from the areas to be cleared are also detailed in the BMP (e.g. nest box installations). The nest box installations and wildlife translocation will be undertaken in the Offset site according to the methodology presented in the BMP.

1.8 Definitions

Table 3: Definitions

Term	Definition
ACR	Annual Compliance Report
AMF	Adaptive Management Framework
BFMP	Bushfire Management Plan
BMP	Biodiversity Management Plan
Council	Gympie Regional Council
DAF	Department of Agriculture and Fisheries
DAWE	Department of Agriculture, Water and the Environment
DoE	Department of the Environment
EMZ	Environmental Management Zone
EMZ 1 (intact)	An Environmental Management Zone (EMZ) area within the Offset Site of remnant and regrowth vegetation which persists in a relatively intact remnant and regrowth condition.
EMZ 2 (regeneration zone)	An EMZ area within the Offset Site that is largely void of native vegetation which is likely to respond well to natural regeneration and active management (e.g. planting).
EPBC Act	*Environmental Protection and Biodiversity Conservation Act* 1999
GBO	General Biosecurity Obligation
GIS	Global Information System
GPS	Global Positioning System
HTW	Weeds of National Significance (WoNS) and weeds restricted under Queensland's *Biosecurity Act 2014,* collectively referred to as High Threat Weeds (HTW)
IBRA	Interim Biogeographic Regionalisation for Australia
KTP	Key Threatening Process
LZ	Land Zone
NP	National Park
Offset site	Land allocated for offsetting impacts to Koala and Grey-headed Flying-fox in the north of the Project site
OMP	Offset Management Plan
PKFT	Primary Koala Feed Tree
PMP	Pest Management Plan
Project site	Woolooga 1 (Lot 158 on LX327, Lot 159 on SP237339, Lot 86 on LX472 and Lot 90 on SP237339) and Woolooga 2 Site B (Lot 157 on LX2424)
Project footprint	The development footprint associated with the Project site
PV	Photovoltaic
QFES	Queensland Fire and Emergency Services
RE	Regional ecosystem type
SEQ	South-east Queensland
TARP	Trigger Action Response Plan
WMP	Weed Management Plan
WoNS	Weeds of National Significance

Project footprint
Woolooga Site 1
Woolooga Site 2B
Offset site
Site access point
Perimeter fencing
Livestock fencing
Road
River/stream
Cadastre

Woolooga Site 2B

Woolooga Site 1

LOCATION

Mount Walsh National Park
Tuan State Forest
742 m
Gronganh National Park
Gympie
Toolara State Forest
Wrattens National Park
Bondai State Forest
Yabba State Forest
Imbil State Forest
Bruce Hwy

84 LX549
161 LX326
4 SP133367
3 SP133367
1 SP133367
85 SP310637
86 LX472
90 SP237339
1 SP285774
2 RP186174
3 RP186174
Wide Bay Hwy
155 LX2414
2 SP285774
216 LX509
2 SP295954
4 RP186174
159 SP237339
1 SP295954
Hayes Rd
234 LX495
Gympie Wooloogа Rd
310 LX2129
EMT LX2129
1 RP851778
2 RP851778
3 RP851778
233 RP851778
235 LX2129
236 LX496
2 RP151892

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N

0 100 200 400 600 800 1,000 m

SCALE: 1:15,000 AT A3 SIZE

FIGURE 1
LOCATION MAP AND OFFSET SITE

LOCATION:
1706 WIDE BAY HWY
WOOLOOGA

PURPOSE:
OFFSET MANAGEMENT PLAN

DATE: **21/06/2021**
VERSION: **E**

CO-ORD SYSTEM:
DATA SOURCE: **RPS, ESRI, QLD GOVT**
PATH:
\\ntlfile1\data\JOBS\147k\147105 Lower Wonga\10 - Drafting\147105_LowerWonga_Wooloooga\147105_LowerWonga_Wooloooga.aprx

CLIENT: **Lightsource bp**
JOB REF: **PR147105**
TECHNICIAN: **Robert.Suansri**

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2 OFFSET SITE VALUES

2.1 Bioregional context

Queensland is comprised of thirteen biogeographical areas that identify biodiversity features at a regional scale. The Offset site is located in the Gympie Block IBRA sub-region, within the South Eastern Queensland (SEQ) IBRA bioregion. This bioregion is bordered by the Brigalow Belt South bioregion to the west and extends south into northern New South Wales where it is bordered by the NSW North Coast bioregion. The SEQ bioregion extends from the North Coast of NSW north to Gladstone and is bounded to the west by the Great Dividing Range. Ranges extend north to south through the centre of the bioregion, creating an altitudinal gradient from the coast.

2.2 Geology and hydrology

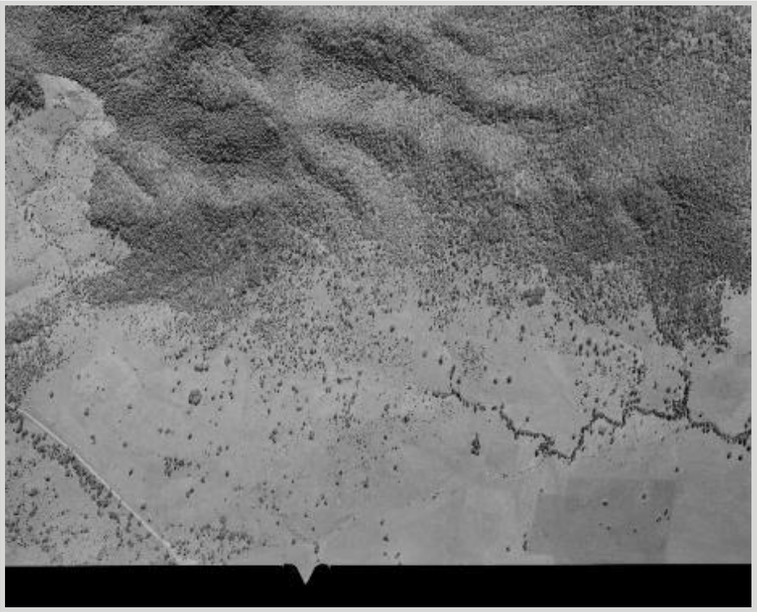
The Offset site is located at the foothills of an undulating low-rise landform, with a south-facing aspect. The dominant Land Zone (LZ) present in the Offset site is LZ 11; Hills and lowlands on metamorphic rocks. These areas lack significant free-standing water, with ephemeral first order tributaries of Hookey Creek and Bongmillerer Creek, which are part of the Lower Mary River drainage basin.

2.3 Previous land uses and events

Notable disturbances evident within the Offset site and more broadly operating in the local area include:

- Historical land clearing and logging;
- Past and current livestock grazing;
- Track constructions within native vegetation; and
- Firewood collection.

A review of available historic photographs shows the progressive degradation of the Offset site with increasing incursion of agricultural practices, which originated within low-land areas to the south (including the Project footprint; see **Plate 1**. In its present state, the extent and influence of these disturbances varies across the Offset site and is largely determined by access (i.e. changes in terrain). Steeper, rockier lands have fewer discernible evidence of past/current livestock grazing as the suitability and access to these areas is poor. Based on the terrain, most of the livestock grazing is restricted to the predominantly treeless and lightly wooded parts of the Offset site, which are associated with a lower relief and simplified/absent shrub and grassier groundcover stratum.



Picture 1 - 1965, offset site contains predominantly remnant vegetation

Picture 2 - 1986, some remnant vegetation is lost south east corner of LOT 88 LX472

Picture 3 - 1989, major clearing of remnant vegetation occurs in the south of LOT 90 LX472

Picture 4 - 1993, major clearing of remnant vegetation occurs in the north of LOT 88 LX472

Picture 5 - 1996, major clearing of remnant vegetation occurs in the north of LOT 90 LX472

Picture 6 - 1999, additional vegetation clearing of remnant vegetation occurs in the north of LOT 90 LX472

Plate 1: Historic aerial photographs of the Project site, including the Offset site

2.4 Native vegetation

Vegetation in the Offset site is typified by patches of moderate condition, dry sclerophyll woodland, which grades into regrowth (dominated by immature canopy vegetation and a disturbed understory) towards the patch margin. These vegetated areas are interspersed with mostly cleared areas, which increase in prevalence toward the east, as relief reduces. These cleared areas, and disturbance contributing to vegetation regrowth, is mainly attributed to cattle grazing, which is historically the primary land use within the Offset site. Regional ecosystem (RE) types within the Offset site are detailed in **Table 4** and shown in **Figure 2**.

Table 4: Regional ecosystems within the Offset site

RE Code	VM Reg. Status	EPBC Act Status	Short Description
12.3.7	Least Concern	Not Listed	*Eucalyptus tereticornis, Casuarina cunninghamiana* subsp. *cunninghamiana* +/- *Melaleuca* spp. fringing woodland.
12.11.6	Least Concern	Not Listed	Lemon-scented gum *Corymbia citriodora* subsp. *variegata*, narrow-leaved ironbark *Eucalyptus crebra* woodland on metamorphics +/- interbedded volcanics.
12.11.8	Least Concern	Not Listed	*Eucalyptus melanophloia* and *E. crebra* grassy woodland on a hillside of metamorphic rock +/- interbedded volcanics.
12.11.14	Of Concern	Not Listed	*Eucalyptus crebra*, *E. tereticornis*, *Corymbia intermedia* woodland on metamorphics +/- interbedded volcanics.

2.5 Threatened Flora

No EPBC Act listed threatened flora species have been recorded within the Offset site.

2.6 Exotic vegetation

Species of Local (Gympie Region Council; 2018), State (*Biosecurity Act*; 2014) or Nationally (Weeds of National Significance; WoNS) significant weed species have been identified across the Offset site, which are listed in **Table 5**. This table also details the duties required for weed species referred to under the *Biosecurity Act* 2014 that occur within the Offset site.

Other environmental weeds found on the Offset site include *Gomphocarpus physocarpus* (Balloon Cotton Bush), *Cirsium vulgare* (spear thistle), *Ageratum houstonianum* (Blue Billygoat weed), *Bidens pilosa* (Cobbler's Pegs), *Verbena bonariensis* (Purple Top), *Sida cordifolia* (Flannel weed), *Stylosanthes scabra* (Shrubby stylo), *Megathyrsus maximus* (Guinea grass) and *Melinus repens* (Red Natal grass).

Table 5: Weed biosecurity duties

Weed	WoNS	*Biosecurity Act* (2014) status	Gympie Region Council (2018)	Duty
Opuntia stricta Prickly Pear	Yes	Restricted Invasive Plant	Restricted 3; Asset Protection; Risk Score 76	• The Act requires that all sightings to be reported to Biosecurity Queensland within 24 hours. • By law, everyone has a general biosecurity obligation (GBO) to take all reasonable and practical steps to minimise the risk of it spreading until they receive advice from an authorised officer. • Individuals and organisations whose activities pose a biosecurity risk must:
Parthenium hysterophorus Parthenium	Yes	Restricted Invasive Plant	Restricted 3; Asset Protection; Risk Score 205	
Sporobolus jacquemontii American rat's tail grass	No	Restricted Invasive Plant	Restricted 3; Asset Protection; Risk Score 148	

Weed	WoNS	*Biosecurity Act* (2014) status	Gympie Region Council (2018)	Duty
Lantana camara Lantana	Yes	Prohibited Invasive Plant	Restricted 3; Asset Protection; Risk Score 38	• take all reasonable and practical steps to prevent or minimise each biosecurity risk; • minimise the likelihood of causing a 'biosecurity event', and limit the consequences if such an event is caused; and • prevent or minimise the harmful effects a risk could have, and not do anything that might make any harmful effects worse. • Gympie Region Biosecurity Plan 2018-2022 goal for landholders: • Landholders implementing best practice activities to reduce the impact of invasive plants and animals; and • Landholders throughout the region have the capacity and commitment to manage widespread invasive species.

Project footprint
Offset Site
Regulated vegetation Category R
Perimeter fencing
Livestock fencing
Road
River/stream
Cadastre

161 LX326
3 SP133367
1 SP133367
2 RP902683
85 SP310637
86 LX472
90 SP237339
1 SP285774
157 LX2424
155 LX2414
Wide Bay Hwy
158 LX327
216 LX509
2 SP285774
2 SP295954
159 SP237339
234 LX495
EMT LX2129
310 LX2129
92 LX1198
Gympie Wooloonga Rd
235 LX2129
1 RP851778

N

0 100 200 400 600 800 1,000 m
SCALE: 1:12,500 AT A3 SIZE

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FIGURE 2
VEGETATION WITHIN OFFSET SITE

LOCATION:
1706 WIDE BAY HWY
WOOLOOGA

PURPOSE:
OFFSET MANAGEMENT PLAN

DATE: **21/06/2021**
VERSION: **E**

CO-ORD SYSTEM: **GDA2020 MGA Zone 56**
DATA SOURCE: **RPS, ESRI, QLD GOVT**
PATH:
\\ntlfile1\data\JOBS\147k\147105 Lower Wonga\10 - Drafting\147105_LowerWonga_Woolooga\147105_LowerWonga_Woolooga.aprx

CLIENT: **Lightsource bp**
JOB REF: **PR147105**
TECHNICIAN: **Robert.Suansri**

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2.7 Fauna

2.7.1 Habitat

Habitat resources for fauna are provided within remnant and regrowth areas of the Offset site, and include:

- Permanent and ephemeral waterbodies associated with first and second order tributaries of Hookey Creek and Bongmillerer Creek that provide potential habitat for aquatic fauna, amphibians and wetland birds;
- Hollow-bearing trees that may provide habitat for arboreal animals and hollow-associated birds;
- Open grassland areas provide foraging habitat for macropods, small mammals, reptiles and birds;
- Fall logs in remnant areas provide potential habitat for some birds and ground-dwelling mammals and reptiles;
- Patches of regrowth with a mid-dense shrub layer (generally dominated by the exotic weed *Lantana camara*), which likely provide suitable habitat for small woodland birds; and
- Rocky areas (outcrops and loose rock) provide suitable habitat for reptiles.

2.7.2 Connectivity

The Offset site provides important linkage habitat between two wildlife corridors, which are likely to support movement of Koala throughout Queensland (**Figure 3**). These nearby wildlife corridors are:

- A State significant wildlife corridor located approximately 6 km west of the Offset site. Broadly, this corridor extends to the length of Queensland, from the Cape York Peninsula in the north to the Queensland border in the south. It connects vast tracts of remnant vegetation, including Good Night Scrub National Park (NP), Mount Walsh NP and Grongah NP to the north and Wrattens NP and Conondale NP in the South; and
- A regionally significant wildlife corridor that supports connection with bushland toward the coast, including Poona in the north and Noosa in the south; corridor located approximately 7 km east of the Offset site.

2.8 Threatened Fauna

No EPBC Act listed threatened fauna species have been recorded within the Offset site.

2.8.1 Koala

2.8.1.1 Lifecycle

Koalas reach sexual maturity at 2 years of age and produce one Koala a year or rarely twins. Koalas live for between 10 and 20 years, and generally breed between September and February (DPIE 2020), with male bellowing, fighting and scent marking occurring in the period between August to October. Gestation is approximately 2 months and a newborn Koala resides in the pouch until around 6–8 months and, after leaving the pouch, remains dependent on the mother, riding on her back until approximately 12 months old (DAWE 2020). When the young Koala is about one year old, its mother can mate again (DPIE 2020). Koalas are typically solitary and dominant males are territorial, often driving off young males (DPIE 2020). Koalas rest for most of the day and at night they move between feed trees and along the ground in open woodland or cleared areas (DPIE 2020).

2.8.1.2 Habitat

Survey efforts (including traditional survey methods and use of Koala detection dogs) failed to detect recent evidence of Koala usage within the Offset site. However, proximity to known local populations and an abundance of primary Koala feed trees, as well as nearby records of the Koala, suggest that habitat in the Offset site has potential to be utilised. Furthermore, surveys found preferred Koala food trees dominant

across the Offset site, which include *Eucalyptus tereticornis* (Forest Red Gum); *Corymbia citriodora* (Lemon-scented Gum) and *Eucalyptus crebra* (Narrow-leaved Ironbark). Moreover, Koala habitat mapping for the Koala Conservation Management Plan for Gympie LGA (hereafter 'KCMP'; GRC (2018), identifies vegetation in the Offset site as having high suitability for Koala habitat regeneration. That is, the Offset site provides a substantial extent of remaining regrowth and remnant Koala habitat with high connectivity to remnant vegetation to the north and adjacent corridors (see **Section 2.7.2**). A detailed assessment of habitat condition for the Koala is provided in **Section 2.10**.

2.8.1.3 Management Implications

The following lifecycle/ habitat related factors represent management matters for the Koala:

- Maintaining patch size and connectivity for foraging and dispersal;
- Protecting individuals from mortality potentially associated with the Project through installation of appropriate fencing;
- Implement traffic calming measures and ensure that the speed of all vehicles on construction roads in the development area is no greater than 40 km/h at any time (except in an emergency) so as to minimise the risk to Koala of vehicle strike;
- Revegetate the treeless areas with Primary Koala Feed Trees (PKFT), including seed stock from *Eucalyptus tereticornis* (Forest Red Gum); *Corymbia citriodora* (Lemon-scented Gum) and *Eucalyptus crebra* (Narrow-leaved Ironbark);
- Encourage natural regeneration of remnant vegetation (including PKFTs) within the Offset site; and
- Reduce the threat of attack from wild dogs.

