APPENDIX Q

Environmental Offset Delivery Strategy

BORDER TO GOWRIE REVISED DRAFT ENVIRONMENTAL IMPACT STATEMENT

Inland Rail is a subsidiary of
Australian Rail Track Corporation

INLAND RAIL

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Glossary

Specific terms and acronyms used throughout this strategy are listed and described in the table below. Words that are written in bold type within the definition column of a term also have a definition within the glossary.

Terminology

TERM	ACRONYM	DEFINITION
Adaptive Management Framework	AMF	A structured, iterative process of decision making that adapts based on what is learned.
Australian Rail Track Corporation	ARTC	The proponent.
Border to Gowrie	B2G	Section of the Inland Rail Project between the border of Queensland and NSW and Gowrie.
Broad Vegetation Group	BVG	Represents a combination of regional ecosystems grouped by similar vegetation communities.
Controlled Action Decision Date	CADD	9 April, 2018.
Department of Climate Change, Energy, the Environment and Water	DCCEEW	Federal Department of Climate Change, Energy, the Environment and Water (formerly the Department of Agriculture, Water and the Environment).
Department of Environment, Tourism, Science and Innovation	DETSI	Queensland Government department.
Environmental Offsets Act 2014 (Qld)	EO Act	A Queensland act that provides a regulatory framework for environmental offsets.
Environment Protection and Biodiversity Conservation Act 1999 (Cth)	EPBC Act	The EPBC Act provides a legal framework to protect and manage **Matters of National Environmental Significance**.
EPBC Environmental Offsets Policy 2012	EPBC Act Policy	A policy that provides upfront guidance on the role of offsets in environmental impact assessments, and how the department considers the suitability of a proposed offset.
Endangered Regional Ecosystem	ERE	**Regional Ecosystem** that is listed as Endangered under the ***Vegetation Management Act 1999*** **(Qld) (VM Act)**.
Guide to determining terrestrial habitat quality version 1.2 (2017)	GTDTHQ	A non-statutory guide that sets out how to assess the suitability of an offset site relative to an impact site, determine the appropriate size and scale of an offset relative to an impact, conduct a baseline habitat quality assessment for an advanced offset application, and assess achievement of, or progress toward achieving, a conservation outcome at an offset site.
High Value Regrowth	HVR	Defined under the **VM Act** as vegetation as regrowth vegetation that has not been cleared for at least 15 years.
Interim Biogeographic Regionalisation for Australia	IBRA	A landscape-based approach/system used to classify the land surface of Australia into bio and subregions.

TERM	ACRONYM	DEFINITION
Land-Based Offsets Multiplier Calculator (version 1.1)	LBOM	The Queensland Standard Assessment Calculator for determining the required multiplier for a proposed offset site when assessing habitat quality on both a proposed impact and proposed offset site.
Multi-Criteria Decision Support Tool	MCDS tool	Purpose built spatial tool designed to rank properties in an area of interest for offset potential.
Matters of National Environmental Significance	MNES	Matters of National Environmental Significance are defined in the EPBC Act as: ▸ World heritage properties ▸ National heritage places ▸ Wetlands of international importance (often called 'Ramsar' wetlands) ▸ Nationally threatened species and ecological communities ▸ Migratory species ▸ Commonwealth marine areas ▸ The Great Barrier Reef Marine Park ▸ Nuclear actions (including uranium mining) ▸ A water resource, in relation to coal seam gas development and large coal mining development.
Matters of State Environmental Significance	MSES	Matters of State Environmental Significance are defined under the Environmental Offsets Regulation 2014 as: ▸ Regulated vegetation ▸ Connectivity areas ▸ Wetlands and watercourses ▸ Designated precinct in a strategic environmental area ▸ Protected wildlife habitat ▸ Protected areas ▸ Highly protected zones of State marine parks ▸ Fish habitat areas ▸ Waterway providing for fish passage ▸ Marine plants ▸ Legally secured offset areas.
Nature Conservation Act 1992 (Qld)	NC Act	The NC Act provides the legislative basis for the conservation of nature through the dedication, declaration and management of protected areas and the protection of native wildlife and its habitat.
Offset Assessment Guide	OAG	An excel spreadsheet with embedded formulae designed to estimate impacts and offsets for threatened species and ecological communities, developed in order to give effect to the requirements of the **EPBC Act Policy**.
Offset Area Management Plan	OAMP	Details the management activities and monitoring program of an offset area to achieve required conservation objectives/performance criteria.
Of Concern Regional Ecosystem	OCRE	Regional Ecosystem that is listed as Of Concern under the **VM Act**.
Queensland Environmental Offsets Policy	QEOP	Policy that provides a decision-support tool to enable administering agencies to assess offset proposals to ensure they meet the requirements of the ***Environmental Offsets Act 2014*** **(Qld) (EO Act)**.

TERM	ACRONYM	DEFINITION
Regional Ecosystem	RE	A vegetation community in a bioregion that is consistently associated with a particular combination of geology, landform and soil.
Regional Ecosystems Description Database	REDD	Excel, CSV or MS Access database of **Regional Ecosystem** long and short descriptions, along with associated **VM Act** statuses, **BVGs** and other notes.
Significant Residual Impacts	SRI	A Significant Residual Impact is generally an adverse impact, whether direct or indirect, on a prescribed environmental matter that: ▸ Remains, or is likely to remain, (whether temporarily or permanently) despite onsite avoidance and mitigation measures for the prescribed activity ▸ Is, or is likely to be, significant.
Significant species	Significant	A general collective term for a fauna or flora listed under either or both the EPBC Act or NC Act and therefore constituting a MNES or MSES.
Statewide Landcover and Trees Study	SLATS	Study that monitors woody vegetation extent, and changes to that extent due to clearing and regrowth using Sentinel-2 satellite imagery as its primary monitoring tool.
State Development and Public Works Organisation Act 1971 (Qld)	SDPWO Act	Provides the Coordinator-General the power to declare a project to be a 'coordinated project', based on a range of criteria related to the project's size, complexity, significant employment or investment opportunities or potential effects on infrastructure.
Border to Gowrie Project	The Project	The Project is a 217.48 km section of new dedicated single track, open access freight railway between the New South Wales (NSW)/Queensland (QLD) border and Gowrie, in Queensland. At the commencement of operation, the Project will accommodate the use of double-stacked 1,800 metre (m) long freight trains.
Threatened Ecological Community	TEC	An ecological community listed as Critically Endangered, Endangered or Vulnerable under the **EPBC Act**.
Department of Transport and Main Roads	TMR	Queensland Government Department.
Vegetation Management Act 1999 (Qld)	VM Act	Act that regulates the clearing of vegetation in Queensland.

Executive Summary

The Inland Rail New South Wales (NSW)/Queensland (QLD) Border to Gowrie (B2G) Project (the Project) is subject to an Environmental Impact Statement (EIS) where environmental impacts will be assessed, and unavoidable Significant Residual Impacts (SRIs) on Matters of National and State Environmental Significance (MNES and MSES) will be determined and quantified. Where unavoidable, these impacts will be subject to offset requirements.

The Australian Government requires that offsets must meet the following principles:

- Deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environment law and affected by the proposed action
- Be built around direct offsets but may include other compensatory measures
- Be in proportion to the level of statutory protection that applies to the protected matter
- Be of a size and scale proportionate to the residual impacts on the protected matter
- Effectively account for and manage the risks of the offset not succeeding
- Be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs
- Be efficient, effective, timely, transparent, scientifically robust and reasonable
- Have transparent governance arrangements including being able to be readily measured, monitored, audited, and enforced.
- The Queensland Government requires that offsets must meet the following principles:
- Offsets will not replace or undermine existing environmental standards or regulatory requirements or be used to allow development in areas otherwise prohibited through legislation or policy
- Impacts must first be avoided, then mitigated, before considering the use of offsets for any remaining impact
- Offsets must achieve a conservation outcome that counterbalances the significant residual impact for which the offset was required
- Offsets must provide environmental values as similar as possible to those being lost
- Offset provision must minimise the time-lag between the impact and delivery of the offsets
- Offsets must provide additional protection to environmental values at risk, or additional management actions to improve environmental values
- Where legal security is required, offsets must be legally secured for the duration of the impact on the prescribed environmental matter.

This Environmental Offset Delivery Strategy (EODS) details the overarching offset strategy for the B2G section of the Inland Rail Program to meet the above principles, as discussed further in Section 2.

The Project impacts on MNES and MSES are presented in Section 3. MNES are proposed to be delivered through land-based offsets and MSES will be delivered through a combination of land-based and financial settlement options. Options for co-location of MNES and MSES are discussed in Section 3.3.

In order to determine the suitability of offsets, an initial desktop analysis and mapping process was undertaken using a custom-made mapping tool designed to transparently and independently identify potential offset areas. This process selected properties containing suitable ecological communities, species habitat, strategically located in proximity to the future rail corridor (impact area), and preferentially adjoining protected area estates, conservation reserves, large intact remnants or located within proximity to bioregional corridors (see Section 4).

The desktop process resulted in the identification of multiple properties of which eleven properties were shortlisted. Six of these properties are presented in this Strategy. All properties have been assessed at both a desktop level and have had detailed baseline surveys undertaken to inform this strategy. Based on the results of the surveys, four properties have now been acquired by Australian Rail Track Corporation (ARTC) and two are currently in the negotiation phase of the offset dealing. It should be noted that an additional two properties had progressed through the detailed assessment and acquisition phases but were unable to be secured and have been removed from this current strategy. A detailed overview of each of the current properties proposed for offsets is provided in Section 5.

Detailed field survey assessments were used to analyse the suitability of each property for supporting MNES/MSES and to determine the available offset area based on the nature of impacts, starting habitat quality and co-location options for each associated matter as well as the suitability/feasibility of appropriate future management actions under an Offset Area Management Plan. The results of the assessments and required offset obligations are presented in Section 6.

Each approved offset property will be secured and managed under a perpetual conservation protection mechanism with management to be undertaken under an approved OAMP. Property-specific OAMP's will seek to maximise landscape conservation outcomes by increasing the quality of vegetation communities and species habitat for targeted matters. OAMPs will be developed to include:

- Specific management objectives to reflect the nature and scale of impacts
- Conservation outcomes and associated management actions for each MNES/MSES developed in accordance with relevant Recovery Plans, approved Conservation Advice and established threat abatement plans to ensure comprehensive strategies are in place for managing habitat and mitigating risks for the respective MNES/MSES
- Monitoring activities and timeframes
- Performance criteria to be achieved for each MNES/MSES and interim milestones
- Corrective actions and triggers for corrective actions
- Auditing and reporting.

It should be noted that until final approvals are in place, this strategy has been prepared to show the feasibility and options available for the Project to mitigate impacts. ARTC is currently finalising the offset portfolio and property acquisition and this EODS will be updated as required by the Project approval process to define the final property portfolio suitable to meet the Project offset requirements.

1 Introduction

1.1 Project background

Australian Rail Track Corporation proposes to construct and operate the Inland Rail – Border to Gowrie Project, a 217.48 kilometre (km) section of new dedicated single track, open access freight railway between the NSW/QLD border and Gowrie, in Queensland. The Project is comprised of approximately 149.48 km of new rail corridor (greenfield) and 68.00 km of reformed existing open access rail corridor (brownfield) that forms part of Queensland Rail's (QR) South Western Line and Millmerran Branch Line to prioritise areas of existing pre-clearing and disturbance. The Project includes five crossing loops and will accommodate the use of double-stacked 1,800 m long freight trains.

The Project was referred to the then Department of Agriculture, Water and the Environment (DAWE) under the environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and was determined to be a controlled action on 9 April, 2018.

1.2 Purpose

The purpose of this Environmental Offset Delivery Strategy (EODS) is to assess the suitability of potential offset areas to compensate for unavoidable Significant Residual Impacts (SRIs) on MNES and MSES identified on the Project. The EODS is a detailed assessment undertaken to support the EIS process in compliance with the framework and principles of the:

- Federal Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)
- Federal *Environmental Offsets Policy* (Department of Sustainability, Environment, Water, Population and Communities, 2012)
- Queensland *Environmental Offsets Policy* Version 1.16 (DESI, 2024)
- Queensland Environmental Offsets Act 2014 (EO Act) and the Environmental Offsets Regulation 2014
- Queensland Nature Conservation Act 1992 (NC Act).

Specifically, the EODS:

- Provides an overview of the environmental offset compliance framework, principles and objectives at a Commonwealth and State level (Section 2)
- Outlines the Project and details the SRIs the Project is predicted to have on MNES/MSES matters (Section 3)
- Summarises the offset property selection process, including desktop assessments and the methodology of rapid and detailed field surveys (Section 4)
- Identifies the properties selected for the Project offset portfolio and summarises how the portfolio will offset the Project's SRIs on MNES and MSES (Section 5 and Section 7)
- Identifies residual Matters of State Environmental Significance (MSES) that may need to be monetised as part of the offset strategy to address impacts that cannot be directly offset through the current portfolio (Section 6).
- Outlines the content that will be contained within the Offset Area Management Plan (OAMP) for each offset area including matter specific management intent (Section 8)
- Details the options for legally securing each proposed offset area (Section 8.4)
- Identifies and assesses the risks associated with delivering environmental offsets and what controls can be put in place to manage these risks (Section 10).

1.3 Offset delivery process

All offset areas will be secured by title or agreement, and the OAMPs will be finalised before commencing the proposed action: constructing a single-track dual-gauge railway with crossing loops between the NSW/QLD border and Gowrie. The project phases and offset delivery process are summarised in Figure 1-1.

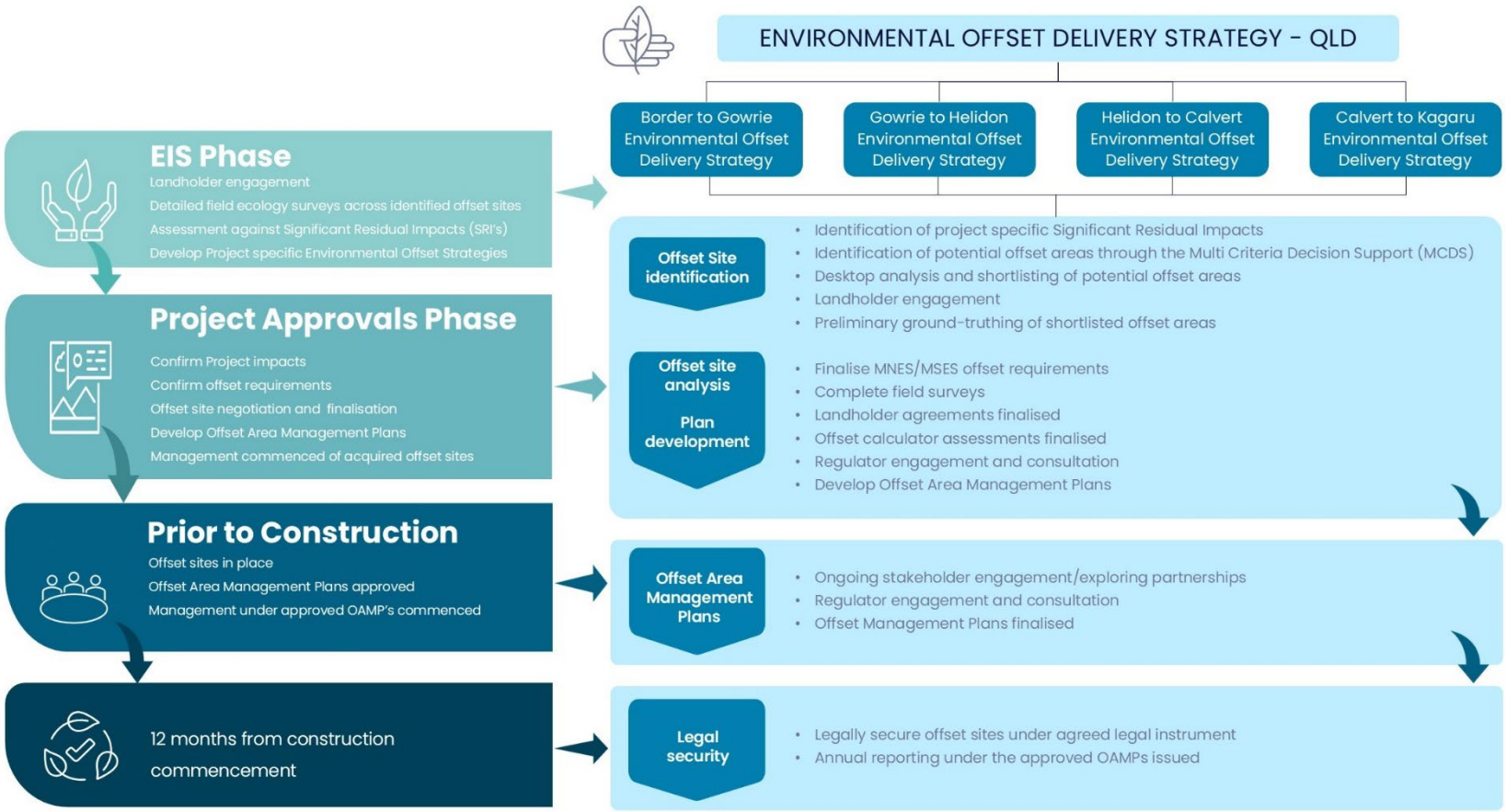


Figure 1-1 Stages of Project offset assessment and delivery

2 Offset Principles and Objectives

As a condition of the Project approvals, where significant impacts to MNES and MSES cannot be avoided or mitigated, environmental offsets will be required in accordance with both the EPBC Act and the EO Act and details on how the offset portfolio has achieved these requirements are provided in Section 2.1 and Section 2.2.

