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These documents remain accurate and relevant and are made available for compliance, transparency and reference purposes. Revised versions incorporating APA branding and references will be progressively updated and published.

For any clarification, please contact environment.national@apa.com.au and or (07) 3003 5342

Offset Area Management Plan



Date: 2 May 2024

Document: SENEX-QLDS-EN-PLN-007

Revision: 3

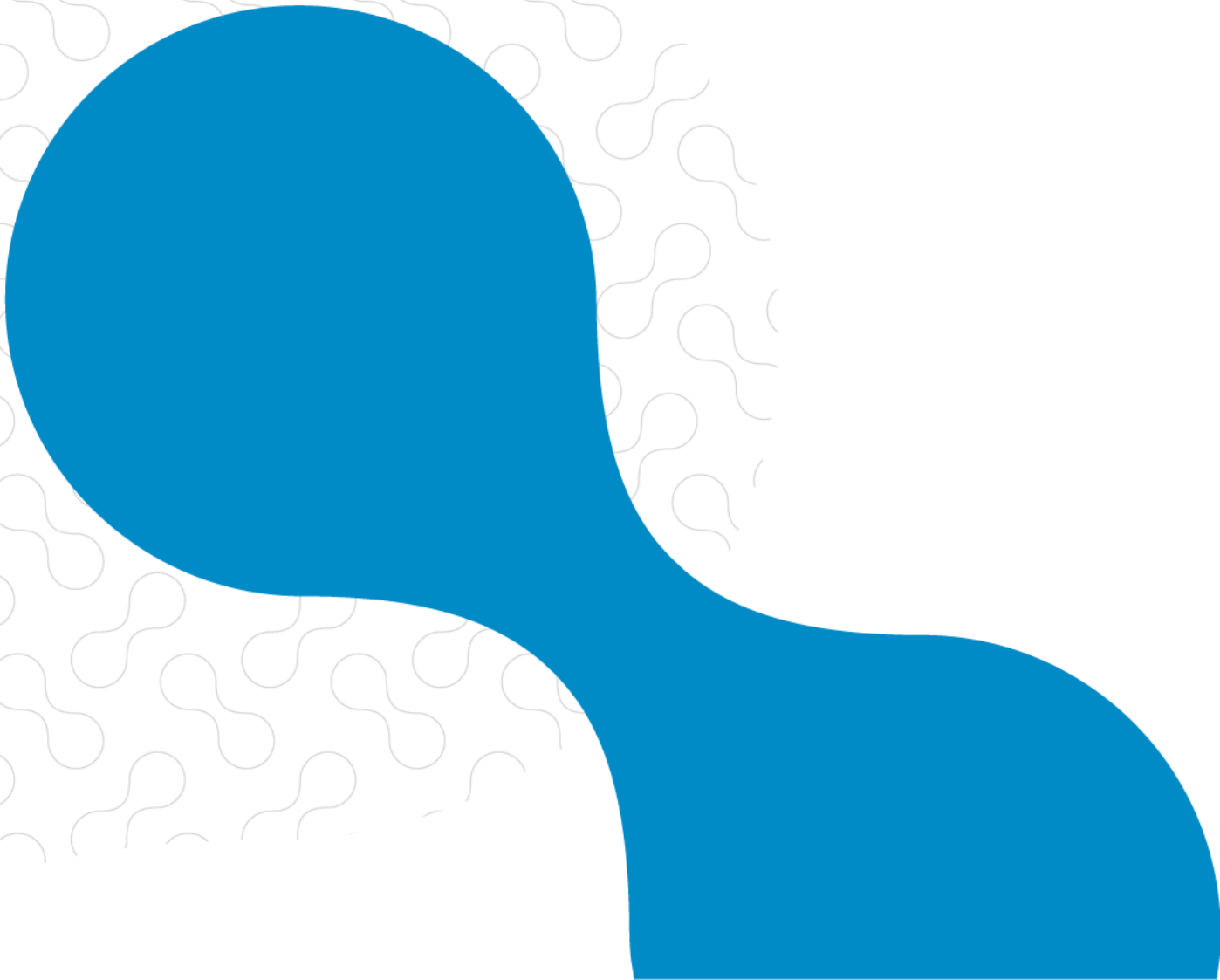


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Document Status

Revision History

Revision	Release Date	Document Status	Issued to	Author	Reviewed By
A	08.11.2023	Ausecology Internal Review	--	L. Overton, Ausecology	D.Chaloner R. Regeer, Ausecology
B	10.11.2023	Ausecology Internal Review	--	L. Overton, Ausecology	L. Grigg, Ausecology
0	10.11.2023	Issued for use	J Cumpstay, Senex	L. Overton, Ausecology	L. Grigg, Ausecology
1	22.12.2023	Reissued to address Senex comments	J Cumpstay, Senex	T. Shields, Ausecology	L. Grigg, Ausecology
C	15.03.2023	Issued to address DCCEEW comments	J Cumpstay, Senex	L. Grigg, Ausecology	J. Cumpstay, Senex
2	20.03.2023	Issued to address DCCEEW comments	DCCEEW	L. Grigg, Ausecology	J. Cumpstay, Senex
D	19/04/2024	Issued to address DCCEEW comments	J Cumpstay, Senex	B. Osborne, L. Grigg, Ausecology	J. Cumpstay, Senex
3	02/05/2024	Issued to address DCCEEW comments	DCCEEW	B. Osborne, L. Grigg, Ausecology	J. Cumpstay, Senex

Preparation of OAMP

The suitably qualified ecologists who were involved with preparing this OAMP are provided below:

Person	Role	Company	Qualifications
Lainie Grigg	Director	Ausecology	<ul style="list-style-type: none"> Bachelor of Science (BSc Molecular Biology) Certificate III in Conservation and Land Management
Ralf Regeer	Director	Ausecology	<ul style="list-style-type: none"> Postgraduate Diploma Environmental Management 2005 (GDipEnvMan) Master of Science (MSc Biology) Bachelor of Science (BSc Biology) Certificate III in Conservation and Land Management
Dean Chaloner	Business Manager	Ausecology	<ul style="list-style-type: none"> Postgraduate Diploma Environmental Management 2007 (GDipEnvMan) Bachelor of Plant Science
Tim Shields	Snr Ecologist	Ausecology	<ul style="list-style-type: none"> Bachelor of Environmental Management (Natural Systems and Wildlife)
Bridget Osborne	Snr Ecologist	Ausecology	<ul style="list-style-type: none"> Bachelor of Science (BSc Ecology and

Person	Role	Company	Qualifications
			Conservation Biology) <ul style="list-style-type: none"> Bachelor of Science (Honours)
Lochlan Overton	Ecologist	Ausecology	<ul style="list-style-type: none"> Bachelor of Science

Declaration of Accuracy

In making this declaration, I am aware that section 491 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (**EPBC Act**) makes it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth). The offence is punishable on conviction by imprisonment or a fine, or both.

I am authorised to bind the approval holder to this declaration and that I have no knowledge of that authorisation being revoked at the time of making this declaration.

Signed:

Full Name:

Title:

Organisation:

Date:

Offset Area Management Plan

1 Executive Summary

ARC Pipeline Pty Ltd (**ARCP P/L**), a wholly owned subsidiary of Senex Energy Pty Ltd (**Senex**), is proposing to construct, operate and decommission the Atlas to Reedy Creep Pipeline (the **Project**). The Project consists of a buried high pressure natural gas pipeline and associated infrastructure, approximately 57 km in length from the Surat Basin gas tenements southwest of Wandoan to the Reedy Creek to Wallumbilla Pipeline north of Yuleba (as described in EPBC Act referral 2023/09585). The Project is proposed to be located approximately 20 km southwest of Wandoan and 28 km north of Yuleba, within the Maranoa Regional Council and Western Downs Regional Council local government areas.

The Project was referred under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (**EPBC Act**) (EPBC 2023/09585), with a decision made on 15 August 2023 that the Project is a controlled action requiring assessment and approval under the EPBC Act. The relevant controlling provision, or matters of national environmental significance (**MNES**), is listed threatened species and communities (sections 18 and 18A, EPBC Act). The Department of Climate Change, Energy, the Environment and Water (**DCCEEW** or the **Department**) has assessed that biodiversity offsets are required for the following listed threatened species:

- koala (*Phascolarctos cinereus*) (**koala**);
- greater glider (southern and central) (*Petauroides volans*) (**greater glider**); and
- south-eastern glossy black cockatoo (*Calyptorhynchus lathami lathami*) (**south-eastern glossy black cockatoo**).

Habitat quality surveys for each of these species were undertaken in accordance with *Guide to Determining Terrestrial Habitat Quality version 1.2* (DEHP, 2017). The *ARC Pipeline EPBC Act MNES Ecological Assessment Report* (E2M, 2024) (**EAR**) provided overall habitat quality scores (**HQS**) of the Project area for the MNES fauna to assist the assessment of suitable offsets for the Project (Table 1). Overall, the EAR found low-to-moderate habitat quality scores for the MNES fauna reflective of the low abundance (or density) of animals and overall patchiness of habitat within the Project area. Fauna surveys did not detect the presence of koalas, greater gliders or south-eastern glossy black cockatoos in the Project areas.

The Project plans to acquit more than 100% of its MNES offset requirements through direct land-based offsets. [REDACTED] (the **Property**) (Figure 2) has been identified as a suitable property to offset the residual impacts to MNES species habitat for koala, greater glider and south-eastern glossy black cockatoo (Table 1). This direct offset area (**Offset Area**) has been determined to be suitable in accordance with the EPBC Act and utilising the Offsets Assessment Guide (**OAG**) published by DCCEEW.

A wholly owned subsidiary of Senex, and a related entity of ARCP/L, purchased the Property on 14 December 2023 for the sole purpose of biodiversity offsets.

Table 1 – Project and offset HQS

Target Protected Area	Scientific Name	HQS (/10)	
		Impact	Offset
Koala	<i>Phascolarctos cinereus</i>	6	6
Greater glider	<i>Petauroides minor</i>	5	5
South-eastern glossy black cockatoo	<i>Calyptorhynchus lathami lathami</i>	6	5

The Property vegetation consists of a matrix of remnant, regrowth and non-remnant vegetation and the offset has excellent connectivity to remnant vegetation in the adjoining [REDACTED] State Forests, with connectivity to both a state riparian and regional biodiversity corridor. The Property has areas that have been historically cleared and/or thinned as shown in Figure 1; the aim of the offset will be to restore the habitat values and connectivity through these disturbed areas and broaden and strengthen the riparian corridor. The offset provides suitable habitat for koala, greater glider and south-eastern glossy black cockatoo, each of which have been identified in close proximity to the offset. Additionally, there are good opportunities for improvements to current land management practices, with historic practices resulting in overgrazing, logging of large trees, areas of clearing and thinning across the Property.

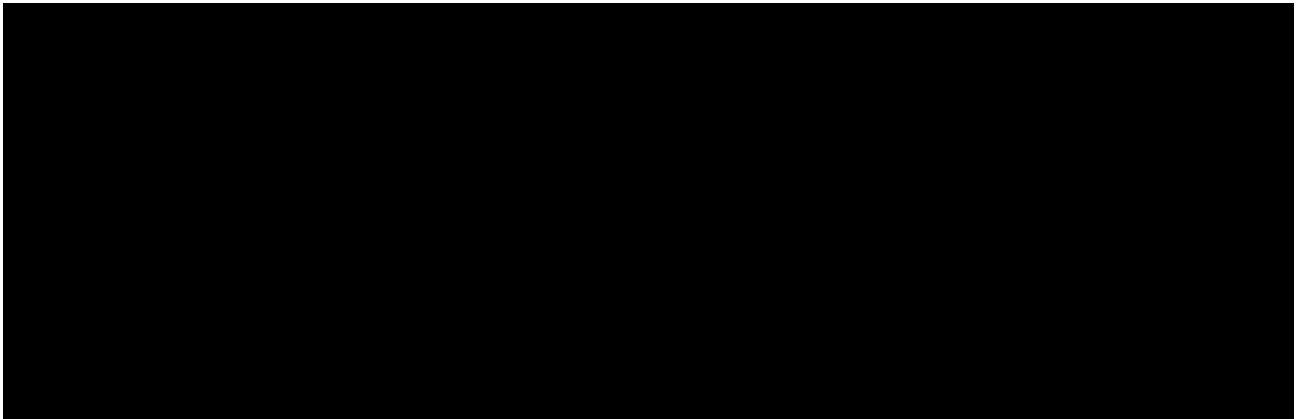


Figure 1 – Aerial imagery of the offset from 2002 and 2016

Importantly, Senex's purchase of the Property for an offset has prevented the chemical treatment (pelleting) to permanently kill 500 hectares (ha) of vegetation across the Property, currently a common practice for areas of Category X (**Cat X**) vegetation occurring on country in the Brigalow Belt. Cat X areas are at high risk of clearing as documented by the 2020-21 Statewide Landcover and Trees Study (**SLATS**) from the Queensland Government, which showed that 349,399 ha of vegetation was cleared in Queensland, of which 91% was fully cleared and 82% of it was in Cat X areas. This risk of loss was avoided through Senex's purchase of the Property, which was conditional on this chemical treatment not proceeding.

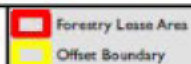
To determine the Risk of Loss (**ROL**) for the offset site, a ROL calculation was undertaken in line with the principles of the *Guidance for deriving 'Risk of Loss' estimates when evaluating biodiversity offset proposals under the EPBC Act* (Maseyk, F.J.F *et al* 2017). The ROL determination included an analysis of vegetation clearing in areas mapped as Cat X within a 50 km buffer of the proposed offset site. Analysis included a review of the change in landcover and trees across Cat X areas between 2019 and 2021 which showed a background rate of loss (%), equating to 30% over 20 years or an annual ROL value of 1.5% which has been used in the ROL section of the OAG calculator.

The property also has an adjacent large forestry lease area that has been traditionally grazed, logged and thinned. A map showing the initial ground truthed Regional Ecosystems (**RE**) on the property, regulated vegetation on the forestry lease and the fauna records recently found adjacent to the Property and in the forestry areas is provided in Figure 3.

This Offset Area Management Plan (**OAMP**), prepared in accordance with DCCEEW's environmental offset guidance and Appendix B (information requirements for EPBC Act Offsets Proposals) of the Request for Information (**RFI**) dated 8 September 2023 for the Project, sets out:

- how the Offset Area (Figure 2) will be managed to maintain and improve the condition and viability for MNES, including koala, greater glider and south-eastern glossy black cockatoo; and
- the offset requirements in line with the EPBC Act *Environmental Offsets Policy* (2012) (**Offsets Policy**), including specific management objectives with performance targets and completion criteria.