2.8.2 Grey-headed Flying-fox

2.8.2.1 Lifecycle

Australian Grey-headed Flying-foxes are seasonal, synchronous and polygamous breeders (Eby 2008). Mating behaviour in Grey-headed Flying-foxes commences in January with conception occurring in April/ May (DAWE 2020a). They have a low reproductive rate, with a single pup generally born from October to December (DAWE 2020a). Individuals reach sexual maturity in the second year of life, but typically do not successfully raise young until the third year (DAWE 2020a). Newborn flying-foxes are incapable of thermoregulation (DAWE 2020a) and the young cling to their mothers for approximately four to five weeks following birth. Flying-foxes can live for over 16 years in the wild, however, average life expectancy is more likely to be under seven years (DAWE 2020a). Grey-headed Flying-fox are nocturnal and have been documented to fly at night up to 50 km from their daytime roost, in search of food (Tidemann and Nelson 2004).

2.8.2.2 Habitat

The Offset site presents potential foraging habitat for some Grey-headed Flying-fox nearby camps. The Offset site is located within the known foraging range (i.e. 50 km - the maximum foraging distance of an adult; Tidemann and Nelson 2004) of at least seven Grey-headed Flying-Fox camps, many of which are monitored as part of the Southern Region Flying-fox roost monitoring program. Four of these, Gympie, Glenwood Varley Road, Goomboorian and Kandanga, are nationally important camps of Grey-headed Flying-fox (DAWE 2020b).

Tree types across the Offset site afford year-round foraging opportunities for the Grey-headed Flying-fox, and hence the Offset site does offer food resources for nearby Flying-fox camps. High value winter nectar species, which are important to sustain these nearby camps, located on site include *Eucalyptus tereticornis* (Forest Red Gum); *Corymbia citriodora* (Lemon-scented Gum) and *Eucalyptus crebra* (Narrow-leaved Ironbark).

2.8.2.3 Management Implications

The following lifecycle/ habitat related factors represent management matters for this species:

- Maintaining patch size and connectivity for foraging and dispersal;
- Revegetate the treeless areas with high value winter nectar species including *Eucalyptus tereticornis* (Forest Red Gum); *Corymbia citriodora* (Lemon-scented Gum) and *Eucalyptus crebra* (Narrow-leaved Ironbark); and
- Encourage natural regeneration of remnant vegetation, including high value winter nectar species and potential camp areas, within the Offset site.

2.9 Exotic Fauna

Pests such as the European fox (*Vulpes vulpes*) and Wild dog are known to frequently occur within the locality (based on land-owner accounts). These pest species represent a threat to native vegetation and structure and for fauna, such as the Koala.

2.10 Existing Infrastructure

2.10.1 Access

There are two existing vehicular access points. One is off the currently unconstructed road reserve adjoining Lot 90 SP237339. The other vehicular access is off Wide Bay Highway at Lot 157 in LX2424, in the SW corner of the site. These two access points are indicated in **Figure 1**.

The Offset site also comprises a network of unmanaged tracks with no specific provisions for access control (i.e. gates). Known vehicle traversable tracks, will be used as the basis for establishing the access infrastructure for the Offset site. There is a public road running through Lot 90 which has been excluded from the Offset site.

2.10.2 Fencing

The Offset site is incompletely fenced, with the variable condition observed ranging from dilapidated to good.

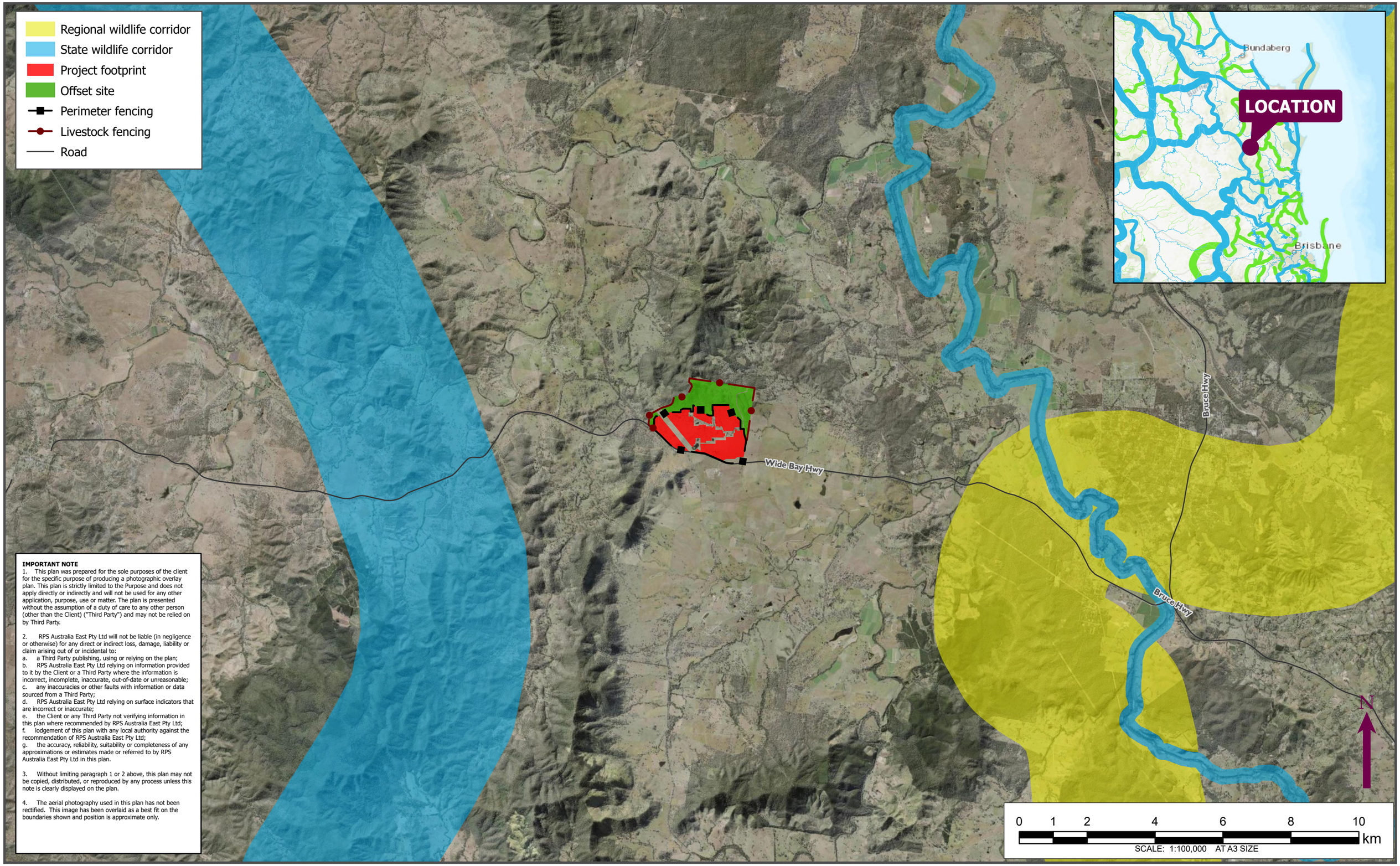

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FIGURE 3
WILDLIFE CORRIDORS NEARBY OFFSET SITE

LOCATION:
1706 WIDE BAY HWY
WOOLOOGA

PURPOSE:
OFFSET MANAGEMENT PLAN

DATE: **21/06/2021**
VERSION: **E**

CO-ORD SYSTEM:
DATA SOURCE: **RPS, ESRI, QLD GOVT**
PATH:
\\ntlfile1\data\JOBS\147k\147105 Lower Wonga\10 - Drafting\147105_LowerWonga_Woolooga\147105_LowerWonga_Woolooga.aprx

CLIENT: **Lightsource bp**
JOB REF: **PR147105**
TECHNICIAN: **Robert.Suansri**

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2.11 Koala and Grey-headed Flying-fox foraging habitat within the Offset site

Based on the assessment, land immediately north of the Project footprint has been investigated with the aim to satisfy the offset liabilities for the Koala and Grey-headed Flying-fox. Specifically, the area proposed as an offset site is:

- Part Lot 86 LX472;
- Part Lot 90 LX472; and
- Part Lot 157 in LX2424.

The total proposed Offset site totals 198.39 ha. The extent of the Offset site is provided in **Figure 1**.

2.12 Koala and Grey-headed Flying-fox offset calculations

The Offset Assessment Guide (the guide) has been populated and run using the following justifications for allocating the numbers used for particular inputs. Ultimately, the guide has been used to comply with the EPBC Offset Policy and to ascertain the offset liability in relation to the Project impacts outlined above. Based on the values and justifications presented in Section 6.4 of the Preliminary Documentation - Sections 3 to 6 (RPS 2020), the proposed offsets will provide:

- 101.47% of the offset obligations for the Koala; and
- 154.98% of the offset obligations for the Grey-headed Flying-fox.

Original offset calculations considering the indicative fence-line were undertaken in V4.0 of the OMP. Calculations were adjusted in **Table 6** to reflect the change in offset provisions associated with the confirmed fence-line (as shown in **Figure 5**).

Table 6: Summary of Offset Assessment Guide Calculator inputs and outcomes for the Koala

Offset Assessment Guide Criteria	Offset site (intact zone)	Offset site (regeneration zone)
Impact Area	176 ha[1]	176 ha[1]
Impact Quality	3	3
Proposed Offset site	111.49 ha	86.91 ha
Start area quality	5	2
Time horizon	20 years	20 years
Time until ecological benefit	20 years	20 years
Future quality without offset	4	2
Future quality with offset	7	6
Confidence in quality results	85%	75%
Risk of loss without offset (averted loss)	3%	0%
Confidence in risk of loss score	90%	0%
Risk of loss with offset	0	0
Percent of Impact Offset	54.02%	47.45%
Total Offset Combined		**101.47%**

1. As per Conditions of Approval 1. for EPBC 2019/8554.

Table 7: Summary of Offset Assessment Guide Calculator inputs and outcomes for the Grey-headed Flying-fox

Offset Assessment Guide Criteria	Offset site (intact)	Offset site (regeneration zone)
Impact Area	83.38 ha[1]	83.38 ha[1]
Impact Quality	3	3
Proposed Offset site	111.49 ha	86.91 ha
Start area quality	6	3
Time horizon	20 years	20 years
Time until ecological benefit	20 years	20 years
Future quality without offset	6	3
Future quality with offset	8	6
Confidence in quality results	85 %	75 %
Risk of loss without offset (averted loss)	3%	0%
Confidence in risk of loss score	90%	0%
Risk of loss with offset	0	0
Percent of Impact Offset	79.87%	75.11%
Total Offset Combined		**154.98%**

1. As per Conditions of Approval 1. for EPBC 2019/8554.

2.13 Offset site baseline habitat condition

Koala and Grey-headed Flying-fox foraging habitat quality was measured using a modified version of the methodology developed by the DEHP (2017; Version 1.2). The Modified Habitat Quality Assessment (MHQA) methodology was recently utilised (July 2020) by Saunders Havill Group as part of the Preliminary Documentation for the Ripley Road, Ripley Residential Development (EPBC Act; 2019/8539). This method modifies the DEHP (2017) quality assessment guide to better align with the with the EPBC Act Offsets Policy.

To accurately assess the habitat values according to MHQA, the Offset site was divided into Habitat Assessment Units (AUs) based on prevailing Regional ecosystems and other ecological and topographical features. Within each Habitat AU, site-based condition attributes, landscape attributes and the species habitat index were determined based on field transects, observations, and GIS analysis. Each of these attributes were then combined to determine the site's overall Habitat Quality Score. A description of how this method calculates habitat quality is provided in **Section 4.4.1**. Parameter inputs and values for each component measured and plots measured during the baseline survey are provided in **Appendix A**.

3 OFFSET SITE MANAGEMENT

Section 3.1 introduces the management plans to be applied to the Offset site, the assigned Performance and Completion Criteria (noting Year 1 is 2021) for each strategy and provides guidance regarding the how these management actions are to be carried out. The OMP is to be implemented prior to works commencing within the Development footprint and at least 198.39 ha of land is to be secured at the Woolooga Offset Site (**Section 2.11**) by the end of year 1.

3.1 Environmental Management Zones

Management actions will be arranged across two broad Environmental Management Zones (EMZs): EMZ 1 (intact) and EMZ 2 (regeneration zone). EMZ 1 (intact) is a natural regeneration zone which contains existing remnant and regrowth vegetation with management actions focused here on improvement of habitat quality. EMZ 2 (regeneration zone) is a revegetation zone which currently lacks habitat, as it currently persists as an area dominated by grazing pastures with scattered trees and will be targeted for habitat restoration through revegetation.

The location of these zones is shown in **Figure 4**, with management measures to be applied to these zones detailed in **Section 3.2**.

3.2 Management measures

Management measures necessary to meet identified environmental outcomes of the Offset site are outlined below, and include:

1. Access and fencing;
2. Weed management;
3. Habitat management (regeneration and revegetation);
4. Pest animal management; and
5. Fire management.

These actions have been designed to minimise the risks associated with key threatening processes (KTPs) for the Koala and Grey-headed Flying-fox. More broadly, actions prescribed by this OMP will assist in maintaining and improving of the overall quality of habitat provided by the Offset site. Ultimately, management measures prescribed here were designed to increase native biodiversity, with benefits to extend beyond the Koala and Grey-headed Flying-fox.

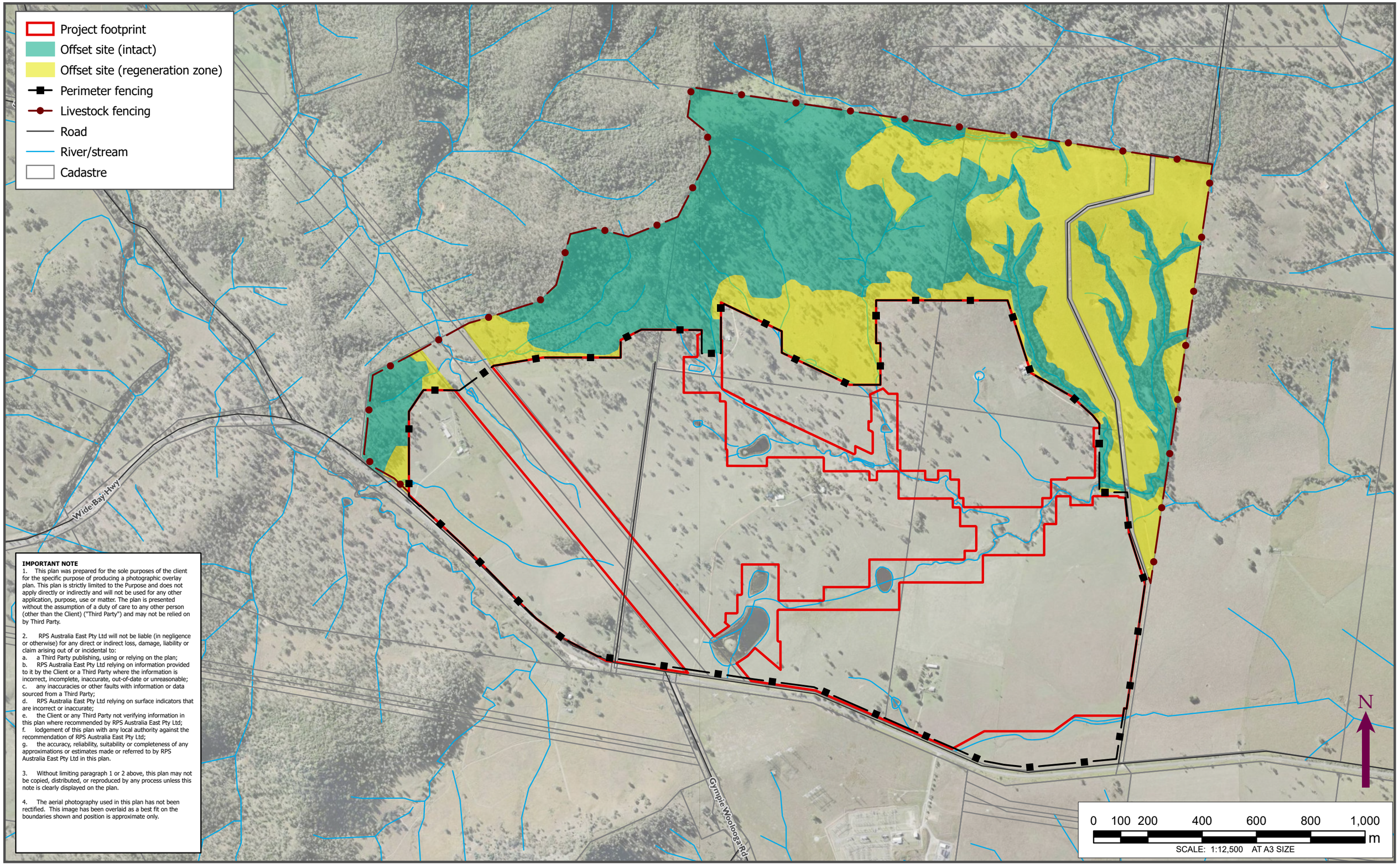

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FIGURE 4
ENVIRONMENTAL MANAGEMENT ZONES

LOCATION:
1706 WIDE BAY HWY
WOOLOOGA

PURPOSE:
OFFSET MANAGEMENT PLAN

DATE: **21/06/2021**
VERSION: **E**

CO-ORD SYSTEM: **GDA2020 MGA Zone 56**
DATA SOURCE: **RPS, ESRI, QLD GOVT**
PATH:
\\ntlfile1\data\JOBS\147k\147105 Lower Wonga\10 - Drafting\147105_LowerWonga_Woolooga\147105_LowerWonga_Woolooga.aprx

CLIENT: **Lightsource bp**
JOB REF: **PR147105**
TECHNICIAN: **Robert.Suansri**

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3.2.1 Management Action 1 - Access and fencing

3.2.1.1 Overview

The rural land and the Project footprint adjoining the Offset site represent potential sources of impacts that may negatively influence the protection of biodiversity values if access is not appropriately controlled. This management action also allows for the establishment of managed movement pathways for biodiversity.