2.1 Australian Government offset requirements

Eight principles are applied in determining the suitability of an offset under the EPBC Act policy.

Table 2-1 outlines these principles and explains how they have been met for each offset property within the B2G offset portfolio.

Table 2-1 Principles of the EPBC Act Policy

PRINCIPLE	HOW THE PRINCIPLE IS MET	RELEVANT SECTIONS OF PLAN
1. Deliver an overall conservation outcome that improves or maintains the viability of the protected matter	The Project offset portfolio is being developed to acquit Project impacts to MNES. Active property management under property specific OAMPs will improve the condition and/or increase the extent of the offset aspects, and the outcome of the offset portfolio will be conservation areas that are protected in perpetuity. These areas will support threatened ecological communities and populations and habitat for threatened flora and fauna and maintain their viability in the region. The offset portfolio will be managed and monitored in line with Offset Area Management Plans (once approved) to improve or maintain MNES.	Section 5 Section 6
2. Be built around direct offsets but may include other compensatory measures	The Project offset portfolio is being built around direct, land-based offset delivery to meet the Project's MNES offset requirements. ARTC will acquire land in the first instance or enter into agreements with landowners for the purposes of offset delivery.	Section 5
3. Be in proportion to the level of statutory protection that applies to the protected matter	The current EPBC Act status of MNES has been considered in the offsets assessment guide in calculating the area of the offset to be provided.	Section 6
4. Be of a size and scale proportionate to the residual impacts on the protected matter	The size and scale of the offset area to be secured for each MNES has been calculated in accordance with the Offsets Assessment Guide (OAG). In addition, offsets are located either directly adjacent or close to the area of impact within the same bioregion and across the subregions where impacts occur.	Section 4 Section 6
5. Effectively account for and manage the risks of the offset not succeeding	A risk assessment has been developed to identify the risks associated with the offset not succeeding and develop mitigation measures to effectively reduce these risks as far as practicable. OAMPs will be developed for each proposed offset site within the Project offset portfolio. These plans will outline a more detailed risk assessment and: ▸ Conservation outcomes and associated management actions ▸ Monitoring activities and timeframes ▸ Performance criteria to be achieved for each MNES, as well as interim milestones ▸ Corrective actions and triggers for corrective actions ▸ Auditing and reporting.	Section 10

PRINCIPLE	HOW THE PRINCIPLE IS MET	RELEVANT SECTIONS OF PLAN
6. 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 the recognition of State or territory offsets that may be suitable as offsets under the EPBC Act for the same action)	The properties within the Project offset portfolio are all on private, freehold land with no legal conservation mechanisms currently in place.	Section 5 Section 9
7. Be efficient, effective, timely, transparent, scientifically robust and reasonable	The offset portfolio is being developed through a transparent and repeatable property selection process that aims to identify the most suitable properties, using criteria that includes offset values, condition, property size and location. All properties are assessed in accordance with relevant guidelines and matter-specific scientific literature. An OAMP will be developed for each proposed offset site and submitted for Commonwealth and State Government approval prior to construction commencement. Offsets will be delivered in a timely matter with management commencing prior to construction commencement.	Section 3.3 Section 10
8. Have transparent governance arrangements including being able to be readily measured, monitored, audited, and enforced	An OAMP will be developed for each proposed offset site and submitted for Commonwealth and State Government approval prior to construction commencement. The OAMP will include a detailed monitoring plan, as well as an implementation schedule for undertaking all monitoring and management actions. The results of the management and monitoring will then be provided in annual reports and as required under conditions of approval. Together these documents will allow the management of the offset to be transparent and easily able to be measured, monitored, audited and enforced.	Section 10

2.2 Queensland Government offset requirements

ARTC plan to deliver offsets consistent with those provisions under the EO Act, in conjunction with provisions under the EPBC Act. Accordingly, the EO Act (Section 15) restricts an administering agency from imposing an offset condition if either of the following has been assessed under the EPBC Act:

- The same, or substantially the same, impact
- The same, or substantially the same, prescribed environmental matter.

Offsets for any remaining State-based matters that are not the same or substantially the same under the EPBC Act will be assessed under Queensland legislation. The details of matters considered the same or substantially the same between Commonwealth and State matters are summarised in Table 2-2 and a specific assessment of remaining State-based matters provided in Section 7.

Table 2-2 Summary of overlap between Commonwealth and State matters

MNES	MSES	ELEMENTS THAT ARE THE SAME OR SUBSTANTIALLY THE SAME	ELEMENTS THAT ARE MSES ONLY
Threatened Ecological Communities (TECs)	• Regulated Vegetation • Endangered Regional Ecosystem (ERE), Of Concern Regional Ecosystem (OCRE) • Wetland • Watercourse	A vegetation community may be both a TEC and regulated vegetation such as an ERE or OCRE. Where aligned these will be assessed under the EPBC Act.	An ERE or OCRE under the VM Act that are not also a TEC under the EPBC Act.
Threatened species (flora or fauna)	• Critically endangered, Endangered, Vulnerable flora and fauna • Essential Habitat • Protected Wildlife Habitat	Critically endangered, Endangered, Vulnerable flora and fauna The habitat of species listed as threatened under the EPBC Act and NC Act.	Any species listed under the NC Act that are not also listed as MNES under the EPBC Act

Seven principles are applied in determining the suitability of an offset under the *Queensland Environmental Offsets Policy* (QEOP). Table 2-3 outlines these principles and explains how they have been met for each offset property within the B2G offset portfolio.

Table 2-3 Principles of the QEOP

PRINCIPLE	HOW THE PRINCIPLE IS MET	RELEVANT SECTIONS OF PLAN
1. Offsets will not replace or undermine existing environmental standards or regulatory requirements or be used to allow development in areas otherwise prohibited through legislation or policy	The Project is being assessed as a coordinated project by the Coordinator-General (CG) and is detailed in the revised draft EIS. The Project will go through an extensive and rigorous assessment process under both Commonwealth and State environmental legislation. Should the Project be approved, delivery of offsets is an expected condition of approval in the CG evaluation report. State-based offsets will be delivered in accordance with QEOP.	EIS
2. Impacts must first be avoided, then mitigated, before considering the use of offsets for any remaining impact	ARTC have implemented the mitigation hierarchy in development of the Project, including avoidance in the first instance to the greatest extent possible. The draft EIS details impact to MSES and the implementation of the mitigation hierarchy.	EIS

PRINCIPLE	HOW THE PRINCIPLE IS MET	RELEVANT SECTIONS OF PLAN
3. Offsets must achieve a conservation outcome that counterbalances the significant residual impact for which the offset was required	ARTC will deliver biodiversity offsets in accordance with the relevant Commonwealth and State offset legislation and policies. Offsets for remaining MSES, not aligned with EPBC Act offsets, will be delivered in accordance with QEOP as proponent-driven, land-based offsets, potentially combined with a portion of a financial settlement offset. The outcome will be strategic conservation areas protected in perpetuity, that support MSES and maintain their viability in the region. This document in combination with Offset Area Management Plans will demonstrate how the significant residual impacts for each MSES are counterbalanced through the final offset portfolio.	Section 5 Section 7
4. Offsets must provide environmental values as similar as possible to those being lost	The Project offset portfolio is being developed to deliver the same environmental values as those being impacted. This document and the OAMPs (once developed) will outline each MSES value impacted and how it is offset. The impact and offset sites will be assessed using a consistent and repeatable approach to demonstrate how the values are aligned.	Section 5 Section 7
5. Offset provision must minimise the time-lag between the impact and delivery of the offsets	The time-lag between the impact and delivery of the offset will be minimised as far as reasonably practical. The offsets presented in this strategy are being assessed, negotiated and implemented in advance, allowing for immediate action when an environmental impact occurs. This strategy presents a portfolio of offsets to be pre-approved as part of the approvals process, allowing for quicker implementation once this strategy is approved by both the Australian Government and Queensland Government. The impact will not occur until the OAMP for each offset site is approved. Once approved the OAMPs will be implemented, as such offset activities will commence before, or at the same time, as the impact occurring. Furthermore, ARTC is targeting the most suitable offset properties in the first instance, when developing the offset portfolio, that incorporate a mix of approaches for offset delivery. This aims to balance offset outcomes and timing of delivery.	Section 8.4
6. Offsets must provide additional protection to environmental values at risk, or additional management actions to improve environmental values	The properties within the Project offset portfolio are on private, freehold land and are currently actively used for agricultural activities. None of the proposed offset sites currently receive stewardship funding, provide an offset for a protected matter or are participating in schemes to improve environmental values (e.g. caring for country or the carbon farming initiative). The properties will be secured for offset delivery and matter-specific management actions will be outlined in each OAMPs.	Section 8
7. Where legal security is required, offsets must be legally secured for the duration of the impact on the prescribed environmental matter	Each proposed offset site will be legally secured under a legally binding mechanism and due to the permanent nature of the impacts, the offsets will be legally secured in perpetuity.	Section 8.4

3 Project Summary

3.1 Project footprint

The Project footprint consists of the land required to accommodate all permanent and temporary infrastructure for the construction and operation of the Project. Permanent infrastructure associated with the Project includes rail, road and other miscellaneous infrastructure. Rail infrastructure includes rail tracks, crossing loops, turnouts, earthworks, bridges, drainage, level crossings, grade separations, rail maintenance access roads, signalling and fencing. Road related works resulting from the Project encompasses new and upgraded roads, realignments and diversions, intersection improvements and closures. The temporary footprint is the area required to accommodate construction activities and facilities of a temporary nature for the duration of the Project construction stage. The temporary footprint is generally wider than the permanent footprint to allow for the construction of Project elements including fencing, drainage features including erosion and sediment control measures, temporary stockpiling of soil and cleared vegetation, and to allow necessary construction access and turnaround provisions. Temporary Project facilities include laydowns, site office areas, non-resident workforce accommodation, a material distribution centre, concrete batch plants and borrow pits (see Figure 3-1).

3.2 Project impacts

Detailed ecological assessments have been undertaken within the Project footprint to inform the EIS and approvals process. Appendix O: MNES Report and Appendix L: Terrestrial and Aquatic Ecology Technical Report provide a detailed description of the field surveys undertaken to inform Project impacts. A revised draft EIS has been prepared which details the Project impacts and outlines the offset requirements as detailed in this strategy. Project impacts to MNES and MSES were determined by:

- Ground-truthing Regional Ecosystems (REs) within the Project footprint
- Identifying TECs within the Project footprint and adjoining areas
- Undertaking seasonal targeted surveys for flora and fauna matters
- Analysis of State regulated vegetation mapping including essential habitat, MSES wildlife habitat and known species records.

Identifying and mapping species habitat including functional components where relevant including:

- Assessing the condition of habitat in compliance with:
- BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland. Assessment Manual. Version 2.2
- Guide to Determining Terrestrial Habitat Quality (GTDTHQ), version 1.2 (2017).

A fauna connectivity assessment has been undertaken to identify existing fauna movement corridors through the landscape and assess the Project design for its ability to provide for fauna connectivity through the landscape. A Connectivity Strategy has been prepared which details how the Project's design progression will incorporate the necessary elements to maintain fauna connectivity on a long-term basis and minimise the risk of injury and mortality of fauna from wildlife train collision for target species including listed threatened fauna species.

Table 3-1 outlines the assessed offset matters and habitat quality scores which inform the calculations detailed in this document. For a more detailed understanding of the habitat quality assessment process and associated scoring see Appendix A – Habitat Quality Assessment Report (Ausecology 2023).

Table 3-1 SRIs and habitat quality scoring for the Project per matter

SCIENTIFIC NAME	COMMON NAME	EPBC ACT^	NC ACT	VM ACT	SRI B2G (HA)+	QUALITY SCORE
MNES – Threatened Ecological Community						
Brigalow (*Acacia harpophylla* dominant and co-dominant)		E	-	-	104.5	5
Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland		CE	-	-	66.07	3
White Box-Yellow Box-Blakely's Red Woodland and Derived Native Grassland		CE	-	-	2.54	6
MSES* – Regulated Vegetation						
Endangered Regional Ecosystems						
RE 11.4.3		-	-	E	24.01	7
RE 11.9.5 (BVG 25a)#		-	-	E	0.67	6
Of Concern Regional Ecosystems						
RE 11.3.2 (BVG 17a)		-	-	OC	25.90	8
RE 11.3.4 (BVG 16c)		-	-	OC	7.57	7
RE 11.5.14 (BVG 33b)		-	-	OC	49.07	6
RE 11.9.13 (BVG 13d)		-	-	OC	0.13	7
RE 11.9.7 (BVG 17a)		-	-	OC	2.39	7
Regional Ecosystems within a defined distance of a watercourse						
RE 11.3.14 (BVG18A)		-	-	LC	1.49	7
RE 11.3.18 (BVG 17a)		-	-	LC	0.15	7
RE 11.3.25 (BVG16a)		-	-	LC	1.88	7
RE 11.3.27 (BVG34d)		-	-	LC	0.02	7
RE 11.5.1/11.5.4 (BVG18B)		-	-	LC	3.19	7
RE 11.5.20 (BVG13D)		-	-	LC	0.34	7
RE 11.7.4/11.7.7 (BVG 12a)		-	-	LC	0.5	7
RE 11.8.4/11.8.5 (BVG11A)		-	-	LC	0.45	7
RE 11.9.9 (BVG13c)		-	-	LC	0.01	7
11.9.9a (BVG15A)		-	-	LC	0.01	7
Regional Ecosystems intersecting a wetland						
11.3.27b (BVG34d)		-	-	LC	0.07	7
RE 11.3.27 (BVG34d)		-	-	LC	0.13	7
RE 11.3.25 (BVG16a)		-	-		0.66	7
Connectivity Areas					475.33	
MNES – Flora						
Homopholis belsonii	Belson's panic	V	E	-	242.25	5
Lepidium monoplocoides	Winged peppercress	E	LC	-	79.86	6
Picris evae	Hawkweed	V	V	-	110.67	5
Westringia parvifolia	Small-flowered westringia	V	V	-	27.19	5
Xerothamnella herbacea	-	E	E	-	11.99	6