FIGURE 3:
Ground-Truthed Regional Ecosystems,
Regulated Vegetation Mapping and
EVNT Fauna Records



Ausecology EVNT Records

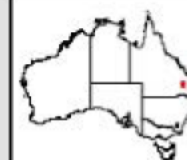
- central greater glider (*Petauroides armillatus*)
- koala (*Phascolarctos cinereus*)

Ground-Truthed Regional Ecosystem

- Remnant - Disturbed
- Non Remnant - Regrowth
- Non Remnant

Regulated Regional Ecosystems v1.3

- Category A or B containing endangered
- Category A or B containing of concern
- Category A or B that is of least concern
- Category C or R that is of least concern
- non-remnant



REVISION	AUTHOR	REVIEWER	DATE
2	NC	LG	19/03/2024
3	NC	LG	15/04/2024

COORDINATE SYSTEM: GDA 1994 MGA Zone 56			
SCALE: 1:42,000			
0	0.25	0.5	0.75 1
Kilometres			

2 Glossary of Terms

Term	Definition
ARCP P/L	ARC Pipeline Pty Ltd
AUs	Assessment Units
Ausecology	Ausecology Pty Ltd
BC	BioCondition
Biosecurity Act	<i>Biosecurity Act 2014 (Qld)</i>
Cat B	Category B areas per the Regulated Vegetation Management map
Cat X	Category X areas per the Regulated Vegetation Management map
cm	Centimetres
Cth	Commonwealth
DAF	Department of Agriculture and Fisheries
DAWE	Department of Agriculture, Water and the Environment
DBH	Diameter at Breast Height (1.3 m)
DCCEEW or Department	Department of Climate Change, Energy, the Environment and Water
DEHP	Department of the Environment and Heritage Protection
DES	Department of Environment and Science
EAR	ARC Pipeline EPBC Act MNES Ecological Assessment Report (E2M, 2024)
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Cth)</i>
GDTHQ	Guide to Determining Terrestrial Habitat Quality v1.2 (DEHP 2017)
ha	Hectare
HQS	Habitat Quality Score(s)
km	Kilometres
m	Metres
MHQA	Modified Habitat Quality Assessment
MNES	Matter of National Environmental Significance
MSES	Matter of State Environmental Significance
NC Act	<i>Nature Conservation Act 1992 (Qld)</i>
OAG	Offset Assessment Guide
OAMP	Offset Area Management Plan
Offset Area	The spatial boundary that represents the offset area
Offsets Policy	EPBC Act Environmental Offsets Policy (2012)
Project	Atlas to Reedy Creek Pipeline (ARCP)
RE	Regional Ecosystem
REM	Random Encounter Model

Term	Definition
RFI	Request for Information
ROL	Risk of Loss
Senex	Senex Energy Pty Ltd
SLATS	Statewide Landcover and Trees Study
sp.	Species (singular)
spp.	Species (plural)
VDec	Voluntary Declaration per the <i>Vegetation Management Act 1999</i> (Qld)
VM Act	<i>Vegetation Management Act 1999</i> (Qld)
WoNS	Weeds of National Significance

3 Project Description

3.1 Project Scope

This OAMP has been prepared to address biodiversity offset requirements associated with the Project.

The Project is located near Wandoan, Queensland, within the Surat Basin. The Project is also located within the Brigalow Belt bioregion and the Southern Downs subregion.

The Project involves the construction, operation and decommissioning of a buried high pressure natural gas pipeline and associated infrastructure, approximately 57 km in length from the Surat Basin gas tenements southwest of Wandoan to the Reedy Creek to Wallumbilla Pipeline north of Yuleba, Queensland.

The Project was referred under EPBC Act, with a decision made on 15 August 2023 that the Project is a controlled action requiring assessment and approval under the EPBC Act (EPBC 2023/09585). The relevant controlling provision, or MNES, is listed threatened species and communities (sections 18 and 18A of the EPBC Act).

The EAR identified MNES to be known or likely to occur within and/or adjacent the Project footprint.

A wholly owned subsidiary of Senex, and a related entity of ARCP/L, purchased the Property on 14 December 2023 for the sole purpose of biodiversity offsets. The Property has been identified as a suitable property to offset environmental matters pertaining to the Project, further detailed within the EAR. Specifically, the Property will offset MNES impacts for:

- koala;
- greater glider; and
- south-eastern glossy black cockatoo.

This OAMP provides the management actions to be undertaken for the offset, including the outcomes to be achieved and the monitoring and reporting requirements. A risk assessment process has also been included that identifies triggers for ongoing adaptive management.

3.2 OAMP Requirements

This OAMP has been prepared in accordance with DCCEE's environmental offset guidance and Appendix B (information requirements for EPBC Act Offsets Plans) of the RFI for the Project. Table 2 below provides a cross reference to each requirement.

Table 2 – RFI Requirements

RFI Reference	RFI Requirement	OAMP Reference
B1.1	Details of the residual impacts to protected matters as a result of the proposed action. This must include the area/s of habitat (in hectares) and its quality within the impact site for which the offset/s is to compensate (i.e., the quantum of impact). For this Project, DCCEE recommends that habitat quality data within the impact site be collected following the method described in B1.6.	Section 4.2
B1.2	A description of the offset area/s, including location, size, condition, environmental values present and surrounding land uses.	Section 4.1 Section 4.2
B1.3	Details, with supporting evidence, of how the environmental offset/s meets the requirements of the Offsets Policy.	Table 6

RFI Reference	RFI Requirement	OAMP Reference
B1.4	Maps and shapefiles to clearly define the location and boundaries of the offset area/s, accompanied by the offset attributes (e.g., physical address of the offset area/s, coordinates of the boundary points in decimal degrees, the relevant protected matter that the environmental offset/s compensates for, and the size of the environmental offset/s in hectares).	All Figures within the plan and associated spatial data
B1.5	Baseline data and other supporting evidence that documents the presence of the relevant protected matter/s within the offset area/s.	Sections 5.2, 5.3, and 5.4
B1.6	<p>Details, with supporting evidence, to demonstrate how the environmental offset/s compensate for residual significant impacts of the proposed action on relevant protected matters, and/or their habitat, in accordance with the principles of the Offsets Policy and the Offsets Assessment Guide, including:</p> <ul style="list-style-type: none"> • time over which loss is averted (max. 20 years); • time until ecological benefit; • ROL (%) without offset; • ROL (%) with offset; and • confidence in result (%). <p>Please note, ROL should not include consideration of stochastic events (e.g., bushfires), activities that contribute to changes in HQS or impacts that would otherwise require an offset under any relevant legislation.</p> <p>Provide the inputs and calculations used for the OAG for all triggered species.</p>	Appendix A

RFI Reference	RFI Requirement	OAMP Reference
B1.7	<p>An assessment of the habitat quality for the offset area/s. A methodology that is suitable for each species in question must be used to assess habitat quality (e.g., endorsed by DCCEEW or supported by literature), noting the same scoring mechanism must be used at both the impact site and the offset site.</p> <p>This must include the methodology, with justification and supporting evidence, used to inform the inputs of the OAG in relation to both the impact site and offset site/s for each relevant protected matter.</p> <p>The Department does not mandate the use of any specific method for deriving Habitat Quality scores for the Offset Assessment Guide (calculator). The important factor is that both impact and offset sites are assessed using the same approaches. Guidance is provided in the How to use the Offset Assessment Guide and the Offsets Policy.</p> <p>For this project, the Modified Habitat Quality Assessment (MHQA) (to be provided by DCCEEW) is recommended, which is largely underpinned by Version 1.2 of Queensland Government Guide to determining terrestrial habitat quality: A toolkit for assessing land-based offsets under the Queensland Environmental Offsets Policy.</p> <p>Provide all the calculations done with the MHQA spreadsheet if this method is chosen.</p> <p>Note: It is important to avoid confounding the presence of threats at a site that might affect the future state of a site, with those affecting its current state. These threats are appropriately dealt with in consideration of future risk of loss in the OAG and so should not be included in the score for current habitat condition.</p>	<p>Table 9</p> <p>Table 10</p> <p>Table 11</p>
B1.8	<p>Details of how the offset area/s will provide connectivity with other habitats and biodiversity corridors and/or will contribute to a larger strategic offset for the relevant protected matter.</p>	<p>Section 4.1 and Figure 4</p>
B1.9	<p>Specific, committal and measurable environmental outcomes that detail the nature of the conservation gain to be achieved for each protected matter, including the creation, restoration and revegetation of habitat in the proposed offset area/s.</p>	<p>Section 5.5</p>
B1.10	<p>Specific offset completion criteria derived from the offset area habitat quality to demonstrate the improvement in the quality of habitat in the offset area/s over a 20-year period.</p>	<p>Section 5.5</p>
B1.11	<p>Details of the management measures, and timeframes for implementation, to be carried out to meet the offset completion criteria.</p> <p>All proposed management measures must be written using committed language (e.g., 'will' and 'must').</p>	<p>Section 5.6</p> <p>Table 13</p>
B1.12	<p>Interim milestones that set targets at appropriate intervals for progress towards achieving the offset completion criteria.</p>	<p>Section 5.6</p>

RFI Reference	RFI Requirement	OAMP Reference
B1.13	Details of the nature, timing and frequency of monitoring to inform progress against achieving the interim milestones (the frequency of monitoring must be sufficient to track progress towards each set of milestones, and sufficient to determine whether the offset area/s are likely to achieve those milestones in adequate time to implement all necessary corrective actions).	Section 8
B1.14	Proposed timing for the submission of monitoring reports which provide evidence demonstrating whether the interim milestones have been achieved.	Section 8.3
B1.15	Details of the tangible, on-ground corrective actions, and timeframes for implementation, if monitoring activities indicate an interim milestone has not been achieved, including an approach to monitoring the effectiveness of the corrective actions. All proposed corrective actions must be written using committed language (e.g., 'will' and 'must').	Section 5.6
B1.16	Evidence of how the management actions and corrective actions take into account relevant approved conservation advices and are consistent with relevant recovery plans and threat abatement plans.	Section 5.6
B1.17	Risk analysis and a risk management and mitigation strategy for all risks to the successful implementation of the OMP and timely achievement of the offset completion criteria, including a rating of all initial and post-mitigation residual risks in accordance with a risk assessment matrix.	Section 7
B1.18	Details and execution timing of the mechanism to legally secure the proposed offset area/s, such that legal security remains in force over the offset area/s for at least 20 years to provide enduring protection for the offset area/s against development incompatible with conservation.	Section 4.3

4 Offset Area

4.1 Property Details



The Property is located within the Brigalow Belt (south) bioregion and the Barakula subregion [REDACTED]. Prior to acquisition by Senex, the Property was primarily used for racing horse breeding and cattle grazing.

The Property has 1,004.05 ha of remnant Category B vegetation (**Cat B**) and 519.58 ha of Cat X vegetation. The offset has been focused to rehabilitate areas of previously disturbed Cat X land and facilitate an increase in connectivity. The property has excellent connectivity to a regional biodiversity corridor following a watercourse in the north of the Property and connectivity to remnant vegetation that adjoins a state biodiversity corridor (Figure 4).

Table 3 – Property details

Property Area	1,524 ha (Cat B 1004.05 ha, Cat X 519.58 ha)
Offset Area	156.4 ha (Cat X 139.1, Cat B 17.3 ha)
Lot on plan/s	[REDACTED]
Address	[REDACTED]
Tenure	Freehold
Local Government Area	Western Downs Regional

FIGURE 4:
Locality Overview Map

-  Watercourses
-  Protected Areas
-  MINES Offset Area
-  Property Boundary
-  Forestry Lease Area

WildNet EVNT Records

-  central greater glider (*Petauroides armillatus*)
-  glossy black-cockatoo (eastern) (*Calyptorhynchus lathami lathami*)
-  koala (*Phascolarctos cinereus*)

Ausecology EVNT Records

-  central greater glider (*Petauroides armillatus*)
-  koala (*Phascolarctos cinereus*)

Statewide Corridors v1.6 - significance

-  Regional
-  State

REVISION	AUTHOR	REVIEWER	DATE
2	NC	LG	19/03/2024
3	NC	LG	15/04/2024

COORDINATE SYSTEM: GDA 1994 MGA Zone 56
SCALE: 1:200,000



0 2 4 6

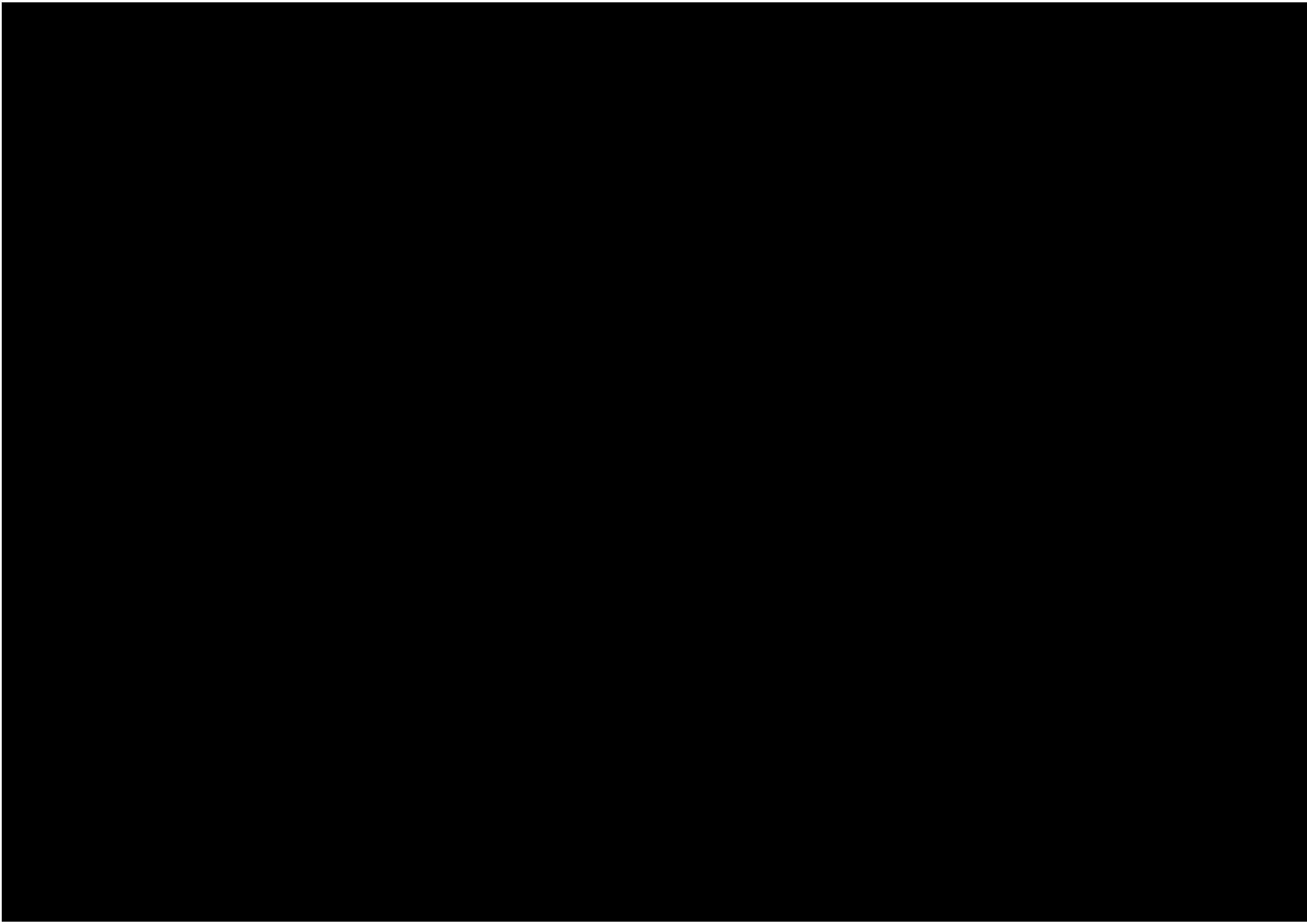
Kilometres

The detailed field assessments of the Offset Area informing this OAMP have been summarised in Table 4 and a map of survey locations in the proposed Offset Area only has been provided in Figure 5.