Access management aims to protect the biodiversity values of the Offset site by preventing impacts from unauthorised access, livestock grazing and exposure of threatened species to threats commonly found in adjoining rural environments. Access management includes the installation of fences, gates, signage and tracks.

Vehicular access to the Project footprint would be made through two existing vehicular access points: the currently unconstructed road reserve adjoining Lot 90 SP237339 and off Wide Bay Highway at Lot 157 in LX2424 (**Figures 1** and **5**). Gated access to the Offset site would be provided only along the Project footprint/Offset site interface.

Fencing serves two main outcomes:

- Protect vegetation and habitat contained within the Offset site from damage caused by livestock and anthropogenic activity associated with unauthorised entry (unauthorised logging, dumping of waste, bushfire threats etc); and
- Separate native fauna, such as the Koala, from threats present in the adjoining rural environment/ Project footprint.

Any clearance of vegetation to facilitate installation of access tracks, fencing etc will be undertaken in accordance with the *Nature Conservation (Koala) Conservation Plan 2017*. In all cases, any potential impacts should take an avoid and mitigate approach, opting for the most ecologically friendly option. Where native vegetation is to be impacted, it should be undertaken in accordance with **Appendix B**.

Fencing for the Offset site and access points to the Project footprint are shown in **Figure 5**.

3.2.1.2 Objectives and Performance/ Completion Targets

The objectives and performance targets for access management works is provided in **Table 8**.

Table 8: Access and fencing objectives and performance targets

Management Objective	Performance Target			Completion Target
	Years 1 to 3	Years 3 to 5	Years 5 to 20	
• Prevent movement of livestock into the Offset site • Prevent unauthorised access into the Offset site.	• Removal all livestock. • Locked gates and fauna friendly fencing to be installed along Project footprint/Offset site interface prior to Project Commencement. • Install fauna friendly stock exclusion fencing around the entire Offset site by the end of Year 3. • Establish access tracks to facilitate effective application of measures. • For the protection of the Koala (and Koala	• Gates/ fences and access tracks maintained in functional order.	• Gates/ fences and access tracks maintained in functional order.	• Locked gates and fauna friendly security fencing to be installed along Project footprint/Offset site interface prior to Project Commencement. • Fauna friendly stock-exclusion fencing to be installed/established around entire Offset site by the end of Year 3. • Access tracks installed and managed to facilitate delivery of effective management measures, including bushfire management. • For the protection of the Koala (and Koala habitat) and the Grey-headed Flying-fox (and Grey-headed Flying-fox foraging

Management Objective	Performance Target			Completion Target
	Years 1 to 3	Years 3 to 5	Years 5 to 20	
	habitat) and the Grey-headed Flying-fox (and Grey-headed Flying-fox foraging habitat), by the end of year 1 the approval holder must increase the visibility to fauna of perimeter barbed-wire fencing (if used), including by affixing durable visibility tags at every 30 cm interval along the top strand of any perimeter barbed-wire fencing.			habitat), by the end of year 1 the approval holder must increase the visibility to fauna of perimeter barbed-wire fencing (if used), including by affixing durable visibility tags at every 30 cm interval along the top strand of any perimeter barbed-wire fencing.

3.2.1.3 Management Actions

The annual works program is to have regard for the proposed management actions outlined in **Table 9**.

Table 9: Proposed access and fencing management actions

Year	Proposed Management Actions
Year 1 to 3	• Remove all livestock. • Install locked gates where required for access within fencing along the Project footprint/Offset site interface by end of year 1. • Install fauna friendly stock exclusion fencing around the entire Offset site by end of year 1. • Affix durable visibility tags along any barbed-wire fencing by end of year 1. • Audit, upgrade, map and register access tracks to enable site access and management (refer also to **Section 3.2.5**).
Year 3 to 5	Monitor and manage access tracks, fences and gates.
Year 5 to 20	Monitor and manage access tracks, fences and gates.

3.2.1.4 Specification Guidance

3.2.1.4.1 Fencing

Fencing and gates separating the Project footprint from the Offset site are not yet established. Fencing designed to prevent the movement of Koalas into the Project footprint is to be installed at the commencement of the Project. This fence is to be designed to prevent the Koala from entering the Project, thus managing the risk of mortality through vehicle strike. A description of the fence is provided as follows, with a description of Koala grids also provided for use in certain circumstances.

Koala-friendly fencing

Fencing is required to create a barrier between the wildlife habitat within the lands to be retained and managed for conservation purposes and that of the adjoining Project footprint. The intent of fencing should be to contain Koala movement within the Offset site, while at the same time restricting access to the Offset site by people and pest animals. This barrier effect can be achieved by installation of corrugated metal sheeting on the upper half and outside of the Project's perimeter security fence, which prevents Koala from climbing as they cannot gain a grip. The sheeting should be at least 600 mm wide with the top edge of the sheeting at least 1.5 m above ground level. To be effective, the fence is to be constructed at least 3 m away from trees or sturdy shrubs from which a Koala could jump to the fence top.

Plate 2: Example of Koala-friendly fencing

(source: https://fencescape.com.au/wildlife-fencing/)

Koala Bridges

Impacts to the riparian zone have been minimised by retaining the riparian vegetation. It is proposed to retain Koala access to the Riparian Zone as part the OMP, and it is proposed to use fence crossing structures (Koala Bridges) similar the below extract from DES (2020) Koala-sensitive design guideline.

Install a simple koala bridge (particularly suited to security fences) using timber logs of at least 125 mm in diameter of the following design:

- Timber logs are positioned adjacent to and within 1 m of each other on either side of the fence and extend for at least 1m above the fence.
- A cross piece of similar diameter to the logs connects the two vertical timber posts that are within 1-4m of each other on either side of the fence.

Plate 3: Examples of Koala-bridge

(source: https://environment.des.qld.gov.au/__data/assets/pdf_file/0025/102859/koala-sensitive-design-guideline.pdf)

Koala Grids

Koala-grids will be required at all access points from the Project footprint into the Offset site, including gated areas. The intent of the Koala-grid is to enforce the exclusion concept of fencing at locations where vehicular crossings occur or where access is otherwise required for management purposes. Koala-grids can provide 100% success in restricting access by Koalas, as demonstrated over the course of a 5-year monitoring program by Biolink (2009). Koala-grids are typically constructed using 60 mm tubular steel pipe at 200 mm centres as a means of restricting access by Koalas (examples of this device are shown in **Plate 4** below.

Plate 4: Examples of Koala-grids

(source: Biolink 2009)

3.2.1.4.2 Tracks

All access gates and tracks shall be assessed in terms of their operational requirements and delegated a classification and category in accordance with Queensland Fire Trails standards. Furthermore, these tracks will be submitted to the Queensland Fire and Emergency Services (QFES) to be included on the district fire trail register to ensure ongoing maintenance to the identified standard.

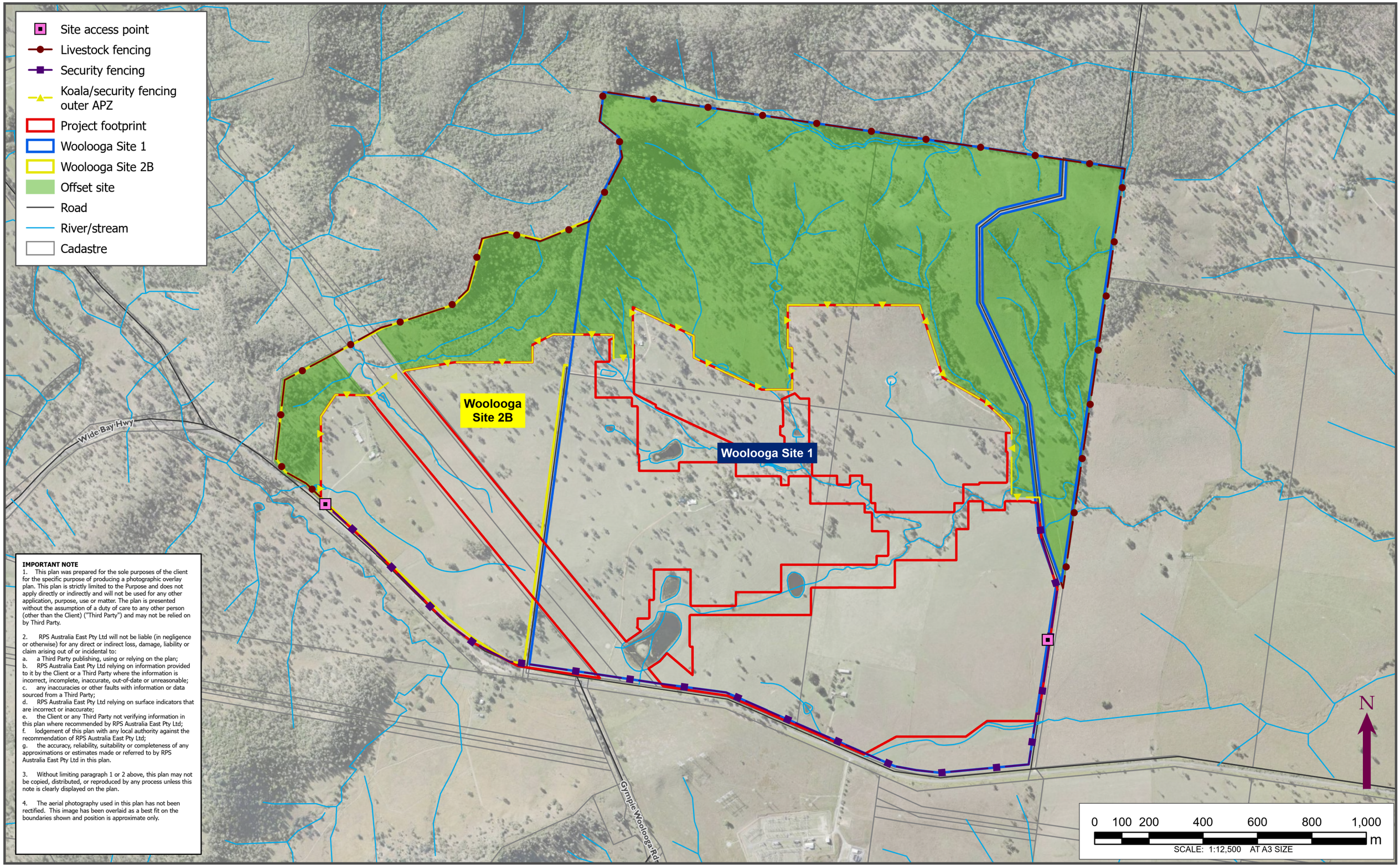

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FIGURE 5
FENCING AND PROJECT FOOTPRINT ACCESS

LOCATION:
1706 WIDE BAY HWY
WOOLOOGA

PURPOSE:
OFFSET MANAGEMENT PLAN

DATE: **18/06/2021**
VERSION: **E**

CO-ORD SYSTEM: **GDA2020 MGA Zone 56**
DATA SOURCE: **RPS, ESRI, QLD GOVT**
PATH:
\\ntlfile1\data\JOBS\147k\147105 Lower Wonga\10 - Drafting\147105_LowerWonga_Wooloogа\147105_LowerWonga_Wooloogа.aprx

CLIENT: **Lightsource bp**
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3.2.2 Management Action 2 – Weed management

3.2.2.1 Overview

Preventing weed incursion, whilst maintaining and eradicating legacy infestations, will improve the condition of Koala and Grey-headed Flying-fox foraging habitat within the Offset site. Due to historical agricultural land use, many weeds have established in the Offset site and they currently degrade habitat quality. To reduce the threat of weeds, a Weed Management Plan (WMP) will be created to control WoNS and those Restricted under Queensland's *Biosecurity Act 2014*; collectively referred to as 'High Threat Weeds' (HTWs). **Table 5** lists HTWs identified within the Offset site. The nature and extent of HTWs to be targeted by the WMP will be determined following baseline surveys of weeds. Key principles to be incorporated into the WMP are outlined in **Section 3.2.2.4**.

3.2.2.2 Objectives and Performance/ Completion Targets

The objectives and performance targets for access management works are provided in **Table 10**.

Table 10: Weed management objectives and performance targets

Management Objective	Performance Target			Completion Target
	Years 1 to 3	Years 3 to 5	Years 5 to 20	
• Reduce Weeds to 5% of baseline level.	• Baseline mapping of weeds and establishment of monitoring plots by end of Year 1. • Refine WMP using baseline data by end of Year 1. • Extent of Weed cover reduced to <50% of baseline levels by end of Year 3.	• Extent of Weed cover reduced to <20% of baseline levels by end of Year 5.	• Extent of Weed reduced to <5% of baseline levels by end of Year 10, and then maintained at 5% or less for the remaining period of effect of this approval.	• Weed levels maintained at ≤5% of baseline levels.

3.2.2.3 Management Actions

The annual works program is to have regard for the proposed management actions outlined in **Table 11**.

Table 11: Proposed weed management actions

Year	Proposed Management Actions
Year 1 to 3	• Baseline mapping of weeds and establishment of monitoring plots within Year 1. • Develop WMP using baseline data within Year 1 and specification guidance in **Section 3.2.2.4**. • Two weed control treatments annually, to be undertaken in summer and spring, for the first three years targeting High Threat Weeds.
Year 3 to 5	Treatment conducted annually according to WMP. Measures to be guided by annual monitoring.
Year 5 to 20	Treatment conducted annually according to WMP. Measures to be guided by annual monitoring.

3.2.2.4 Specification Guidance

During the initial primary weed control phase, priority shall be given to areas where HTW occur, focusing on those listed in **Table 5**. Weed removal techniques should be appropriate to the weed type, growth form, and ecology. Wherever possible, weed removal should be carried out prior to annual seed set.

It is generally not possible to remove a weed from a site on a single occasion, as many weeds have a persistent seed bank that can remain viable for long periods. Seeds may germinate rapidly after the parent plant has been removed due to increases in light and habitat availability. Therefore, a secondary consolidation phase of weed control will be undertaken, which will involve control of minor infestations and revisiting the primary control phase sites for follow-up weeding. This is likely to consist of spraying with

herbicide (in areas not in the vicinity of a water body) or removal by hand, as any weeds present will generally be small and easily controlled. Minimal weed cover should be evident at the completion of this stage. Preventative measures and an ongoing monitoring and maintenance phase control program will be undertaken to ensure this remains the case.

The following approach will be used for weed management, firstly to establish baseline weed mapping, refine then instigate weed control according to the WMP. These management measures are detailed below in Sections **3.2.2.4.1** to **3.2.2.4.3**. The monitoring program is detailed in **Section 4.3**.

3.2.2.4.1 Baseline weed mapping

Baseline weed mapping of the cover and extent of WoNS (as well as any State Restricted Invasive Plants) would be undertaken across the Offset site to prioritise weed control measures. Baseline weed mapping will involve establishing plots and photo points for ongoing annual vegetation monitoring, in conjunction with other vegetation monitoring activities (see **Section 3.2.3**). Based on the findings of this survey, weed management zones will be established in association with site-specific control strategies and techniques tailored to the location, life stage, growth habit and extent of the weed infestation.

3.2.2.4.2 Weed control

Weed control requires an integrated approach and a single method of treatment should not be solely relied upon. Bush regeneration principles (Bradley 1988) designed for use in bushland settings, in combination with designated plantings, should be employed. The systematic removal of weeds will allow native plants to establish themselves naturally (Buchanan 1989).

The Bradley Method of bush regeneration employs four basic principles:

1. Work outwards from good bush areas towards areas of weed;
2. Make minimal disturbance to the environment;
3. Weed control will involve primary, consolidation and long-term maintenance; and
4. Do not over-clear; where possible let native plant regeneration dictate the rate of weed removal.