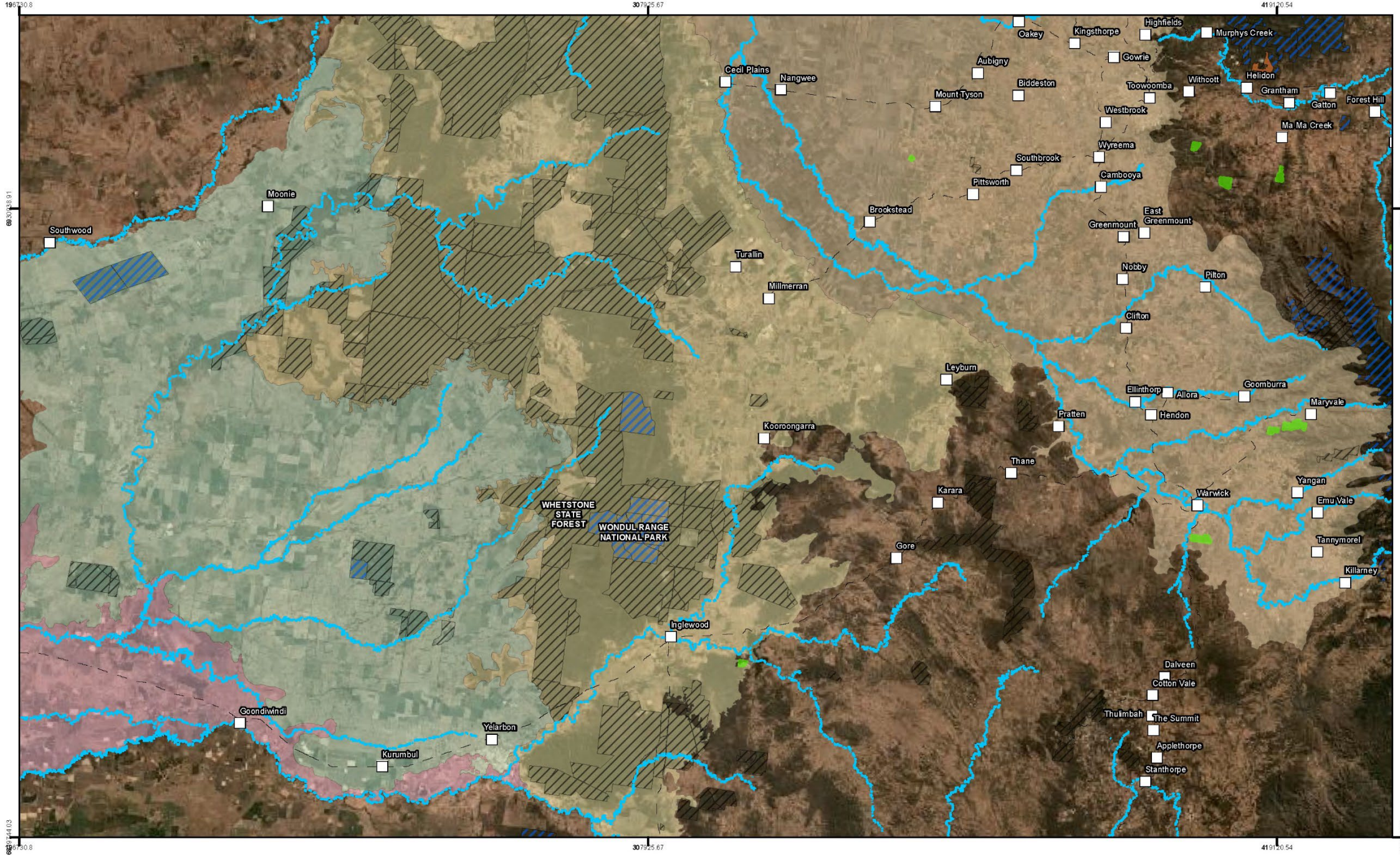
SCIENTIFIC NAME	COMMON NAME	EPBC ACT^	NC ACT	VM ACT	SRI B2G (HA)+	QUALITY SCORE
MSES – Protected Wildlife Habitat - Flora						
Cyperus clarus	-	-	V	-	166.07	3
Picris barbarorum	-	-	V	-	174.98	3
MNES – Fauna						
Adclarkia cameroni	Brigalow woodland snail	E	V	-	146.72	5
Anomalopus mackayi	Five-clawed worm-skink	V	E	-	241.60	5
Dasyurus maculatus maculatus	Spotted-tailed quoll	E	-	-	387.48	5
Furina dunmalli	Dunmall's snake	V	V	-	262.69	6
Geophaps scripta scripta	Squatter pigeon (southern subspecies)	V	V	-	421.42	6
Grantiella picta	Painted honeyeater	V	V	-	330.66	6
Nyctophilus corbeni	South-eastern long-eared bat	V	V	-	696.25	5
Phascolarctos cinereus	Koala	E	E	-	769.4	6
Rostratula australis	Australian painted snipe	E	E	-	7.91	5
Tympanocryptis condaminensis	Condamine earless dragon	E	E	-	51.20	5
MSES – Protected Wildlife Habitat – Fauna						
Aphelocephala leucopsis	Southern whiteface	-	V	-	216.89	4
Calyptorhynchus lathami lathami	Glossy black-cockatoo	-	V	-	120.01	4
Jalmenus eubulus	Pale imperial hairstreak	-	V	-	26.59	5
Stagonopleura guttata	Diamond firetail	-	V		216.89	4

* Note the SRI area (ha) for Of Concern and Endangered REs is the amount of remnant in the Project footprint minus any associated TEC area.

For the purpose of an environmental offset for an impact on regulated vegetation, an offset can be provided in an ecosystem in the same 'broad vegetation group' (BVG) and of the same RE status (or higher).

^ EPBC Act status as at the Project Controlled Action Decision Date (CADD), 9 April 2018.

\+ Note SRI areas were taken from the revised draft EIS, Chapter 11: Flora and Fauna.



Ausecology

Figure 3-1: Overview
ARTC B2G - Alignment

- Populated Places
- Rail Network
- Major Watercourse Lines

Protected Areas
- Resources Reserve
- National Park
- State Forest
- Conservation Park

Biogeographic Subregions
- Eastern Darling Downs
- Inglewood Sandstones
- Macintyre - Weir Fan
- Moonie R. - Commoron Creek Floodout

REVISION	AUTHOR	REVIEWER	DATE
0	JS	LG	29/10/2024

COORDINATE SYSTEM: GDA 1994 MGA Zone 56
SCALE: 1:840,218
0 10 20
Kilometres

3.3 Co-location of relevant matters

Both Commonwealth and Queensland offset policies recognise that offset requirements for multiple threatened species or communities may overlap and offset areas can accommodate more than one overlapping environmental matter. In addition to those matters that are the same, or substantially the same, many listed matters also overlap in physical location and the type of habitat or community where they occur. The Project will impact on areas that typically contain more than one threatened species, threatened species habitat or threatened ecological community. For example, a mixed Brigalow and eucalypt dominated woodland may constitute a Threatened Ecological Community (e.g. Brigalow TEC) and a State-listed endangered regional ecosystem, while also being recognised as habitat for Commonwealth-listed fauna species such as South-eastern long-eared bat, as well as species listed only under State legislation at the time of the Controlled Action Decision Date (CADD), being 9 April 2018, such as the Glossy black-cockatoo. As such, offset areas will also support multiple offset matters as these matters naturally overlap in occurrence and as offsets aim to offset the same communities as those that are impacted. The co-location of matters relating to microhabitat was assessed during targeted field surveys and the details will be provided in the OAMPs for each property.

Importantly, management activities and the conservation outcomes must provide benefits for all the overlapping matters. This includes ensuring improvements to foraging, breeding, dispersal and shelter habitat for threatened species as well as condition improvement and ongoing viability for listed vegetation communities. In addition, each property specific OAMP will address each impacted matter including matter specific management actions and outcomes recognising, among other things, the nature of impacts, relevant recovery plans, approved conservation advice and threat abatement plans. The Project offset portfolio will be delivered in a way that is consistent with EPBC Act and NC Act offset policies, guidelines, and principles regarding co-location of matters.

It is also important to note that offset management actions designed to benefit one species cannot simultaneously disadvantage another overlapping species. For example, thinning mid-story vegetation to assist one species mobility may disadvantage other species that also have potential to be co-located. If microhabitat manipulation of this nature is prescribed on an offset, the two matters cannot be co-located.

In order to determine appropriate and reasonable co-locations of matters on an offset site, the analysis process outlined in Figure 3-2 was undertaken for the Project impacts. The end results of this analysis are contained within Table 3-2.

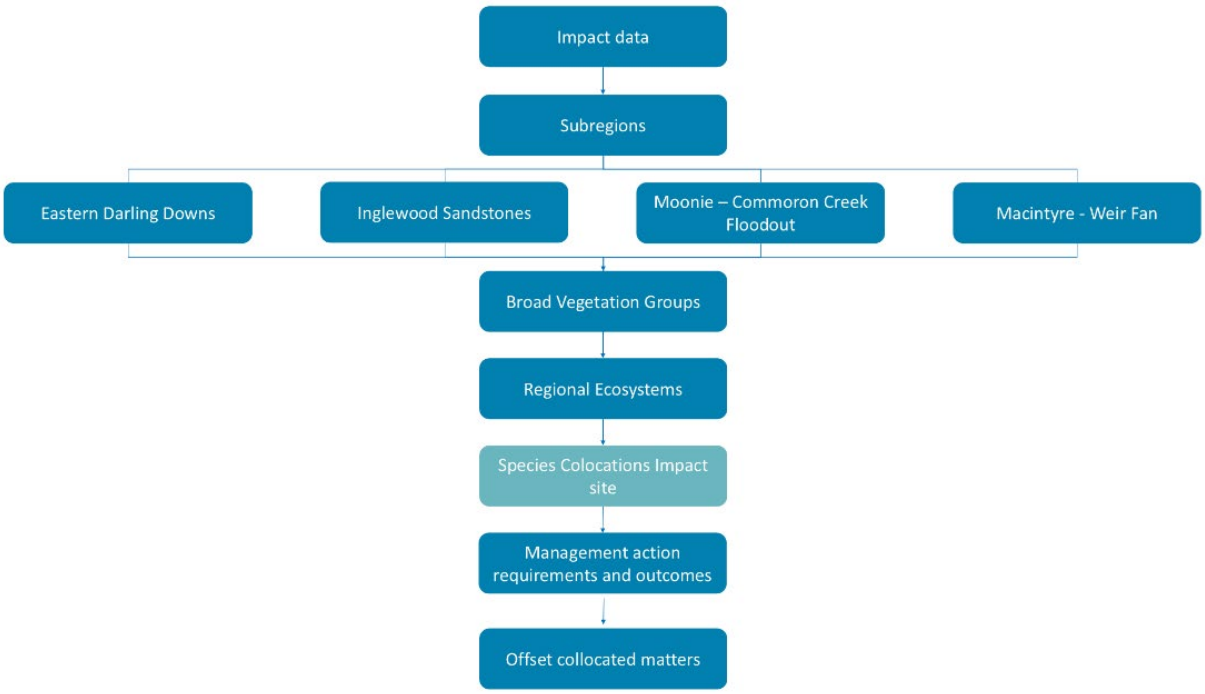


Figure 3-2 Flow chart depicting the steps taken to inform co-location options for both MNES and MSES

The Project covers four separate subregions recognised under the Interim Biogeographic Regionalisation for Australia (IBRA)(see Figure 5-1.). These subregions vary on vegetation types, land uses and levels of connectivity. Given the Project spans 770.83 km, the co-location analysis has been split according to these subregions to account for this variability across the length of the Project.

Co-locatable matters were then grouped into Broad Vegetation Groups (BVGs). BVGs were used to group the REs together to illustrate similar vegetation types suitable for determining co-location options (see Table 3-2). This was considered necessary given REs can prove challenging for determining suitability for species with general habitat requirements not always based on a particular species composition. The final co-locatable matters list for each RE (and condition class) per offset property was then reviewed to determine whether a conservation outcome could be achieved for all the co-located matters. If a conservation outcome was not considered to be possible for all co-located matters and/or if synergies could not be produced and/or if there was potential for perverse outcomes from managing co-located matters, then matters were removed from the co-locatable matters list.

Table 3-2 Co-location analysis of impact matters

BROAD VEGETATION GROUP	DESCRIPTION	ASSOCIATED REGIONAL ECOSYSTEMS IMPACT SITE	SPECIES ASSOCIATIONS – IMPACTS (CONFIRMED RECORDS/SURVEYS)	ASSOCIATED REGIONAL ECOSYSTEMS OFFSET SITES	CO-LOCATED MATTERS ON OFFSET SITES (TO DATE)
Eastern Darling Downs					
11A	Moist to dry open forests to woodlands dominated by *Eucalyptus orgadophila* (mountain coolibah). Some areas dominated by *E. tereticornis* (blue gum), *E. melliodora* (yellow box), *E. albens* (white box), *E.* crebra (narrow-leaved red ironbark) or *E. melanophloia* (silver-leaved ironbark).	11.8.4 11.8.5	▸ *Anomalopus mackayi* ▸ *Cyperus clarus* ▸ *Phascolarctos cinereus* ▸ *Picris barbarorum* ▸ *Picris evae*	11.8.4 11.8.5	▸ *Anomalopus mackayi* ▸ *Cyperus clarus* ▸ *Phascolarctos cinereus* ▸ *Picris barbarorum* ▸ *Picris evae*
16C	Woodlands and open woodlands dominated by *Eucalyptus coolabah* (coolabah) or *E. microtheca* (coolabah) or *E. largiflorens* (black box) or *E. tereticornis* (blue gum) or *E. chlorophylla* on floodplains.	11.3.4	▸ *Adclarkia cameroni* ▸ *Anomalopus mackayi* ▸ *Phascolarctos cinereus*	11.3.4	▸ *Anomalopus mackayi* ▸ *Phascolarctos cinereus*
17A	Woodlands dominated by *Eucalyptus populnea* (poplar box) on alluvium, sand plains and foot slopes of hills and ranges.	11.3.2	▸ *Adclarkia cameroni* ▸ *Anomalopus mackayi* ▸ *Grantiella picta* ▸ *Homopholis belsonii* ▸ *Phascolarctos cinereus* ▸ *Picris barbarorum* ▸ *Picris evae* ▸ *Tympanocryptis condaminensis*	11.3.2	▸ *Adclarkia cameroni* ▸ *Anomalopus mackayi* ▸ *Dasyurus maculatus* ▸ *Furina dunmalli* ▸ *Geophaps scripta scripta* ▸ *Grantiella picta* ▸ *Homopholis belsonii* ▸ *Nyctophilus corbeni* ▸ *Phascolarctos cinereus*
25A	Open forests to woodlands dominated by *Acacia harpophylla* (brigalow) sometimes with *Casuarina cristata* (belah) on heavy clay soils.	11.9.5 11.9.10	▸ *Adclarkia cameroni* ▸ *Grantiella picta* ▸ *Homopholis belsonii* ▸ *Phascolarctos cinereus*	11.9.5	▸ *Adclarkia cameroni* ▸ *Aphelocephala leucopsis* ▸ *Calyptorhynchus lathami lathami* ▸ *Dasyurus maculatus* ▸ *Furina dunmalli* ▸ *Grantiella picta* ▸ *Jalmenus eubulus* ▸ *Nyctophilus corbeni* ▸ *Phascolarctos cinereus* ▸ *Stagonopleura guttata*

BROAD VEGETATION GROUP	DESCRIPTION	ASSOCIATED REGIONAL ECOSYSTEMS IMPACT SITE	SPECIES ASSOCIATIONS – IMPACTS (CONFIRMED RECORDS/SURVEYS)	ASSOCIATED REGIONAL ECOSYSTEMS OFFSET SITES	CO-LOCATED MATTERS ON OFFSET SITES (TO DATE)
30A	Tussock grasslands dominated by Astrebla spp. (mitchell grass) or Dichanthium spp. (bluegrass) often with *Eulalia aurea* (silky browntop) on alluvia.	11.3.21 11.3.24	▸ *Anomalopus mackayi* ▸ *Picris barbarorum* ▸ *Picris evae* ▸ *Tympanocryptis condaminensis*	11.3.21 11.3.24	▸ *Anomalopus mackayi* ▸ *Cyperus clarus* ▸ *Picris barbarorum* ▸ *Picris evae* ▸ *Tympanocryptis condaminensis*
30B	Tussock grasslands dominated by Astrebla spp. (mitchell grass) or Dichanthium spp. (bluegrass) often with Iseilema spp. on undulating downs or clay plains.	11.8.11	▸ *Anomalopus mackayi* ▸ *Picris evae*	11.8.11	▸ *Anomalopus mackayi* ▸ *Cyperus clarus* ▸ *Picris barbarorum* ▸ *Picris evae*
Inglewood Sandstones					
13C	Woodlands and open forests dominated by *Eucalyptus youmanii* (Youman's stringybark), *E. scoparia* (Wallangarra white gum), *E. caliginosa* (broad-leaved stringybark) or *E. melliodora* (yellow box) occurring on traprock.	11.9.9 11.9.9a	▸ *Homopholis belsonii* ▸ *Phascolarctos cinereus*	11.9.9 13.11.3	▸ *Dasyurus maculatus* ▸ *Furina dunmalli* ▸ *Nyctophilus corbeni* ▸ *Phascolarctos cinereus*
13D	Woodlands dominated by *Eucalyptus moluccana* (gum-topped box) (or *E. microcarpa* (inland grey box)) on a range of substrates.	11.5.20	▸ *Aphelocephala leucopsis* ▸ *Dasyurus maculatus* ▸ *Furina dunmalli* ▸ *Geophaps scripta* ▸ *Grantiella picta* ▸ *Nyctophilus corbeni* ▸ *Phascolarctos cinereus* ▸ *Stagonopleura guttata*	11.5.20 11.9.13	▸ *Aphelocephala leucopsis* ▸ *Calyptorhynchus lathami lathami* ▸ *Dasyurus maculatus* ▸ *Furina dunmalli* ▸ *Grantiella picta* ▸ *Nyctophilus corbeni* ▸ *Phascolarctos cinereus* ▸ *Stagonopleura guttata*