Table 4 – The Offset Area – Field Assessment Summary

Field Assessment Date	Description of Assessment
September 2023	High level ecological due diligence assessment
October 2023	<ul style="list-style-type: none"> • Site visit and ground-truthing of regional ecosystem (RE) mapping • Baseline habitat quality assessments generally in accordance with the <i>Guide to Determining Terrestrial Habitat Quality</i> (Version 1.2; DEHP 2017) • Targeted and incidental surveys for threatened species: koala and greater glider • Incidental surveys for threatened species: south-eastern glossy black cockatoo • Review of current property management practices to inform future offset management actions including current grazing practices, weed infestations, fire management, infrastructure and access
March 2024	<ul style="list-style-type: none"> • BioCondition and Habitat assessments in accordance with the <i>BioCondition - A Condition Assessment Framework for Terrestrial Biodiversity in Queensland, Assessment Manual</i> (Eyre et al., 2015) and the <i>Guide to Determining Terrestrial Habitat Quality, Version 1.3</i> (DES, 2020) • Ground truthing of GTRE • Bat trapping survey with harp traps • Opportunistic fauna observations including spotlighting • Operational planning to prescribe management actions designed to protect and maintain the properties existing ecological values and management actions required to maintain compliance with environmental legislation and implementation of this OAMP





4.2 Offset Area Requirements

Offset calculations were completed using the OAG, with the outputs summarised in Table 5. Further, Table 6 summarises how the Property meets the offset requirements of the Offsets Policy.

In Figure 6, there appears to be an isolated patch of RE 11.3.4 within AU5. However, as shown in Figure 5, this patch will be contained within the boundaries of the MSES offset area which, when joined with the MNES offset area, create one complete, self-contained area that will be managed for multiple species. This patch of AU5 will therefore not be vulnerable to impacts such as edge effects or habitat fragmentation.

Table 5 – Summary of required MNES Offset Area per the OAG

MNES value required to be offset	Impact Area (ha)	Offset requirement (ha)	Offset Area (ha)	Total % impact offset
south-eastern glossy black cockatoo (<i>Calyptorhynchus lathami lathami</i>)	28.32	101	101.2	100
koala (<i>Phascolarctos cinereus</i>)	35.1	152	152.1	100
greater glider (southern and central) (<i>Petauroides volans</i>)	29.9	109	109.8	100

Table 6 – Offset Area compliance with the Offsets Policy requirements

Policy Requirement	Supporting Evidence
Suitable offsets must deliver an overall conservation outcome that improves or maintains the viability of the protected matter	<p>The Offset Area will acquire a minimum of 100% of the offset requirements for the Project's MNES impacts in accordance with the OAG. The Offset Area will be managed to maintain and improve the condition and viability of the threatened species habitat as outlined in this OAMP. This OAMP details specific management objectives with performance targets and completion criteria. The OAG calculations provided in Appendix A provide the scoring as it is currently and proposed targets to be met.</p> <p>The Offset Area vegetation consists of a matrix of remnant, regrowth and non-remnant vegetation, there is regional biodiversity corridor following a watercourse in the north of the property. The Property has excellent connectivity to remnant vegetation in the adjoining state forest and connectivity through to a state biodiversity corridor. The matrix of habitat provides good opportunities for improvement given current land management practices that have resulted in overgrazing and extensive logging, threats from clearing and thinning across the Property will be removed.</p> <p>Prior to purchasing the Property, the previous landowner intended to permanently kill approximately 500 ha of Cat X vegetation by way of chemical treatment (pelleting). The purchase of the Property by Senex has prevented this from occurring.</p> <p>The Offset Area will be managed for at least 20 years. ARCP P/L anticipates that all completion criteria will be met within this time period.</p>

Policy Requirement	Supporting Evidence
	Management actions are outlined in this OAMP with associated adaptive management triggers and corrective actions in the event that monitoring identifies performance targets and/or completion criteria are not attained and/or being maintained.
Suitable offsets must be built around direct offsets but may include other compensatory measures	ARCP P/L will acquit more than 100% of the Project's EPBC Act offset requirements as shown in Table 5 through direct land-based offsets. These direct land-based Offset Area have been determined as suitable in accordance with the EPBC Act and OAG.
Suitable offsets must be in proportion to the level of statutory protection that applies to the protected matter	The OAG calculator (Appendix A) accounts for the threatened status of the impacted protected matters and the proposed Offset Area. OAG calculations provided.
Suitable offsets must be of a size and scale proportionate to the impacts on the protected matter	The Offset Area has been calculated in accordance with the OAG calculator (Appendix A), with inputs based upon results of detailed ecological field assessments.
Suitable offsets must effectively account for and manage the risks of the offset not succeeding	The OAG calculator (Appendix A) accounts for associated risks of the offset not succeeding.
Suitable offsets must be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs (this does not preclude state or territory offsets)	The Offset Area is zoned as freehold land under the Western Downs Regional Council. Prior to acquisition, the primary land use of the Offset Area was for horses and cattle grazing. The relevant vegetation communities were subject to numerous potential threats including feral pests (horses, cattle, dogs, cats, rabbits, cane toads), exotic flora (<i>Bryophyllum delagoense</i> (mother-of-millions), <i>Opuntia</i> spp., <i>Eragrostis curvula</i> (African love-grass) and <i>Cenchrus ciliaris</i> (buffel grass)), inappropriate fire regimes, logging and land clearing. The above threats would continue to exist without the acquisition and management of the Property for the purpose of biodiversity offsets.
Suitable offsets must be efficient, effective, timely, transparent, scientifically robust and reasonable	<p>All processes used to identify, secure and establish offsets for the Project have been consistent with the requirements of the Offsets Policy.</p> <p>The Offset Area has been identified and deemed suitable using an evidence-based and scientifically robust approach (BioCondition and habitat quality scoring), with the OAMP supporting the efficient, effective, timely, transparent and scientifically robust approach to providing offset deliverables.</p>
Suitable offsets must have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.	The OAMP outlines a governance framework and delivery pathway to legally secure the Offset Area and transparently report upon their outcomes.

4.3 Offset Protection

The Property has been purchased by a wholly owned subsidiary of Senex and a related entity of ARCP/L. Senex will legally secure the Offset Area via a voluntary declaration (VDec) under the *Vegetation Management Act 1999* (Qld) (VM Act) and in accordance with any forthcoming EPBC Act approval conditions. Because Senex has purchased the land, it does not expect delays in implementing a legal binding mechanism to secure the offset.

A VDec is a voluntary process under the VM Act to protect areas of native vegetation, not otherwise protected by the VM Act, and can be used to secure areas of land to satisfy statutory offset requirements. Once a VDec is made it is registered on title and is binding on all current and future owners of the land until the intent and outcomes of the management plan attached to the VDec is achieved. Therefore, it will provide enduring protection for the Offset Area against development incompatible with its conservation.

The Offset Area is considered to satisfy the criteria for declaration under the criteria described in clause 19G of the VM Act.

This OAMP establishes conservation objectives to improve or maintain the viability of the MNES within the Offset Area. The Offset Area will protect and enhance habitat for MNES such as koala, greater glider and south-eastern glossy black cockatoo and includes non-remnant REs and Cat X vegetation, which through implementation of the OAMP should transition to remnant REs and facilitate an increase in connectivity to a regional biodiversity corridor following a watercourse in the north of the Property and to remnant vegetation that adjoins a state biodiversity corridor, providing a net gain in biodiversity.

4.3.1 Offset Protection – habitat quality loss / gain

Protecting relevant parts of the Property as offsets will prevent future habitat degradation most notably in the current regrowth and remnant areas which are subject to threats from fire, clearing, grazing pressures and climate change. Table 7 identifies where habitat quality would both increase and decrease in future with and without the establishment of Offset areas and implementation of management measures. Management of the Offset Area in accordance with management measures described in Section 5.6 will avert a 1-point habitat quality loss (which would have occurred if not for the offset) as well as achieve a 1-point habitat quality gain as detailed further in Section 5.5.

Table 7 – Future habitat quality with and without offset

Site Condition Attributes	Current Score (%)	Future quality without offset	Future quality with offset
Recruitment of woody perennial species in EDL	97	Decrease	--
Native plant species richness - trees	85	Decrease	--
Native plant species richness - shrubs	85	Decrease	--
Native plant species richness - grasses	80	--	--
Native plant species richness - forbes	47	--	Increase
Tree emergent height	74	Decrease	Increase
Tree canopy height		Decrease	Increase
Tree sub-canopy height		Decrease	Increase
Tree emergent cover	67	Decrease	Increase
Tree canopy cover		Decrease	Increase
Tree sub-canopy cover		Decrease	Increase
Shrub canopy cover	61	Decrease	Increase

Site Condition Attributes	Current Score (%)	Future quality without offset	Future quality with offset
Native grass cover	77	--	Increase
Organic litter	87	Decrease	--
Large trees (euc plus non-euc)	29	Decrease	Increase
Coarse woody debris	52	Decrease	Increase
Non-native plant cover	89	--	--

5 Environmental Values

5.1 Offset Values

The following sections summarise the condition and quality of the Offset Area for each MNES (Table 8).

Table 8 – MNES and associated baseline HQS

MNES	Offset Area (ha)	Baseline HQS
south-eastern glossy black cockatoo (<i>Calyptrorhynchus lathamii lathamii</i>)	101.2	5
koala (<i>Phascolarctos cinereus</i>)	152.1	6
greater glider (southern and central) (<i>Petauroides volans</i>)	109.8	5

5.2 South-eastern glossy black cockatoo (*Calyptrorhynchus lathamii lathamii*)

South-eastern glossy black cockatoos feed almost exclusively on *Allocasuarina* spp. and *Casuarina* spp. seeds, preferring woodland areas dominated by feed tree species and a canopy of Eucalypt species (DAWE, 2022; Hourigan, 2012). South-eastern glossy black cockatoos are obligate hollow nesters, utilising hollows in both living and dead trees (DAWE, 2022). South-eastern glossy black-cockatoos have a preference towards hollows that are greater than 15 cm diameter and greater than 8 m above the ground and vertical to near-vertical (DAWE, 2022; Hourigan, 2012).

South-eastern glossy black cockatoos are listed as:

- vulnerable at a Federal level under the EPBC Act; and
- vulnerable at a State level under the *Nature Conservation Act 1992* (Qld) (**NC Act**).

South-eastern glossy black cockatoos have not yet been detected on the Property, but records have been recorded within 10 km of the Property boundary (DES, 2023).

Within the Offset Area, south-eastern glossy black cockatoos habitat consists of the following Regional Ecosystems (Res); 11.3.1, 11.3.25, 11.3.26, 11.3.27b, 11.3.4, 11.5.1, 11.5.1a, 11.5.20, 11.5.21, 11.5.4, 11.7.6, 11.7.4, 11.7.7 (refer to Figure 7 below). General habitat types within the Property associated with south-eastern glossy black cockatoos include: dry sclerophyll (Eucalypt) woodlands, fringing watercourse and riparian vegetation and *Allocasuarina* spp. and *Casuarina* spp. woodlands. The condition of south-eastern glossy black-cockatoo habitat across the Property varies from non-remnant paddocks with sparse feeding and/or habitat trees, regrowth vegetation with thickets of young *Allocasuarina luehmannii* regrowth, to remnant stands of vegetation with suitable hollow bearing trees. Resultingly, south-eastern glossy black-cockatoo HQS varied across REs and condition status. The Offset Area chosen for south-eastern glossy black cockatoos is shown in Figure 8.



Figure 7 – Examples of south-eastern glossy black cockatoo habitat REs within the Offset Area from top left to bottom right: RE 11.3.25, RE 11.3.26, RE 11.5.1, RE 11.5.1a, RE 11.5.21 and RE 11.7.6.

5.2.1 Habitat Quality

Table 9 provides a comparison of the habitat quality metrics on the impact and offset sites. While showing that an equivalent area of habitat has been protected under the offset, it also provides guidance on target measures to improve habitat quality which will be focused on reducing threats to the species across the offset. It should be noted that the removal of threats should also result in uplift across the species habitat indices (Table 9) except for the "Quality and availability of habitat required for mobility" which already has the maximum score. Target offset outcome scores are provided in Table 12. Individual species habitat indices have been extracted from the impact assessment methodology in the EAR.

5.2.2 Threats

Prior to acquisition of the offset, the primary threat to south-eastern glossy black cockatoo habitat was land clearing and the immediate threat of chemical treatment (pelleting) of native trees, consisting of regrowth of various REs in Cat X areas. Following legally securing the offset, the continued threats faced by south-eastern glossy black cockatoos on the Property include reduced suitable feed and habitat tree recruitment as a result of livestock (horse and cattle) and pest species grazing (rabbits) (DCCEEW, 2022) which has been shown to not only cause a decline in extent and productivity of foraging habitat, but also impedes the regeneration ability of native vegetation, including feed tree species, after fires (DCCEEW, 2022). The threats that will be addressed and minimised through the implementation of this OAMP include:

- Inappropriate fire regimes and the risk of increased fuel loads (DCCEEW, 2022) and loss of future habitat trees for hollows; and
- Reduced suitable feed and habitat tree recruitment as a result of livestock (horse and cattle) and pest species grazing (rabbits) (DCCEEW, 2022, 2016).

The species habitat indices used to score each of the habitat quality metrics is provided in Table 9.

Table 9 – Species Habitat Indices for south-eastern glossy black cockatoo

Habitat quality metrics	Weighted indicators	Poor score	Moderate score	High score	Weighting		Score (out of 10 except threats out of 15)	
					Impact site	Offset site	Impact site	Offset site
Quality and availability of food and habitat required for foraging	Known feed tree species (<i>Allocasuarina</i> spp. or <i>Casuarina</i> spp.) presence	No known feed trees present	Less-preferred feed tree species present (<i>Casuarina cunninghamii</i> , <i>C. equisetifolia</i> , <i>Callitris glauca</i> and/or <i>Allocasuarina inophloia</i>)	Preferred feed tree species present (<i>Allocasuarina torulosa</i> , <i>A. littoralis</i> , <i>A. luehmannii</i> and/or <i>C. cristata</i>)	0.5	0.5	5.1	4.9
	Abundance of mature female (cone-bearing) trees	Absent	3-5 trees per plot	> 10 trees per plot	0.5	0.5		
Quality and availability of habitat required for shelter and breeding	Abundance of suitable hollow bearing trees and/or stags	No trees or stags containing suitable hollows present	Single tree/stag containing suitable hollow(s) present	Two or more trees/stags containing suitable hollow(s) present	0.75	0.75	4.1	4.0
	Distance to 'suitable' water source (including dams, troughs, seasonal wetlands, and pools along watercourses)	Site > 3 km from a suitable water source	Site 0.5-1.5 km from a suitable water source	Site < 0.5 km from a suitable water source	0.25	0.25		
Quality and availability of habitat required for mobility	Maximum score of 10 assigned due to the species' mobility and ability to traverse/overfly highly modified landscapes, unless site located in proximity to transmission lines and/or wind turbines (in which case mobility is assigned a score of 1)	-	-	-	1	1	10	10
Absence of threats	Inappropriate fire regime: infrequent fire resulting in senescence of feed trees; high frequency fires suppressing recruitment of feed trees; and/or high intensity fires resulting in death of feed trees and/or loss of suitable future nest trees/stags	80% of AU impacted or potentially impacted	20-40% of AU potentially impacted	AU not impacted or unlikely to be impacted	N/A (Average used)	0.7	7.5	1
	Presence of non-native herbivorous pest species (reducing the regeneration of feed and nest trees)	80% of AU impacted or potentially impacted	20-40% of AU potentially impacted	AU not impacted or unlikely to be impacted		0.3		



5.3 Greater glider (southern and central) (*Petauroides volans*)

Greater gliders are a nocturnal, strictly arboreal species, restricted to tall eucalyptus forests (Grzimek, 1990). Greater gliders rely upon leaf moisture for water intake and are generally restricted to watercourses and associated riparian vegetation (DCCEEW, 2022; Melzer et al. 2014), with home ranges of between 1 to 16 ha (DCCEEW, 2022). Greater gliders are highly reliant on hollow-bearing trees for shelter and breeding (Eyre et al., 2022; Lindenmayer et al. 1993; Smith et al. 2007). Eucalypt trees with a Diameter at Breast Height (DBH) >30 cm have been found to be preferentially selected for foraging, with trees >50 cm DBH more likely to contain suitable hollows for denning by greater gliders (Eyre et al., 2022). In southern Queensland, greater gliders require at least 2–4 live den trees for every 2 ha of suitable habitat (DCCEEW, 2022).