Manual removal of herbaceous weeds, regrowth and seedlings is preferred where practicable, with minimal disturbance to soil stability and existing native species. Ecologically sensitive areas where weeds are removed manually should be stabilised or planted within 24 hrs or prior to forecast rainfall events. Removal work will be undertaken outside the seeding period of weeds, especially those weeds that produce large quantities of seed. If any work is undertaken within these periods, seed will be collected, bagged and disposed of off-site, ensuring that no seed remains.

3.2.2.4.2.1 Herbicide use

Chemical removal is only considered appropriate for larger weeds and areas of large infestation or in areas containing few natives. Regarding larger woody weed species and infestations, felling and digging up the roots can be dangerous, expensive, time consuming and could potentially increase erosion or expose soil for more weeds to invade. Where practical the application of herbicides should only be carried out by qualified personnel and the use of chemicals should be kept to a minimum. Care should also be taken when implementing chemical spraying techniques near waterways, environmentally sensitive areas and non-target plant species.

The use of more environmentally friendly non-residual systemic herbicides which don't bioaccumulate, such as; "Roundup Biactive ®" should be adopted when working within or adjacent to riparian areas. Herbicides should not be applied immediately prior to rain. This reduces the effectiveness of the herbicide and poses the risk that the herbicide could be transported by runoff into local waterways.

Herbicide use has the advantage of reduced management effort (i.e. cost) compared to physical removal, particularly for large areas or infestations of weeds. In this respect, it is considered that the use of herbicides is warranted in the following circumstances:

- There are small areas of dense weeds with few or no native plants to protect;
- There are large areas of weeds;
- The weeds are growing too rapidly for physical removal; and

- The receiving environment is tolerant to herbicide applications, with respect to indirect impacts on non-target species, such as threatened plant species.

It is important to plan herbicide control of target species according to a weeding calendar that recognises the life form and seasonality of the target weed species (i.e. flowering, fruiting and seed set).

Herbicide application associated with the implementation of this OMP shall be limited to the following techniques:

- Cut-stump and poison (cut and dab);
- Stem injection;
- Stem-scrape or frilling and poison;
- Basal bark painting; and
- Selective spot-spraying (suitable for herbaceous weeds, grasses and saplings of woody weeds).

All herbicides and pesticides must be used in accordance with the requirements on the label, relevant permits and Safety Data Sheets (SDS). Any person undertaking pesticide (including herbicide) application must be trained to do so and have the proper certificate of completion/competency or statement of attainment issued by a registered training organisation.

3.2.2.4.2.2 Weed hygiene

All tracked vehicles/plant/equipment must be made free of soil, seed and plant material prior to entering or leaving the Offset site – this will be managed by:

- An initial vehicle inspection will include a check for weeds and seeds on the vehicle;
- The Project site access points onto public roads will be inspected weekly for tracked soil and soil will be removed as required;
- Vehicles and equipment shall remain on existing roads and defined site access tracks where possible;
- Parking will be restricted to designated areas; and
- Any imported fill must have certification that demonstrates that the material is weed free.

3.2.2.4.3 Significant weed outbreaks

Uncontrolled weed outbreaks are to be managed by a qualified bush regeneration contractor following Department of Agriculture and Fisheries (DAF) weed eradication programs and control methods (DAF 2020; see **Section 3.2.2.5**).

3.2.2.5 Trigger, Action and Response Plan (TARP)

Scenarios for corrective action, and the planned response are detailed in **Table 12**.

Table 12: Trigger, Action and Response Plan

Scenario	Corrective action
New HTW identified	• Targeted weed control and focus on containment, within 2 months of detection. • Notify relevant Government Agencies and neighbours of new HTW outbreak. • Implement new hygiene controls. • Review the WMP. • Follow all directions and guidance provided by relevant state government agency to assist in control.
Weed control not meeting performance criteria	• Increase the frequency of weed control events. • Suitably qualified third party to review weed control action. • Revise the WMP Plan.

3.2.3 Management Action 3 – Habitat management (regeneration and revegetation)

3.2.3.1 Overview

Habitat for Koala and Grey-headed Flying-fox within the Offset site will be enhanced through implementing a Habitat Management Plan (HMP), which will focus on the following two core approaches:

1. Regeneration of existing remnant and regrowth vegetation (EMZ 1 (intact)); and
2. Creation of habitat by revegetating areas lacking trees (EMZ 2 (regeneration zone).

These approaches, which target developing and implementing vegetation recovery, are identified as a priority to acts against habitat loss, disturbance and modification for the Koala, as specified in the Approved Conservation Advice for *Phascolarctos cinereus* (DSEWPC 2012).

3.2.3.2 Objectives and Performance/ Completion Targets

The objectives and performance targets for access management works are provided in **Table 13**.

Table 13: Habitat enhancement objectives and performance targets

Management Objective	Performance Target			Completion Target
	Years 1 to 3	Years 3 to 5	Years 5 to 20	
• Enhance condition of 109.72 ha of Koala and Grey-headed Flying-fox habitat (EMZ 1 (intact))	• Baseline vegetation mapping to clarify the extent of regeneration areas (i.e. EMZ 1). To be carried out within the first three months of the commencement of the action. • An average of at least 2 different winter or spring flowering Grey-headed Flying-fox foraging species in each assessment plot by the end of Year 3, and subsequently maintain or exceed this outcome for the remainder of the period of effect of the approval. • An average tree canopy cover maintained at between greater than 50% and less than 200% of the benchmark for relevant Regional Ecosystems and subsequently	• Average Diameter at Breast Height of trees has increased by at least 2.5 cm by the end of year 5 relative to the baseline habitat quality assessment data. • Average recruitment of woody perennial species in the ecologically dominant layer by approximately 75% of the benchmark for relevant Regional Ecosystems present by the end of year 5, and subsequently maintain or exceed this outcome for the remainder of the period of effect of the approval. • An average of at least 5 different Grey-Headed Flying-fox winter or spring flowering	• Average Diameter at Breast Height of trees has increased by at least 5 cm by the end of year 10 and 7.5cm by the end of year 15 relative to the baseline habitat quality assessment data. • Improvement of habitat quality (MHQA) of Offset site from a 5 to a 7 for the Koala and from a 6 to an 8 for the Grey-headed Flying-fox by year 20. • Average tree canopy at >50% to <200% of benchmark for RE types by the end of Year 10 and maintain that rate for the remainder of the time horizon (i.e. 20 years). • Average recruitment of woody perennial species in the ecologically dominant layer	• The number of large trees must be >100% of the benchmark for relevant Regional Ecosystems present by the end of year 20 and this proportion must be subsequently maintained for the remainder of the period of effect of the approval. • Maintain the habitat quality (MHQA) of Offset site at a 7 for the Koala and an 8 for the Grey-headed Flying-fox for the duration of the project. • Average tree canopy at >50% to <200% of benchmark for RE types by Year 20 • Average recruitment of woody perennial species in the ecologically dominant layer greater than 75% by the end of Year 20 and subsequently maintain or exceed that rate of recruitment for the remainder of the period of effect of the approval. • The number of large trees >50% of the benchmark for the RE by the end of Year 20 and this number subsequently maintained or exceeded for the remainder of the period of effect of the approval. • An average of at least 5 different Grey-Headed

Management Objective	Performance Target			Completion Target
	Years 1 to 3	Years 3 to 5	Years 5 to 20	
	maintain or exceed this outcome for the remainder of the period of effect of the approval. • Tree canopy height greater than 70% of the benchmark for relevant Regional Ecosystems present and subsequently maintain or exceed this outcome for the remainder of the period of effect of the approval.	foraging species present per hectare by the end of year 5, and subsequently maintain or exceed this outcome for the remainder of the period of effect of the approval. • By the end of year 5, the number of large trees greater than 100% of the benchmark for relevant Regional Ecosystems present and subsequently maintain or exceed this outcome for the remainder of the period of effect of the approval. • An increase, relative to the baseline habitat quality assessment data, in Koala usage by the end of year 5, and subsequently maintain or exceed this outcome for the remainder of the period of effect of the approval.	greater than 75% of the benchmark by the end of Year 10 and subsequently maintain or exceed that rate of recruitment for the remainder of the period of effect of the approval.	Flying-fox winter or spring flowering foraging species present per hectare by the end of year 5, and subsequently maintain or exceed this outcome for the remainder of the period of effect of the approval.
• Revegetate 86.70 ha of new habitat for Koala and Grey-headed Flying-fox foraging habitat (EMZ 2 (regeneration zone))	• Baseline vegetation mapping to clarify the extent of area to revegetate (i.e. EMZ 2 (regeneration zone)). To be carried out within the first three months of the commencement of the action. • All planting to be completed by	• Average Diameter at Breast Height of trees has increased by at least 2.5 cm by the end of year 5 relative to the baseline habitat quality assessment data. • Average recruitment of woody perennial species in the ecologically dominant layer	• Average Diameter at Breast Height of trees has increased by at least 5 cm by the end of year 10 and 7.5cm by the end of year 15 relative to the baseline habitat quality assessment data. • Average tree canopy cover at >10% of the benchmark for	• The average Diameter at Breast Height trees must be at least 50% of the benchmark for large trees for relevant Regional Ecosystems present by the end of year 20 and this proportion must be subsequently maintained or exceeded for the remainder of the period of effect of the approval. • Revegetation and increases in habitat quality of the (EMZ 2 (regeneration zones)), from a 2 to a 6 for the Koala and a 3 to a 6 for

Management Objective	Performance Target			Completion Target
	Years 1 to 3	Years 3 to 5	Years 5 to 20	
	the end of year 1.	greater than 20% of the benchmark for relevant Regional Ecosystems present by the end of year 5. • Average tree canopy at >5% benchmark for RE types by Year 5 • An average of at least 3 different winter or spring flowering Grey-headed Flying-fox foraging species in each assessment plot by the end of Year 5, and subsequently maintain or exceed this outcome for the remainder of the period of effect of the approval. • An increase, relative to the baseline habitat quality assessment data, in Koala usage by the end of year 5, and subsequently maintain or exceed this outcome for the remainder of the period of effect of the approval.	relevant Regional Ecosystems present by the end of year 10, and subsequently maintain or exceed 10% • Average tree canopy height at >25% of the benchmark for relevant Regional Ecosystems present at the site by the end of year 10, and subsequently maintain or exceed that tree canopy height for the remainder of the period of the approval. • Average recruitment of woody perennial species in the ecologically dominant layer at greater than 75% of the benchmark for relevant Regional Ecosystems present by the end of year 10 and subsequently maintain or exceed that rate of recruitment for the remainder of the period of effect of the approval. • Average tree canopy cover at >10% of the benchmark for relevant Regional Ecosystems present by the end of year 10, and subsequently maintain or exceed 10%.	the Grey-headed Flying-fox (MHQA) by Year 20 • Average tree canopy cover at >10% of the benchmark for relevant Regional Ecosystems present by the end of year 10, and subsequently maintain or exceed 10% • Average tree canopy height at >25% of the benchmark for relevant Regional Ecosystems present at the site by the end of year 10, and subsequently maintain or exceed that tree canopy height for the remainder of the period of the approval. • Average recruitment of woody perennial species in the ecologically dominant layer greater than 60% by the end of Year 20 and subsequently maintain or exceed that rate of recruitment for the remainder of the period of effect of the approval. • The number of large trees ≥50% of the benchmark for the RE by the end of Year 20 and this number subsequently maintained or exceeded for the remainder of the period of effect of the approval. • An average of at least 5 different winter or spring flowering Grey-headed Flying-fox foraging species in each assessment plot by the end of Year 10, and subsequently maintain or exceed this outcome for the remainder of the period of effect of the approval.

Management Objective	Performance Target			Completion Target
	Years 1 to 3	Years 3 to 5	Years 5 to 20	
			• Average recruitment of woody perennial species in the ecologically dominant layer greater than 30% by the end of Year 10 and subsequently maintain or exceed that rate of recruitment for the remainder of the period of effect of the approval. • An average of at least 5 different winter or spring flowering Grey-headed Flying-fox foraging species in each assessment plot by the end of Year 10, and subsequently maintain or exceed this outcome for the remainder of the period of effect of the approval. • The number of large trees at least 25% of the benchmark for relevant Regional Ecosystems present, by the end of year 10. • The number of large trees at least 50% of the benchmark for relevant Regional Ecosystems present, by the end of year 20 and this proportion subsequently maintained or exceeded for the remainder of the period of effect of the approval.	

3.2.3.3 Management actions

The annual works program is to have regard for the proposed management actions outlined in **Table 14**.

Table 14: Proposed habitat regeneration and revegetation management actions

Year	Proposed Management Actions
Year 1 to 3	**Habitat regeneration:** Undertake supplementary planting if performance targets not achieved. **Habitat revegetation:** Tubestock to be planted at a density of 500 stems per ha: • 100 % of replanting to occur by end of Year 1; and • Tubestock restocked where required to meet a density of 500 stems per ha for Years 2 to 3. Species to be replanted are preferably to be sourced from genetic stock within 50 km of Offset site, be protected from herbivory by an appropriate guard and consist of >80% PKFT trees.
Year 3 to 5	**Habitat regeneration:** Undertake supplementary planting if performance targets not achieved. **Habitat revegetation:** Tubestock restocked where required to meet a density of 500 stems per ha. Replanting to be guided by annual monitoring.
Year 5 to 20	**Habitat regeneration:** Undertake supplementary planting if performance targets not achieved. **Habitat revegetation:** Tubestock restocked where required to meet a density of 500 stems per ha up to Year 10. Replanting to be guided by annual monitoring. Between Years 10 and 12, saplings will be selectively thinned to about 100 – 250 saplings per ha (aiming for 6 to 10 m between plants).

3.2.3.4 Specification guidance

The following approach is suggested for the Habitat (regeneration and revegetation) Management Plan:

1. Baseline vegetation mapping;
2. Exclusion of livestock;
3. Replanting key food trees;
4. Manage plant spacing; and
5. Monitoring of regeneration and revegetation success.

All these regeneration and revegetation activities will be carried out by a suitably qualified bush regeneration contractor. These management activities are detailed in **Sections 3.2.3.4.1** to **3.2.3.4.3** below.

3.2.3.4.1 Baseline vegetation mapping

To maximise the ecological benefit of the Offset site for the two key species, detailed baseline mapping of the condition and extent of existing vegetation was undertaken in 2020 by RPS (2020b). This mapping was undertaken using LiDAR aerial data, acquired specifically for the Project, with ground-truthing surveys undertaken to verify vegetation types and extent. Further surveys are required to confirm vegetation extent and quality in the more difficult to access areas of the Offset site, such as the steep and rocky hillslopes.

3.2.3.4.2 Exclusion of livestock

Livestock will be physically removed from the Offset site, then excluded using fencing in accordance with **Section 3.2.1**.

3.2.3.4.3 Replanting of key food trees and management of spacing

Important revegetation prescription parameters are listed below:

- Tubestock are to be planted at a density of 500 stems per ha;

- By years 10 to 12, saplings will be selectively thinned to about 100 – 250 saplings per ha (aiming for 6 to 10 m between plants). Trees to be retained would prioritise those that are vigorous and/or showing signs of use by Koala and or Grey-headed Flying-fox;
- Preferential use of tube stock due to higher success rates;
- Preferential planting of *Eucalyptus tereticornis* (Forest Red Gum); *Corymbia citriodora* (Lemon-scented Gum); and *Eucalyptus crebra* (Narrow-leaved Ironbark), as these species are important fodder and nectar sources for Koala and Grey-headed Flying-fox, respectively;
- Preferential utilisation of local provenance seed collected from trees within 50 km of the Offset site, preferably with high measured foliage nutrient value and low plant secondary metabolites;
- Implement appropriate establishment and management measures to maximise revegetation success; and
- Use of appropriately timed thinning practices to maintain high biomass production in the tree crown (i.e. preventing adverse impacts from conspecific competition).

3.2.3.4.3.1 Timing

Re-planting will be undertaken by a suitably experienced contractor who will be able to readily assess the Offset site and develop a site-specific approach. The planting of additional vegetation will increase the coverage of the tree layers, re-introducing Koala foraging and (and potential) breeding habitat. Where possible, planting should occur in the cooler months (April to September) to allow for plants to become acclimatised to the site before drier conditions occur over summer.

3.2.3.4.3.2 Establishment

The most important factors for plant establishment are:

- The surrounding soil is moist at the time of planting. Mulch is a safe and effective way of ameliorating soil conditions. It helps control soil water loss, soil temperature fluctuations and weed invasion (Buchanan 1989);
- All plants are protected by bags (plastic sleeves) and bamboo stakes;
- Plants actively growing at the time of planting;
- Sufficient rain occurs and/ or watering is provided in the following months;
- The plants are free of weed competition. Weeds around planted vegetation shall be controlled during regular associated maintenance works; and
- If mulching is required, weed free leaf and woodchip mulch will be used at the discretion of the regeneration contractor following Project works and the establishment/preparation of the Offset site. Mulch will be established to a minimum depth of 75 mm prior to planting. It is recommended that once tube stock become established, mulching ceases to encourage seed germination of native plants. If weed-free mulch is not locally available, it should be sourced from local landscape centres.

3.2.3.4.3.3 Soil preparation and fertilisers

Soils should be prepared for plantings by deep ripping to loosen hard layers of soil and allow for unobstructed plant growth. Water saving crystals may also be used if the conditions are hot and/or dry in order to aid in sapling establishment. Fertilisers may also be used if soils are found to be lacking appropriate nutrient conditions to support sapling establishment.