BROAD VEGETATION GROUP	DESCRIPTION	ASSOCIATED REGIONAL ECOSYSTEMS IMPACT SITE	SPECIES ASSOCIATIONS – IMPACTS (CONFIRMED RECORDS/SURVEYS)	ASSOCIATED REGIONAL ECOSYSTEMS OFFSET SITES	CO-LOCATED MATTERS ON OFFSET SITES (TO DATE)
16A	Open forests and woodlands dominated by *Eucalyptus camaldulensis* (river red gum) (or *E. tereticornis* (blue gum)) and/or *E. coolabah* (coolibah) (or *E. microtheca* (coolabah)) fringing drainage lines. Associated species may include Melaleuca spp., *Corymbia tessellaris* (carbeen), Angophora spp., *Casuarina cunninghamiana* (river sheoak).	11.3.25	*Adclarkia cameroni* *Anomalopus mackayi* *Aphelocephala leucopsis* *Calyptorhynchus lathami* *Dasyurus maculatus* *Furina dunmalli* *Geophaps scripta scripta* *Grantiella picta* *Nyctophilus corbeni* *Phascolarctos cinereus* *Stagonopleura guttata*	11.3.25	*Adclarkia cameroni* *Anomalopus mackayi* *Aphelocephala leucopsis* *Calyptorhynchus lathami lathami* *Dasyurus maculatus* *Furina dunmalli* *Geophaps scripta scripta* *Grantiella picta* *Homopholis belsonii* *Nyctophilus corbeni* *Phascolarctos cinereus* *Rostratula australis* *Stagonopleura guttata*
16C	Woodlands and open woodlands dominated by *Eucalyptus coolabah* (coolabah) or *E. microtheca* (coolabah) or *E. largiflorens* (black box) *or E. tereticornis* (blue gum) or *E. chlorophylla* on floodplains.	11.3.4	*Anomalopus mackayi* *Aphelocephala leucopsis* *Dasyurus maculatus* *Furina dunmalli* *Geophaps scripta* *Homopholis belsonii* *Nyctophilus corbeni* *Phascolarctos cinereus* *Stagonopleura guttata*	11.3.4	*Anomalopus mackayi* *Aphelocephala leucopsis* *Dasyurus maculatus* *Furina dunmalli* *Geophaps scripta scripta* *Grantiella picta* *Nyctophilus corbeni* *Phascolarctos cinereus* *Stagonopleura guttata*
17A	Woodlands dominated by *Eucalyptus populnea* (poplar box) on alluvium, sand plains and foot slopes of hills and ranges.	11.3.17 11.3.18 11.3.2 11.9.7	*Adclarkia cameroni* *Anomalopus mackayi* *Calyptorhynchus lathami* *Dasyurus maculatus maculatus* *Furina dunmalli* *Geophaps scripta scripta* *Grantiella picta* *Homopholis belsonii* *Nyctophilus corbeni* *Phascolarctos cinereus*	11.3.18 11.3.2	*Adclarkia cameroni* *Anomalopus mackayi* *Aphelocephala leucopsis* *Calyptorhynchus lathami lathami* *Dasyurus maculatus maculatus* *Furina dunmalli* *Geophaps scripta scripta scripta* *Grantiella picta* *Homopholis belsonii* *Nyctophilus corbeni* *Phascolarctos cinereus* *Stagonopleura guttata*

BROAD VEGETATION GROUP	DESCRIPTION	ASSOCIATED REGIONAL ECOSYSTEMS IMPACT SITE	SPECIES ASSOCIATIONS – IMPACTS (CONFIRMED RECORDS/SURVEYS)	ASSOCIATED REGIONAL ECOSYSTEMS OFFSET SITES	CO-LOCATED MATTERS ON OFFSET SITES (TO DATE)
18A	Dry woodlands to open woodlands, dominated by bloodwoods (*Corymbia dallachiana, C. terminalis* (long-fruited bloodwood), *C. plena, or C. leichhardtii* (rustyjacket)) or ironbarks (*Eucalyptus quadricostata* (Pentland ironbark), *E. crebra* (narrow-leaved red ironbark) or *E. exilipes* (fine-leaved ironbark), often with *E. acmenoides* (narrow-leaved white stringybark), *Angophora leiocarpa* (rusty gum) and *Callitris glaucophylla* (white cypress pine) in the Brigalow belt, on sandy plateaus and plains.	11.3.14	▸ *Aphelocephala leucopsis* ▸ *Dasyurus maculatus* ▸ *Furina dunmalli* ▸ *Nyctophilus corbeni* ▸ *Phascolarctos cinereus* ▸ *Stagonopleura guttata*	11.3.14	▸ *Aphelocephala leucopsis* ▸ *Calyptorhynchus lathami lathami* ▸ *Dasyurus maculatus maculatus* ▸ *Furina dunmalli* ▸ *Grantiella picta* ▸ *Nyctophilus corbeni* ▸ *Phascolarctos cinereus* ▸ *Stagonopleura guttata*
18B	Woodlands dominated *Eucalyptus crebra* (sens. lat.) (narrow-leaved red ironbark) frequently with Corymbia spp. or Callitris spp. on flat to undulating plains.	11.5.1 11.5.1a 11.5.4	▸ *Aphelocephala leucopsis* ▸ *Calyptorhynchus lathami lathami* ▸ *Dasyurus maculatus maculatus* ▸ *Furina dunmalli* ▸ *Geophaps scripta scripta* ▸ *Grantiella picta* ▸ *Homopholis belsonii* ▸ *Nyctophilus corbeni* ▸ *Phascolarctos cinereus* ▸ *Stagonopleura guttata*	11.5.1 11.5.1a 11.5.4	▸ *Aphelocephala leucopsis* ▸ *Calyptorhynchus lathami lathami* ▸ *Dasyurus maculatus maculatus* ▸ *Furina dunmalli* ▸ *Geophaps scripta scripta scripta* ▸ *Grantiella picta* ▸ *Jalmenus eubulus* ▸ *Lepidium monoplocoides* ▸ *Nyctophilus corbeni* ▸ *Phascolarctos cinereus* ▸ *Stagonopleura guttata* ▸ *Westringia parvifolia*
25A	Open forests to woodlands dominated by *Acacia harpophylla* (brigalow) sometimes with *Casuarina cristata* (belah) on heavy clay soils.	11.3.1 11.3.17 11.4.3 11.4.10 11.9.5	▸ *Adclarkia cameroni* ▸ *Anomalopus mackayi* ▸ *Aphelocephala leucopsis* ▸ *Calyptorhynchus lathami lathami* ▸ *Dasyurus maculatus maculatus* ▸ *Furina dunmalli* ▸ *Grantiella picta* ▸ *Homopholis belsonii* ▸ *Nyctophilus corbeni* ▸ *Phascolarctos cinereus* ▸ *Stagonopleura guttata*	11.9.5 11.4.10	▸ *Adclarkia cameroni* ▸ *Anomalopus mackayi* ▸ *Aphelocephala leucopsis* ▸ *Calyptorhynchus lathami lathami* ▸ *Dasyurus maculatus maculatus* ▸ *Furina dunmalli* ▸ *Grantiella picta* ▸ *Homopholis belsonii* ▸ *Jalmenus eubulus* ▸ *Nyctophilus corbeni* ▸ *Phascolarctos cinereus* ▸ *Stagonopleura guttata*

BROAD VEGETATION GROUP	DESCRIPTION	ASSOCIATED REGIONAL ECOSYSTEMS IMPACT SITE	SPECIES ASSOCIATIONS – IMPACTS (CONFIRMED RECORDS/SURVEYS)	ASSOCIATED REGIONAL ECOSYSTEMS OFFSET SITES	CO-LOCATED MATTERS ON OFFSET SITES (TO DATE)
34D	Palustrine wetlands. Freshwater swamps/springs/billabongs on floodplains ranging from permanent and semi-permanent to ephemeral.	11.3.27 11.3.27i	▸ *Nyctophilus corbeni* ▸ *Phascolarctos cinereus* ▸ *Rostratula australis*	11.3.27b 11.3.27	▸ *Dasyurus maculatus maculatus* ▸ *Furina dunmalli* ▸ *Grantiella picta* ▸ *Nyctophilus corbeni* ▸ *Phascolarctos cinereus*
Moonie R. - Commoron Creek Floodout & Castlereagh – Barwon					
13D	Woodlands dominated by *Eucalyptus moluccana* (gum-topped box) (or *E. microcarpa* (inland grey box) on a range of substrates.	11.5.20	▸ *Grantiella picta* ▸ *Lepidium monoplocoides* ▸ *Phascolarctos cinereus* ▸ *Westringia parvifolia*	11.5.20	▸ *Aphelocephala leucopsis* ▸ *Calyptorhynchus lathami lathami* ▸ *Grantiella picta* ▸ *Lepidium monoplocoides* ▸ *Phascolarctos cinereus* ▸ *Stagonopleura guttata* ▸ *Westringia parvifolia*
18A	Eucalyptus spp., Angophora spp., Callitris spp. woodland on alluvial plains.	11.3.14	▸ *Phascolarctos cinereus*	11.3.14	▸ *Calyptorhynchus lathami lathami* ▸ *Grantiella picta* ▸ *Phascolarctos cinereus*
18B	Woodlands dominated *Eucalyptus crebra* (sens. lat.) (narrow-leaved red ironbark) frequently with Corymbia spp. or Callitris spp. on flat to undulating plains.	11.5.1 11.5.1a 11.5.4	▸ *Aphelocephala leucopsis* ▸ *Calyptorhynchus lathami lathami* ▸ *Dasyurus maculatus maculatus* ▸ *Furina dunmalli* ▸ *Geophaps scripta scripta* ▸ *Grantiella picta* ▸ *Homopholis belsonii* ▸ *Nyctophilus corbeni* ▸ *Phascolarctos cinereus* ▸ *Stagonopleura guttata* ▸ *Westringia parvifolia*	11.5.1 11.5.1a 11.5.4	▸ *Aphelocephala leucopsis* ▸ *Calyptorhynchus lathami lathami* ▸ *Grantiella picta* ▸ *Lepidium monoplocoides* ▸ *Phascolarctos cinereus* ▸ *Rostratula australis* ▸ *Stagonopleura guttata*

BROAD VEGETATION GROUP	DESCRIPTION	ASSOCIATED REGIONAL ECOSYSTEMS IMPACT SITE	SPECIES ASSOCIATIONS – IMPACTS (CONFIRMED RECORDS/SURVEYS)	ASSOCIATED REGIONAL ECOSYSTEMS OFFSET SITES	CO-LOCATED MATTERS ON OFFSET SITES (TO DATE)
25A	Open forests to woodlands dominated by *Acacia harpophylla* (brigalow) sometimes with *Casuarina cristata* (belah) on heavy clay soils.	11.4.3 11.4.10	▸ *Anomalopus mackayi* ▸ *Calyptorhynchus lathami lathami* ▸ *Dasyurus maculatus maculatus* ▸ *Grantiella picta* ▸ *Homopholis belsonii* ▸ *Nyctophilus corbeni* ▸ *Phascolarctos cinereus* ▸ *Xerothamnella herbacea*	11.4.3	▸ *Calyptorhynchus lathami lathami* ▸ *Grantiella picta* ▸ *Lepidium monoplocoides* ▸ *Phascolarctos cinereus* ▸ *Xerothamnella herbacea*
33B	Hummock grasslands dominated by *Triodia pungens* or *T. longiceps* (giant grey spinifex) or *T. mitchellii* (buck spinifex) sandplains.	11.5.14	▸ *Lepidium monoplocoides* ▸ *Phascolarctos cinereus* ▸ *Westringia parvifolia*	11.5.14	▸ *Lepidium monoplocoides* ▸ *Phascolarctos cinereus* ▸ *Westringia parvifolia*

4 Offset property selection

Offset property selection is an iterative process that involves property shortlisting, rapid field surveys and detailed field surveys. The key components of property selection are outlined below.

4.1 Property shortlisting – MCDS tool

The selection of potential offset properties was facilitated through the purpose-built Inland Rail – Multi-Criteria Decision Support Tool (MCDS tool) (EMM, 2020). The MCDS tool is a spatial tool designed to rank properties in the area of interest for offset potential. The tool ranks properties based on their position in the landscape and assesses their suitability for a range of MNES and MSES using vegetation mapping that identifies unmapped regrowth, advanced regrowth and remnant ecosystems from vegetation base layers. This is driven by the species association with different REs. RE associations for each matter were determined based on the species ecological requirements and were consistent with the impact assessment process. The MCDS tool uses the following data sources:

- Impact area field survey reports and spatial data for the Project
- Regional Ecosystems Description Database (REDD) – threatened flora, Of Concern and Endangered REs by Broad-Vegetation Group (BVG)
- ALA and WildNet Records – threatened flora, threatened fauna
- Essential Habitat RE list – threatened fauna
- Statewide Landcover and Trees Study (SLATS) – monitoring of woody vegetation extent.

The MCDS tool provides a consistent, transparent, and repeatable approach to assessing properties and identifying those that may offer the greatest offset potential from a desktop perspective. The highest-ranking properties were targeted for further assessment through rapid and detailed field surveys to confirm their suitability.

4.2 Community and stakeholder engagement

The Project has contributed to and participated in comprehensive consultation through involvement in general and targeted Community Consultative Committee (CCC) information sessions, community ecology workshops and consultation regarding the management of koalas and matters relating to fauna connectivity as well as regular and ongoing consultation with stakeholders including Local Government Authorities and other organisations involved in protection and land management initiatives such as Queensland Trust for Nature and Healthy Land and Water. See Chapter 6: Stakeholder Engagement for a comprehensive overview of community and stakeholder engagement for the Project.

The Project continues to participate in community and stakeholder engagement opportunities not only to help with the identification of offset priorities but also to develop synergies and alignment relating to the long-term management objectives across the Queensland offset property portfolio particularly relating to strategic priorities and actions contained within the *South East Queensland Koala Conservation Strategy 2020 – 2025*, Commonwealth and State Recovery Plans as well as priorities and actions detailed in species specific conservation advices and listings.

4.3 Land access

Once properties had been shortlisted through the MCDS tool, landowners were identified and approached with information on the Project offsets program. Interested landowners were asked to give formal land access consent prior to any further due diligence.

4.4 Rapid field survey

Once land access was approved, a preliminary ecological offset survey was undertaken to confirm the anticipated offset value/s. These surveys focused on verifying vegetation type and condition, suitability of the site for offset matters, threats and the potential improvement/management options.

The presence of specific target flora and fauna species was also determined where possible although targeted and detailed species assessments were not undertaken at this stage.

4.5 Detailed field survey

Detailed field surveys are undertaken across priority offset properties that the rapid field surveys identified as containing suitable offset values and where landowners indicated their interest in property acquisition.

Detailed offset field surveys include the following:

- Baseline habitat quality assessments for relevant REs conducted in accordance with the *Guide to determining terrestrial habitat quality version 1.2 (2017)* and as detailed in Appendix A *Habitat Quality Assessment Report* (Ausecology, 2023).
- Targeted TEC assessments in accordance with relevant EPBC approved conservation advice and relevant diagnostic characteristics. Verification of 'Of Concern' and 'Endangered' REs was in accordance with the *Methodology for Surveying and Mapping of REs and Vegetation Communities in Queensland*, Version 5.1 (Neldner et al. 2020).
- Targeted flora and fauna surveys for MNES/MSES species conducted in accordance with approved assessment policies, methodologies, guidelines, and approved conservation advice listings including but not limited to the Queensland Government Terrestrial Fauna Survey Guidelines, EPBC Act Survey Guidelines, SPRAT profiles and other relevant government accredited matter-specific survey guidelines.
- Detailed micro-habitat, habitat feature and species threat assessments for MNES/MSES matters. Where possible habitat assessments and active searches were co-located with habitat quality assessment sites.
- Incidental surveys and collection of other inferential evidence across the property (e.g. condition of access tracks, fencing and gates, weed presence and abundance, and land use history).

To date, detailed field surveys have been conducted across multiple properties, with the most suitable options presented in this EODS. Four properties have progressed to acquisition, and an additional property is nearing acquisition, pending approval of this strategy. Further properties are currently in preliminary landholder negotiations to provide additional options if needed. The top six proposed offsets included in this strategy are

- Canning Creek – acquired
- [redacted] – in negotiation pending strategy acceptance
- Glenlovely – acquired
- Hillside – acquired
- Longsdale – acquired
- Whitebox TEC lot – in negotiation pending strategy acceptance

More detailed methodologies for aspects of the detailed field surveys are provided below.