Ausecology surveys conducted during October 2023, confirmed the presences of greater gliders occurring within 2 km of the Property boundary (Figure 9).



Figure 9 – Greater glider (*Petauroides volans*) detected within 2 km of the Property boundary during Ausecology surveys, October 2023.

Within the Offset Area, greater glider habitat consisted of the following REs; 11.3.2, 11.3.25, 11.3.26, 11.3.27b, 11.3.4, 11.5.1, 11.5.20, 11.5.21, 11.7.4, 11.7.6 and 11.7.7 (refer to Figure 10 below). Areas associated with the greater glider included; dry sclerophyll (Eucalypt) woodlands, open dry sclerophyll (Eucalypt) woodland and fringing watercourse and riparian vegetation. The Offset Area chosen for greater glider is shown in Figure 10.

The condition of potential greater glider habitat across the Property varied from non-remnant paddocks with scattered trees, regrowth vegetation with thickets of foraging trees (but lacking denning trees), to remnant stands of vegetation with sufficient stands of feed and denning trees. Resultingly, greater glider HQS varied across REs and condition status.



Figure 10 – Examples of greater glider habitat REs within the Offset Area from top left to bottom right; RE 11.3.2, RE 11.3.4, RE 11.3.25, RE 11.3.27b, RE 11.5.20 and RE 11.5.21.

5.3.1 Habitat Quality

Table 10 provides a comparison of the habitat quality metrics on the impact and offset sites. While showing that an equivalent area of habitat has been protected under the offset, it also provides guidance on target measures to improve habitat quality which will be focused on reducing threats to the species across the offset. It should be noted that the removal of threats will also result in uplift across all of the species habitat indices (Table 10). Target offset outcome scores are provided in Table 12. Individual species habitat indices have been extracted from the impact assessment methodology within the EAR.

5.3.2 Threats

Prior to the acquisition of the Property, the primary threat to greater glider habitat was land clearing and the immediate threat of chemical treatment (pelleting) of native trees, consisting of regrowth of various REs in Cat X areas. Following Property acquisition, the continued threats faced by greater gliders on the Property that will be addressed through the implementation of this OAMP include:

- Inappropriate fire regimes and the risk of increased fuel loads (DCCEEW, 2022);
- Fragmentation of habitat and reduced greater glider tree recruitment as a result of thinning, fire and livestock grazing (cattle and horses) (DCCEEW, 2022); and
- Barbwire fence entanglement risk (DCCEEW, 2022).

The species habitat indices used to score each of the habitat quality metrics is provided in Table 10.

Table 10 – Species Habitat Indices for greater glider

Habitat metric	Indicators	Poor score	Moderate score	High score	Weighting		Score (out of 10 except threats out of 15)	
					Impact site	Offset site	Impact site	Offset site
Quality and availability of food and habitat required for foraging	Diversity of preferred food trees (<i>Corymbia</i> and <i>Eucalyptus</i> species) of >30 cm DBH	Preferred food trees are absent	3-4 species of preferred food tree species are present	≥5 species of preferred food tree are present	0.25	0.25	3.3	3.2
	Abundance of preferred food trees (<i>Corymbia</i> and <i>Eucalyptus</i> species) of >30 cm DBH	Preferred food trees are absent	Preferred food trees are moderately abundant in the canopy (comprise 30-50% of canopy species)	Preferred food trees are dominant in the canopy (comprise over 50% of canopy species)	0.75	0.75		
Quality and availability of habitat required for shelter and breeding	Abundance of large hollow bearing trees and stags (trees stags bearing hollows with an aperture >10 cm) ¹	Large hollow-bearing trees or stags are absent (>10 cm)	3-4 large hollow-bearing trees or stags are present (>10 cm)	>4 large hollow-bearing trees or stags are present (>10 cm)	1	1	2	1.2
Quality and availability of habitat required for mobility	Patch size of suitable habitat	Suitable habitat patch is <1 ha	Suitable habitat patch is >3-5 ha	Suitable habitat patch is >20 ha	0.35	0.35	3.2	4.9
	Connectivity of suitable habitat in the landscape	The suitable habitat patch is separated from other suitable habitat by: <ul style="list-style-type: none"> • ≥50 m of non-remnant or regrowth vegetation; or • ≥200 m of non-suitable remnant vegetation. 	The suitable habitat patch is separated from other suitable habitat by: <ul style="list-style-type: none"> • ≥30-50 m of non-remnant or regrowth vegetation; or • ≥100 – 200 m of non-suitable remnant vegetation. 	The suitable habitat patch is separated from other suitable habitat by: <ul style="list-style-type: none"> • <30 m of non-remnant or regrowth vegetation; or • <100 m of non-suitable remnant vegetation. 	0.35	0.35		
	Presence of man- made fragmentation features	Main roads or large cleared areas are present to prevent connectivity with other suitable habitat present within the landscape	Moderately significant man-made fragmentation features are present within the landscape e.g. powerlines, fence lines	No man-made fragmentation features	0.3	0.3		
Absence of threats	Inappropriate fire regimes	80% of AU impacted or potentially impacted	20-40% of AU impacted or potentially impacted	AU patch not impacted or unlikely to be impacted	N/A (Average used)	0.7	9.5	3.6
	Fragmentation of habitat	80% of AU impacted or potentially impacted	20-40% of AU impacted or potentially impacted	AU patch not impacted or unlikely to be impacted		0.2		
	Barbed wire entanglement	80% of AU impacted or potentially impacted	20-40% of AU impacted or potentially impacted	AU patch not impacted or unlikely to be impacted		0.1		

¹ Absolute number of hollows counts were undertaken per assessment unit.



5.4 Koala (*Phascolarctos cinereus*)

Koala habitat can be generalised as woodlands or open forests containing known koala habitat trees. Koala habitat trees are defined as trees of the *Corymbia*, *Melaleuca*, *Lophostemon*, *Eucalyptus* and *Angophora* genera (Qld. Gov, 2017). Koalas are obligate folivores, predominately feeding upon trees of the genera *Eucalyptus*, *Corymbia*, and *Angophora* (DAWE, 2022). Distribution of koala within north-western Queensland was found to be patchy and associated with creek-lines correlating with higher leaf-moisture content (Munks et al., 1996 and DAWE, 2022). Koalas are also known to occur in modified or regenerating native vegetation communities, as well as urban and rural landscapes where food and shelter trees may be highly scattered (DAWE, 2021).

Koalas are listed as endangered under the provisions of the EPBC Act and endangered under the NC Act.

Ausecology surveys conducted in October 2023, confirmed the presences of koalas occurring within 50 m of the Property boundary (Figure 12). An additional koala was seen in the adjacent forestry lease area 2.5 km away from the proposed Offset Area covered in this OAMP.



Figure 12 – Koala with joey (*Phascolarctos cinereus*) detected within 50 m of the Property boundary during Ausecology surveys, October 2023.

Within the Offset Area, koala habitat consisted of the following REs; 11.3.1, 11.3.2, 11.3.25, 11.3.26, 11.3.27b, 11.3.4, 11.5.1, 11.5.1a, 11.5.20, 11.5.21, 11.5.4, 11.7.6, 11.7.4, 11.7.7 (refer to Figure 13 below). General habitat types within the Property associated with koala include; dry sclerophyll (*Eucalypt*) woodlands, open dry sclerophyll woodland and fringing watercourse and riparian vegetation. The condition of koala habitat across the Property varies, from non-remnant paddocks with individual habitat trees, regrowth vegetation with thickets of koala habitat trees, to remnant stands of vegetation with stands of larger trees with increased quantities of large trees. Resultingly, koala HQS varied across REs and condition status. The Offset Area chosen for koala is shown in Figure 14.



Figure 13 – Examples of koala habitat REs within the Offset Area from top left to bottom right; RE 11.3.2, RE 11.3.25, RE 11.3.26, RE 11.3.27b, RE 11.5.4 and RE 11.5.21.

5.4.1 Habitat Quality

Table 11 provides a comparison of the habitat quality metrics on the impact and offset sites. While showing that an equivalent area of habitat has been protected under the offset it also provides guidance on target measures to improve habitat quality which will be focused on reducing threats to the species across the offset. Species habitat indices have been taken from the impact assessment methodology EAR (Table 11). Target offset outcome scores are provided in Table 12.

5.4.2 Threats

Prior to the acquisition of the Property, the primary threat to koala habitat was land clearing and the immediate threat of chemical treatment (pelleting) of native trees, consisting of regrowth of various REs in Cat X areas. Following Property securement, the continued threats faced by koalas on the Property that will be addressed through the implementation of this OAMP include:

- Inappropriate fire regimes and the risk of increased fuel loads (DCCEEW, 2022); and
- Impacts of climate change to important koala habitat (e.g. riparian corridors, canopy cover and EDL recruitment) (DAWE, 2022 and Ellis, et al., 2010).

The species habitat indices used to score each of the habitat quality metrics is provided in Table 11.

Table 11 – Species Habitat Indices for koala

Habitat metric	Indicators	Poor score	Moderate score	High score	Weighting		Score (out of 10 except threats out of 15)	
					Impact site	Offset site	Impact site	Offset site
Quality and availability of food and habitat required for foraging	Abundance of Locally Important Koala Trees (LIKTs)	No LIKTs present	LIKTs ≥ 10 cm DBH present as: <ul style="list-style-type: none"> Associated canopy species; Scattered emergent trees; and/or Subdominant species (at sites where the density of subcanopy trees exceeds 10 per 100 x 50 m plot) 	LIKTs ≥ 10 cm DBH present as dominant canopy species	0.9	0.9	6.3	9.5
	Leaf moisture content/availability of soil water to feed trees	Low – low rainfall, not alluvial floodplains, quick draining soils	Moderate – high seasonal rainfall floodplains, high water table	High – high rainfall, frequent flooding, alluvial soils	0.1	0.1		
Quality and availability of habitat required for shelter and breeding	Abundance of suitable Koala shelter trees (LIKT, Ancillary habitat tree, or other suitable shade tree species) ≥ 10 cm DBH	Absent	Suitable koala shelter trees present at low-to-moderate abundance (2-5 per 100 x 50 m plot)	Suitable koala shelter trees present at moderate-to-high abundance (>5 per 100 x 50 m plot)	1	1	8.7	10
Quality and availability of habitat required for mobility	Patch size of suitable habitat (remnant or regrowth vegetation with LIKTs ≥ 10 cm DBH)	Suitable habitat patch is <2 ha	Suitable habitat patch is 11-50 ha	Suitable habitat patch is >500 ha	0.4	0.4	4.7	10
	Connectivity of suitable habitat in the landscape	The suitable habitat patch is separated from other suitable habitat by: <ul style="list-style-type: none"> Man-made or natural barriers to dispersal (e.g. fencing, dense/impenetrable weedy ground cover, permanent watercourses >30 m wide); or >1 km of cleared/developed land with no suitable habitat trees 	The suitable habitat patch is separated from other suitable habitat by: <ul style="list-style-type: none"> <1 km and >0.5 km of mostly cleared/developed land with scattered habitat trees; or >1 km of remnant or regrowth woodland/open forest without any LIKTs or ancillary habitat trees; or Multiple roadways carrying low volume traffic 	The suitable habitat patch is more or less contiguous or separated from other areas of suitable by: <ul style="list-style-type: none"> No more than 100 m of remnant or regrowth woodland/open forest without an LIKTs or ancillary habitat trees 	0.6	0.6		
Absence of threats	Inappropriate fire regimes	80% of AU patch impacted or potentially impacted	20-40% of AU patch impacted or potentially impacted	AU patch not impacted or unlikely to be impacted	N/A (Average used)	0.6	9.8	4.3
	Impacts to important koala climate refugia habitat (extent of riparian corridor, canopy cover and recruitment of EDL).	80% of AU patch impacted or potentially impacted	20-40% of AU patch impacted or potentially impacted	AU patch not impacted or unlikely to be impacted		0.4		



5.5 Offset Outcomes

This OAMP seeks to acquit the Project offset requirements for the south-eastern glossy black cockatoo, greater glider and the koala. Table 12 details HQS milestones for each species, depicting an expected 1-point increase over a 20-year period. Additional detail including interim performance targets and completion criteria are outlined within Table 13.

Starting HQS for the offset MNES were determined as part of baseline surveys undertaken in accordance with the *Guide to Determining Terrestrial Habitat Quality v1.2 (GDHTQ)* (DEHP 2017) (Section 8.1). The GDHTQ methodology utilises a range of indicators and attributes tailored to each species, providing an overall indication of an area's capability to support a species. Resultingly, the Property completion criteria is centralised on increasing the overall species habitat quality, represented by an increase in overall species habitat quality scoring. Management targets and actions to achieve these habitat quality uplifts are provided in Table 12 and Table 13.

Table 12 – Property HQS Milestones for each MNES

MNES	Baseline (Year 0)	Year 5	Year 10	Year 20 (Minimum)	Year 20 (Expected)
South-eastern glossy black cockatoo (<i>Calyptorhynchus lathami lathami</i>)	5.39 (5)	5.42	5.45	5.48	5.51 (6)
Greater glider (southern and central) (<i>Petauroides volans</i>)	4.77 (5)	4.95	5.14	5.32	5.51 (6)
Koala (<i>Phascolarctos cinereus</i>)	6.09 (6)	6.19	6.30	6.40	6.51 (7)

Table 13 – Interim performance targets and completion criteria – Offset Area

Attribute / Metric	Baseline Performance Target (Year 0)	Interim Performance Target (Year 5)	Interim Performance Target (Year 10)	Interim Performance Target (Year 15)	Completion Criteria (Year 20)	Justification
Site-specific attributes²						
Number of large trees (Eucalypts and non-eucalypts)	0 to 25% of the relevant benchmark ³	≥25 to 50% of the relevant benchmark ³	≥50% to 75% of the relevant benchmark ³	≥75% to 100% of the relevant benchmark ³	≥100% the relevant benchmark ³	<p><i>Large Trees</i> across BioCondition sites received an average score of 4.3/15, indicating that there is potential for improvement. <i>Recruitment</i> (4.83/5), <i>Tree Height</i> (3.65/5) and <i>Tree Species Richness</i> (4.25/5) indicate that the completion criteria for number of <i>Large Trees</i> is achievable within the 20-year offset period.</p> <p>Relevant Management Actions: Bushfire management, Livestock management, fencing and Pest fauna management</p>
Tree canopy cover (%)	≥10% and <20% of the relevant benchmark ³	≥20% and <30% of the relevant benchmark ³	≥30% and <40% of the relevant benchmark ³	≥40% and <50% of the relevant benchmark ³	≥50% and ≤200% of the relevant benchmark ³	<p>The average <i>Tree Canopy Cover</i> (emergent, canopy and subcanopy) averaged 3.35/5 across all the BioCondition sites, indicating there is room for improvement. <i>Recruitment</i> (4.83/5), <i>Large Trees</i> (4.33/15) and <i>Tree Species Richness</i> (4.25/5) all show room for improvement, which would subsequently bring an increase to the <i>Tree Canopy Cover</i> metric.</p> <p>Relevant Management Actions: Bushfire management</p>

² Noting the remaining site-specific attributes will also likely increase with implementation of the management actions.