3.2.3.4.3.4 Tree guards

All planted tube stock will be protected with a suitable plastic guard, designed to encourage establishment by reducing herbivory.

3.2.3.5 Trigger, Action and Response Plan

Scenarios for corrective action, and the planned response are detailed in **Table 15**.

Table 15: Trigger, Action and Response Plan

Scenario	Corrective action
Livestock or unauthorised activity detected within Offset site	• Restore fencing failures. • Remove livestock. • Investigate damage and rectify.
Habitat regeneration: Performance criteria not met	• Investigate the cause of recruitment failure and rectify accordingly. • Undertake additional stocking of tubestock to achieve density targets. • Implement corrective measures and revise HMP (if required).
Habitat revegetation: Performance criteria not met	• Investigate the cause of recruitment failure and rectify accordingly. • Undertake additional stocking of tubestock to achieve density targets. • Consider ecological thinning to increase species and age class diversity. • Implement corrective measures and revise HMP (if required).

3.2.4 Management Action 4 - Pest management

3.2.4.1 Overview

Pest animals degrade the quality and suitability of habitat for native fauna. For the Koala, wild dogs are identified as a KTP under the Koala Conservation Advice (DSEWPC 2012). As such, the development and implementation of management measures to control the adverse impacts of predation by dogs is a Priority Management Action. Moreover, within Queensland, all restricted invasive animals carry management requirements prescribed by *Biosecurity Act 2014*. As such, a Pest Management Plan (PMP) will be developed following two years of baseline surveys. These surveys are important to gauge the activity of pest animals in the Offset site, to ensure that controls prescribed by the PMP are suitable to ensure the relevant performance targets are met.

Once the PMP is instigated, pest species management will be undertaken by a suitably qualified pest management contractor, ensuring all pest animal control is conducted in accordance with the *Animal Care and Protection Act 2001* using control techniques that cause the animal as little pain as is possible. As well as targeting other pest species, the PMP will include techniques designed to target wild dog control, which will account for wild dog behaviour, social structure, habits and food preferences.

3.2.4.2 Objectives and Performance/ Completion Targets

The objectives and performance targets for access management works is provided in **Table 16**.

Table 16: Pest animal objectives and performance targets

Management Objective	Performance Target			Completion Target
	Years 1 to 3	Years 3 to 5	Years 5 to 20	
• Reduce abundance of non-native predators and non-native herbivores.	• Two years of baseline survey of pest animals to be undertaken. • Develop PMP. • Commence pest control in Year 3.	• A 90% reduction in the number or abundance of non-native predators and non-native herbivores by the end of year 5, relative to the number or abundance identified during the baseline surveys.	• Ensure that the number or abundance of non-native predators and non-native herbivores are then maintained at, or reduced below, the year 5 number or abundance for the rest of the period of effect of the approval.	• Ensure that the number or abundance of non-native predators and non-native herbivores are then maintained at, or reduced below, the year 5 number or abundance for the rest of the period of effect of the approval.

3.2.4.3 Management Actions

The annual works program is to have regard for the proposed management actions outlined in **Table 17**.

Table 17: Proposed pest species management actions

Year	Proposed Management Actions
Year 1 to 3	Undertake two years of baseline survey of pest animals to characterise and quantify activity levels, with results informing the refinement of the Pest Management Plan. Commence pest animal management in Year 3.
Year 3 to 5	Annual pest animal management (with effort / method requirements informed by monitoring results).
Year 5 to 20	Annual pest animal management (with effort / method requirements informed by monitoring results).

3.2.4.4 Specification Guidance

Information collected from baseline surveys will be used to develop a PMP to be implemented within the Offset site. This management plan will outline control strategies, techniques (trapping, baiting, shooting, fencing etc), timelines and benchmarks. Measures to reduce numbers of wild dogs will be prioritised to reduce their risk to Koala.

Important pest animal prescription parameters, to be considered in the PMP, are listed below:

- Pest species management will be undertaken by a suitably qualified pest management contractor. Control techniques employed will be dependent on the contractor understanding wild dog behaviour, social structure, habits, and food preferences resulting in an effective control strategy using a combination of techniques;
- All pest management actions are to be carried out in accordance with the *Biosecurity Act 2014*;
- Appropriate signage will be used once control techniques are determined;
- Baiting programs will be employed following local government area guidelines (i.e. GRC 2020) to control or eradicate pest species;
- Timelines are to be established for monitoring and control activities depending on pest activity levels. Once pest species numbers are at a controlled level, monitoring and management events could be reduced accordingly; and
- PMP will take into consideration combined management of surrounding locality of the Offset site through consultation and communication with local land managers and stakeholders (i.e. government departments, LGA's, utility providers and landowners).

Pest management options for species most likely to occur are outlined below:

- European fox (*Vulpes vulpes*), wild dog (*Canis familiaris*) and feral cat (*Felis catus)*: 1080 baiting of foxes/dogs and Curiosity® or similar baiting for cats in accordance with relevant legislation (i.e. usage signs erected around the Offset site). Factors to consider when using such baiting programs are:
  - Using signage;
  - Avoid placement near waterways;
  - Appropriate disposal and recording of carcasses; and
  - Notification to neighbours regarding commencement of a 1080 and Curiosity® baiting program onsite.

  Trapping with cage traps may also be undertaken. However, any animals to be euthanised should be conducted in accordance with legislation and ethics requirements.
- European rabbit (*Oryctolagus cuniculus*): current best practice control is the inspection, ripping and rehabilitation of rabbit warrens as detected. Initial pest management audit will establish trapping and baiting requirements;
- Pig (*Sus scrofa*) - 1080 baiting of feral pigs in accordance with relevant legislation and measures suggested for management of European fox, wild dog and feral cat (see above).
- Black rat (*Rattus rattus*) and house mouse (*Mus musculus*): Non-trapping/poison methods are to be maintained as the primary method of management. A clean operational area is to be maintained to reduce potential for home range establishment (i.e. limit refugia habitat and food sources). Water availability is to be managed, to prevent occurrence. Chemical/ trapping control measures to be deployed if primary method is ineffective.

3.2.4.5 Trigger, Action and Response Plan

Scenarios for corrective action, and the planned response are detailed in **Table 18**.

Table 18: Trigger, Action and Response Plan

Scenario	Corrective action
Feral pests rise above baseline levels.	• Revise PMP; considering increasing the timing, method and frequency of control measures. • Implement revised approach to pest control and monitoring for success against performance and completion criteria. • Where required, consult with Council to initiate broader control measures (e.g. coordinated baiting programs).

3.2.5 Management Action 5 - Bushfire Management

3.2.5.1 Overview

Fire intensity and frequency shapes the natural environment. Too frequent fire may prevent plants from recovering post-fire and lead to localised species extinctions or a contraction of a vegetation community extent. Conversely, prolonged inter fire intervals can lead to a dominance of a small suite of longer-lived taxa to the detriment of other plant species. Fire may also be used to aid in the management of weeds and pest species.

To manage the fire ecology of the Offset site, a Bushfire Management Plan (BFMP) will be developed. The purpose of this plan will be to maintain and enhance biodiversity values by implementing ecological burns (Queensland Herbarium, 2018), in accordance with the recommended fire regime (see **Section 3.2.5.4**). These ecological burns will also assist with mitigating high intensity burns that may otherwise threaten biodiversity values within Offset site, including food resources for Koala and Grey-headed Flying-fox. Such fire management measures are becoming increasingly important as climate change is increasing the frequency and intensity of bushfires, particularly in SEQ, where the Offset site is located (BOM 2019). The BFMP will be prepared by a suitably qualified Bushfire Planner.

3.2.5.2 Objectives and Performance/ Completion Targets

The objectives and performance targets for fire management works is provided in **Table 19**.

Table 19: Pest animal objectives and performance targets

Management Objective	Performance Target			Completion Target
	Years 1 to 3	Years 3 to 5	Years 5 to 20	
• Manage Bushfire Ecology within guidelines for respective RE types.	• Undertake baseline surveys by end of Year 1. • Develop BFMP by end of Year 2. • Implement all required bush fire suppression assets in preparation of implementing prescribed burns by end of Year 3.	• Ecological prescribed burn in >50% of priority areas identified in BFMP by end of Year 5.	• Ecological prescribed burn in 100% of priority areas identified in BFMP by end of Year 10.	• All ecological burns undertaken as prescribed by the BFMP by end of Year 10 (repeat where required to year 20).

3.2.5.3 Management Actions

The annual works program is to have regard for the proposed management actions outlined in **Table 20**.

Table 20: Proposed bushfire management actions

Year	Proposed Management Actions
Years 1 to 3	• Conduct a survey of baseline bushfire loads, determine period since last burn and identify existing fire breaks and potential paths by end of Year 1. • Undertake assessment of bush fire suppression assets (trails, roads, water points, trail signage and access gates) and determine suitability for fire management operations by end of Year 1. • Develop BFMP considering baseline survey data to inform ongoing bushfire management activities by end of Year 2. • Undertake installation and maintenance to bush fire suppression assets in preparation of implementing prescribed burns by end of Year 3.
Years 3 to 5	Undertake ecological prescribed burn to >50% priority areas identified in BFMP, implementing cold burning practises by end of Year 5.
Years 5 to 20	Undertake ecological prescribed burn to 100% priority areas identified in BFMP, implementing cold burning practises by end of Year 10 (repeat ecological burn where needed).

3.2.5.4 Specification Guidance

Fire management is to be completed in consultation with Queensland Fire and Emergency Services (QFES) and have regard for the management objectives stated in this OMP. The BFMP should include (but not limited to) fire history; assessment of baseline fuel load; current fire risk; existing firebreaks and/or control lines; potential fire paths; recommendations for the implementation of ecological burns (excluding the revegetation zone) and risk mitigation of high intensity bushfire. Importantly, the BFMP will be prepared with respect to the vegetation types within the Offset site, and their recommended fire management guidelines (see **Table 21**). Burns should also be designed to protect the revegetation works and Koala fence.

Management measure to be included in the BFMP will include:

- Establishing new fire trails (i.e. access tracks), fire breaks and barriers/ buffers;
- Annual inspection and maintenance of fire trails, fire breaks and barriers/ buffers;
- Implementing controlled ecological burns in conjunction with QFES and Queensland Rural Fire Service in compliance with the *Fire and Emergency Services Act 1990* (excluding the revegetation zone);
- If fire management is not deemed a practical management tool, recommendations will be made regarding further techniques to reduce fuel loads within the Offset site; and
- Appropriate inter-fire intervals (i.e. time needed between fire events) to allow for sustainable vegetation community recovery.

Table 21: Fire management guidelines for relevant Regional ecosystems

RE Code	Short Description	Fire management guidelines[1]
12.3.7	*Eucalyptus tereticornis, Casuarina cunninghamiana* subsp. *cunninghamiana* +/- *Melaleuca* spp. fringing woodland	SEASON: Summer to late autumn INTENSITY: Low INTERVAL: 3-6 years STRATEGY: Aim to burn 40-60% of any given area. Spot ignition in cooler or moister periods encourages mosaics
12.11.6	Lemon-scented gum *Corymbia citriodora* subsp. *variegata*, narrow-leaved ironbark *Eucalyptus crebra* woodland on metamorphics +/- interbedded volcanics	SEASON: Summer to winter INTENSITY: Low to moderate INTERVAL: 4-25 years STRATEGY: Aim for 40-60% mosaic burn. Burn with soil moisture and with a spot ignition strategy so that a patchwork of burnt/unburnt country is achieved
12.11.8	*Eucalyptus melanophloia* and *E. crebra* grassy woodland on a hillside of metamorphic rock +/- interbedded volcanics	SEASON: Summer to winter INTENSITY: Low to moderate INTERVAL: 4-25 years STRATEGY: Aim for 40-60% mosaic burn. Burn with soil moisture and with a spot ignition strategy so that a patchwork of burnt/unburnt country is achieved
12.11.14	*Eucalyptus crebra*, *E. tereticornis*, *Corymbia intermedia* woodland on metamorphics +/- interbedded volcanics	SEASON: Summer to late autumn INTENSITY: Low INTERVAL: 3-6 years STRATEGY: Aim to burn 40-60% of any given area. Spot ignition in cooler or moister periods encourages mosaics

1. Fire management guidelines prescribed by (Queensland Herbarium 2018)

3.2.5.5 Trigger Action Response Plan

Scenarios for corrective action, and the planned response are detailed in **Table 22**.

Table 22: Trigger, Action and Response Plan

Scenario	Corrective action
Fire management fails to meet burn intensity and interval prescribed for relevant Regional ecosystem types.	• Control bush fire risk in accordance with BFMP; and • Revise BFMP (if required).

3.3 Risk assessment

A summary of risk characterisation for the OMP is presented in **Table 23**. The likelihood and consequence of risk was assessed in accordance with Section 4 of the *Environmental Management Plan Guidelines* by DoE (2014).

Table 23: Risk assessment for management objectives

Management Objective	Risk or hazard	Likelihood	Consequence	Risk Level[1]	Trigger	Contingency/s	Related monitoring activity
Management Action 1 - Access and Fencing Management							
Prevent movement of livestock into Offset site	Livestock access Offset site resulting in degradation of habitat	Unlikely	Minor	Low	Livestock (or signs thereof) observed in Offset site.	• Immediately remove livestock • Check and mend fencing (if needed)	General inspections of the Offset site undertaken quarterly (**Section 4.2**)
Prevent unauthorised access into Offset site	Unauthorised access to Offset site by 4WD, trail bikes etc resulting in degradation of habitat	Unlikely	Moderate	Low	Signs of access including litter, soil disturbance, damage to fencing or damage to native vegetation.	• Determine entry point, recording location on GPS and any damage to fencing. Repair damage as soon as possible (within 30 days of detection). • Review Access and Fencing Management Plan.	General inspections of the Offset site undertaken quarterly (**Section 4.2**)
Management Action 2 – Weed Management							
Reduce High Threat Weeds to 5% of baseline level	New HTW[2] detected	Unlikely	Moderate	Low	Annual weed monitoring detects HTW in Offset site not detected previously encountered.	• Targeted weed control and focus on containment, within 2 months of detection • Notify Government Agency and neighbours of new WoNS and/or environmental weed outbreak • Implement new hygiene controls • Review the WMP • Follow all directions and guidance provided by relevant state government agency to assist in control.	Annual weed monitoring (**Section 4.3**)
	Weed control measures fail to meet performance and completion criteria	Possible	Moderate	Medium	Annual weed monitoring finds HTW coverage is not meeting performance and or completion criteria.	• Increase the frequency of weed control events • Suitably qualified and experienced person to revise WMP.	Annual weed monitoring (**Section 4.3**)

Management Objective	Risk or hazard	Likelihood	Consequence	Risk Level[1]	Trigger	Contingency/s	Related monitoring activity
Management Action 3 – Habitat Management (regeneration and revegetation) Plan							
Increase condition of 109.72 ha of Koala and Grey-headed Flying-fox habitat	Habitat quality scores for interim performance targets are not achieved for one or more offset values (as defined by **Table 13**)	Possible	High	Medium	Annual habitat monitoring finds Habitat regeneration measures are not meeting performance and or completion criteria.	• Investigate the cause of recruitment failure and rectify accordingly • Undertake stocking of tubestock to achieve density targets (if and where required) • Implement corrective measures and revise HMP (third part review of OMP if required).	Annual habitat monitoring (**Section 4.4**)
Recreate 86.70ha of new habitat for Koala and grey-headed Flying-fox foraging habitat	Sapling stocking densities and or habitat quality scores for interim performance targets are not achieved for one or more offset values (as defined by **Table 13**)	Possible	High	Medium	Annual habitat monitoring finds habitat revegetation measures are not meeting performance and or completion criteria.	• Investigate the cause of recruitment failure and rectify accordingly • Undertake stocking of tubestock to achieve density targets (if and where required) • Implement corrective measures and revise HMP (third part review of OMP if required).	Annual habitat monitoring (**Section 4.4**)
	Management Action 4 – Pest Management Plan						
Reduce abundance of pest animals below baseline	Pests rise above baseline levels.	Possible	High	Medium	Annual pest species monitoring finds pest animal levels of activity have increased since baseline survey.	• Revise PMP; considering increasing the timing, method and frequency of control measures • Implement revised approach to pest control and monitoring for success against performance and completion criteria • Where required, consult with Council to initiate broader control measures.	Annual pest species monitoring (**Section 4.5**)

Management Objective	Risk or hazard	Likelihood	Consequence	Risk Level[1]	Trigger	Contingency/s	Related monitoring activity
	Management Action 5 – Bushfire Management Plan						
Manage Bushfire Ecology within guidelines for respective RE types	Fire management fails to meet burn intensity and interval prescribed for relevant Regional ecosystem types	Possible	High	Medium	Annual habitat monitoring finds time since last burn does not meet the RE Type requirements.	• Control bush fire risk in accordance with Bush Fire Management Plan • Revise Bush Fire Management Plan (if required).	Annual habitat monitoring (**Sections 4.3** and **4.6**)
	Unplanned fire degrades habitat quality	Possible	High	Medium	Unplanned fire occurs in Offset site.	• Undertake targeted assessment may be required in the case of an unplanned fire, to assess the extent of extent, intensity and potential implications for other management plans • Revise Bush Fire Management Plan (if required).	Annual habitat monitoring (**Section 4.6**)

1 .Risk level was considered the risk of the management objective not being achieved due to the respective risk or hazard, with emphasis on the consequence to Koala and grey-headed Flying-fox foraging habitat. 2. High Threat Weeds (HTW) are considered Weeds of National Significance (WoNS) or restricted invasive plants, and carry a 'general biosecurity obligation' (GBO) under Queensland's *Biosecurity Act* 2014.