4.5.1 Vegetation communities

Ground-truthing of REs was undertaken using quaternary assessments, conducted as per the *Methodology for Surveying and Mapping Regional Ecosystems and Vegetation Communities in Queensland Version 5.1* (Neldner et al., 2020). Quaternary assessments are used to collect data on vegetation characteristics (e.g. floristic structure and composition), broad ecological condition and the extent and classification of vegetation communities across the offset areas.

The offset areas are delineated into relatively homogenous 'assessment units' defined by a unique RE and broad condition state (i.e. 'remnant' versus 'regrowth' versus 'non-remnant'). BioCondition assessments were then undertaken in accordance with the *BioCondition Manual v2.2* (Eyre *et al*., 2015). Following collection of field data, further analysis was conducted to determine the BioCondition score for each site. To calculate the BioCondition score, the value for each site condition attribute collected during the field survey was compared to reference (i.e. 'benchmark') site values. Benchmark site values are specific to each RE and are based on the average or median value from reference sites. RE benchmark data are provided by the Queensland Herbarium.

All areas were also assessed against TEC criteria. The legal definition of each potentially occurring TEC was examined and, during ground-truthing of REs, any REs likely to be associated with one (or more) TECs were further assessed against the descriptions, condition categories and thresholds as detailed in their respective Approved Conservation Advice documents.

4.5.2 Threatened species

Targeted surveys were undertaken for threatened flora and fauna species across the Project (see Appendix L Terrestrial and Aquatic Ecology Technical Report). Opportunistic random meander transects were undertaken across the offset areas targeting likely MNES/MSES flora species habitat. The random meander transects consisted of two ecologists walking along parallel search lines at an appropriate pace to ensure threatened flora could be identified.

Targeted surveys for fauna were undertaken in accordance with the survey requirements for each matter detailed in the following guidelines:

- Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (Department of Environment and Science, 2018)
- Draft referral guidelines for the nationally listed Brigalow Belt reptiles (DSEWPC 2011a)
- Survey guidelines for Australia's threatened bats (DEWHA 2010a)
- Survey guidelines for Australia's threatened birds (DEWHA 2010b)
- Survey guidelines for Australia's threatened mammals (DSEWPC 2011b)
- Survey guidelines for Australia's threatened reptiles (DSEWPC 2011c).

Targeted surveys included, pitfall and funnel trapping (with drift fencing), harp trapping and mist netting, spotlighting, diurnal area searches, and sign searches.

4.5.3 Habitat quality

All areas were also assessed for habitat quality. The habitat quality assessment methodology used in this report was based on a combination of assessment methods and the following guides:

- Guide to determining terrestrial habitat quality (GTDTHQ) Version 1.2 (2017*)*
- Offset Assessment Guide (OAG) (v1.04.00) and associated 'How to use the OAG' document (DAWE, 2012)
- Queensland Herbarium –BioCondition Assessment Manual (Eyre *et al*., 2015).

The detailed habitat quality assessment methodology has been provided in Appendix A *Habitat Quality Assessment Report* (Ausecology, 2023).

4.6 Investigation, research and monitoring

ARTC has also engaged a range of ecological specialist and research organisations to guide offset property selection and inform species-specific management and monitoring actions associated with Offset Area Management Plans (OAMP). Current investigation, research and monitoring studies relevant to the Project are discussed below.

4.6.1 Koala genetics and dietary analysis

Environmental Resources Management Australia Pty Ltd was commissioned by ARTC to conduct studies into koala genetics, habitat, occurrence, and utilisation across sections of the Inland Rail Program from Narromine to Acacia Ridge/Bromelton. A collaboration has been undertaken with the University of the Sunshine Coast (UniSC) Detection Dogs for Conservation (DDC) team to obtain genetic information from koalas across the Project area. The focus of the study was to undertake an assessment of koala genetics to identify genetic diversity, gene flow and population structure while also assessing health characteristics such as the presence of disease, particularly chlamydia (*Chlamydia pecorum*).

This study aims to provide an understanding of, and contribute new knowledge to, the current status of inland koala populations. Following previous field assessments, this research aims to extend what is currently known about koalas in the Project area and results will contribute to the design and application of koala management strategies and further inform the offset OAMPs.

4.6.2 Koala monitoring

USQ has been engaged to establish a koala investigation monitoring program across the Project. This work has involved engaging University of Queensland's koala ecology specialists to assist with key components of the program. The primary objectives of the monitoring program are to:

1. Assess koala diet (i.e. food trees used by koalas) through scat collection and DNA metabarcoding
2. Assess koala movement patterns through long-term GPS-collaring
3. Assess the risk posed by wild dogs (i.e. koala-wild dog interactions) through long-term GPS collaring of wild dogs
4. Assess the potential efficacy of novel wild dog management strategies to reduce wild dog risk to koalas.

This monitoring is ongoing and results will be used to inform the OAMP for each of the offset properties.

4.6.3 Brigalow Belt reptiles

The University of Southern Queensland has been engaged to establish a research and monitoring program focusing on threatened reptiles of the Brigalow Belt. The overall aim of this research is to acquire the key data to inform impact mitigation of the Project for species including Dunmall's snake, Five-clawed worm skink and Condamine earless dragon populations. The primary objectives include:

1. Experimentally assess capture success of various reptile survey and sampling methods
2. Experimentally assess reptile preferences for various types of artificial habitat
3. Assess the relationship between land use practices and reptile presence/absence
4. Assemble and assess reptile genomes for associations with artificial habitat design.

This monitoring is ongoing and results will be used to inform the OAMP for each of the offset properties.

4.6.4 Threatened bats

Targeted surveys and tracking research were conducted for two threatened microbat species in the large, forested areas of the Project. The target species included the South-eastern Long-eared Bat (*Nyctophilus corbeni*) and the Large-eared Pied Bat (*Chalinolobus dwyeri*), both of which are listed as Vulnerable under the EPBC Act and the NC Act. Results from these studies have helped inform this strategy and will further inform the OAMPs.

4.7 Threatened flora

The University of Southern Queensland has been conducting ongoing threatened flora species on the Project focused on *Westringia parvifolia*; *Xerothamnella herbacea*; *Lepidium monoplocoides*; *Thesium australe*; *Acacia lauta; and Eucalyptus virens*. Results from these investigation, research and monitoring studies will provide ongoing information to support the identification of offset property targets as well as monitoring and management actions within relevant OAMPs.

4.7.1 Indirect impacts

An indirect impact assessment process detailed in the approvals included a thorough evaluation of MNES and MSES across the Project and included the intersected offset properties. This assessment confirmed that there were no indirect impacts to MNES or MSES and that there are no specific management actions required in response to indirect impacts.

5 Project offset portfolio

Using the information and assessments described in Section 4, the following offset property portfolio consisting of six properties (see Figure 5-1) has been selected to best offset impacted matters in:

- Canning Creek
- [redacted]
- Glenlovely
- Hillside
- Longsdale
- Whitebox TEC lot.

Detailed property summaries are provided for each property in the following sections (Section 5.3 to Section 5.8).

An offset summary has been provided in Table 5-1. Detailed data collected from field surveys associated with impact and offset areas have informed the inputs into the OAG. The inputs into the OAG have been considered for each assessment unit across each offset property.

An overview of how the offset portfolio will offset the impacts on remaining MSES is provided in Section 7. Section 7 therefore refers to impacts to MSES where they occur in isolation and are substantially different from any MNES.

ARTC has successfully acquired four of the six properties forecast to be required for the offset portfolio to date. The two remaining properties are currently in the negotiation phase of the offset dealing process. This demonstrates ARTC's commitment to ensuring offset properties are secured in parallel to the Project approvals and demonstrates capability to delivering environmental offsets within Queensland.

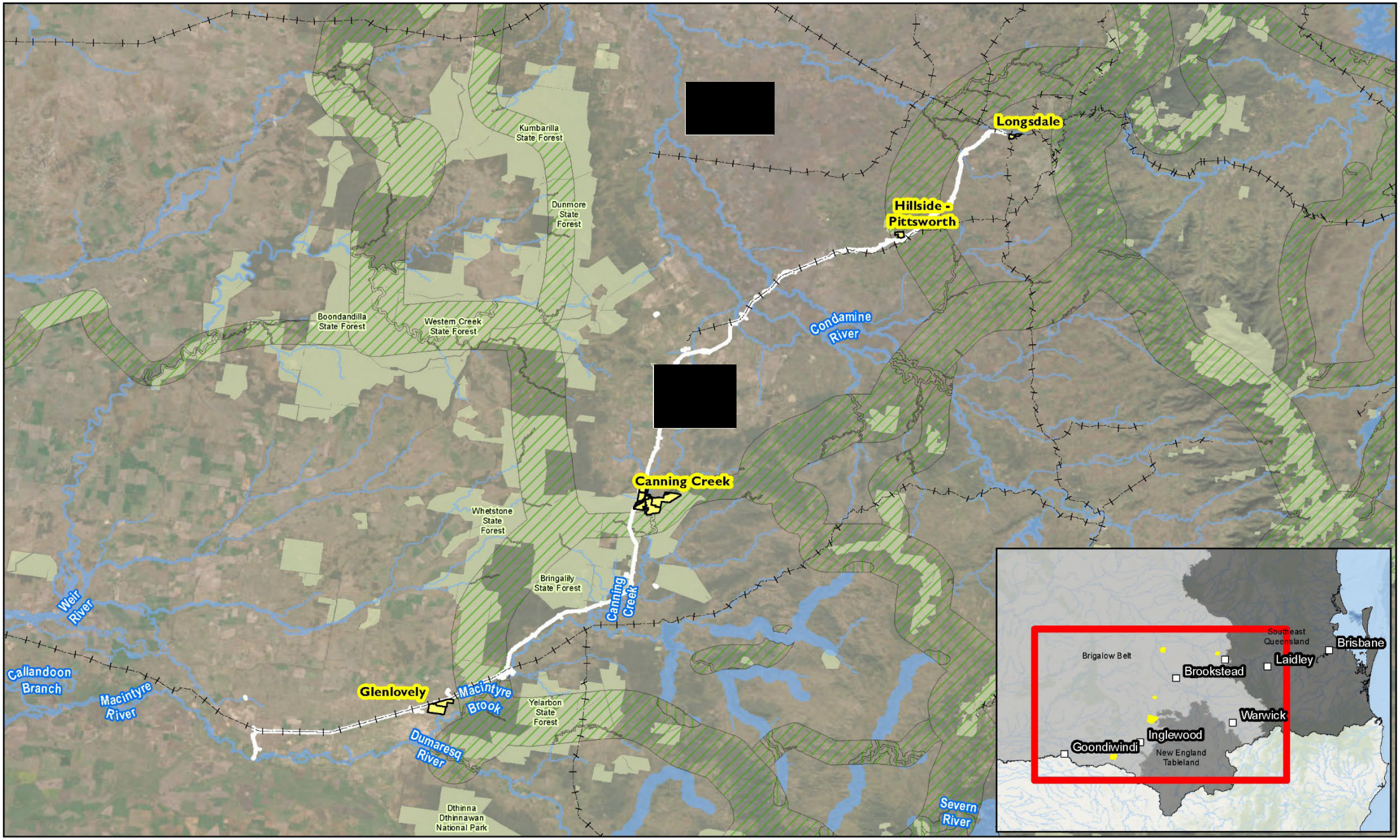


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FIGURE: 5-1

B2G Offset Property Portfolio Overview

- Protected areas
- B2G Footprint
- Rail Network
- Offset Areas

Biodiversity Corridor Type

- Riparian
- Riparian/Terrestrial
- Terrestrial

REVISION	AUTHOR	REVIEWER	DATE
0	JS	LG	23/10/2024

COORDINATE SYSTEM: GDA2020

SCALE: 1:1,000,000

0 10 20 30

Kilometres

5.1 Summary of predicted offset obligation

Table 5-1 Summary of predicted offset obligation

MATTER			RESIDUAL IMPACT (HA)	CANNING CREEK (HA)	GLENLOVELY (HA)	[redacted] (HA)	HILLSIDE (HA)	LONGSDALE (HA)	WHITEBOX TEC LOT (HA)	FORECAST OBLIGATION (%)
MNES – Threatened Ecological Community										
Brigalow (*Acacia harpophylla* dominant and co-dominant)			104.5	325.9	53.5	-	-	-	-	>100%
Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland			66.07	-	-	512.7	-	54.8	-	>100%
White Box-Yellow Box-Blakely's Red Woodland and Derived Native Grassland			2.54	-	-	-	-	-	22.7	>100%
MSES – Remnant Endangered or Of Concern (VM Act)										
BVG 17a	OC	11.3.2 / 11.9.7	28.29	778.4	-	-	-	-	-	>100%
BVG 16c	OC	11.3.4	7.57	23.4	-	-	-	-	-	77%*
BVG 33b	OC	11.5.14	49.07	-	77.1	-	-	-	-	40%*
BVG 13d	OC	11.9.13	0.13	5.7		-	-	-	-	>100%
BVG 25a	E	11.9.5 / 11.4.3	24.68	-	69	-	-	-	-	70%*
REs within a defined distance of a watercourse										
BVG 18A	LC	11.3.14	1.49	7.9	-	-	-	-	-	>100%
BVG 17A	OC	11.3.18	0.15	46.1	-	-	-	-	-	>100%
BVG 16A	LC	11.3.25	1.88	63.1	-	-	-	-	-	>100%
BVG 34D	LC	11.3.27/11.3.27b	0.04	26	-	-	-	-	-	>100%
BVG 18B	LC	11.5.1/11.5.4	3.19	20.46	-	-	-	-	-	>100%
BVG 13D	LC	11.5.20	0.34	-	6.2	-	-	-	-	>100%
BVG 12A	LC	11.7.4/11.7.7	0.5	-	-	-	-	-	-	0*

MATTER			RESIDUAL IMPACT (HA)	CANNING CREEK (HA)	GLENLOVELY (HA)	[redacted] (HA)	HILLSIDE (HA)	LONGSDALE (HA)	WHITEBOX TEC LOT (HA)	FORECAST OBLIGATION (%)
BVG 11A	LC	11.8.4/11.8.5	0.45	-	-	-	5.2	-	-	>100%
BVG 13C	LC	11.9.9	0.01	2.2				-	-	>100%
BVG 15A	LC	RE 11.9.9a	0.01	-	-	-	-	-	9.9	>100%
REs intersecting a wetland										
BVG 16a	LC	11.3.25	0.66	-	-	-	-	-	-	0*
BVG 34A	LC	11.3.27	0.13	-	-	-	-	-	-	0*
BVG 34D	LC	11.3.27b	0.07	-	-	-	-	-	-	0*
MNES – Flora										
Homopholis belsonii			242.25	955.4	-	-	-	-	-	>100%
Lepidium monoplocoides			79.86	-	460.06	-	-	-	-	>100%
Picris evae			110.67	-	-	512.7	-	122.4	-	>100%
Westringia parvifolia			27.19	-	322.5	-	-	-	-	>100%
Xerothamnella herbacea			11.99	-	122.4	-	-	-	-	>100%
MSES – Flora										
Cyperus clarus			166.07	-	-	512.7	151.6	122.4	-	>100%
Picris barbarorum			174.98	-	-	512.7	151.6	-	-	>95%*
MNES – Fauna										
Brigalow woodland snail			146.72	736.0	-	-	-	-	-	>100%
Five-clawed worm-skink			241.6	796.2	-	-	107.8	122.4		>100%
Spotted-tailed quoll			387.48	1900.4	-	-	-	-	-	>100%
Dunmall's snake			262.69	1517.4	-	-	-	-	-	>100%
Squatter pigeon			421.42	1562.0	-	-	-	-	-	>100%
Painted honeyeater			330.66	1736.8	412.39	-	-	-	-	>100%

MATTER	RESIDUAL IMPACT (HA)	CANNING CREEK (HA)	GLENLOVELY (HA)	[redacted] (HA)	HILLSIDE (HA)	LONGSDALE (HA)	WHITEBOX TEC LOT (HA)	FORECAST OBLIGATION (%)
South-eastern long-eared bat	696.25	2041.38	-	-	-	-	-	>100%
Koala	769.4	2087.9	489.5	-	119.54	-	-	>100%
Australian painted snipe	7.91	73	19.8	-	-	-	-	>100%
Condamine earless dragon	51.20	-	-	512.7	-	-	-	>100%
MSES – Fauna								
Southern whiteface	216.89	880.5	348.3	-	-	-	-	>100%
Glossy black-cockatoo	120.01	1012.97	412.4	-	-	-	-	>100%
Pale imperial hairstreak	26.59	254.2	-	-	-	-	-	>100%
Diamond firetail	216.89	935.7	384.3	-	-	-	-	>100%
Connectivity								
Remnant Category B Vegetation	475.33	300.8	336.1	290.4	114.5	22.7	16.9	>100%

* *Residual MSES matters to be a financial settlement offset*

This section outlines how the proposed offset portfolio will address the anticipated offset requirements under the EPBC Act for each MNES to achieve no net loss acknowledging that matter specific management actions and associated detail will be presented in property specific OAMPs.