³ as defined in the *BioCondition - A Condition Assessment Framework for Terrestrial Biodiversity in Queensland, Assessment Manual* (Eyre et al., 2015).

Attribute / Metric	Baseline Performance Target (Year 0)	Interim Performance Target (Year 5)	Interim Performance Target (Year 10)	Interim Performance Target (Year 15)	Completion Criteria (Year 20)	Justification
Native forbs and other species richness	≥25% to 40% of the relevant benchmark ³	≥40% to 55% of the relevant benchmark ³	≥55% to 70% of the relevant benchmark ³	≥70% to 90% of the relevant benchmark ³	≥90% of the relevant benchmark ³	<p><i>Native forbs and other species richness</i> scored an average of 2.35/5 across all the BioCondition sites, indicating room for improvement. The proposed management actions (e.g. weed management and removal of livestock) are likely to encourage an increase in native groundcover species.</p> <p>Relevant Management Actions: Weed management, Livestock management and Fencing, Bushfire management, Pest fauna management.</p>
Coarse woody debris	≥10 to <20% or >200% of the relevant benchmark ³	≥20 to <30% or >200% of the relevant benchmark ³	≥30 to <40% or >200% of the relevant benchmark ³	≥40 to <50% or >200% of the relevant benchmark ³	≥50% to ≤200% of the relevant benchmark ³	<p><i>Coarse woody debris</i> across all BioCondition sites scored an average of 2.6/5, allowing room for scores to increase during the 20-year offset. <i>Large Trees</i> (4.33/15) and <i>Tree Species Richness</i> (4.25/5) also show room for improvement, providing more potential for sources of <i>Coarse Woody Debris</i> within the Property.</p> <p>Relevant Management Actions: Bushfire management, Livestock management and fencing.</p>

Attribute / Metric	Baseline Performance Target (Year 0)	Interim Performance Target (Year 5)	Interim Performance Target (Year 10)	Interim Performance Target (Year 15)	Completion Criteria (Year 20)	Justification
Species-specific attributes						
<i>South-eastern glossy black cockatoo</i>						
Quality and availability of food and foraging habitat	Overall score of 2/10	Overall score of 4/10	Overall score of 6/10	Overall score of 8/10	Overall score of 10/10	<p>The average score for <i>Quality and availability of food and foraging habitat</i> across all BioCondition sites was 4.88/10. This attribute is divided equally between two components, known feed tree species (<i>Allocasuarina</i> spp. or <i>Casuarina</i> spp.) presence and abundance of mature female (cone-bearing) trees. Based on the average <i>Recruitment</i> (4.83/5), <i>Tree Species Richness</i> (4.25/5) and <i>Large Trees</i> (4.33/15) detected in the BioCondition assessments, it is considered likely that an increase in the <i>Quality and availability of food and foraging habitat</i> is achievable as the offset vegetation matures and continues to self-propagate.</p> <p>Relevant Management Actions: Bushfire management, Livestock removal, fencing and Pest fauna management.</p>

Attribute / Metric	Baseline Performance Target (Year 0)	Interim Performance Target (Year 5)	Interim Performance Target (Year 10)	Interim Performance Target (Year 15)	Completion Criteria (Year 20)	Justification
Quality and availability of shelter	Overall score of 2/10	Overall score of 4/10	Overall score of 6/10	Overall score of 8/10	Overall score of 10/10	<p><i>Quality and availability of shelter</i> across all BioCondition sites scores an average of 4/10 indicating that there is room for improvement during the 20-year offset. This attribute is scored based on the abundance of suitable hollow bearing trees and/or stags and distance to 'suitable' water sources (including dams, troughs, seasonal wetlands, and pools along watercourses). Based on the average <i>Large Trees</i> (3.75/5) and the proposed increase and installation of nestboxes, it is considered likely that an increase in the <i>Quality and availability of shelter</i> is achievable.</p> <p>Relevant Management Actions: Bushfire management and Nestbox program.</p>
Threats to the species	Overall score of 3/15	Overall score of 6/15	Overall score of 9/15	Overall score of 12/15	Overall score of 15/15	<p><i>Threats to species</i> across all BioCondition sites was determined to average 1/15 based on the current condition of the Property. It is considered likely that improvement of this score to 15/15 is achievable by the completion of the 20-year offset based on the management actions proposed.</p> <p>Relevant Management Actions: Bushfire management, Livestock removal, fencing and Pest fauna management.</p>

Attribute / Metric	Baseline Performance Target (Year 0)	Interim Performance Target (Year 5)	Interim Performance Target (Year 10)	Interim Performance Target (Year 15)	Completion Criteria (Year 20)	Justification
<i>Greater glider</i>						
Quality and availability of food and foraging habitat	Overall score of 2/10	Overall score of 4/10	Overall score of 6/10	Overall score of 8/10	Overall score of 10/10	<p>The average score for <i>Quality and availability of food and foraging habitat</i> across all BioCondition sites was 3.15/10. This attribute is divided between two components, diversity of preferred food trees (<i>Corymbia</i> and <i>Eucalyptus</i> species) of >30 cm DBH and abundance of preferred food trees (<i>Corymbia</i> and <i>Eucalyptus</i> species) of >30 cm DBH, with abundance given the highest weighting.</p> <p>Based on the average <i>Recruitment</i> (4.83/5), <i>Tree Species Richness</i> (4.25/5) and <i>Large Trees</i> (4.33/15) detected in the BioCondition assessments, it is considered likely that an increase in the <i>Quality and availability of food and foraging habitat</i> is achievable as the AUs mature and continue to self-propagate.</p> <p>Relevant Management Actions: Bushfire management, Livestock management, fencing and Pest fauna management.</p>

Attribute / Metric	Baseline Performance Target (Year 0)	Interim Performance Target (Year 5)	Interim Performance Target (Year 10)	Interim Performance Target (Year 15)	Completion Criteria (Year 20)	Justification
Quality and availability of shelter	Overall score of 2/10	Overall score of 4/10	Overall score of 6/10	Overall score of 8/10	Overall score of 10/10	<p><i>Quality and availability of shelter</i> across BioCondition sites scores an average of 1.2/10 indicating that there is room for improvement during the 20-year offset. This attribute is scored based on the abundance of large hollow bearing trees and stags (trees stags bearing hollows with an aperture >10 cm). Based on the average <i>Large Trees</i> (4.33/15) and the proposed increase and installation of nestboxes, it is considered likely that an increase in the <i>Quality and availability of shelter</i> is achievable.</p> <p>Relevant Management Actions: Bushfire management and Nestbox program.</p>
Quality and availability of habitat required for mobility	Overall score of 2/10	Overall score of 4/10	Overall score of 6/10	Overall score of 8/10	Overall score of 10/10	<p>Species mobility scored an average of 4.93/10 indicating that there is room for improvement across the 20-year offset. This attribute is likely to increase upon the increase of regrowth vegetation to remnant and resultant increase in patch size and the removal of internal fences. An increase in <i>Large trees</i> is also likely to influence this attribute.</p> <p>Relevant Management Actions: Livestock management and fencing.</p>

Attribute / Metric	Baseline Performance Target (Year 0)	Interim Performance Target (Year 5)	Interim Performance Target (Year 10)	Interim Performance Target (Year 15)	Completion Criteria (Year 20)	Justification
Threats to the species	Overall score of 3/15	Overall score of 6/15	Overall score of 9/15	Overall score of 12/15	Overall score of 15/15	<p><i>Threats to species</i> across all BioCondition sites was determined to average 3.6/10 based on the current condition of the Property. It is considered likely that improvement of this score to 15/15 is achievable by the completion of the 20-year offset based on the management actions proposed mainly through management of the risk of fire and as vegetation reaches remnant status.</p> <p>Relevant Management Actions: Bushfire management, Livestock management, fencing and Pest fauna management.</p>
<i>Koala</i>						
Quality and availability of food and foraging habitat, Quality and availability of habitat required for shelter and breeding, Quality and availability of food and habitat required for foraging	Meets interim targets	Meets interim targets	Meets interim targets	Meets interim targets	Meets completion criteria	<p>The average score for all components meets the maximum score for these attributes.</p> <p>It is unlikely that management will increase this score given it is already at the maximum value for the site.</p>

Attribute / Metric	Baseline Performance Target (Year 0)	Interim Performance Target (Year 5)	Interim Performance Target (Year 10)	Interim Performance Target (Year 15)	Completion Criteria (Year 20)	Justification
Threats to the species	Overall score of 3/15	Overall score of 6/15	Overall score of 9/15	Overall score of 12/15	Overall score of 15/15	<p><i>Threats to species</i> across all BioCondition sites was determined to average 4.28/15 based on the current condition of the Property. It is considered likely that improvement of this score to 15/15 is achievable by the completion of the 20-year offset based on the management actions proposed to increase vegetation to remnant status.</p> <p>Relevant Management Actions: Bushfire management and pest fauna management especially along riparian corridors.</p>

5.6 Management Actions

The management measures to be implemented within the Offset Area have been developed considering the relevant consideration advice for each MNES species and are consistent with the measures in relevant recovery plans and threat abatement measures (Table 14).

Table 14 – Relevant conservation priorities and management measures to be implemented within the Offset Area

Species	Species threats identified in relevant conservation advices and threat abatement plans	Management Activity
South-eastern glossy black cockatoo (<i>Calyptorhynchus lathami lathami</i>)	Inappropriate fire regime: infrequent fire resulting in senescence of feed trees; high frequency fires suppressing recruitment of feed trees; and/or high intensity fires resulting in death of feed trees and/or loss of suitable future nest trees/stags	Establish fire break network and ecological burn program over the life of the offset
	Presence of non-native herbivorous pest species (reducing the regeneration of feed and nest trees)	Removal of livestock grazing in the offset area and management of pest rabbits
Greater glider (southern and central) (<i>Petauroides volans</i>)	Inappropriate fire regimes and the risk of increased fuel loads resulting in direct deaths to the species	Establish fire break network and ecological burn program over the life of the offset to mitigate the impacts of wildfire
	Fragmentation of habitat and reduced greater glider tree recruitment as a result of thinning, fire and livestock grazing (cattle and horses)	Removal of livestock, removal of thinning practices from landholders and fire management.
	Barbwire fence entanglement risk	Removal of internal fencing
Koala (<i>Phascolarctos cinereus</i>)	Inappropriate fire regimes and the risk of increased fuel loads	Establish fire break network and ecological burn program over the life of the offset
	Impacts to important koala climate refugia habitat (e.g. riparian corridors, canopy cover and EDL recruitment)	Fire management across the site, protecting vegetation (from livestock, fire and edge effects) to increase

5.6.1 Bushfire Management

An active bushfire management regime will be undertaken across the Property to manage fuel loads in the Offset Area and reduce the risk of unplanned wildfire. A bushfire management plan will be developed for the Property and will include details on fire preparedness, fire break network and an ecological burn program.

5.6.2 Livestock Management and Fencing

There will be no livestock in the Offset Area for the duration of this OAMP. The Offset Area is fenced off from adjacent properties and this fencing will be maintained to ensure neighbouring livestock remain excluded from the offset. This exclusion will help to reduce habitat degradation and allow recruitment and plant species richness to reach maturity.

All internal fences, specifically barbed wire, will be removed from the Offset Area. Barbed wire fences present a fauna entanglement risk, especially for greater gliders (DCCEEW, 2022b) and impede fauna movement across the site. Indicative fences to be removed are provided in Figure 16 (note all fences still being mapped). Removal of all internal fences will eliminate the risk of fauna entanglement in the Offset Area.

5.6.3 Nestbox Program

Current data in the Offset Area showed evidence of a shortage of natural hollows and large trees, in the interim as the vegetation matures a nestbox program is proposed to attract greater gliders and south-eastern glossy black cockatoos that are known to be in the vicinity of the protected Offset Area. Nestboxes will be tailored to each species and positioned in the Offset Area of mapped habitat including adjacent areas to allow connectivity to areas of known populations. Different nestboxes will be used for different species, with species specific design and dimensions (Table 15). The rear entry greater glider nestbox (for example, the ones designed and made by Hollow Log Homes) has been tested in the field and has been shown to be used by greater gliders (with first photographic evidence captured by Ausecology in 2015/2016). Nestboxes for south-eastern glossy black cockatoo proposed are known as “Cockatubes” (Trademark Landcare SJ Inc.) or similar with larger dimensions and characteristics of large open hollows.

Table 15 – Nestbox program targets

Species	Habitat	Type of box	Current hollows	Nestboxes
Greater Glider	11.3.25, 11.3.4, 11.5.20, 11.3.2		Areas of 11.3.25 were found to have <2 hollows per ha all other areas were absent of hollows	>25 at >6 m above the ground.

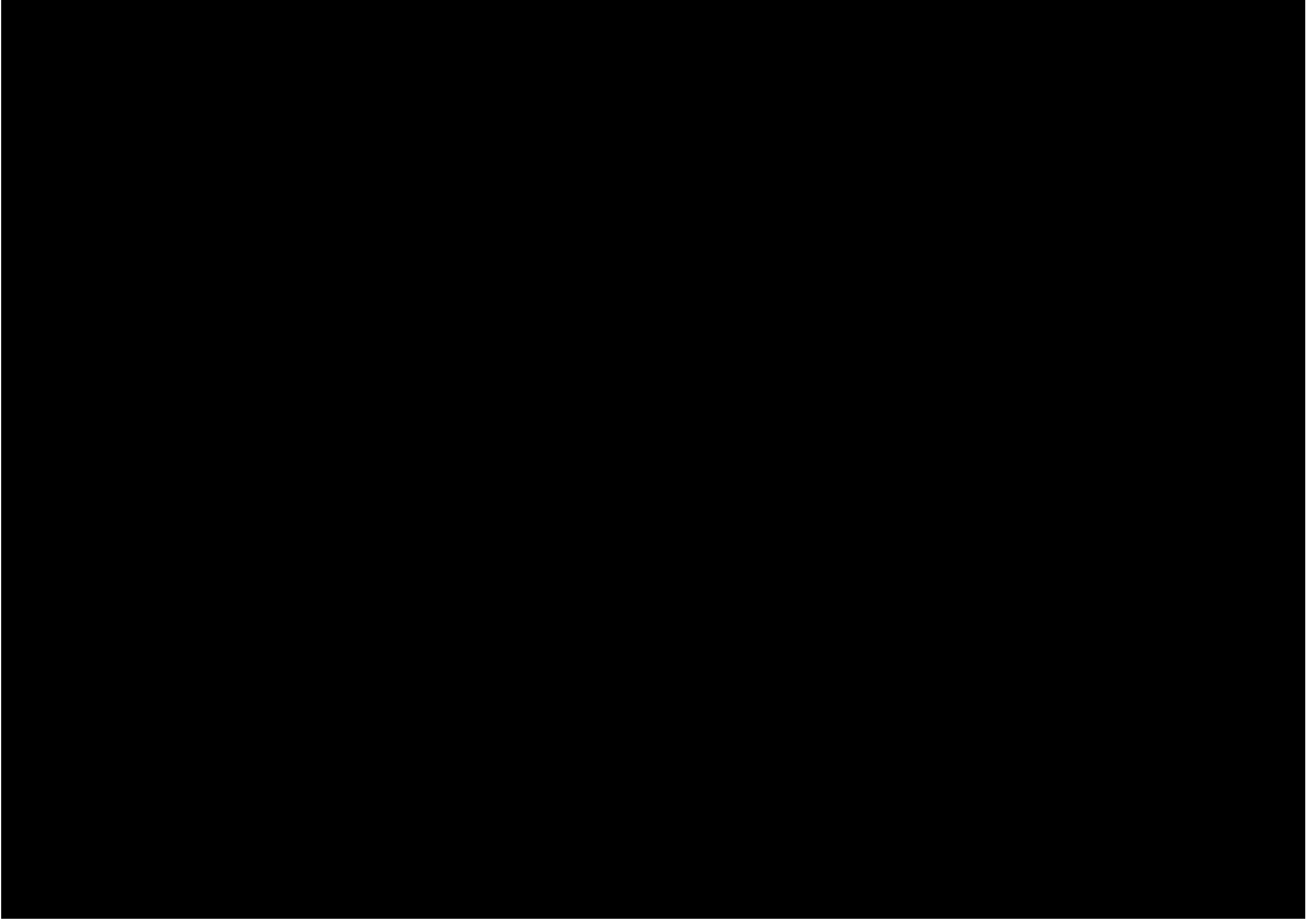
Species	Habitat	Type of box	Current hollows	Nestboxes
South-eastern glossy black cockatoo	11.3.25, 11.3.27b, 11.3.4, 11.5.21, 11.5.20, 11.5.4		No suitable hollows or stags present	>20 in close proximity to each other at >10m above the ground in >45 degree angle

For the nestbox monitoring a non-invasive technique using a pole mounted camera with direct bluetooth to a mobile device will be used for greater glider (Figure 16). This will only briefly expose the animals in the nestboxes to disturbance and is safer for operators. Monitoring for south-eastern glossy-back cockatoos will be undertaken during the breeding season from the ground with binoculars at dusk or dawn. Drones will also be used to assist with monitoring in the event trials of this technique are successful. Nestbox monitoring will be conducted biannually for the first five years, and annually thereafter, with damaged nestboxes reported and replaced.