4 MONITORING

The following section describes the monitoring regimes that will be employed within the Offset site. Monitoring regimes were developed with a goal of quantifying the efficacy of the management actions, whilst ensuring habitat for the Koala and Grey-headed Flying-fox habitat within the Offset site is improved in accordance with the relative performance and completion criteria (as detailed in **Section 3**). The overarching monitoring objectives are given in **Section 4.1**, whilst the suggested monitoring approaches for each of the management actions are presented in **Sections 4.2** to **4.6**.

4.1 Monitoring objectives

The objective of the monitoring program is to determine if the objectives of the OMP are being met and that all measures are being effectively implemented. Additionally, the monitoring program will allow identification of corrective actions required, to inform adaptive management. The key criteria to be monitored against are:

- Performance and completion criteria for each of the Management Plans (see **Section 3**);
- Performance criteria and completion criteria triggers (see **Section 3**); and
- Identification of any scenarios that risk the OMP objectives (see **Section 3.3**).

The results of the monitoring program will inform the need for corrective actions, with the two broad scenarios detailed below:

1. Where monitoring informs that the performance and completion criteria are being achieved, it suggests that the OMP is achieving the objectives and should proceed without medication; and
2. If performance and completion criteria are not met, or a risk is identified that could compromise these criteria, then corrective actions are to be implemented in accordance with the Risk Assessment (see **Section 3.3**) and or TARP (where relevant).

All progress and outcomes from the monitoring program present below will be reported in the ACR, as detailed further in **Section 5**.

4.2 Management Action 1 - Access and fencing management

General inspections will be undertaken of the Offset site quarterly to identify any potential issues that may require remedial action regarding access and fencing. During each general inspection, the following will be checked:

- Condition of signs, fencing and gates;
- State of access tracks;
- Condition of firebreaks;
- Exclusion of livestock;
- If any vegetation clearing required to maintain/ establish access tracks, fencing and firebreaks complies with relevant legislation;
- Record any erosion within Offset site; and
- Signs of land degradation.

4.3 Management Action 2 - Weed management

Monitoring of HTWs is required to ensure habitat improvement measure for Koala and Grey-headed Flying-fox meet the relevant performance and completion criteria (see **Section 3.2.2**).

HTWs will be initially mapped within three months of the action commencing, to determine the extent and location of infestation. Monitoring of HTW will then occur biannually (noting for any seasonal differences) until they are no longer observed. Following meeting performance criteria, monitoring will then occur annually. To ensure consistency, monitoring will be replicated at the same times of the year and using the

same method. The following methodology will be employed throughout the baseline assessment and ongoing monitoring:

- Initial mapping will involve a field survey to identify all weed species and infestations within the Offset site by:
  - Meandering transect surveys will also be conducted to identify and record (using field proformas) all weed species encountered throughout the Offset site;
  - Delineating weed infestations using a GPS to map out large weed infestations, to be targeted in weed control. This will be done by walking around weed infestation creating a polygon outlining the extent;
  - Representative (20 x 20 m) monitoring plots, allocated to be representative of the nature of weed infestation across the Offset site, to be undertake during baseline and ongoing monitoring. At each plot, all weed species will be recorded, with abundance and percentage cover recorded for each species. All data will then be entered into an excel spreadsheet and GPS data mapped using GIS software to guide future monitoring efforts; and
- During each monitoring event, the same procedure outlined in the mapping stage will be employed. This will provide an accurate representation of the overall extent of weed infestations, along with data outlining any changes in density, abundance and diversity of invasive species throughout the Offset site.

4.4 Management Action 3 - Habitat management (regeneration and revegetation)

Monitoring of vegetation is required to measures to rehabilitate and create habitat for Koala and Grey-headed Flying-fox meet the relevant performance and completion criteria (see **Section 3.2.3**). Monitoring will be carried out annually, to co-inside with late summer (e.g. February – March) to allow assessment of habitat following the highest risk period (i.e. drought and fire) and promptly direct any required adaptive management.

The habitat quality assessment methodology, MHQA, will be used to gather baseline and monitor habitat condition within the Offset site. To date, preliminary baseline vegetation mapping and vegetation transects have been undertaken in accordance with DEHP (2017) (see **Appendix A** for baseline data). Further vegetation mapping may be required to refine vegetation types and condition classes across the Offset site, as well as identify if any additional plots are required to be established to better consider the range of habitat conditions present.

A summary of this habitat quality assessment methodology MHQA is provided in **Section 4.4.1**. This method is to be used to monitor the condition of areas where habitat is to be regenerated and revegetated (i.e. EMZs 1 and 2, respectively).

Additionally, fixed photo monitoring will be undertaken to monitor habitat management success across the Offset site (**Sections 4.4.2**), whilst an assessment of planting stock will be undertaken to measure the progress of habitat revegetation (**Section 4.4.3**).

4.4.1 Modified Habitat Quality Assessment (DEHP 2017)

The MHQA method involves dividing the Offset site into Habitat Assessment Units (AUs), in accordance with prevailing Regional ecosystems and other ecological and topographical features relevant to the Koala and Grey-headed Flying-fox. Within each Habitat AU, site condition, site context and the species habitat index will be determined based on vegetation transects, general site observations and GIS analysis. The primary means of monitoring habitat regeneration and revegetation success will be undertaken through the Site-based attributes (collected in accordance with the BioConditon Method; *sensu* DEHP 2017. Overall habitat quality will also be monitored using the overall habitat quality score, which equals Site-based attributes (**Appendix A; section A1.1.2)** + Landscape-scale attributes (**Appendix A; section A1.1**) + Species habitat index (**Appendix A; section A1.1.4**). Below is a brief description of the data recorded for each of these components. **Appendix A** outlines the method used to calculate the habitat quality scores for the Koala and Grey-headed Flying-fox and results from the baseline study.

4.4.2 Photo monitoring

Photographs will be taken at pre-determined locations (fixed GPS coordinates) on a pre-determined bearing to ensure consistency throughout years (see Ecological Inventory Report for baseline assessment locations; **Appendix A** of the Preliminary Documentation (RPS 2021). The monitoring locations and results are to be reported as part of the ACR, which is to be a key reference for future monitoring and performance management. Photographs are to be included in the ACR.

4.4.3 Revegetation stock assessment

Stock health assessment plots will be established in areas where habitat revegetation (i.e. replanting; EMZ 2) is to occur. These plots are to be established in accordance with DEHP (2017; see **Section 4.4.1**). The location and number of these plots is to be representative of the number of plantings undertaken (i.e. areas with greater numbers of tube stock would be preferred) and diversity of species planted. They will also be located to capture areas where chances of planting success are lowest (i.e. areas where soils are most compacted, disturbed and or driest). As well as the parameters routinely collected as part of the BioCondition method (see **Section 4.4.1**), monitoring of plots in EMZ 2 will involve an additional assessment of stock health. At each plot, the following variables will be recorded on field proformas:

- Survival rates of all tube stock;
- Average health of all tube stock;
- Signs of plant disease/stress for all tube stock;
- Average height of canopy species;
- Average height of mid story species;
- Average height of ground cover species;
- Percentage cover of canopy species; and
- Percentage cover of mid story species.

4.5 Management Action 4 - Pest management

Baseline pest animal surveys will be undertaken for two years to understand the extent and nature of pest animals inhabiting or utilising the Offset site by a suitably experienced ecologist. Following baseline surveys, surveys should occur annually until the desired level of control is reached, as determined by the relevant performance and completion criteria (see **Section 3.2.4.2**). Given the anecdotal evidence of wild dogs frequenting the area, attention would be given to this species as it poses an acute threat to Koala. Research will be undertaken to estimate the number of Koala mortalities due to predation by pests. This baseline survey would be used to develop a PMP, as well as serve as a baseline survey to allow for ongoing monitoring on the performance of the management plan.

The following pest species monitoring methods may be used:

- Scat and track surveys and analysis to be carried out to identify the presence of pest species. A GPS device will be used to mark locations of relevant scat or tracks found during the survey (or by opportunity);
- Motion detection cameras will be deployed for at least four trapping nights to find a pest species within the Offset site (note that these cameras will also provide data on the presence of nocturnal native species, including the Koala);
- All data will be entered into an excel spreadsheet and relevant GIS program for comparison with previous years data to identify trends within the Offset site; and
- Where pest species are identified, data is to be relayed to an engaged pest management contractor to implement control techniques, in accordance with the PMP.

4.6 Management Action 5 – Bushfire management

A baseline bushfire assessment of the Offset site is required to inform the BFMP within the first year. This initial survey will involve an assessment of baseline fuel loads, fire history, current fire risk, existing firebreaks and/or control lines and potential fire paths.

Monitoring will then be undertaken in accordance with the BFMP, at a frequency and extent that allows reliable measurement of the success of the plan against relevant performance and completion criteria. This may be undertaken in unison with habitat monitoring (see **Section 4.4**). Note that monitoring efforts outside of the monitoring schedule may be required in the case of an unplanned fire, to guide adaptive management.

4.7 Timeline for monitoring and report actions

The proposed timeframes for monitoring and reporting for each of the management actions is provided in **Table 24**.

The findings of each reporting assessment must be documented and published by the proponent within 3 months of the reporting period of which and be provided to DAWE within five business days of being published.

Within three (3) months after the end of year 1, the approval holder must publish on its website a report containing all survey data (including survey methodology and dates) from the baseline surveys required under condition 6 including a program to monitor and report on progress against the ecological outcomes specified in conditions 7-12. A copy of this information and evidence of the date of publication on the website must be provided to the Department within 3 months after the end of year 1.

According to Condition 13., the approval holder must engage a suitably qualified field ecologist to undertake an assessment, at the end of each of year 5, year 10, year 15, and year 20, as to whether each outcome required under conditions 7-12 has been, or is likely to be, achieved in accordance with the condition requirements, and provide advice of any circumstance/s which they consider is/are affecting the achievement of each outcome. The findings of each assessment must be documented and published on the website within 3 months of the end of the particular period of which the assessment is undertaken and be provided to the Department within 5 business days of being published.

Table 24: Timeline for monitoring and reporting

Baseline monitoring	Routine monitoring	Reporting	Responsible Parties
Management Action 1 - Access and Fencing Management			
-	Quarterly	• Annually as part of ACR. • Suitably qualified field ecologist to undertake an assessment, at the end of each of year 5, year 10, year 15, and year 20, as to whether each outcome required under conditions 7-12 has been, or is likely to be, achieved in accordance with the condition requirements.	• Land Holder (the proponent, Lightsource bp)/ Project Ecologist with input from Bush regeneration specialist. • Year 5, year 10, year 15 and year 20 assessment to be undertaken by independent qualified ecologist (i.e. not Project Ecologist).
Management Action 2 - Weed Management			
Baseline weed mapping and monitoring plots will be conducted within three months of the commencement of the action	Monitoring of HTW will then occur biannually (noting for any seasonal differences) until they are no longer observed. Following meeting performance criteria, monitoring will then occur annually.	• Annually as part of ACR. • Suitably qualified field ecologist to undertake an assessment, at the end of each of year 5, year 10, year 15, and year 20, as to whether each outcome required under conditions 7-12 has been, or is likely to be, achieved in	• Project Ecologist with input from Bush regeneration specialist. • Year 5, year 10, year 15 and year 20 assessment to be undertaken by independent qualified ecologist (i.e. not Project Ecologist).

Baseline monitoring	Routine monitoring	Reporting	Responsible Parties
		accordance with the condition requirements.	
Management Action 3 – Habitat (Revegetation and Regeneration) Management			
Baseline mapping to confirm areas for regeneration and regeneration areas (i.e. EMZ1 and EMZ2) within the first three months of the commencement of the action. Undertake additional BioCondition plots where needed.	Monitoring will be carried out annually, to co-inside with late summer (e.g. February – March) to allow assessment of habitat following the highest risk period (i.e. drought and fire) and promptly direct any required adaptive management.	• Annually as part of ACR. • Suitably qualified field ecologist to undertake an assessment, at the end of each of year 5, year 10, year 15, and year 20, as to whether each outcome required under conditions 7-12 has been, or is likely to be, achieved in accordance with the condition requirements.	• Project Ecologist with input from Bush regeneration specialist. • Year 5, year 10, year 15 and year 20 assessment to be undertaken by independent qualified ecologist (i.e. not Project Ecologist).
Management Action 4 – Pest Management			
Baseline pest surveys will be undertaken for the first two years to understand the extent and nature of pest animals inhabiting the Offset site.	Following baseline surveys, surveys should occur annually until the desired level of control is reached, as determined by the relevant performance and completion criteria.	• Annually as part of ACR. • Suitably qualified field ecologist to undertake an assessment, at the end of each of year 5, year 10, year 15, and year 20, as to whether each outcome required under conditions 7-12 has been, or is likely to be, achieved in accordance with the condition requirements.	• Project Ecologist with input from Project Pest Management Specialist. • Year 5, year 10, year 15 and year 20 assessment to be undertaken by independent qualified ecologist (i.e. not Project Ecologist).
Management Action 5 – Bushfire Management			
Baseline survey of bushfire ecology for Offset site required within the first year from the commence of the action (to include baseline fuel loads, fire history, current fire risk, existing firebreaks and/or control lines, and potential fire paths).	Monitoring will then be undertaken in accordance with the BFMP, at a frequency and extent that allows reliable measurement of the success of the plan against relevant performance and completion criteria. This may be undertaken in unison with habitat monitoring. Additional monitoring may be required outside of the monitoring schedule in the case of an unplanned fire, to guide adaptive management.	• Annually as part of ACR. • Suitably qualified field ecologist to undertake an assessment, at the end of each of year 5, year 10, year 15, and year 20, as to whether each outcome required under conditions 7-12 has been, or is likely to be, achieved in accordance with the condition requirements.	• Suitable qualified Bushfire Planner. • Year 5, year 10, year 15 and year 20 assessment to be undertaken by independent qualified ecologist (i.e. not Project Ecologist).

4.8 Adaptive management framework (AMF)

To account for uncertainties and to improve management response, all impacts to biodiversity will be adaptively managed using an Adaptive Management Framework (AMF). The AMF actions are detailed below, noting this OMP represents Steps 1 to 4, with any specifications for adaptive management to be determined through steps 5 to 7.

1. **Describe** - Undertake and complete comprehensive baseline biodiversity data collection;
2. **Model** – Model the biological environment and its response to certain actions/decisions;
3. **Identify** – Set clear biodiversity management objectives;
4. **Do** – Implement the modelled biological management action;
5. **Learn** – Use the monitoring program to evaluate the biological response to management actions against objectives and performance targets. Where required, prepare draft adaptive management response and include in the ACR;
6. **Consult** – Share draft adaptive management response with relevant stakeholders (i.e. DAWE). Seek approval to implement revised management actions; and
7. **Adapt** – Implement revised and approved adaptive management actions.

Draft adaptive management responses are to be defined through Step 5, reported in the ACR and approved as varied by DAWE prior to implementation.

5 REPORTING

5.1 Annual Compliance Report (ACR)

Lightsource bp will provide DAWE an ACR by 30 June every year after commencement of the action for the life of the OMP (e.g. 20 years). This report will detail the progress made towards achieving the performance and completion criteria specified in this OMP.

The ACR will contain (but not limited to):

- Name and contact details of the proponent, landowner, and contractors/consultants who worked on Offset site. Details regarding their skills and expertise will be provided to demonstrate that management measures were carried out by suitably qualified practitioners;
- Queensland Government environmental approval number;
- EPBC approval number;
- Lot on plan property description and postal address;
- Climatic conditions leading up to and during monitoring;
- Description of management actions undertaken within the management period;
- Results of monitoring campaigns and comparison against management and/or performance criteria to track progress;
- Identification of any risks or potential threats that have arisen or changed since the development of the OMP, and activities required to manage these threats and risks;
- Details of any triggers that have been exceeded and/or corrective actions that were implemented; and
- Recommendations for revising the OMP, including changes to management and monitoring activities to improve management and/or monitoring performance and attain interim performance targets and/or completion criteria.

5.2 Updating the OMP

Following an AMF (see **Section 4.8**), the OMP will be reviewed on an annual basis and amended (if needed) to address changes in risks / threats or management issues identified whilst undertaking management actions, monitoring or attending site. Based on the outcomes of the review, management actions may be revised to include additional management measures or monitoring approaches, or removal of actions / monitoring if found to be ineffective. Following attainment of the completion criteria presented in the OMP, it will be continued to be reviewed to ensure the completion criteria is maintained until the end of Year 20.