5.2 Offset assessment guide parameters

The inputs required for the Offset Assessment Guide (OAG) have been assessed and will be outlined in detail in the OAMPs for each property. OAG inputs draw from the detailed site surveys across assessed properties. OAG outputs have been provided in Appendix B: OAG Calculations.

Table 5-2 Offset assessment guide attribute notes and rules used for assessing offsets

OFFSET ASSESSMENT GUIDE ATTRIBUTES		DETERMINATION OF ATTRIBUTE
MNES	EPBC Act Status	The EPBC Act status
Impact calculator	Area (ha)	SRI area of each MNES in hectares.
	Quality (scale 0-10)	The habitat quality of the impact area for each MNES. This was assessed during detailed field surveys undertaken between 2021-2024. This method has been developed based on a combination of assessment methods outlined in the Queensland Herbarium's *BioCondition Manual* (Eyre et al. 2015) and the GTDTHQ (version 1.2) to be consistent with the requirements under the EPBC Act guideline for the OAG
Offset calculator	Start area (ha)	The start area for each MNES represents the total matter area or area of available habitat for the matter on each offset property, as determined through detailed field surveys. Project footprint areas have been excluded across all Project interfaces.
	Time over which loss is averted	The offset sites will be managed for 20 years. Therefore, the time over which loss is averted is considered to be the maximum allowable time of 20 years.
	Time until ecological benefit	The time until ecological benefit is influenced by the matter being offset and the offset approach being implemented to achieve the benefit. As such, this is assessed on a site-by-site basis. Offset sites will have an expected time until ecological benefit of 20 years as a conservative yet appropriate period in which to see measurable and consistent increases in habitat quality. Some management actions may accomplish ecological benefits earlier and this will be measured, monitored and reported on as detailed in each OAMP.
	Risk of loss without offset	Risk of loss has been calculated using the Guidance for deriving 'Risk of Loss' estimates when evaluating biodiversity offset proposals under the EPBC Act (Maseyk et al., 2017). ROL scores will only deviate from this guide where there is credible evidence, and any deviation will be detailed and justified.
	Risk of loss with offset	All proposed offset sites within the offset portfolio will be legally secured under a legally binding mechanism and any development induced clearing of the offset would trigger an offset requirement. No offsets chosen at the time had competing land uses such as mining leases, petroleum leases, or forestry. Therefore, the risk of loss with offset is zero based on the decision tree within Maseyk et al. (2017). This is consistent across all B2G offset properties.

OFFSET ASSESSMENT GUIDE ATTRIBUTES		DETERMINATION OF ATTRIBUTE
Offset calculator	Confidence in result – risk of loss	Where the risk of loss is determined using Maseyk et al. (2017) the confidence will be 90 per cent. Any departure from this approach, where appropriate, will be assessed on a case-by-case basis and justified accordingly.
	Confidence in result – future quality	The anticipated site improvement and the type of management practices proposed, their suitability and provability will inform the confidence in the future site quality. This will be determined on a site-by-site basis. However, where only standard practices and proven measures for quality improvement are selected to achieve a single point increase, the confidence will be 90%.
	Start quality (scale 0-10)	Habitat quality score of the offset site for each MNES. This is assessed during detailed field surveys undertaken across offset properties. This method has been developed based on a combination of assessment methods outlined in the Queensland Herbarium's *BioCondition Manual* (Eyre et al. 2015) and the GTDTHQ (version 1.2) to be consistent with the requirements under the EPBC Act guideline for the OAG.
	Future quality without offset	A detailed, site-specific analysis of the future quality of each offset site has been undertaken and will reflect existing threats and land management practices within the offset area. The predicted future quality without the offset considers the results of field surveys as well as interrogation of aerial imagery and any known land use practices. Detailed justification will be provided for each offset area where the future quality is expected to decline without the offset.
	Future quality with offset	The future quality of the offset is determined by expected improvements in the site condition as a result of offset area management. This will be site-specific and determined by the specific metrics targeted for improvement. Detailed justification will be provided for each offset area.
	Time over which loss is averted	The offset sites will be managed for 20 years. Therefore, the time over which loss is averted is considered to be the maximum allowable time of 20 years.

5.3 Canning Creek

Canning Creek property is a 2,139 ha property (excluding the Project footprint) that adjoins Bringalily State Forest and is intersected by the Project footprint which follows mostly along the highway which also intersects the property. The Project footprint impacts a small portion (60 ha) of the property and offset areas are proposed on either side of the Project footprint, with the majority of offset areas to the eastern side of the Project footprint.

The property supports a broad suite of biodiversity matters and is strategically located close to the impact and large intact biodiversity corridors. Given the size and location, Canning Creek is anticipated to address a large proportion of Project offset requirements and will achieve broader landscape-scale biodiversity outcomes. The property has been acquired by ATRC as an outcome of this process.

Detailed field surveys confirmed that the property contains similar vegetation and habitat to the impact areas. Confirmed two TECs, one MNES flora species, nine MNES / MSES fauna species and mapped habitat for an additional four MNES / MSES species (see Table 5-3).

The property is currently used for agricultural activities, primarily cattle grazing with small areas historically cultivated for forage sorghum. The property is proposed to be wholly used for offsets with on-going grazing only to be considered in a limited capacity as a management tool in non-remnant vegetation and for fire management purposes. The nature and extent of any ongoing cattle grazing on Canning Creek will be consistent with the defined offset management objectives across the property and ultimately determined and defined in the Canning Creek Offset Area Management Plan (OAMP).

Sections of the property have been historically fully cleared, some sections have been left to regrow and some areas of remnant vegetation have been selectively logged of large trees. Most areas, regardless of vegetation condition, have been used for grazing purposes. This has resulted in a mosaic of young and more mature advanced regrowth scattered throughout the cleared grazing areas, as well as remnant areas that are somewhat degraded and others in relatively good condition. A large portion of the property, approximately 70%, is mapped as Category X under a Queensland Property Map of Assessable Vegetation (PMAV), meaning it may be able to continue to be cleared under State legislation and used for agricultural activities.

The property contains a high diversity of REs across a range of land zones, from alluvial flats to rocky ridgelines, as well as significant wetlands including gilgai. The site is also in close proximity to the New England Tableland bioregion (bioregion 13) and together all these factors contribute to very high biodiversity across the property. The property is highly connected, adjoining Bringalily State Forest along its south, west and eastern boundaries. The property also occurs within the State-wide terrestrial biodiversity corridor buffer and regional riparian buffer.

The presence of offset matters, large areas of regrowth and the location close to the impact and regionally protected areas makes Canning Creek an ideal offset property. Offset delivery on Canning Creek will include improvement of the condition of regrowth and remnant vegetation, and selective revegetation in cleared areas. Legally securing the property as an offset will confer greater protection to vegetation, particularly young and mature regrowth currently at risk due to the property's predominantly Category X designation.

An overview map of Canning Creek is provided in Figure 5-2 and a summary of the Canning Creek proposed offset matters in Table 5-3. Photographs of select flora and fauna species are provided Figure 5-3 to Figure 5-14.

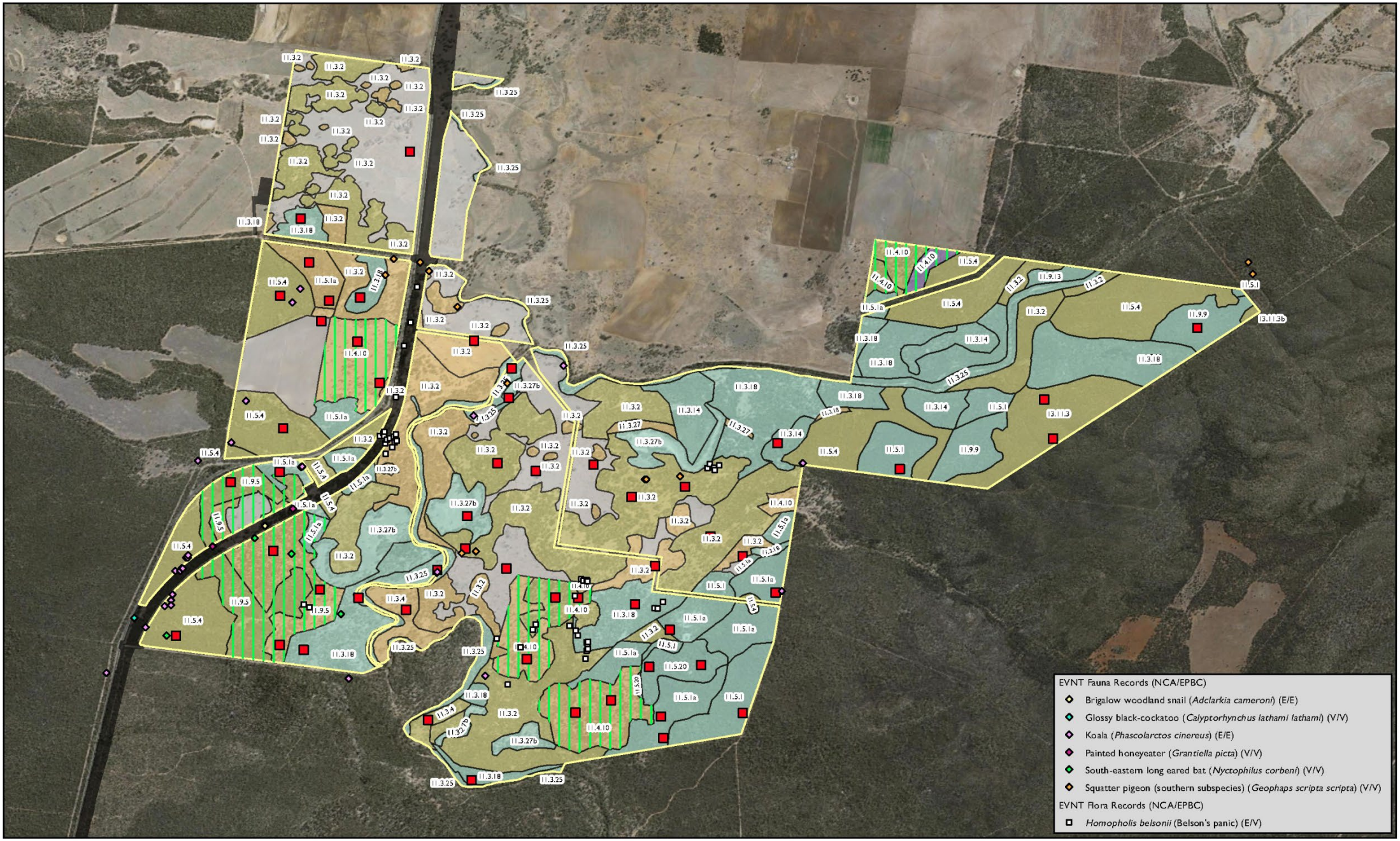

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FIGURE 5-2:
GTRE and BioCondition Survey Sites
B2G - 'Canning Creek'

BioCondition Centre Point
Brigalow TEC
Offset Boundary
B2G Project Footprint

Ground-Truthed Regional Ecosystem (VM Status)
Remnant - Endangered
Remnant - Of Concern
Remnant - Least Concern
Non Remnant - Regrowth
Non Remnant

REVISION	AUTHOR	REVIEWER	DATE
0	NC	LG	23/10/2024

COORDINATE SYSTEM: GDA2020
SCALE: 1:42,000
0 500 1,000
Metres

Table 5-3 Canning Creek Summary

CATEGORY	DETAILS		
Lot and Plan	1BNT185; 10MH737; 2B34277; 9MH737; 31SP118699; 155MA3432; 2RP110474; 2SP118699; 40MA3442.		
Tenure	Freehold.		
Land use	Grazing and cropping, production forestry.		
Total property size (ha)	2,139 ha (excluding the Project footprint).		
LGA	Goondiwindi Regional and Toowoomba Regional.		
Bioregion and Subregion	Majority of the site is within the Brigalow Belt Bioregion, Inglewood Sandstone Subregion of Southern Queensland.. However, a small section along the north-eastern property boundary is within the New England Tableland Bioregion, Nandewar Northern Complex Subregion.		
Confirmed vegetation communities			
Community type	**TEC (EPBC Act status)**	**Equivalent RE (BD status)**	
Alluvial eucalypt dominated woodlands	Poplar box TEC (E)	11.3.2 (OC)	
Freshwater wetlands	-	11.3.27 (OC), 11.3.27b (OC)	
Eucalypt dominated open forests/woodlands (Cainozoic)	-	11.5.1 (NC), 11.5.1a (NC), 11.5.4 (NC), 11.5.20 (NC), 11.9.9 (NC), 11.9.9a (NC)	
Eucalypt/Brigalow dominated open forests to woodlands (Cainozoic)	Includes Brigalow TEC (E)	11.4.10 (E)	
Eucalypt dominated open forests (Sedimentary)	-	11.9.13 (OC)	
Eucalypt dominated woodlands (Metamorphic)	-	13.11.3 (OC), 13.11.3b (OC)	
Brigalow dominated open forests	Includes Brigalow TEC (E)	11.9.5 (E)	
Waterways and wetlands	The dominant land zone is alluvial and there are several waterways that flow across the property, including Canning Creek, Bringalily Creek and Native Dog Creek. Multiple palustrine wetlands confirmed, as well as riverine floodplains and gilgai.		
Confirmed threatened species			
Species	**EPBC Act status**	**NC Act status**	**Notes**
Belson's panic (Homopholis belsonii)	V	E	Multiple records recorded adjacent to the Project footprint within the offset area. An additional individual also recorded to the east.
Common death adder (*Acanthophis antarcticus*)	-	V	Adult male crossing Millmerran Inglewood road ~2 km south of Canning Creek property boundary.
Dunmalls snake (*Furina dunmalli*)	V	V	Records located less than 4 km from Canning Creek. The site contained Brigalow woodlands on black alluvial cracking clay and clay loams.
South-eastern long-eared bat (*Nyctophilus corbeni*)	V	V	One individual male, captured in harp trap during field surveys. Further individual tagged and tracked during threatened bat research.

CATEGORY	DETAILS		
Glossy black-cockatoo (eastern) (*Calyptorhynchus lathami lathami*)	-	V	Record from 2005. Fire Dam beside Millmerran-Inglewood Road, SEQ.
Koala (*Phascolarctos cinereus*)	E	E	Koala evidence and tracking across property.
Painted honeyeater (*Grantiella picta*)	V	V	Two records recorded adjacent to the Project footprint within the offset area.
Spotted quoll (*Dasyurus maculatus maculatus*)	V	V	One record recorded near Canning Creek West.
Squatter pigeon (*Geophaps scripta scripta – southern subspecies*)	V	V	Recorded multiple times on Canning Creek which provides good areas of habitat in 11.3.2 both remnant and non-remnant close to water.
Brigalow woodland snail (*Adclarkia cameroni)*	E	V	Recorded within the Project footprint on Canning Creek property.
Additional threatened species			
Species	**EPBC Act status**	**NC Act status**	**Habitat on site**
Australian painted snipe (*Rostratula australis*)	E	E	Ephemeral shallow, freshwater wetland areas mapped on site that contained a mosaic of ground cover including areas of bare ground, mud and tufted hydrophytic wetland species.
Five-clawed worm-skink (*Anomalopus mackayi*)	V	E	Mapped riparian zones and uncultivated grassy headlands, areas with good coarse woody debris and leaf litter.
Diamond firetail (*Stagonopleura guttata*)	-	V	Remnant and regrowth eucalypt and mixed eucalypt woodland/open forest.
Southern whiteface (*Aphelocephala leucopsis*)	-	V	Remnant and regrowth eucalypt and mixed eucalypt woodland/open forest.