In the event that nestboxes are reported to be damaged or not utilised, corrective actions will be implemented as detailed in Table 17.



Figure 15 – Example monitoring technique (Ausecology 2015)



5.6.4 Pest Fauna Management

Within the Property, European rabbits (*Oryctolagus cuniculus*) were detected during surveys and pose a threat to the south-eastern glossy black cockatoo. Proposed interim performance targets and completion criteria are presented in Table 16. Monitoring methodologies are provided in Section 8.2.

The first 12 months of monitoring will largely be targeted toward derivation of baseline abundance of pest fauna species. The specific management program, including treatment and frequencies, will be designed following this baseline monitoring and will be detailed in the Pest fauna management plan.

Table 16 – Pest fauna species detected within the Property

Pest fauna	Baseline Performance Target (Year 0)	Interim Performance Target (Year 5)	Interim Performance Target (Year 10)	Interim Performance Target (Year 15)	Completion Criteria (Year 20)	Justification
European rabbit (<i>Oryctolagus cuniculus</i>)	Conduct pest fauna monitoring to determine baseline abundance.	≥25% reduction in the pest fauna baseline population.	≥50% reduction in the pest fauna baseline population.	≥75% reduction in the pest fauna baseline population.	100% reduction in the pest fauna baseline population.	Following baseline monitoring and derivation of an estimated population, a pest fauna management plan designed to eradicate the European rabbit population over 20 years will be created. Every five years, comprehensive pest fauna monitoring will be conducted (refer to Section 8.2) to establish an updated population estimate in which to monitor compliance with the interim targets and further adjust the pest fauna program should it be required.

5.6.5 Weed Management

The Property has a very small proportion of weeds (<5%) and currently contains three restricted species (*Bryophyllum delagoense*, *Opuntia stricta* and *Opuntia tomentosa*) listed under the *Biosecurity Act 2014* (Qld), two of which are also Weeds of National Significance (**WoNS**) (*O. stricta* and *O. tomentosa*). Non-native plant cover across all BioCondition sites scored an average of 8.87/10, indicating low weed presence.

Weeds are not explicitly noted as a threat to any offset MNES. As such, weed management is still proposed as a general biosecurity obligation to take all reasonable and practical measures to prevent or minimise the biosecurity risk. Weeds will be managed in accordance with the control measures outlined in the Biosecurity Queensland Fact Sheets for the relevant weed species (as necessary), and not managed under this OAMP.

5.7 Adaptive Management

This OAMP is based on adaptive management principles (Figure 17). Adaptive management involves implementation of management actions in such a way that enables evaluation against performance objectives and allows for adjustment if required. Key components of adaptive management are clear, measurable objectives, frequent monitoring rounds and the ability to adjust management actions based upon additional information.

Once implemented, management actions are to be followed by monitoring rounds in accordance with this OAMP. Results are compared to previous results and previously outlined performance criteria. If the performance criteria have not been met, corrective actions are implemented (refer to Table 17), with this OAMP updated accordingly. These updates are then reassessed during the next monitoring period, and further remedied if the performance criteria are not achieved. If it's found that the performance criteria have been met, management will continue as outlined within this OAMP.

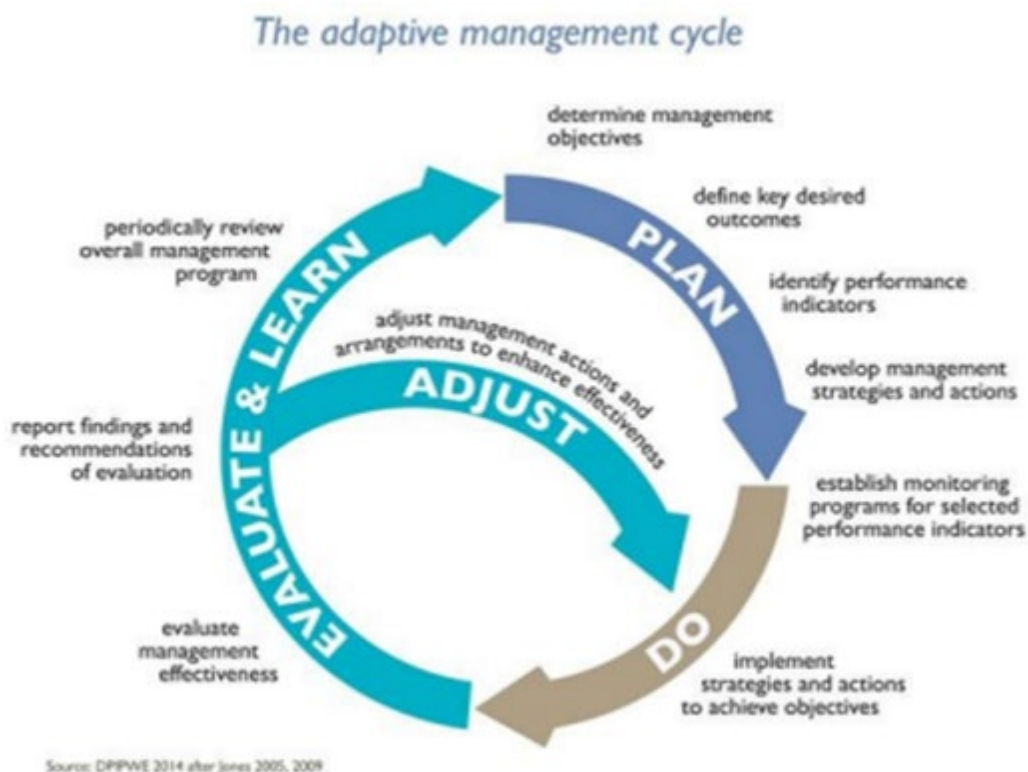


Figure 17 – The adaptive management cycle with iterative adjustments to implementation (DPIPW; Jones 2005, 2009)

Table 17 Management action, monitoring schedule and proposed corrective actions

Objective	Management action	Monitoring Methodology, Frequency, Responsible Party and Reporting Requirements	Trigger for corrective action	Corrective action/s	Completion criteria
Bushfire management	No evidence of unplanned and uncontrolled fire in the offset area.	Monitoring of this management action will be undertaken biannually and any evidence of wildfire, prohibited burning or Force Majeure events will be documented. Details about any bushfire management conducted will be included in the annual report.	Uncontrolled bushfire is detected within the offset area.	<ul style="list-style-type: none"> Complete an investigation within one month to determine the cause of the bushfire and extent of damage to the offset area. Reassess and implement new access protocols for any lessees etc., signage and general access. Review the current bushfire management measures to identify any areas for improvement. Subsequent to any occurrence of uncontrolled bushfire in the offset area: <ol style="list-style-type: none"> inspect and repair, and widen if necessary, all firebreaks; and reassess fuel load reduction practices. 	Bushfire management incorporated in property plan and appropriate ecological burn regime are implemented for the duration of the offset.
	Fuel loads within the offset area are being effectively managed and remain low.	Annual rapid condition assessments will note general fuel loads throughout the offset area to be reported upon in the annual report. BioCondition monitoring every five years will note fuel loads at individual monitoring sites with details provided in the five-yearly report.	Excessive fuel loads are reported during rapid condition assessments or BioCondition monitoring	<ul style="list-style-type: none"> Review the current bushfire management measures and consider: <ul style="list-style-type: none"> Review the ecological burn program for the offset area; Utilising controlled low intensity burns more frequently to help manage fuel loads; and Increasing the frequency of monitoring to capture increased fuel loads earlier. 	Bushfire management incorporated in property plan and appropriate ecological burn regime are implemented for the duration of the offset.
	Firebreaks and access tracks throughout the offset area have been maintained.	Annual operational monitoring to inspect the condition of firebreaks, fence lines and access tracks. Additional fence inspections to be conducted twice a year with maintenance conducted as required. Condition of access tracks should be noted and reported upon if any issues are noted at any time. Details of firebreak, fence line and access track condition and maintenance will be detailed in the annual report.	Firebreaks, fence lines and access tracks have become degraded or ineffective.	<ul style="list-style-type: none"> Engage a contractor to repair/maintain firebreaks, fence lines and access tracks. Reassess and implement new maintenance procedures if required. Review the current bushfire management measures to identify any areas for improvement. 	Bushfire management incorporated in property plan and firebreaks and access tracks are in operational condition for the life of the offset.
Livestock management and fencing	All livestock to be removed from within the offset area at the commencement and for the duration of this OAMP.	Removal of all livestock from the offset area at the commencement of the OAMP. Operational monitoring will note livestock presence or evidence of livestock presence to be reported upon in the annual report. Additional opportunistic sightings will be reported at any time.	Livestock or evidence of livestock detected within the offset area.	<ul style="list-style-type: none"> All livestock to be removed from the offset area. An investigation will be completed to determine how the livestock gained access to the offset area and the extent of damage caused. A contractor will be engaged to repair fences (if applicable) and ensure livestock remain excluded. 	Livestock are excluded from the offset area for the duration of the offset.
	Remove all internal barbed wire fencing from the offset area within the first year.	All internal barbed wire fences are to be removed within the first year of the offset area. Biannual fencing inspections will be conducted with details reported in the annual report. Opportunistic sightings of fauna entanglement to be reported at any time.	Fauna entanglement in internal / boundary barbed wire fences.	<ul style="list-style-type: none"> An investigation will be conducted to determine if fencing can be removed or replaced with single strand. 	No fauna injuries or death to be caused by entanglement from internal barbed wire fencing.
Nestbox program	Nestboxes to be implemented for use by greater gliders and glossy black cockatoos.	Nestbox monitoring as per Section 5.6.3 will be conducted biannually for the first five years and annually thereafter. Maintenance will be conducted as per manufacturer's instructions. Results of the nestbox program will be detailed in the annual report.	There is no evidence of nestboxes being utilised.	<ul style="list-style-type: none"> Within five years of the nestbox program commencing, if no evidence of use is recorded the following will be changed: <ul style="list-style-type: none"> Location of the nestbox, including specific tree and tree species Within 10 years of the nestbox program commencing, if no evidence of use is recorded, the following will be changed: <ul style="list-style-type: none"> Location of the nestbox; 	Nestboxes to provide habitat for greater glider and glossy black cockatoo in lieu of suitable hollow-bearing trees.

Objective	Management action	Monitoring Methodology, Frequency, Responsible Party and Reporting Requirements	Trigger for corrective action	Corrective action/s	Completion criteria
		Additional opportunistic sightings of nestbox use will be reported at any time.		<ul style="list-style-type: none"> Design of the nestbox; and Increase nestbox monitoring to quarterly. 	
	Nestboxes to be maintained in good condition.	Biannual monitoring program for first five years and annual monitoring will detail the condition of nestboxes Additional opportunistic sightings will be reported at any time.	Nestboxes are damaged.	<ul style="list-style-type: none"> Immediately scope the nestbox location to determine the cause of the damage; Replace/repair the nestbox. If it is determined that the current location is likely to result in further damage, then the box is to be relocated to a new location. 	Nestboxes to provide habitat for greater glider and glossy black cockatoo in lieu of suitable hollow-bearing trees.
Pest fauna management	Pest fauna populations within the offset area to be reduced	Random Encounter Model (REM) and targeted camera trapping to be conducted twice a year, between Jan-Mar and Sept-Nov, in the first year, followed by once every five years thereafter. Results will be detailed in the initial annual report and in the five-yearly report thereafter. Refer to Section 8.2 for more details. BioCondition monitoring results and habitat quality scoring results Additional opportunistic sightings will be reported at any time.	Browsing of recruiting species for matters.	<ul style="list-style-type: none"> Review the pest management procedures in place to determine if they are still considered to be effective. Additional and/or different management actions will be implemented (e.g. different traps/baits, increased traps/baits). If impacts from the pest animal populations have not naturally remediated over time after completion of implementation of the control measures, additional works may be required to remediate those impacts (e.g. planting or seeding of species). 	Regrowth recruitment of key species surviving to maturity (beyond point where they can be impacted by browsing).

6 OAMP Timing and Implementation

The Offset Area will be managed until all completion criteria have been achieved. It is anticipated that the completion criteria will be achieved within the proposed 20-year management period. In the event that completion criteria have not been achieved, management and monitoring will continue beyond the 20-year period, in accordance with this OAMP, until all completion criteria have been achieved.

7 Risk Assessment

Relevant risks to the Offset Area were identified and assessed based on current scientific literature. This included the assessment of the likelihood and consequence of each identified risk (Table 18 and Table 19).