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Appendix A

Baseline habitat quality scores and future targets

A.1 Baseline Habitat Quality Assessment

The habitat quality assessment methodology known as MHQA was used to assess habitat values for Koala within with Project footprint and Offset site.

To accurately assess the habitat values, both the Project footprint and Offset site were divided into Habitat Assessment Units (AUs) based on prevailing Regional ecosystems and other ecological and topographical features relevant to the Koala. Within each Habitat AU, site condition, site context and the species habitat index were determined based on field transects and observations and GIS analysis. Scores for each of these attributes were combined to determine the overall habitat quality score. That is, Site condition + Site context + Species habitat index = Habitat quality score (measured).

The approach used to calculate the habitat quality are presented in **Section A.1.1.1**, whilst the results from baseline monitoring are presented in **Section A.1.2**.

A.1.1 Methodology

A.1.1.1 Habitat Assessment Units

Habitat AUs were allocated based on obtaining adequate representation of the diversity of communities and ecological conditions present in potential Koala habitats across the entire site. In total, 13 BioCondition transects (DEHP 2017) were conducted in the Offset site. **Apx Figure 1** shows the locations of these transects and AUs, whilst **Table A1 1** details the REs composing each of the three AUs located in the Offset site.

Table A1 1: Habitat Assessment unit descriptions

Habitat Assessment Unit	Regional ecosystem	Description	Transect nos.
EMZ 1 (Intact)			
AU1	RE 12.11.6 (BVG 2M=10; BVG 5M=3)	Lemon-scented gum *Corymbia citriodora subsp. variegata*, narrow-leaved ironbark *Eucalyptus crebra* woodland on metamorphics +/- interbedded volcanics	Offset 1, 3 and 7
AU2	RE 12.11.8 (BVG2M=17; BVG 5M=5)	*Eucalyptus melanophloia* and *E. crebra* grassy woodland on a hillside of metamorphic rock +/- interbedded volcanics	Offset 2
AU3*	RE 12.11.14 (BVG 2M=13; BVG 5M=3)	*Eucalyptus crebra*, *E. tereticornis*, *Corymbia intermedia* woodland on metamorphics +/- interbedded volcanics	Offset 4 and 5
EMZ 2 (regeneration zone)			
AU4	RE 12.11.6 (BVG 2M=10; BVG 5M=3)	Lemon-scented gum *Corymbia citriodora subsp. variegata*, narrow-leaved ironbark *Eucalyptus crebra* woodland on metamorphics +/- interbedded volcanics	Offset 11 and 12
AU5	RE 12.11.14 (BVG 2M=13; BVG 5M=3)	*Eucalyptus crebra*, *E. tereticornis*, *Corymbia intermedia* woodland on metamorphics +/- interbedded volcanics	Offset 8, 9, 10 and 13

*AU3 includes a narrow strip of approximately 1.07 ha of RE 12.3.7 *Eucalyptus tereticornis, Casuarina cunninghamiana* subsp. *cunninghamiana* +/- *Melaleuca* spp. fringing woodland which is bordered by RE 12.11.14. As this area is on the limit of the minimum assessment unit size (1ha) and the RE contains suitable Koala and Grey-headed Flying-fox feed trees in the form of *E.tereticornis*, this area has been incorporated into AU3.

A.1.1.2 Site-based attributes

Site condition was assessed, compared to benchmarks and assigned a score within each Habitat AU on-site:

1. Recruitment of Woody Species;
2. Tree Species Richness;
3. Shrub Species Richness;
4. Grass Species Richness;
5. Forb Species Richness;
6. Tree Canopy Height;
7. Tree Canopy Cover;
8. Shrub Canopy Cover;
9. Native Perennial Grass Cover;
10. Organic Litter;
11. Large Trees;
12. Coarse Woody Debris;
13. Non-native plant cover;
14. Quality and availability of food and foraging habitat; and
15. Quality and availability of shelter.

Photographs of the habitat AUs are provided in **Table A1 2**.

Table A1 2 Habitat Assessment Unit photographs

AU	Transect nos.	Aspect	Photograph
EMZ 1 (intact)			
AU1	Offset 1	East	

AU	Transect nos.	Aspect	Photograph
	Offset 3	East	
	Offset 7	East	
AU2	Offset 2	South	

AU	Transect nos.	Aspect	Photograph
AU3	Offset 4	East	
	Offset 5	East	
Offset site (regeneration zone)			
AU4	Offset 11	East	

AU	Transect nos.	Aspect	Photograph
	Offset 12	East	
AU5	Offset 8	East	
	Offset 9	East	

AU	Transect nos.	Aspect	Photograph
	Offset 10	East	
	Offset 13	East	

A.1.1.3 Landscape-scale attributes

Patch size

This attribute was a measure of the size of the patch of vegetation in which the assessment unit is located. Scores assigned to patch size according to the following categories: <5 ha remnant AND/OR regrowth (0); ≥5 – 25 ha remnant AND/OR regrowth (2); ≥25 – 100 ha remnant OR ≥25 – 200 ha remnant and regrowth OR ≥25 – 200 ha regrowth (5); ≥100 – 200 ha remnant OR >200 ha remnant and regrowth OR >200 ha regrowth (7) and ≥200 ha remnant (10).

Connectivity

Connectivity relates to the capacity species have to disperse through the landscape between suitable patches of habitat. Four broad categories that describe the connectivity of the assessment unit within the landscape with both remnant and regrowth vegetation assessed within the connectivity attribute: Low (AU is not connected using any of the following descriptions; 0); Medium (AU is connected with adjacent remnant vegetation along >10% to <50% of its perimeter OR is connected with adjacent remnant vegetation along <10% of its perimeter AND is connected with adjacent regrowth native vegetation > 25% of its perimeter; 2); High (AU is connected with adjacent remnant vegetation along 50% to 75% of its perimeter; 4); and Very High (AU is connected with adjacent remnant vegetation along >75% of its perimeter OR includes > 500 ha remnant vegetation; 5).

Site Context

The context attribute refers to the amount of native vegetation that is retained in the landscape proximal to the Offset site. A 1 km radius buffer from the 50 m mark of the BioCondition transect (DEHP 2017) is used to delineate a circular spatial extent. **Apx Figure 2** shows the allocation of these buffers. Scores were allocated as Low (<10% remnant vegetation AND <30% native non-remnant vegetation (regrowth); 0), Medium (≥10% to 30% remnant vegetation AND <30% regrowth OR <10% remnant vegetation AND ≥30% regrowth; 2), High (≥30% to 75% remnant vegetation OR ≥10% to 30% remnant vegetation AND ≥30% regrowth; 4) or Very High (>75% remnant vegetation; 5).

Ecological Corridors

Queensland Globe (2020) was used to explore the presence of state, bioregional, regional or sub-regional corridors (terrestrial or riparian). It was then determined whether the Offset site is located within (wholly or partly; 6); shares a common boundary with (4); or is not within a corridor (0).

A.1.1.4 Species Habitat Index

Threats to species

Threats to Koala were considered as the number and severity of threatening processes observed at or adjacent to the Offset site. Potential threats considered were focused on risk of attack from wild dogs, vehicle strike and clearing associated with development/agriculture. Threat to the species was scored as High threat level (i.e. likely to result in death, irreversible damage (1); Moderate threat level (7); and Low threat level (i.e. likely to survive; 15).

Quality and availability of food and foraging habitat

This was scored to reflect the extent (i.e. density and distribution) that food trees may sustainable population of Koalas. Quality and availability of food and foraging habitat was scored as Poor (1); Moderate (5); and High (10).

Quality and availability of shelter

This parameter accounted for the relative abundance and condition of habitat features that could be used. For the Koala, shelter was taken as the abundance of tall mature trees. Quality and availability of shelter was scored as Poor (1); Moderate (5); and High (10).

Species mobility capacity

This parameter is measured as the presence and severity of factors that would contribute to a reduction in the mobility of the species. Species mobility capacity was scored as Severely restricted (76–100% reduction; 1); Highly Restricted (51–75% reduction; 4); Moderately restricted (26–50% reduction; 7); and Minor restriction (0–25% reduction; 10).

Role of site location to species overall population in the state

This score is be based on the observed role of the Offset site in relation to the overall population of the species in Queensland. This takes into account the species' use of the Offset site – such as whether it is used for feeding and/or nesting and the effect that damage to or removal of the site would have to the likelihood of the species' overall population survival. Role of Offset site location to species overall population in the state was scored as Not or unlikely to be critical to species' survival (1); Likely to be critical to species' survival (4); and Critical to species survival (5).

A.1.1.5 Modified Habitat Quality Scores

The score for each AU was then converted to a score out of 10 using the following equation:

Habitat quality score $^{(measured)}$ / Habitat quality score $^{(max)}$) x 10 =
= Assessment unit habitat quality score $^{(out\ of\ 10)}$

Each assessment unit was divided by the AU area (in hectares) by the total impact or Offset site area (in hectares) to find the size weighting for that AU using the following equation:

Assessment unit habitat quality score x Size weighting=
Weighted assessment unit habitat quality score

Once each Weighted AU habitat quality score was been determined, these scores were added to find the final Habitat Quality Score for the entire Offset site (this was then rounded to the nearest whole number).

Project footprint
Offset site
Perimeter fencing
Livestock fencing
Road
River/stream
Cadastre
Biocondition site

Regional Ecosystems (RE)
12.11.14
12.11.6
12.11.8
12.3.7

Offset 1
Offset 2
Offset 3
Offset 4
Offset 5
Offset 6
Offset 7
Offset 8
Offset 9
Offset 10
Offset 11
Offset 12
Offset 13

Wide Bay Hwy
Gympie Woologa Rd

N

0 100 200 400 600 800 1,000 m
SCALE: 1:12,500 AT A3 SIZE

IMPORTANT NOTE

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4. The aerial photography used in this plan has not been rectified. This image has been overlaid as a best fit on the boundaries shown and position is approximate only.

APX FIGURE 1
HABITAT ASSESSMENT UNITS AND VEGETATION TRANSECTS

LOCATION:
1706 WIDE BAY HWY
WOOLOOGA

PURPOSE:
OFFSET MANAGEMENT PLAN

DATE: **21/06/2021**
VERSION: **E**

CO-ORD SYSTEM: **GDA2020 MGA Zone 56**
DATA SOURCE: **RPS, ESRI, QLD GOVT**
PATH:
\\ntlfile1\data\JOBS\147k\147105 Lower Wonga\10 - Drafting\147105_LowerWonga_Wooloooga\147105_LowerWonga_Wooloooga.aprx

CLIENT: **Lightsource bp**
JOB REF: **PR147105**
TECHNICIAN: **Robert.Suansri**

RPS AUSTRALIA EAST PTY LTD (ABN 44 140 292 762)
Unit 2A, 45 Fitzroy Street, Carrington, NSW, Australia, 2294 PO Box 120, Carrington, NSW, 2294
T: 02 4940 4200 F: 02 4940 4299 www.rpsgroup.com.au

MAKING COMPLEX EASY

Offset site
Perimeter fencing
Livestock fencing
Road
River/stream
Cadastre

Regional Ecosystems (RE)
12.11.14
12.11.6
12.11.8
12.3.7

RE patch buffers
12.11.14
12.11.6
12.11.8
12.3.7

Wide Bay Hwy

Gympie Wooloogal Rd

N

0 100 200 400 600 800 1,000 m
SCALE: 1:15,000 AT A3 SIZE

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APX FIGURE 2
1KM RADIUS BUFFERS FOR BIOCONDITION TRANSECTS

LOCATION:
1706 WIDE BAY HWY
WOOLOOGA

PURPOSE:
OFFSET MANAGEMENT PLAN

DATE: **21/06/2021**
VERSION: **E**

CO-ORD SYSTEM: **GDA2020 MGA Zone 56**
DATA SOURCE: **RPS, ESRI, QLD GOVT**
PATH:
\\ntlfile1\data\JOBS\147k\147105 Lower Wonga\10 - Drafting\147105_LowerWonga_Woolooga\147105_LowerWonga_Woolooga.aprx

CLIENT: **Lightsource bp**
JOB REF: **PR147105**
TECHNICIAN: **Robert.Suansri**

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MAKING COMPLEX EASY

A.1.2 Baseline scores

A.1.2.1 Koala MHQA Scores

Table A1 3 Baseline Site Condition Scores (40% weighting)

Parameter	EMZ 1 (Intact)			EMZ 2 (Regeneration zones)	
	AU1	AU2	AU3	AU4	AU5
Recruitment of woody perennial species in EDL	4.2	5	4.7	3.0	4.5
Native plant species richness - trees	4.5	5	2.9	5.0	1.9
Native plant species richness - shrubs	4.5	5	2.9	5.0	1.9
Native plant species richness - grasses	2.5	2.5	2.1	2.5	1.3
Native plant species richness - forbs	1.5	2.5	0.8	0.0	0.0
Tree canopy height (average of emergent, canopy, sub-canopy)	3.0	5	1.8	0.0	0.8
Tree canopy cover (average of emergent, canopy, sub-canopy)	5.0	5	2.0	5.0	0.5
Shrub canopy cover	3.2	3	3.0	4.0	2.0
Native grass cover	2.2	1	0.5	1.0	0.5
Organic litter	4.6	5	3.3	5.0	3.5
Large trees (euc plus non-euc)	4.0	15	2.5	0.0	0.0
Coarse woody debris	2.0	2	1.2	0.0	0.0
Non-native plant cover	2.6	5	0.8	0.0	0.0
Quality and availability of food and foraging habitat	6.66	10	5	1	1
Quality and availability of shelter	6.66	10	5	1	1
Totals (out of 100)	66	81	62	33	19
Totals (out of 4)	2.64	3.24	2.49	1.30	0.75

Table A 1.4 Site Context scores (30% weighting)

Parameter	EMZ 1 (Intact)			EMZ 2 (Regeneration zones)	
	AU1	AU2	AU3	AU4	AU5
Size of patch	10	10	10	5	5
Connectedness	2	1	1	2	2
Context	4	4	2	0	0
Ecological corridors	0	0	0	0	0
Threats to the species	7	7	7	7	7
Species mobility capacity	7	7	7	7	7
Role of site location to species overall population in the state	4	4	4	4	4
Totals (out of 56)	34	33	31	25	25
Totals (out of 3)	1.82	1.77	1.66	1.34	1.34

Table A1.5 Species stocking rate scores (30% weighting)

Parameter	EMZ 1 (Intact)			EMZ 2 (Regeneration zones)	
	AU1	AU2	AU3	AU4	AU5
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	5*	5*	5*	5*	5*
Species usage of the site (habitat type & evidenced usage)	10	10	10	0	0
Approximate density (per ha)	0	0	0	0	0
Role/importance of species population on site	0	0	0	0	0
Total Species Stocking Rate Score - out of 70	15	15	15	5	5
Species Stocking Rate Score – out of 3	0.64	0.64	0.64	0.214	0.214

*Refer to Figure 11 of the Preliminary documentation for the recent Koala records in adjoining habitat.

A.1.2.2 Final Koala Habitat Quality Scores

After weighting the habitat quality score by the assessment unit (AU) area, the final habitat quality score for the Project footprint was 3, whilst the Offset site area (intact) was 5 and the Offset site (regeneration zones) was 2.

Table A1.6 Modified Habitat Quality Scores

Parameter	EMZ 1 (Intact)			EMZ 2 (Regeneration zones)	
	AU1	AU2	AU3	AU4	AU5
Site Condition - out of 4	2.64	3.24	2.49	1.30	0.75
Site Context - out of 3	1.82	1.77	1.66	1.34	1.34
Species Stocking Rate Score– out of 3	0.64	0.64	0.64	0.29	0.29
Total all three variables - out of 10	5.10	5.65	4.79	2.93	2.38
Approximate Area (ha)	35.04	45.57	29.09	14.29	72.41
Weighting	0.32	0.42	0.27	0.17	0.84
Total all three variables weighted	1.63	2.35	1.27	0.48	1.98
Total weighted scores combined	**5.25 (rounded to a 5)**			**2.47 (rounded to a 2)**	

A.1.2.3 Grey-headed Flying-fox MHQA Scores

Table A1.7 Site Condition Scores (70% weighting)

Parameter	EMZ 1 (Intact)			EMZ 2 (Regeneration zones)	
	AU1	AU2	AU3	AU4	AU5
Recruitment of woody perennial species in EDL	4.2	5	4.7	3.0	4.5
Native plant species richness - trees	4.5	5	2.9	5.0	1.9
Native plant species richness - shrubs	4.5	5	2.9	5.0	1.9
Native plant species richness - grasses	2.5	2.5	2.1	2.5	1.3
Native plant species richness - forbs	1.5	2.5	0.8	0.0	0.0
Tree canopy height (average of emergent, canopy, sub-canopy)	3.0	5	1.8	0.0	0.8
Tree canopy cover (average of emergent, canopy, sub-canopy)	5.0	5	2.0	5.0	0.5

Parameter	EMZ 1 (Intact)			EMZ 2 (Regeneration zones)	
	AU1	AU2	AU3	AU4	AU5
Shrub canopy cover	3.2	3	3.0	4.0	2.0
Native grass cover	2.2	1	0.5	1.0	0.5
Organic litter	4.6	5	3.3	5.0	3.5
Large trees (euc plus non-euc)	4.0	15	2.5	0.0	0.0
Coarse woody debris	2.0	2	1.2	0.0	0.0
Non-native plant cover	2.6	5	0.8	0.0	0.0
Totals (out of 90)	53	61	52	31	17
Totals (out of 7)	**1.89**	**2.70**	**1.60**	**2.37**	**1.30**

Table A1.9 Site Context (30% weighting)

Parameter	EMZ 1 (Intact)			EMZ 2 (Regeneration zones)	
	AU1	AU2	AU3	AU4	AU5
Size of patch	10	10	10	5	5
Connectedness	2	1	1	2	2
Context	4	4	2	0	0
Ecological corridors	0	0	0	0	0
Threats to the species	7	7	7	7	7
Species mobility capacity	7	7	7	7	7
Role of site location to species overall population in the state	4	4	4	4	4
Totals (out of 56)	34	33	31	25	25
Totals (out of 3)	**1.82**	**1.77**	**1.66**	**1.34**	**1.34**

A.1.2.4 Species Stocking Rate (0% weighting)

Species Stocking Rate is only applicable to sites which contain a Grey-headed Flying-fox roosting site (camp). Given this site is used by the species for foraging only, this attribute has been removed from habitat assessment because good quality data is not available for SSR attributes in the MHQA spreadsheet.