Figure 5-3 *Homopholis belsonii* on Canning Creek

Figure 5-4 Quoll caught on camera trap by The University of Southern Queensland at Canning Creek

Figure 5-5 *Homopholis belsonii* on Canning Creek

Figure 5-6 A local rescued and rehabilitated koala tagged and released on Canning Creek in suitable habitat

Figure 5-7 Squatter pigeon on Canning Creek

Figure 5-8 Squatter pigeon on Canning Creek

Figure 5-9 Landscape of Canning Creek wetland

Figure 5-10 Common death adder (*Acanthophis antarcticus*) sighting close to Canning Creek (Brendan Schembri, 2019)

Figure 5-11 Camera trapping captured a large number of feral pests across the site

Figure 5-12 South-eastern long-eared bat (*Nyctophilus corbeni*) captured in harp trap on Canning Creek

Figure 5-13 Little forest bat (*Vespadelus vulturnus*) found on Canning Creek

Figure 5-14 Landscape of Canning Creek

5.3.1 Offset protection and management – habitat quality loss/gain

Management of Canning Creek under an OAMP will prevent future habitat degradation most notably in the current non-remnant, regrowth and remnant areas which are subject to threats from clearing (especially Category X regrowth areas), timber harvesting, wildfires, pest fauna, grazing pressures and climate change. Table 5-4 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 under an approved OAMP in accordance with proposed management measures 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 over the next 20 years.

Canning Creek is not currently actively managed for fire risks and given the location next to adjacent forest, the risk of fire to the ecological values on the property is high. A fire break network and ecological burn program is not actively managed across the property and currently fire through some parts of the property would be hard to contain and currently represents a significant risk without management. The property had a high feral pest load that was evident during the surveys, this is likely to continue without active management.

Canning Creek has a PMAV (Category X) over a large portion of the property and the previous owners have not recently cleared within much of this area, resulting in a mosaic of young and more mature regrowth emerging. However, without offset protection over the property, it is likely that large areas under the PMAV would be subject to clearing/thinning works to remove regrowth and promote pastures for grazing. Canning Creek has been logged in the past and large trees removed and this pressure continues with landowners cutting timber for firewood.

The offset will be managed under an OAMP to improve habitat quality for MNES and MSES and habitat quality at Canning Creek is expected to increase. The OAMP developed for the property will include specific management actions targeting threats to each matter being offset and improving the quality of habitat within the offset area. The vegetation condition and associated habitat quality on the property can be improved with implementation of management actions as detailed further in Table 5-5 with further details to be detailed further in a OAMP for Canning Creek. In general, this will include:

- Pest animal control
- Livestock management/removal
- Weed control
- Fire management
- Regrowth restoration management and active plantings / habitat reconstruction

Table 5-4 - Overall future habitat quality with and without offset

SITE CONDITION ATTRIBUTES	CURRENT SCORE AGAINST BENCHMARK (%)	FUTURE QUALITY WITHOUT OFFSET	FUTURE QUALITY WITH OFFSET
Recruitment of woody perennial species in EDL	71	Decrease	Increase
Native plant species richness – trees	90	Decrease	--
Native plant species richness – shrubs	114	Decrease	--
Native plant species richness – grasses	156	Decrease	--
Native plant species richness – Forbes	136	Decrease	-
Tree emergent height	72	Decrease	Increase
Tree canopy height		Decrease	Increase
Tree sub-canopy height		Decrease	Increase

SITE CONDITION ATTRIBUTES	CURRENT SCORE AGAINST BENCHMARK (%)	FUTURE QUALITY WITHOUT OFFSET	FUTURE QUALITY WITH OFFSET
Tree emergent cover	87	Decrease	Increase
Tree canopy cover		Decrease	Increase
Tree sub-canopy cover		Decrease	Increase
Shrub canopy cover	52	Decrease	Increase
Native grass cover	146	--	-
Organic litter	49	Decrease	Increase
Large trees	26	Decrease	Increase
Coarse woody debris	64	Decrease	Increase
Non-native plant cover	93	--	--

Table 5-5 Proposed Management actions for matters on Canning Creek

MANAGEMENT ACTION	BRIGALOW TEC	BRIGALOW WOODLAND SNAIL	*HOMOPHOLIS BELSONII*	PALE IMPERIAL HAIRSTREAK
Fire management	Establish fire break network. Exclude fire in core Brigalow patches to prevent structural changes in vegetation, reduce fuel loads in areas directly adjacent to remnant patches through slashing or cool burns. Establish fire break network and ecological burn program in surrounding areas over the life of the offset.	Establish fire break network. Avoid fire in habitat areas to protect leaf litter and ground cover and prevent damage to the fire sensitive habitat that the species depends on.	Establish fire break network. Avoid high intensity burns that impact habitat and regeneration areas. Trials of ecological burns in areas with known *Homopholis belsonii* records.	Establish fire break network. Implement controlled burns to maintain habitat structure and promote the growth of native flora that supports the larval food source, particularly in areas where wildfires may threaten existing populations.
Pest fauna management	Remove herbivores (like cattle) that degrade vegetation and soil.	Remove herbivores and feral pigs that compact and disturb soil.	Control herbivores to reduce browsing pressure and trampling.	Monitor invasive species that threaten native butterflies, including potential predators such as ants that may disrupt their symbiotic relationships. Trial ant-specific bait particularly during times when the Pale Imperial Hairstreak is in its larval and pupal stages although currently no research on this.
Weed management	Undertake weed management using targeted weed control in Brigalow patches where weeds are impacting on the Brigalow TEC, remove cattle to reduce weed spread and potential thin areas of regrowth to encourage growth that will crowd/shade out weeds.	Undertake weed management using targeted weed control in Brigalow patches where weed species are impacting on the vegetation condition.	Monitor for any weed incursions and treat as required.	Undertake weed management using targeted weed control in Brigalow patches where weed species are impacting on the vegetation condition and recruitment of flora species that the butterfly relies on.

MANAGEMENT ACTION	BRIGALOW TEC	BRIGALOW WOODLAND SNAIL	*HOMOPHOLIS BELSONII*	PALE IMPERIAL HAIRSTREAK
Habitat restoration	Restore Brigalow vegetation through replanting and regeneration. Removal of cropping and grazing by cattle.	Active translocation program for snails found in the impact area to suitable habitat within the offset site. Salvage and relocation of microhabitat features for offset properties will be undertaken as part of rehabilitation, reinstatement. habitat enhancement and beneficial re-use activities, as far as practicable, including in areas in identified as important functional movement corridors (e.g. priority connectivity zones)	Seed collection from plants in the impact zone for future regeneration from seed.	Restore Brigalow vegetation through replanting and regeneration Removal of cropping and grazing by cattle.
Revegetation	Area of Brigalow previously cleared for cropping will be planted back to the TEC community. Replant native Brigalow species to restore community structure.	Re-establish native vegetation to maintain microhabitats. Protect ground litter and fallen logs for moisture retention through removal of cattle, using any logs from the impact area reinstated into the offset area or through thinning (where required). Encourage regrowth areas and plant out new areas of Brigalow to create new habitat.	Actively translocate plants or collect seed from the impact zone onto Canning Creek offset area. Noted other projects that have successfully translocated this species.	Plant or regenerate local native species that support the Pale Imperial Hairstreak's lifecycle, ensuring a strong presence of larval host plants, particularly in disturbed or fragmented areas.

MANAGEMENT ACTION	PAINTED HONEYEATER	PAINTED SNIPE	SQUATTER PIGEON	DIAMOND FIRETAIL	GLOSSY BLACK COCKATOO	SOUTHERN WHITEFACE
Fire management	Establish fire break network. Avoid fire in nesting habitats; manage fire to preserve mistletoe plants (food source).	Establish fire break network Maintain water sources and avoid burning riparian zones where nesting could occur.	Establish fire break network. Use low intensity burns to maintain/create open grasslands; avoid nesting season burns where possible.	Establish fire break network. Maintain open woodland areas with shrubs and patchy groundlayer through a low intensity ecological burning regime.	Establish fire break network. Exclude fire from regenerating feed trees ((allo)casuarina trees.	Establish fire break network. Maintain open woodland areas with shrubs and patchy groundlayer through a low intensity ecological burning regime.
Pest fauna management	Control predators like cats and foxes on the property.	Reduce predation by managing feral cats and foxes near wetland habitats. Control pigs to avoid damage to wetland habitats.	Control predators to reduce chick predation; manage feral pigs in nearby areas.	Predator control (cats, foxes).	Reduce feral animals (cats, foxes) to protect chicks and adult birds.	Control invasive predators like cats and foxes that may prey on nests and young birds.
Habitat restoration	Avoid clearing of vegetation to protect trees with mistletoe growing in them. Undertake low ecological burn regime to protect areas with mistletoe.	Avoid clearing of native vegetation around wetland areas. Undertake weed control where weeds significantly impact the vegetation condition of the wetlands.	Undertake weed control where weeds significantly impact the vegetation condition of the woodlands. Conduct low intensity ecological burns.	Undertake weed control where weeds significantly impact the vegetation condition of the woodlands. Conduct low intensity ecological burns.	Plant *Casuarina cristata* trees in brigalow areas to be revegetated as a future food source. Conduct low intensity ecological burns to avoid hot uncontrolled wildfires that can destroy nesting habitat.	Undertake weed control where weeds significantly impact the vegetation condition of the woodlands. Conduct low intensity ecological burns.
Revegetation	Restore Brigalow vegetation through replanting and regeneration.	Not applicable.	Not applicable.	Not applicable.	Restore Brigalow vegetation through replanting and regeneration.	Not applicable.

MANAGEMENT ACTION	KOALA	SPOTTED TAIL QUOLL	SOUTH-EASTERN LONG-EARED BAT
Fire management	Establish fire break network. Use low-intensity, patchy burns to reduce fuel load without harming key eucalyptus trees or their regrowth.	Establish fire break network. Exclude fire from denning areas, especially rocky outcrops and dense vegetation.	Establish fire break network. Avoid fire in roosting habitat areas, as these bats roost in hollow-bearing trees. Undertake fire mitigation practices (where practical) if conducting low intensity ecological burns.
Pest fauna management	Control domestic and feral dogs, which can pose predation risks.	Control foxes and feral cats, which are significant quoll predators.	Not applicable.
Weed management	Not applicable.	Not applicable.	Not applicable.
Habitat restoration	Restore eucalyptus-dominated woodlands through regeneration, with an emphasis on preferred koala food species and enhancing connectivity. Remove internal barrier fencing across the property.	Restore forested areas to increase denning options and hunting grounds for quolls. Remove internal barrier fencing across the property.	Protect and restore forest areas with mature, hollow-bearing trees for roosting. Salvage and relocation of microhabitat features for offset properties will be undertaken as part of rehabilitation, reinstatement. habitat enhancement and beneficial re-use activities, as far as practicable, including in areas in identified as important functional movement corridors (e.g. priority connectivity zones)

MANAGEMENT ACTION	FIVE-CLAWED WORM SKINK	DUNMALL'S SNAKE
Fire management	Establish fire break network. Use low-intensity, patchy mosaic burns where possible to maintain areas with ground cover and leaf litter.	Establish fire break network. Use low-intensity, patchy mosaic burns where possible to maintain areas with ground cover and leaf litter. Undertake pre-burn preparations to protect coarse woody debris where practical.
Pest fauna management	Control invasive species like feral cats and foxes that may prey on skinks.	Reduce predation pressure by controlling feral cats and foxes.
Weed management	Undertake weed management where required for general vegetation condition improvement.	Undertake weed management where required for general vegetation condition improvement.
Habitat restoration	Use low-intensity, patchy mosaic burns where possible to promote a healthy groundlayer and protect areas with significant coarse woody debris. Remove cattle grazing that contributes to soil compaction,	Use low-intensity, patchy mosaic burns where possible to promote a healthy groundlayer and protect areas with significant coarse woody debris. Restore Brigalow vegetation through replanting and regeneration. Remove cattle grazing that contributes to soil compaction and reduction of ground cover.
Revegetation	Not applicable.	Restore Brigalow vegetation through replanting and regeneration.

5.4 [redacted]

The [redacted] property is located approximately 30 km north of the Project footprint and is further away from the impact area than other Project offset properties. However, it has been targeted as an offset property as it contains a large patch of remnant grassland which is rare in the landscape. This is one of the more significant remaining remnant grassland patches in the region. The property also contains habitat for three MNES/MSES flora and two MNES/MSES fauna (see Table 5-6). In particular, the confirmed presence of the Condamine earless dragon is significant, as the species extent of occurrence is estimated to be less than 2,000 km^2 and the area of actual anticipated occupancy around 76 km^2. As such this property offers a unique ecosystem type that is rare in the landscape and compliments the broader biodiversity matters of other properties in the portfolio, such as Canning Creek. Offset property dealings are currently underway.

Grassland TEC makes up around 47% of the property and is currently grazed with the remaining area being fully cleared and actively cropped. The property is proposed to be fully secured and wholly used for offsets with cropping and grazing practices to be phased out based on management actions prescribed in the [redacted] OAMP.

The property is in a highly fragmented landscape however, within the Brigalow Belt bioregion, remnant grasslands have largely been converted to cropland and/or are highly fragmented, occurring along narrow road reserves and headlands. Therefore, the occurrence of a large, intact patch of natural grassland TEC on [redacted] is considered very unique and highly significant in this landscape. It is also representative of the habitat for matters in the impact area.

The offset delivery on [redacted] will focus on improving the condition of the existing remnant patch and converting the area that is currently cropped to grassland TEC. This would double the size of the grassland patch and significantly improve habitat for the Condamine earless dragon.

An overview map of [redacted] is provided in Figure 5-15 and a summary of the [redacted] property and confirmed offset matters is provided in Table 5-6. Photographs of select flora and fauna species are provided from Figure 5-16–Figure 5-21.

Map removed as it contains private information which is confidential and not suitable to be provided to third parties, in compliance with requirements of the Information Privacy Act 2009.

Figure 5-15 GTRE and BioCondition Survey Sites - B2G [redacted]

Table 5-6 [redacted] Offset Property Summary

CATEGORY	DETAILS		
Lot and Plan	[redacted]		
Tenure	Freehold		
Land use	Cropping and other minimal use		
Total property size (ha)	513		
LGA	Toowoomba Regional		
Bioregion and Subregion	The site sits within the Brigalow Belt Bioregion, Eastern Darling Downs Subregion of Southern Queensland.		
Confirmed vegetation communities			
Community type	**TEC (EPBC Act Status)**	**Equivalent RE (BD Status)**	
Dichanthium sericeum grassland on alluvial plain with cracking clay soils	Natural Grassland TEC (E)	11.3.21 (E)	
Themeda avenacea grassland on alluvial plains	Natural Grassland TEC (E)	11.3.24 (E)	
Confirmed threatened species			
Species	**EPBC Act Status**	**NC Act Status**	**Notes**
Cymbonotus maidenii	-	E	Along fence line, edge of sorghum cropping and adjacent to drainage line in remnant grassland.
Picris barbarorum	-	V	Adjacent to drainage line in remnant grassland.
Condamine earless dragon *(Tympanocryptis condaminensis)*	E	E	One juvenile individual captured in a pitfall trap.
Grey snake (Hemiaspis damelii	-	E	One individual grey snake (*Hemiaspis damelii*) was captured in a funnel trap along a drift fence line located within remnant grassland paddocks of [redacted].
Additional potential threatened species			
Species	**EPBC Act Status**	**NC Act Status**	**Habitat on site**
Five-clawed worm-skink (*Anomalopus mackayi)*	V	E	Mapped riparian zones and uncultivated grassy headlands, areas with good coarse woody debris and leaf litter.
Picris evae	V	V	Black soils and remnant grassland.
Dichanthium queenslandicum	E	E	Natural grassland on the black cracking clay soil.

Figure 5-16 Close up of *Cymbonotus maidenii*

Figure 5-17 Close up of *Picris evae*

Figure 5-18 Condamine earless dragon (*Tympanocryptis condaminensis*) captured on [redacted]

Figure 5-19 Condamine earless dragon (*Tympanocryptis condaminensis*) from fauna trapping on [redacted]

Figure 5-20 Grey snake (*Hemiaspis damelii*) found on [redacted]

Figure 5-21 *Cymbonotus maidenii* recorded along fence line

5.4.1 Offset protection and management – habitat quality loss/gain

Management of [redacted] under an OAMP will prevent future habitat degradation most notably in the current non-remnant and remnant areas which are subject to threats from cropping, grazing pressures and weeds.

Table 5-7 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 under an approved OAMP in accordance with proposed management measures 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 over the next 20 years.

The [redacted] property contains a large area of natural grassland TEC and seasonally cropped areas, and the surrounding areas are also heavily cultivated and predominantly used for sorghum cropping. The natural grassland is currently grazed heavily, and the site is located within a highly fragmented landscape; together these edge effects are expected to decrease the quality of the area over time. Due to the nature of the surrounding land uses, without active management, the natural grassland TEC would be expected to decline in quality over the next 20 years due to weed invasion and increased grazing pressure. Heavy grazing is known to result in a replacement sequence of dominant species within the TEC over time (Dorrough, Ash, & McIntyre, 2004).