Table 18 – Risk Matrix

RISK MATRIX	
Qualitative measure of likelihood – how likely is it that this event will occur after management activities are implemented	
Rare	May occur in exceptional circumstances
Unlikely	Could occur but considered unlikely or doubtful
Possible	Might occur during the life of the project
Likely	Will probably occur during the life of the project
Highly likely	Is expected to occur in most circumstances
Qualitative measure of consequences – what will be the consequence if the issue does occur	
Minor	Minor incident of environmental damage that can be reversed (<i>e.g. short-term delays to achieving plan objectives, implementing low-cost, well-characterised corrective actions</i>)
Moderate	Isolated but substantial instances of environmental damage that could be reversed with intensive efforts (<i>e.g. short term delays to achieving plan objectives, implementing well-characterised, high-cost/effort corrective actions</i>)
High	Substantial instances of environmental damage that could be reversed with intensive efforts (<i>e.g. medium-long term delays to achieving objectives, implementing uncertain, high-cost/effort corrective actions</i>)
Major	Major loss of environmental amenity and real danger of continuing (<i>e.g. plan objectives are unlikely to be achieved, with significant legislative, technical, ecological and/or administrative barriers to attainment that have no evidenced mitigation strategies</i>)
Critical	Severe widespread loss of environmental amenity and irrecoverable environmental damage (<i>e.g. plan objectives are unable to be achieved, with no evidenced mitigation strategies</i>)

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

Table 19 – Risk Assessment

Risk	Threats	Initial Risk Rating			Management measures / actions	Residual Risk Rating		
		L	C	R		L	C	R
Mining within the offset site	Mining has the potential to result in the full clearing of the offset site.	Rare	Critical	High	<ul style="list-style-type: none"> Currently, no mining/exploration permits cover the Property. Currently, there is no legal mechanism that will render mining impossible to occur on the offset site. Legally securing the Property as an offset site will however greatly increase any offset obligations if the offset site were impacted upon. Following procurement, site will be legally recognised as an offset site via VDec under the VM Act. 	Rare	Critical	High
Drought	<ul style="list-style-type: none"> Increase in the likelihood of unplanned and uncontrolled fire. Reduced growth levels of native species flora growth. Increased risk of native flora dieback. Increased risk of threatened fauna mortality due to reduced moisture levels in surrounding environment. Increase in bare ground, and therefore increase in ability of invasive species to capitalise after rainfall event. 	Likely	Moderate	Medium	<ul style="list-style-type: none"> Fire network management. Fire regimes as per RE guidelines. Increased native flora health via; removal of livestock (cattle and horses) and pest fauna (rabbit) management. 	Likely	Moderate	Medium
Flooding	<ul style="list-style-type: none"> Damage to infrastructure; fencing, gates, signage and access tracks. Spread of non-native weed material. 	Possible	High	Medium	<ul style="list-style-type: none"> Within one year, all internal fencing is to be removed and construction of access tracks and fencing will not be undertaken in proximity to creek lines. Within one month following a flood event, an inspection will be undertaken to determine extent of, and budget allocation for, repairs to infrastructure. Ongoing maintenance and promotion of riparian vegetation to reduce erosion of waterways and flooding impacts. Following flooding, frequent site inspections to monitor potential spread of non-native flora material. Within one year, removal of grazing will be undertaken to ensure good ground cover and limit the ability of non-natives to encroach on native pasture areas. 	Possible	Moderate	Medium

Risk	Threats	Initial Risk Rating			Management measures / actions	Residual Risk Rating		
		L	C	R		L	C	R
Timber harvesting	<ul style="list-style-type: none"> Timber harvesting within the adjacent forestry lease. Loss of habitat and species in surrounding area. Deaths of protected matters. Access through Offset Area (increased disturbance, dust, noise and new access tracks). 	Unlikely	Major	High	<ul style="list-style-type: none"> Installation within six months and ongoing maintenance and management of Property boundary fence. Engagement with the state government and forestry contractors to avoid areas of known greater glider and koala habitat in the forestry lease area. Within one month, all signage and locks on gates at all Property entry points will be installed. Signage identifying the Offset Area as an environmental offset and "no unauthorised access signs at entrance" to be installed within one month. Installation of monitoring camera at entrance within one month. 	Rare	High	Low
Land clearing	<ul style="list-style-type: none"> Land clearing within the Offset Area. 	Highly likely	Critical	Severe	<ul style="list-style-type: none"> Purchase of entire Property by Senex grants legal protection. Installation within six months and ongoing maintenance and management of Property boundary fence. Within one month, all signage and locks on gates at all Property entry points will be installed. Signage identifying the Offset Area as an environmental offset and "no unauthorised access signs at entrance" to be installed within one month. All clearing activities (e.g. access tracks, fire break network) to be approved ARCP P/L. Clear instructions and boundaries to be provided to clearing contractor. 	Rare	Critical	High
Unplanned and/or uncontrolled fire in Offset Area	<ul style="list-style-type: none"> Loss of native vegetation; canopy cover, ground cover, coarse woody debris etc. Loss of habitat suitability; loss of feed trees, loss of suitable hollow bearing trees. Damage to infrastructure; fencing, gates etc. Threatened fauna mortality. Spread into adjacent vegetation, outside of the Offset Area. 	Likely	Critical	Severe	<ul style="list-style-type: none"> Implement fire break network throughout the Property. Implement appropriate fire regimes as per RE guidelines. Ecological burns. 	Possible	High	Medium

Risk	Threats	Initial Risk Rating			Management measures / actions	Residual Risk Rating		
		L	C	R		L	C	R
Additional pest fauna species introduced into Offset Area	<ul style="list-style-type: none"> Potential significant deterioration in habitat values of the offset site. Potential for increased threats to MNES. 	Unlikely	Major	High	<ul style="list-style-type: none"> Targeted and incidental pest fauna monitoring and management to be conducted throughout lifetime of the offset. Should additional pest fauna be detected in the offset area, investigate the pathway and manage accordingly within one month of detection. Pest fauna management plan to control pests. 	Possible	High	Medium
Increased population of pest fauna within Offset Area	<ul style="list-style-type: none"> Potential significant deterioration in habitat values of the offset site. Increased threats to MNES. 	Likely	High	High	<ul style="list-style-type: none"> Targeted and incidental pest fauna monitoring and management to be conducted throughout lifetime of the offset. Should an increase in pest fauna abundance be detected, investigate reasons and manage accordingly within one month of detection. Pest fauna management plan. 	Unlikely	High	Medium
Livestock grazing in the Property and/or Offset Area	<ul style="list-style-type: none"> Loss of native vegetation; shrub cover, ground cover, flora species richness etc. Loss of regenerating flora. 	Highly likely	Major	Severe	<ul style="list-style-type: none"> Complete removal of livestock from Offset Area at the commencement of the OAMP. Installation within six months and ongoing maintenance and management of Property boundary fence. Twice yearly boundary fence quality inspection and maintenance as required. Annual camera trap monitoring period. 	Unlikely	Moderate	Low

Risk	Threats	Initial Risk Rating			Management measures / actions	Residual Risk Rating		
		L	C	R		L	C	R
Offset fails to achieve the interim performance targets and/or completion criteria within outline timeframes	<ul style="list-style-type: none"> Failure to achieve the interim performance criteria and/or completion criteria within the 5, 10, 15 and/or 20-year time intervals. Interim performance criteria and/or completion criteria initially achieved but declines. 	Likely	Major	High	<ul style="list-style-type: none"> Implement OAMP management and monitoring actions. Within one month of detecting a failure, undertake an investigation into the reasons why the interim performance targets or the completion criteria were not achieved within the specified timeframes. This investigation must reevaluate the suitability of the relevant management actions and identify appropriate corrective actions, which may include but not be limited to: <ul style="list-style-type: none"> increasing the frequency and/or intensity of existing management measures modifying the methodology of existing management measures implementing additional management measures (e.g. direct enrichment planting). Within six months of detecting a failure, an appropriate corrective action will be selected, approved and implemented (refer to Table 17 for potential corrective actions). Within six months of detecting a failure, a review of all current management and corrective actions will be undertaken to ensure they remain suitable for their intended purpose and are capable of correcting the failure. Upon completion, the revised OAMP will be submitted to DCCEW for approval. 	Rare	Major	Medium

Risk	Threats	Initial Risk Rating			Management measures / actions	Residual Risk Rating		
		L	C	R		L	C	R
Offset completion criteria are achieved but then decline before the end of the approval	<ul style="list-style-type: none"> Severe weather or other extreme event. Climate change impacts. 	Possible	Major	High	<ul style="list-style-type: none"> Implement OAMP management and monitoring actions. Within one month of detecting a decline, undertake an investigation into the reasons why the interim performance targets or the completion criteria have declined within the specified timeframes. This investigation must reevaluate the suitability of the relevant management actions and identify appropriate corrective actions, which may include but not be limited to: <ul style="list-style-type: none"> increasing the frequency and/or intensity of existing management measures modifying the methodology of existing management measures implementing additional management measures (e.g. direct enrichment planting). Within six months of detecting a decline, an appropriate corrective action will be selected, approved and implemented (refer to Table 17 for potential corrective actions). Within six months of detecting a decline, a review of all current management and corrective actions will be undertaken to ensure they remain suitable for their intended purpose and are capable of correcting the decline. Upon completion, the revised OAMP will be submitted to DCCEW for approval. 	Possible	Moderate	Medium

8 Monitoring and Baseline Surveys

Accurate baseline information is required to plan and compare future management actions and results. If time is not spent gathering accurate and detailed baseline information, the true impact of management actions will not be measurable. As outlined in Table 13 and Table 20, baseline information is required.

8.1 BioCondition and Habitat Quality Scoring

HQS methodology utilised within this OAMP reflects that utilised as part of the impact assessment (refer to the EAR).

A HQS out of 10 is produced from the site condition, site context and species stocking rate for each MNES as described within the GDTHQ and as measured on the impact site (refer to the EAR). Site Assessment Units (**AUs**) were based upon ground-truthed REs (Nelder et al., 2022; Qld Herbarium, 2023) and condition. RE condition was broken down into four categories:

- Non-remnant:
 - Non-remnant: cleared paddock, sparse scatterings of woody vegetation (shrubs and/or trees); and
 - Non-remnant – regrowth: increased levels of woody vegetation (shrubs and/or trees).
- Remnant:
 - Remnant – disturbed: Meets remnant status (Nelder et al., 2022), however, evidently has been impacted upon in the past e.g. lack of large trees; and
 - Remnant: Meets remnant status (Nelder et al., 2022), large trees present, not evidently recently impacted upon.

8.2 Pest Fauna Monitoring

A comprehensive pest monitoring program that allows for population density estimation of pest species populations will be implemented. Monitoring of pest fauna within the Property will utilise the Random Encounter Model (**REM**) or activity index dependent on statistical analysis. These models enable the estimation of population density without the need for individual recognition (Rowcliffe et al., 2008; Palencia et al., 2022; Palencia et al., 2021; European Observatory of Wildlife, 2022). In brief, the REM methodology to be applied on the Property will involve:

- Approximately 1 km grid spacing overlaid over the Offset Area – grid spacing will be reduced until ≥ 40 grid references overlay the study area.
- Camera traps are to be deployed at each grid reference location, resulting in 40 camera traps deployed.
 - Cameras final deployment location can vary within 100 m of the predetermined 1 km grid location – allowing for the repositioning of cameras if extremely undesirable conditions are present.
- Cameras are to be deployed on trees or star pickets, at the height of 0.5 m.
 - Permanently installed star pickets are preferred as they will allow for the redeployment of cameras in identical locations for follow up studies.
- All cameras will be deployed facing the same direction, i.e., north or south to avoid direct sunlight, and have identical capture settings; e.g. trigger sensitivity, burst length etc.
- Vegetation in front of the cameras will be trimmed to reduce the number of false triggers and

maximise animal detectability.

- Cameras remain deployed for 1 month.
- Cameras will be deployed twice a year Sept-Nov and Jan-March, allowing for seasonality changes.
- REM based cameras will not be baited.
- Data will then be analysed to estimate the population density (D) following analysis methodology outlined within Rowcliffe et al. (2008), Palencia et al. (2022) and Palencia et al. (2021), utilising the REM equation of:

$$D = \frac{y}{t} \cdot \frac{\pi}{v \cdot r \cdot (2 + \theta)}$$

Where:

Y = number of encounters;

t = survey effort;

v = day range;

r = radius of camera detection zone; and

Θ = angle of camera detection zone.

In addition to the systematic camera traps, separate targeted camera traps may be installed in key locations where there is anticipated increased native and pest fauna activity i.e., permanent water sources which may assist in determining and monitoring pest management locations. Sites will be determined based on the systemic camera trap results and where ground data shows increased pest activity or damage. It should be noted that the remote location of the site or weather events could restrict the ability to deploy extra camera traps. It is important that targeted camera traps are placed only in areas of perennial interest, so that changes in detection over time can be attributed to change in species abundance, rather than change in site conditions i.e. ephemeral pond drying up compared to a permanent dam that holds water year-in year-out.

Cameras will be installed at approximately 1.5 m above ground level, secured to a suitable tree (or star picket if no trees available) and angled to ensure the bait tube is within frame, no more than 3 m away from the camera. Bait tubes are to be constructed utilising PVC piping (approximately 10 cm long x 5 cm diameter) and baited with sardines and a mixture of peanut butter, oats, honey and vanilla essence. Cameras are to be set to continuous detection day and night, and when triggered set to take a burst of three photos, with five second delay between photos and no rest period between bursts.

Installation of motion sensitive cameras will be positioned at key sites where target pest fauna might be expected to pass by or use the area for foraging, watering, emerging from shelter or traversing the site. Cameras set to continuous detection day and night, high passive infrared sensitivity and three captures per motion trigger so as to provide a series of photos to aid identification of each animal.

8.3 Monitoring Requirements

Monitoring results will highlight and inform required changes to management actions, with results compared to those from previous monitoring events. Monitoring results will be the primary measure of performance targets and completion criteria satisfaction.

All monitoring actions will be based on current scientific literature and techniques, including but not limited to:

- *Survey guidelines for Australia's threatened mammals* (SEWPaC, 2011);
- *Guide to Determining Terrestrial Habitat Quality (Version 1.2)* (DEHP, 2017);

- *BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland. Version 2.2* (Eyre et al., 2015);
- *Conservation Advice for Calyptorhynchus lathami lathami (South-eastern Glossy Black Cockatoo)* (DAWE, 2022);
- *Conservation Advice for Petauroides volans (greater glider (southern and central))* (DAWE, 2022);
- *Conservation Advice for Phascolarctos cinereus (Koala) combined populations of Queensland, New South Wales and the Australian Capital Territory* (DAWE, 2022);
- *Hourigan, C. 2012. Glossy black-cockatoo, Calyptorhynchus lathami. Targeted species survey guidelines. Queensland Herbarium, Department of Environment and Science, Brisbane; and*
- *Guide to greater glider habitat in Queensland* (DES 2022).

The monitoring schedule is outlined in Table 20.

Table 20 – Management action and monitoring schedule

Management action		Timing	Reporting
Biosecurity Management	Installation of signage and locks at all site entry points	One off, start of project	Annual report
Fire management	Installation of fire management lines	Installation first year, 2 x a year monitoring, maintenance as required.	Annual report
	Fire management line inspection and maintenance		
	Fire fuel load assessments (Hines et al., 2010)	2 x a year	Annual report
	Ecological burns and post-burn assessment and reporting	In line with RE guidelines (REDD, 2023).	Annual report
Grazing management	Removal of all livestock from Offset Area (cattle and horses)	Upon commencement of the OAMP	Annual report
Fencing	Fence audits, inspections and maintenance	Installation and removal first year, inspections 2 x a year, maintenance as required.	Annual report
Access tracks	<ul style="list-style-type: none"> Development of internal and external access track plan Grading and maintenance of access tracks 	Installation first year, annual and opportunistic inspections and maintenance	Annual report
Pest fauna monitoring	<ul style="list-style-type: none"> Random Encounter Model (REM) and targeted camera traps Camera trapping database Opportunistic observations 	First year; Baseline survey (2 x a year; Jan – March and Sept – Nov) and then repeated every five years (year 5, 10, 15 and 20)	Annual report
Daily Work Reports	<ul style="list-style-type: none"> Used to capture operation data including: Health and safety aspects Hours of work and personnel Works conducted including photos and chemical application records 	Daily during operational visits (minimum occurrence: first year; 2 x a year (Jan – March and Sept – Nov). Then once every four years (2 x a year; Jan – March and Sept – Nov)).	Daily, submitted by contractors
Operational reporting	Site inspection and/or maintenance items e.g. fence audit, fire break networks, weed treatment etc.	Annual	Annual report
Rapid Condition Assessments	<ul style="list-style-type: none"> Monitoring general vegetation condition and structure; strata heights, strata cover, species richness Photo monitoring Weed cover Presence/absence of pest fauna 	Annual	Annual report

Management action		Timing	Reporting
Habitat Quality Monitoring reporting	As per the <i>Guide to Determining Terrestrial Habitat Quality v1.2</i> (GDHTQ) (DEHP 2017)	Year 0 (baseline), 5, 10, 15, 20	5-Yearly report

9 Updating the OAMP

As more information becomes available during ongoing performance monitoring, the management and monitoring regime will be reviewed and revised to maximise the likelihood of attaining and maintaining the outcomes to be achieved by implementing this OAMP. In addition, this OAMP will be updated in accordance with the principles of adaptive management, as required, to incorporate any changes identified through management activities, site visits and monitoring activities. This may include updating of current management actions (e.g. quantity, frequency, area), identification of additional management actions, identification of additional monitoring actions and responses to adaptive management triggers.