A.1.2.5 Final Grey-headed Flying-fox MHQA Scores

After weighting the habitat quality score by the assessment unit (AU) area, the final habitat quality score for the Project footprint was 3, whilst the Offset site area (intact) was 6 and the Offset site (regeneration zones) was 3.

Table A1.10 Modified Habitat Quality Scores

Parameter	EMZ 1 (intact)			EMZ 2 (regeneration zone)	
	AU1	AU2	AU3	AU4	AU5
Site Condition - out of 7	4.10	4.74	4.30	1.30	2.37
Site Context - out of 3	1.82	1.77	1.75	1.34	1.34
Total of variables - out of 10	5.92	6.51	6.05	3.71	2.64

Parameter	EMZ 1 (intact)			EMZ 2 (regeneration zone)	
	AU1	AU2	AU3	AU4	AU5
Approximate Area (ha)	35.04	45.57	29.09	14.29	72.41
Weighting	0.32	0.42	0.27	0.16	0.84
Total of variables weighted	1.89	2.70	1.60	0.44	1.70
Total weighted scores combined	**6.20 (rounded to a 6)**			**2.82 (rounded to a 3)**	

A.1.3 Proposed Future Habitat Quality Scores

A.1.3.1 Site Condition

The site condition of the Offset site is proposed to undergo access and fencing management (Action 1), weed removal and management (Action 2), habitat regeneration and revegetation management (Action 3), fire management (Action 5).

Implementation of these management actions throughout the Offset site (intact and regeneration zones) in accordance with the Offset Management Plan will support the transition to regrowth and remnant vegetation communities across the Offset site.

A.1.3.2 Site Context

Anecdotal evidence of infrequent or irregular Koala mortality from vehicle strike or dog attack is present in the Project area. Local landowners have confirmed that wild dogs are common in the area, and therefore there is likely to be a considerable threat of dog attack.

Gympie Regional Council did not have available specific records of native animals in this area that may have been attacked/killed by Wild Dogs, however through their trapping of Wild Dogs throughout the region and autopsies conducted on those dogs, results show that approximately half of the gut content to be of native animals (species usually indeterminate, mostly Macropod). Gympie Regional Council advised that in their local authority area that Wild Dogs are a key predator of the Koala and that within the Gympie Region they have had a number of suspected Koala attacks and kills by Wild Dogs (and/or domestic dog) and that wild dogs are widespread throughout the region. Gympie Regional Council also advised that pest animal species that have been recorded within and nearby (within 2km) of the subject sites, include: Rabbit; Feral Pig; and Feral Deer – Red, Chital and Rusa.

An adaptive Pest Animal Management Program (Action 4) will be implemented as part of the OMP in collaboration with Gympie Regional Council in collaboration with other landholders in the region.

The implementation of this program for the life of the offset will result in a lower potential for wild dog attacks causing injury and death to Koalas.

Given the proposed action area is located in an agricultural landscape, there are no vehicle threats. The Wide Bay-Highway, which borders the southern extent of the Project footprint, also presents a substantial threat to Koala. It is a busy road with fast moving traffic: the Average Annual Daily Traffic Volume of 2,730 vehicles, whilst it has a design speed of 110 km/hr (SLR, 2018). Given the density of woodland to the north generally creating a continuous bridge between the two flanking movement corridors (refer to Figure 11 of the Preliminary Documentation), it is unlikely that the loss of the sparsely distributed trees within the Project footprint will interrupt Koala population connectivity nor impact the viability of Koala populations in a regional context, including that for the sub-population in Lower Wonga.

Considerable vegetation to the north of the Project footprint, including vegetation to be retained and enhanced as an offset, affords far denser and connective woodland, which should reduce the risk of movement of Koala through this landscape. Through the implementation of revegetation and replanting activities (Action 3), in conjunction with Action 4, the species mobility capacity of the Koala will increase considerably.

A.1.3.3 Species Stocking Rate

Through the implementation of the Offset Management Plan and all the proposed management actions therein, it is proposed that the key threatening processes impacting upon the potential for the Koala and Grey-headed Flying-fox to utilise the Offset site are likely to persist and increase could be controlled and decrease in severity.

This in turn is likely to increase the species stocking rate on the Offset site for the Koala and the Grey-headed Flying-fox by managing this parcel of land for conservation for a minimum of 20 years and more likely more than 30 years for the life of the Project.

Table A1.11 Indicative Future Koala Habitat Quality Scores

Parameter	Future - Offset site (intact)	Future - Offset site (regeneration zones)
Site Condition - out of 4	3.96	2.78
Site Context - out of 3	2.52	1.88
Species Stocking Rate Score– out of 3	0.85	0.85
Total all three variables - out of 10	7.33	5.51
Total scores - rounded	**7**	**6**

Table A1.12 Indicative Future Grey-headed Flying-fox Habitat Quality Scores

Parameter	Future - Offset site (intact)	Future - Offset site (regeneration zones)
Site Condition - out of 7	6.14	4.63
Site Context - out of 3	2.09	1.71
Total variables - out of 10	8.23	6.34
Total scores - rounded	**8**	**6**

Appendix B

Preclearance and clearance procedures

Pre-clearing and clearance activities including clearly delineating clearing extents and implementing fauna habitat protection measures are detailed in **Table A1** and **Table A1** below.

Table A1 13: Pre-clearance activities

Action	Timing	Responsibility
Mark all trees within the development footprint that could potentially be used by resident and migratory fauna as habitat (i.e. potential shelter sites, nest sites, hollows, termitaria, epiphytes, crevices, standing dead trees and large hollow logs. These habitat trees will be clearly demarcated with flagging tape or fluorescent paint, and clearly shown on plans, so that they are retained for the second stage of clearing or avoided by contractors where possible.	Prior to the commencement of clearing	Project Ecologist
Identify natural habitat features such as hollow logs, felled branches and bush rocks within the development footprint. Locations of habitat features will be recorded with a GPS and marked with flagging tape or fluorescent paint. Fauna microhabitat features will be removed from areas to be cleared and relocated to suitable nearby areas to be retained.	Prior to the commencement of clearing	Project Ecologist
Identify nearby habitat suitable for the release of fauna that may be encountered during the pre-clearing process.	Within 7 days prior to the commencement of clearing	Project Ecologist

Table A14: Clearance activities

Action	Timing	Responsibility
All site personnel involved in construction activities must be inducted during Toolbox Talks on the requirements of this WMS prior to commencing work on the Project footprint. Site personnel are to be: • Made aware of the clearing limits and how they are marked. • Informed that they are not to encroach on areas beyond the clearing limits. • Are to be informed of the 2-stage clearing process for habitat trees. • Made aware of the locations of trees that will be retained, measures required to protect them, and the consequences of damage to these areas. • Made aware of threatened and migratory species known or likely to occur in the Project footprint and their habitat. • Made aware of the 40 km/h vehicle speed limit (except in case of emergency) during clearing and construction activities as to minimise risk to Koala vehicle strike.	Immediately prior to the commencement of clearing	Foreman, Project Ecologist, Contactors
Undertake a pre-start up check for sheltering native fauna of all infrastructure, plant and equipment and/or during relocation of stored construction materials. If fauna is identified, notify the Project Ecologist, ANARRA, WILVO's, or RSPCA so that they can relocate uninjured animals and manage injured animals.	Immediately prior to the commencement of daily clearing activities	Contractors
Clearance supervision by a qualified and experienced ecologist.	During clearing activities	Project Ecologist, Contractors

Action	Timing	Responsibility
Clearing of Koala habitat (176 ha) is to be in accordance with the *Nature Conservation (Koala) Conservation Plan 2017* approved under the *Nature Conservation Act 1992* (Qld) so as to allow Koalas to safely move out of clearing area and into connected areas of Koala habitat. This includes: • carrying out clearing in stages to ensure that no more 3 ha or 3% of the site's area (whichever is greater) of the Koala habitat area is cleared at a time • ensuring there is at least a period of 12 hours of which no trees are cleared on the site. Undertake a two-stage approach to clearing ensuring that habitat links are maintained between the clearing site and adjacent bushland as follows: • Stage 1: under-scrubbing of the entire Project footprint should be carried out by a 4x4 tractor with a slashing deck and a layer of mulch is to be left to aid in soil retention. Non-hollow-bearing tree and non-habitat trees will be cleared in a sequence that leaves trees that allow fauna to move to adjacent vegetation to be retained. • Stage 2: After a period of up to two weeks, clearing of hollow-bearing and habitat trees will commence. Trees not requiring arborist attention are to be knocked with an excavator bucket or other machinery to encourage fauna to evacuate the tree immediately prior to felling. Tree should be "soft-felled". Felled trees must be left for a short period of time on the ground to give any fauna trapped in the trees an opportunity to escape before further processing of the trees. If a Koala is present within a habitat tree, the habitat tree and any other habitat trees with an overlapping crown must not be felled until the Koala has moved on.		
Felled hollow bearing trees must be inspected by the Project Ecologist as soon as possible for the presence of fauna, including trapped, shocked or injured fauna. Trees must be left on the ground for two nights before being mulched, relocated for re-use and/or stacked for disposal.	During clearing activities	Project Ecologist
The draining of dams/ waterbodies in the Project footprint must be supervised by the Project Ecologist. The Project Ecologist will relocate any wildlife found in these areas.	During clearing activities	Project Ecologist
If an animal (including shocked, juvenile animals or eggs) are discovered during clearing or other construction activities, STOP ALL WORK and handle fauna as per **Animals identified** within the construction footprint are to be handled in accordance with Error! Not a valid bookmark self-reference.. Table A1 below.	During clearing activities	All site personnel
Immediately after clearing, install temporary Koala exclusion fencing around the Project footprint to prevent Koalas entering during the construction period. This must remain in place until construction activities are complete.	Immediately after clearing activities.	Project Ecologist, Contractors

Animals identified within the construction footprint are to be handled in accordance with Error! Not a valid bookmark self-reference.

Table A1 4: Fauna Handing Procedures

Action	Timing	Responsibility
Animal Handling		
If an animal is located within the works area, stop all work in the vicinity of the animal and immediately notify the Environmental Manager. The Environmental Manager is to notify the Project Ecologist, who may nominate to contact a rescue agency (e.g. ANARRA, WILVO's, or RSPCA).	As soon as an animal is identified in the construction footprint	Contractors, Project Ecologist
Minimise stress to the animal and reduce the risk of further injury by: • Handling fauna with care and as little as possible • Covering larger animals with a towel or blanket and placing in a large cardboard box • Placing small animals in a cotton bag, tied at the top • Keeping the animal in a quiet, warm, ventilated and dark place away from construction activities. This location is to be designated in advance of construction work.	As soon as possible after an animal is identified in the construction footprint	Project Ecologist
Where handling of frogs is necessary, captured frogs must be handled in accordance with the Hygiene Protocol for the control of Disease in Frogs (DECC 2008), specifically: • A new pair of disposable gloves must be used between the handling of each frog • Use one plastic bag per frog when transporting frogs. Do not reuse bags.	As soon as possible after a frog is identified in the construction footprint	Project Ecologist
Dangerous animals such as venomous reptiles must not be handled by inexperienced/unqualified personnel. The following actions must therefore be taken when a dangerous animal is identified within the construction footprint: • Exclude all personnel from the vicinity with fencing and/or signage. • Contact the Project Ecologist. The Project Ecologist may nominate to contact rescue agency or professional snake handler to assist. • ANARRA (07) 5484 9111. • The Project Ecologist or other nominated personnel are, where practical, to keep the dangerous animal in sight where it remains within the construction site.	As soon as possible after a venomous snake or other dangerous animal is identified in the construction footprint	Project Ecologist and Wildlife rescue agency
If the fauna species is identified by the Project Ecologist, as a threatened species that was not identified and assessed in the Environmental Assessment or other Project documentation, then the Project Ecologist must inform the Environmental Manager, who must: • Immediately cease all work that may affect the threatened species • Contact the Environmental Manager and advise them of the situation • Contact relevant stakeholders	As soon as possible after an additional threatened species is identified in the construction footprint	Project Ecologist

Action	Timing	Responsibility
• Determine in consultation with stakeholders, corrective actions and additional safeguards to be undertaken • Construction works may recommence only once the Environmental Manager in consultation with the Project Ecologist, has confirmed that all corrective actions and additional safeguards have been implemented.		
Release of Animals		
Release the animal, outside of the construction footprint, into similar habitat and as close as possible to the area where the animal was found.	As soon as practical after animal is caught, and only when animal is determined to be fit for release	Project Ecologist
Time the release of the animal to coincide with the active period of the species, i.e. nocturnal animals to be released at dusk.	As soon as practical after animal is caught, and only when animal is determined to be fit for release	Project Ecologist
Do not undertake fauna relocation during periods of heavy rainfall or extreme weather conditions (e.g. very high temperatures), unless the animal is too stressed to be held any longer.	As soon as practical after animal is caught, and only when animal is determined to be fit for release	Project Ecologist
Injured Animals Management		
Contact the Project Ecologist if an injured animal is found on or in the vicinity of the construction site. The Project Ecologist will determine if the animal is seriously injured and requires attention. If the animal is injured, contact one of the following local wildlife rescue agencies and/or veterinary surgeries immediately: • ANARRA (07) 5484 9111	As soon as practical after injured animal is identified in the construction footprint	Project Ecologist
Contact the local wildlife rescue agency and/or veterinary surgeon if the Project Ecologist is not present or cannot immediately attend the site. Follow advice from the Project Ecologist, wildlife rescue agency and/or veterinary surgeon while waiting for any of the above parties to attend the site.	As soon as practical after injured animal is identified in the construction footprint	Project Ecologist
Once the rescue agency arrives at the site, they are responsible for the animal. Any decisions regarding the care of the animal will be made by the rescue agency.	Upon arrival of wildlife rescue agency	Wildlife Agency
In the event that the rescue agency and/or local veterinary service cannot be contacted, the Project Ecologist, or in their absence, the Environmental Manager, will deliver the injured animal to the agency/local veterinary service as soon as practically possible.	As soon as practical after injured animal is identified in the construction footprint	Environmental Manager
The Project Ecologist must record the following information about the animal, prior to the animal leaving the site: • Species • Location of where animal was found (exact as possible, GPS co-ordinates) • Date • Gender (if possible)	Prior to injured animal leaving the site boundary	Project Ecologist

Action	Timing	Responsibility
• Photograph the animal (if possible).		
Contact the Environmental Manager immediately if a dead animal is found within the site. Carcasses must be buried to a depth that will prevent scavengers from reaching them and to minimise the risk of disease transmission. The Project Ecologist must record the following details: • Species • Location of where animal was found (exact as possible, GPS co-ordinates) • Date • Gender (if possible) • Photograph the animal (if possible).	As soon as practical after a dead animal is found within the site	Project Ecologist
Reporting		
The Project Ecologist must prepare a report upon completion of clearing activities for submission to the Environmental Manager and council, that includes: • A description of the assessment of habitat trees undertaken prior to clearing • How fauna was handled that was affected by clearing activities • Procedures that were adopted for the relocation of non-injured fauna from clearing areas and operations, including the identification of appropriate locations, timings, and weather conditions for the relocation of non-injured fauna • Procedures, dates, areas and fauna specialist(s) present during clearing and structures removal operations • A description of any animals that were sighted, captured, released, injured or shocked • Procedures that were adopted for handling injured fauna from clearing areas and operations, including details on liaison with wildlife rescue groups, veterinary surgeons and any other appropriate organisations or individuals • A description of any dead animals that were found as a result of clearing of structures operations and fauna rescue • A description of any tree that is used for breeding or roosting by fauna. Include tree species, location, size, height and depth of hollow • A description of any bridge or culvert structure that is used for breeding or roosting by fauna. Include location, size, gap height and depth • Photos (where possible) of rescued and dead fauna.	Within 30 days of the completion of clearing activities	Project Ecologist