Any proposed updates to this OAMP will proceed subject to any relevant scrutiny and approval as well as stakeholder consultation. Any updates to this OAMP which do not result in a material change to the environmental outcomes, performance and completion criteria will be made by ARCP P/L without the requirement of informing DCCEEW as allowed by the conditions of any approval for the Project. If material amendments are likely to alter the environmental outcomes, or performance and completion criteria are proposed to this OAMP, the amendments and justification for the proposed measures will be submitted to DCCEEW for review and approval.

10 References

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Appendix A – Offset Assessment Guide calculations

Appendix B – Fire guidelines

Regional Ecosystems confirmed on the Property and associated fire guidelines (Queensland Herbarium, 2023)

BVG (1M)	RE	RE Short Description	Season	Intensity	Interval	Strategy	Issues
10a	11.7.6	<i>Corymbia citriodora</i> or <i>Eucalyptus crebra</i> woodland on Cainozoic lateritic duricrust	Late wet to early dry season when there is good soil moisture. Early storm season or after good spring rains.	Moderate to high	6-10 years	Burn less than 10-30% in any year. Burn surrounding vegetation under conditions of good soil moisture and when plants are actively growing throughout the year so that wildfires will be very limited in extent. Fire exclusion not necessary.	Best protection from wildfires is probably the creation of a multi-aged mosaic in surrounding vegetation and perimeter burning. Planned burns have traditionally been carried out in the winter dry season; further research required.
12a	11.7.4	<i>Eucalyptus decorticans</i> and/or <i>Eucalyptus</i> spp., <i>Corymbia</i> spp., <i>Acacia</i> spp., <i>Lysicarpus angustifolius</i> woodland on Cainozoic lateritic duricrust	No information provided	No information provided	Fire return interval not relevant	Manage surrounding country. Burn surrounding country only under conditions of good soil moisture and when plants are actively growing. Will be difficult to burn owing to a lack of ground fuel that normally occurs in this RE.	No information provided
12a	11.7.7	<i>Eucalyptus fibrosa</i> subsp. <i>nubilis</i> +/- <i>Corymbia</i> spp. +/- <i>Eucalyptus</i> spp. woodland on Cainozoic lateritic duricrust	Late wet to early dry season when there is good soil moisture. Early storm season or after good spring rains.	Moderate to high	6-10 years	Burn less than 10-30% in any year. Burn surrounding vegetation under conditions of good soil moisture and when plants are actively growing throughout the year so that wildfires will be very limited in extent. Fire exclusion not necessary.	Best protection from wildfires is probably the creation of a multi-aged mosaic in surrounding vegetation and perimeter burning. Planned burns have traditionally been carried out in the winter dry season; further research required.

BVG (1M)	RE	RE Short Description	Season	Intensity	Interval	Strategy	Issues
13d	11.3.26	<i>Eucalyptus moluccana</i> or <i>E. microcarpa</i> woodland to open forest on margins of alluvial plains	No information provided	No information provided	Fire return interval not relevant	Fire management required only sometimes as there is often nothing to burn (even in the absence of cattle stock).	Grass will become established if trees have been poisoned/pelleted but typically there is no grass available as fuel.
13d	11.5.20	<i>Eucalyptus moluccana</i> and/or <i>E. microcarpa</i> and/or <i>E. woollsiana</i> +/- <i>E. crebra</i> woodland on Cainozoic sand plains	Late wet to early dry season when there is good soil moisture. Early storm season or after good spring rains.	Various	6-15 years	Burn less than 30% in any year. Burn under conditions of good soil moisture and when plants are actively growing. All shrubby areas will carry fire after a good season.	Management of this fire tolerant vegetation type should be based on maintaining vegetation composition, structural diversity, animal habitats and preventing extensive wildfire. Maintaining a fire mosaic will ensure protection of habitat and mitigate against wildfires. Planned burns have traditionally been carried out in the winter dry season; further research required.
16a	11.3.25	<i>Eucalyptus tereticornis</i> or <i>E. camaldulensis</i> woodland fringing drainage lines	Primarily early dry season.	Low	3 - 5 years	Protection relies on broad-scale management of surrounding country with numerous small fires throughout the year so that wildfires will be very limited in extent. c-g: Depending on position in the landscape, protection depends on broad-scale management of surrounding country, with numerous small fires throughout the year so that wildfires will be very limited in extent.	Fringing communities are critical habitat. In some situations, it may be best not to burn. Intense and extensive fires degrade vegetation structure and destroy fauna habitats. Restrict the extent and intensity of fires. Hollow trees are critical habitat. Green panic may be an issue and an intensive grazing regime for very short periods, may be necessary to limit potential of wildfire. e.g: If burning is to occur then implement when water level is deep enough to protect the bases of aquatic plants. Sedges are disadvantaged by repeated fires. Impact of fire on rare and threatened plants associated with mound springs that include <i>Arthraxon hispidus</i> and <i>Dimeria</i> sp. (Salvator Rosa R.J.Fensham RJF3643) should be considered. Boggomosses/springs can bounce back following fire but care should be taken where a dry peat layer has developed (particularly in degraded situations). Fire is an option for control of weeds (possibly in ungrazed situations). If riparian areas need to be burnt to reduce fuel loads then burning should occur when there is good soil moisture and active growth.

BVG (1M)	RE	RE Short Description	Season	Intensity	Interval	Strategy	Issues
16c	11.3.4	<i>Eucalyptus tereticornis</i> and/or <i>Eucalyptus</i> spp. woodland on alluvial plains	Late wet to early dry season when there is good soil moisture. Early storm season or after good spring rains.	Low to moderate	6-10 years (shorter in north of bioregion: 2 - 7 years)	Restrict to less than 30% in any year. Burn under conditions of good soil moisture and when plants are actively growing. Sometimes a small amount of wind may move the fire front quickly so that burn intensity is not too severe to destroy habitat trees.	Burn interval for conservation purposes will differ from that for grazing purposes; the latter being much shorter. Management of this vegetation type should be based on maintaining vegetation composition, structural diversity, fauna habitats (in particular hollow-bearing trees and logs) and preventing extensive wildfire. Maintaining a fire mosaic will help ensure protection of habitat and mitigate against wildfires. Fire can control shrub invasives (e.g., <i>Eremophila</i> spp. and <i>A. stenophylla</i> in the red soil country in particular). Fire will also control cypress. Low to moderate intensity burns with good soil moisture are necessary to minimise loss of hollow trees. Avoid burning riparian communities as these can be critical habitat for some species. Culturally significant (scar) trees may need protection, such as rake removal of ground fuels. Planned burns have traditionally been carried out in the winter dry season; further research required.
17a	11.3.2	<i>Eucalyptus populnea</i> woodland on alluvial plains	Late wet to early dry season when there is good soil moisture. Early storm season or after good spring rains.	Low to moderate	6-10 years (shorter in north of bioregion: 2- 7 years)	Restrict to less than 30% in any year. Burn under conditions of good soil moisture and when plants are actively growing. Sometimes a small amount of wind may move the fire front quickly so that burn intensity is not too severe to destroy habitat trees.	Burn interval for conservation purposes will differ from that for grazing purposes; the latter being much shorter. Management of this vegetation type should be based on maintaining vegetation composition, structural diversity, fauna habitats (in particular hollow-bearing trees and logs) and preventing extensive wildfire. Maintaining a fire mosaic will help ensure protection of habitat and mitigate against wildfires. Fire can control shrub invasives (e.g., <i>Eremophila</i> spp. and <i>A. stenophylla</i> in the red soil country in particular). Fire will also control cypress. Low to moderate intensity burns with good soil moisture are necessary to minimise loss of hollow trees. Avoid burning riparian communities as these can be critical habitat for some species. Culturally significant (scar) trees may need protection, such as rake removal of ground fuels. Planned burns have traditionally been carried out in the winter dry season; further research required.

BVG (1M)	RE	RE Short Description	Season	Intensity	Interval	Strategy	Issues
17a	11.5.1a	<i>Eucalyptus populnea</i> woodland with <i>Allocasuarina luehmannii</i> low tree layer. Occurs on flat to gently undulating plains formed from weathered sandstones. Duplex soils with sandy surfaces. Not a Wetland. (BVG1M: 17a).	Late wet to early dry season when there is good soil moisture. Early storm season or after good spring rains.	Low to moderate	6 -10 years	Restrict to less than 30-60% in any year. Rotate burns in mosaic patches. Maintain fire management of surrounding country so that wildfires will be very limited in extent. Burn under conditions of good soil moisture and when plants are actively growing.	Maintaining a fire mosaic will ensure protection of fauna habitats (such as dense stands of <i>A. luehmannii</i>) and mitigate against wildfires. <i>Allocasuarina luehmannii</i> (bull oak) can be both killed by fire and regenerate from seed following fire. Bull oak thickening/creation of whipstick communities may be controlled with planned low intensity burns. Drought index will help deliver required guideline. Jewel butterfly is significant in this community, but the jewel butterfly needs thick leaf litter/mature bull oak; so high intensity fire (or fire that removes the litter layer) could be detrimental to survival. <i>Allocasuarina</i> is also an important food source for south-eastern glossy black cockatoo.
18a	11.5.21	<i>Corymbia blosomei</i> +/- <i>Callitris glaucophylla</i> +/- <i>Eucalyptus crebra</i> +/- <i>Angophora leiocarpa</i> woodland on Cainozoic sand plains and/or remnant surfaces	Late wet to early dry season when there is good soil moisture. Early storm season or after good spring rains.	Moderate	3-5 years	Burn less than 30% in any year. Burn under conditions of good soil moisture and when plants are actively growing.	Young cypress are killed by fire. Planned burns have traditionally been carried out in the winter dry season; further research required.
18b	11.5.1	<i>Eucalyptus crebra</i> and/or <i>E. populnea</i> , <i>Callitris glaucophylla</i> , <i>Angophora leiocarpa</i> , <i>Allocasuarina luehmannii</i> woodland on Cainozoic sand plains and/or remnant surfaces	Late wet to early dry season when there is good soil moisture. Early storm season or after good spring rains.	Low to moderate	6 -10 years	Restrict to less than 30-60% in any year. Rotate burns in mosaic patches. Maintain fire management of surrounding country so that wildfires will be very limited in extent. Burn under conditions of good soil moisture and when plants are actively growing.	Maintaining a fire mosaic will ensure protection of fauna habitats (such as dense stands of <i>A. luehmannii</i>) and mitigate against wildfires. <i>Allocasuarina luehmannii</i> (bull oak) can be both killed by fire and regenerate from seed following fire. Bull oak thickening/creation of whipstick communities may be controlled with planned low intensity burns. Drought index will help deliver required guideline. Jewel butterfly is significant in this community, but the jewel butterfly needs thick leaf litter/mature bull oak; so high intensity fire (or fire that removes the litter layer) could be detrimental to survival. <i>Allocasuarina</i> is also an important food source for south-eastern glossy black cockatoo.

BVG (1M)	RE	RE Short Description	Season	Intensity	Interval	Strategy	Issues
18b	11.5.4	<i>Eucalyptus chloroclada</i> , <i>Callitris glaucophylla</i> , <i>C. endlicheri</i> , <i>Angophora leiocarpa</i> woodland on Cainozoic sand plains and/or remnant surfaces	Late wet to early dry season when there is good soil moisture. Early storm season or after good spring rains.	Low to moderate	6-10 years	Burn less than 10-30% in any year to achieve a mosaic. Burn under conditions of good soil moisture and when plants are actively growing. Protection relies on broad-scale management of surrounding country with numerous small fires throughout the year so that wildfires will be very limited in extent.	Cypress is killed by fire and regenerates from canopy stored seed (obligate seeder). It reaches reproductive age at about 6 years. Fire frequency less than 6-8 years will reduce cypress, but long fire interval will lead to cypress dominance and eucalypt suppression. Fuel reduction burns will help restrict incursions by high intensity wildfires that kill cypress. Fire after good spring rain has the potential to burn severely if there is no follow-up rain and re-lights occur.
25a	11.3.1	<i>Acacia harpophylla</i> and/or <i>Casuarina</i> <i>cristata</i> open forest on alluvial plains	No information provided	No information provided	Occasional fires 5 - 10 years	Maintain fire management of surrounding country so that wildfires will be very limited in extent. Frequent fire at the edge of this RE keeps fuel loads low. Protection from fire is necessary	<i>Casuarina cristata</i> is fire sensitive, although germination can be good in bare areas. Brigalow is soft-seeded, so germination is not promoted by fire. Buffel grass invasion will increase risk from fire. High intensity fires will cause damage to overstorey. Grazing may be an option for reducing fuel loads where exotic grass such as buffel have invaded.

BVG (1M)	RE	RE Short Description	Season	Intensity	Interval	Strategy	Issues
34d	11.3.27	Freshwater wetlands. Vegetation ranges from open water +/- aquatics and emergents such as <i>Potamogeton crispus</i> , <i>Myriophyllum verrucosum</i> , <i>Chara</i> spp., <i>Nitella</i> spp., <i>Nymphaea violacea</i> , <i>Ottelia ovalifolia</i> , <i>Nymphoides indica</i> , <i>N. crenata</i> , <i>Potamogeton tricarinatus</i> , <i>Cyperus difformis</i> , <i>Vallisneria spiralis</i> and <i>Hydrilla verticillata</i> . Often with fringing woodland, commonly <i>Eucalyptus camaldulensis</i> or <i>E. coolabah</i> but also a wide range of other species including <i>Eucalyptus platyphylla</i> , <i>E. tereticornis</i> , <i>Melaleuca</i> spp., <i>Acacia holosericea</i> or other <i>Acacia</i> spp. Occurs on billabongs. Palustrine.	No information provided	No information provided	Fire return interval not relevant.	Depending on position in the landscape, protection depends on broad-scale management of surrounding country, with numerous small fires throughout the year so that wildfires will be very limited in extent.	If burning is to occur then implement when water level is deep enough to protect the bases of aquatic plants. Sedges are disadvantaged by repeated fires. Impact of fire on rare and threatened plants associated with mound springs that include <i>Arthraxon hispidus</i> and <i>Dimeria</i> sp. (Salvator Rosa R.J.Fensham RJF3643) should be considered. Boggomosses/springs can bounce back following fire but care should be taken where a dry peat layer has developed (particularly in degraded situations). Fire is an option for control of weeds (possibly in ungrazed situations). If riparian areas need to be burnt to reduce fuel loads then burning should occur when there is good soil moisture and active growth.



Registered Office
Level 30, 180 Ann Street,
Brisbane Qld 4000

Senex Energy Pty Ltd
ABN 50 008 942 827

Postal Address
GPO Box 2233,
Brisbane Qld 4001

Phone: +61 7 3335 9000
Facsimile: +61 7 3335 9999
Web: senexenergy.com.au