The offset will be managed to improve habitat quality for MNES and MSES and includes an area to return cultivation to natural grassland. Therefore, habitat quality at [redacted] is generally expected to increase.

An OAMP will be developed for the property that will include specific management actions targeting threats to each MNES/MSES being offset. The vegetation condition and associated habitat quality on the property can be improved with implementation of management actions as detailed further in Table 5-8 with further details to be detailed further in an OAMP for the [redacted] offset. In general, this will include:

- Revegetation of native grassland
- Livestock management
- Slashing at appropriate times to promote regeneration, nutrient cycling, and reduction of hazardous fuel loads.
- Managing weeds that may invade the grassland and elevate fuel loads
- Seed collection, propagation and planting of threatened flora species

Table 5-7 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	NA		
Native plant species richness – trees	NA		
Native plant species richness – shrubs	29	Decrease	Increase
Native plant species richness – grasses	38	Decrease	Increase
Native plant species richness – forbes	35	Decrease	Increase
Tree emergent height	NA		
Tree canopy height			
Tree sub-canopy height			

SITE CONDITION ATTRIBUTES	CURRENT SCORE (%)	FUTURE QUALITY WITHOUT OFFSET	FUTURE QUALITY WITH OFFSET
Tree emergent cover	NA		
Tree canopy cover			
Tree sub-canopy cover			
Shrub canopy cover	29	Decrease	Increase
Native grass cover	30	Decrease	Increase
Organic litter	70	-	Increase
Large trees	NA		
Coarse woody debris	NA		
Non-native plant cover	42	Decrease	Increase

Table 5-8 Proposed management actions for matters on [redacted]

MANAGEMENT ACTION	GRASSLAND TEC	CONDAMINE EARLESS DRAGON	PICRIS EVAE
Fire management	Establish fire break network. Low to moderate burns less than 30% in any year. Burn under conditions of good soil moisture and when plants are actively growing and taking the REs fire guidelines into consideration.	Establish fire break network. Low to moderate burns less than 30% in any year. Burn under conditions of good soil moisture and when plants are actively growing and taking the REs fire guidelines into consideration.	Establish fire break network. Low to moderate burns less than 30% in any year. Burn under conditions of good soil moisture and when plants are actively growing.
(Pest) Fauna management	Conduct pig control if deemed to be negatively impacting the grassland vegetation condition.	Reduce predation pressure by controlling feral cats and foxes.	Conduct pig control if deemed to be negatively impacting the grassland vegetation condition.
Weed management	Undertake weed control with an emphasis on species that will result in an uplift in the habitat quality score.	Undertake weed control as part of good grassland management.	Undertake weed control as part of good grassland management.
Habitat restoration	Remove herbivores (like cattle) that degrade vegetation and soil structure. Conduct low intensity ecological mosaic burns.	Consider a trial of installing artificial burrows.	Consider seed collection and direct seeding in suitable habitat to establish new subpopulations. Establish fire break network. Use low-intensity, patchy mosaic burns where possible to maintain areas with ground cover and leaf litter.
Revegetation	Grassland restoration to increase the current extent of grassland in the area.	Not applicable.	Consider seed collection of populations on adjacent remnant for revegetation.

5.5 Glenlovely

Glenlovely property is located near Yelarbon, west of Whetstone State Forest and is intersected by the Inland Rail. The Project footprint intersects the northern boundary and offsets are proposed south of the Project footprint. This section of the Project falls within the Moonie R.-Commoron Creek Floodout subregion and Glenlovely supports several unique offset matters that are impacted in this subregion. These include *Westringia parvifolia, Lepidium monoplocoides and Xerothamnella herbacea*, and regional ecosystem 11.5.14 (Yelarbon desert). A 77.4 ha area of RE 11.5.14 has been confirmed on the property along with both *Westringia parvifolia and Lepidium monoplocoides* during surveys. In total, 40 individual *W. parvifolia* were recorded on Glenlovely on the edge of regrowth RE 11.5.20 and RE 11.5.4 and 25 *L. monoplocoides* were recorded near the south-west corner of the property. In particular, the confirmed presence of *W. parvifolia* is significant, as the site is one of only several to have recorded the species in Queensland this century. The property also contains confirmed habitat for the threatened Australian painted snipe (*Rostratula australis*) as well as Brigalow TEC and potential habitat for a range of other threatened species.

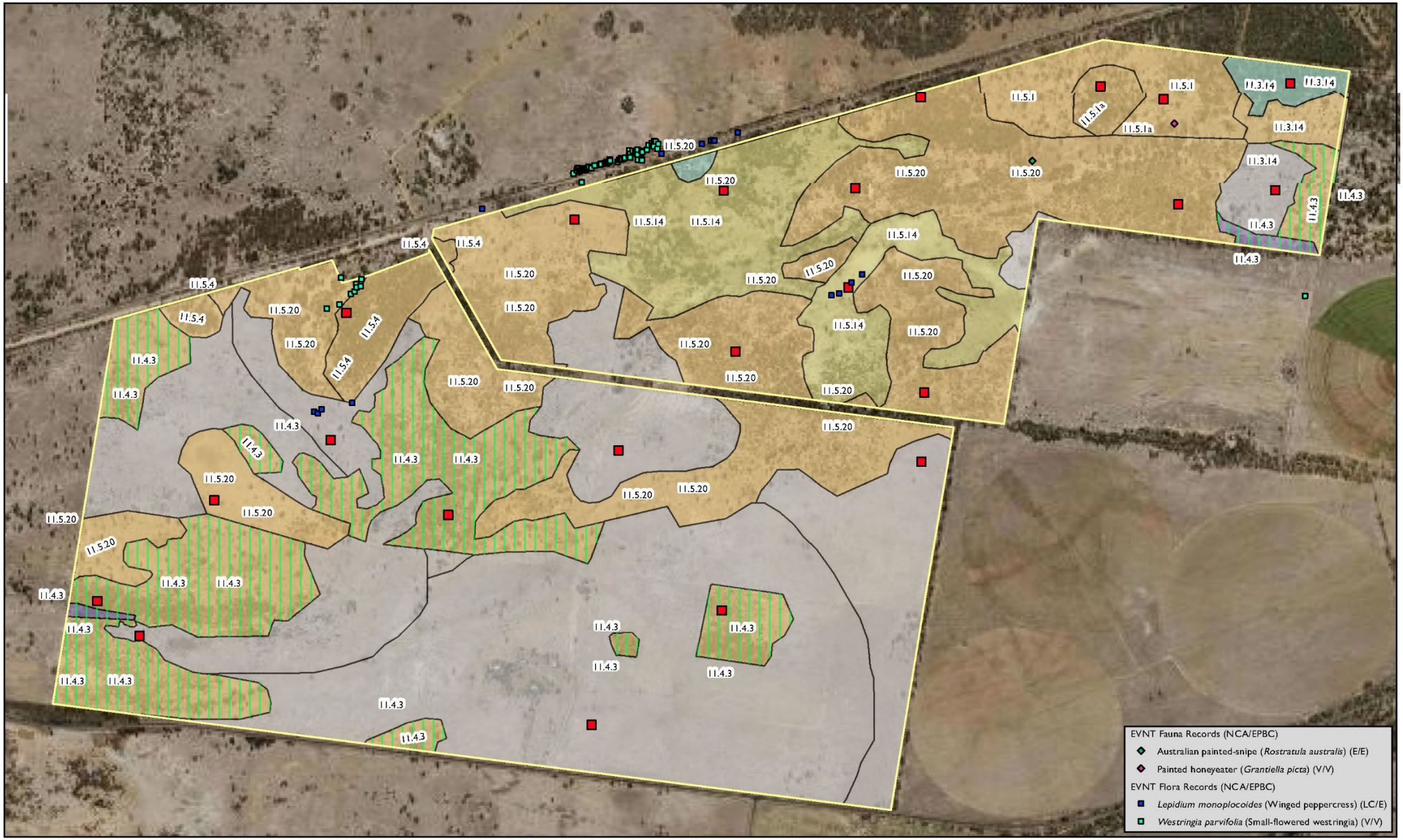
The unique Yelarbon 'desert' ecosystem occurs is listed as Of Concern due to its small extent (4,000 ha) despite very little clearing ever being undertaken (approximately 4,000 ha remains). The RE was formed by concentration of sodium and salts through evaporation of groundwater from the Great Artesian Basin. The unusual soil chemistry makes the area susceptible to flood erosion and inhospitable to most plant species (Biggs *et al.,* 2010). The resulting scalds have unusual combinations of plants, including the Nationally Endangered *Lepidium monoplocoides*, which reaches its northern range limit at Yelarbon (Fensham *et al*., 2007).

The property is currently used for grazing and does not contain any competing land uses such as mining leases, petroleum leases, or forestry. The property has recently been acquired by ARTC.

The property is located in a highly fragmented landscape but has connectivity to native vegetation on adjoining properties; at its closest point, it is approximately 500 m from the Macintyre Brook and 3 km north of Yelarbon State Forest. There are also numerous wetlands formed in large gilgai in RE11.4.3 and in run-on areas in 11.5.14 that increase fauna and plant diversity. The site is within 3 km of the Yelarbon State Forest, contributing to the potential for high biodiversity within the offset area.

The presence of offset matters, areas of sensitive ecological communities and the location close to the impact and the Whetstone State Forest make Glenlovely an ideal offset property for a variety unique flora species. The property also provides supporting habitat for threatened fauna in the region. Offset delivery on Glenlovely will include removing current threats and managing pressures to the sensitive vegetation communities contained on this property to improve the habitat for the flora species that it supports.

An overview map of Glenlovely and a summary of the Glenlovely property, including the sites potential and confirmed offset matters, is provided in Table 5-9.



Ausecology

FIGURE 5-24:
GTRE and BioCondition Survey Sites
B2G - 'Glenlovely'

- BioCondition Centre Point
- Brigalow TEC
- Offset Boundary

Ground-Truthed Regional Ecosystem (VM Status)

- Remnant - Endangered
- Remnant - Of Concern
- Remnant - Least Concern
- Non Remnant - Regrowth
- Non Remnant

REVISION	AUTHOR	REVIEWER	DATE
0	NC	LG	23/10/2024

COORDINATE SYSTEM: GDA2020
SCALE: 1:20,000
N W E S
0 250 500
Metres

Table 5-9 Glenlovely offset property summary

CATEGORY	DETAILS
Lot and Plan	13MH160, 14MH160, 15MH160, 5MH160, 78MH399, 7MH160, 8MH160
Tenure	Freehold
Land use	Grazing native vegetation
Total property size (ha)	826 ha
LGA	Goondiwindi Regional
Bioregion and Subregion	The site sits within the Brigalow Belt Bioregion and the Subregion Moonie R. - Commoron Creek Flood out subregion of Southern Queensland

Confirmed vegetation communities

Community type	TEC (EPBC Act status)	Equivalent RE (BD status)
Acacia harpophylla and/or *Casuarina cristata* shrubby open forest on Cainozoic clay plains	Brigalow TEC (E)	11.4.3 (E)
Triodia sp. open hummock grassland with emergent trees on Cainozoic sand plains and/or remnant surfaces; and highly alkaline soils	-	11.5.14 (OC)
Eucalyptus populnea woodland with *Allocasuarina luehmannii* low tree layer on Cainozoic sand plains and/or remnant surfaces	-	11.5.1a (LC)
Eucalyptus spp., ***Angophora*** spp., ***Callitris*** spp. woodland on alluvial plains	-	11.3.14 (LC)
Eucalyptus moluccana and/or *E. microcarpa* and/or *E. woollsiana* +/- *E. crebra* woodland on Cainozoic sand plain	-	11.5.20 (LC)

Confirmed threatened species

Species	EPBC Act status	NC Act status	Notes
Westringia parviflora	V	V	Individuals growing on the edge of regrowth RE 11.5.20 and RE 11.5.4.
Lepidium monoplocoides	E	C	Areas of *Triodia scabra*/*Melaleuca densispicata* grassland/shrubland.
Australian painted snipe (*Rostratula australis*)	E	E	Located in human made dam with good coarse woody debris and cover of sedges.
Painted honeyeater (*Grantiella picta)*	V	V	Found in areas with flowering and fruiting mistletoe and flowering eucalypts

CATEGORY	DETAILS		
Additional potential threatened species			
Species	**EPBC Act status**	**NC Act status**	**Habitat on site**
Xerothamnella herbacea	E	E	Brigalow areas along drainage features with good layers of leaf litter.
Dunmall's Snake	V	V	Cracking clay soils and brigalow/belah woodlands.
Brown treecreeper *(Climacteris picumnus)*	V	V	Record confirmed within northern section of the property.
Koala (*Phascolarctos cinereus)*	E	E	Remnant and regrowth eucalypt or mixed eucalypt woodland/open forest and non-remnant communities with scattered eucalypt paddock trees.
Glossy black-cockatoo (*Calyptorhynchus lathami lathami)*	-	V	Areas of mixed *Allocasuarina*, *Casuarina*, *Callitris* and *Acacia harpophylla* woodland.
Diamond firetail (*Stagonopleura guttata)*	-	V	Remnant and regrowth eucalypt and mixed eucalypt woodland/open forest.
Southern whiteface *(Aphelocephala leucopsis)*	-	V	Remnant and regrowth eucalypt and mixed eucalypt woodland/open forest.

Figure 5-23 A juvenile female Australian painted snipe (*Rostratula australis*) pictures by Ausecology in a human made dam on Glenlovely showing the importance of this habitat

Figure 5-24 RE 11.5.14 with the characteristic spinifex grass clumps and *Melaleuca densispicata*

Figure 5-25 Australian painted snipe (*Rostratula australis*) habitat on Glenlovely in a constructed dam

Figure 5-26 Painted honeyeater (*Grantiella picta*) *pictured by Ausecology in mistletoe on Glenlovely*

Figure 5-27 Mistletoe in tree within proposed offset area, showing the importance of new recruitment for this habitat

Figure 5-28 Tree hollows in Eucalypt tree, importance habitat feature to be protected

Figure 5-29 *L. monoplocoides* located within the proposed offset area

Figure 5-30 *W. parvifolia* located within the proposed offset area

5.5.1 Offset protection and management – habitat quality loss/gain

Management of Glenlovely under an OAMP 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 5-10 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 under an approved OAMP in accordance with proposed management measures 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 over the next 20 years.

Glenlovely is not currently actively managed for fire risks to ecological values and the risk of fire to the ecological values on the property is high. These values need to be carefully managed through fire planning to maintain vegetation composition, structural diversity, animal habitats and to prevent the risk of extensive wildfire.

The offset will be managed to improve habitat quality for MNES and MSES and therefore, habitat quality is generally expected to increase.

An OAMP will be developed for the property that will include specific management actions targeting threats to each MNES/MSES being offset and improving the quality of habitat within the offset area.

The vegetation condition and associated habitat quality on the property can be improved with implementation of management actions as detailed further in Table 5-11 with further details to be provided in the OAMP to be developed for the Glenlovely offset. In general, this will include:

- Pest management with a focus on foxes and pigs
- Removal of improved pastures either through intensive pulse grazing, slashing, ecological burning or herbicide treatment or combination of these options), to allow brigalow communities to regenerate.
- Removal of grazing from regenerating and remnant areas to allow the recruitment of canopy and subcanopy species and associated coverage. This will contribute to the increase in the extent of brigalow TEC. This will most likely also result in an increase in the native groundcover species and coverage, increase leaf litter coverage and reduction of bare ground.
- Opportunity for infill planting to fill in gaps in regenerating areas and/or to provide connectivity
- Seed collection, propagation and planting of threatened flora species across the property.

Table 5-10 -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	48	Decrease	Increase
Native plant species richness – trees	100	-	--
Native plant species richness – shrubs	109	-	--
Native plant species richness – grasses	103	-	-
Native plant species richness – forbes	84	Decrease	-
Tree emergent height	62	Decrease	Increase
Tree canopy height		Decrease	Increase
Tree sub-canopy height		Decrease	Increase
Tree emergent cover	76	Decrease	Increase
Tree canopy cover		Decrease	Increase
Tree sub-canopy cover		Decrease	Increase
Shrub canopy cover	117	-	-
Native grass cover	274	-	-
Organic litter	24	Decrease	Increase
Large trees	49	Decrease	Increase
Coarse woody debris	77	Decrease	-
Non-native plant cover	97	-	-

Table 5-11 Proposed management actions for matters on Glenlovely

MANAGEMENT ACTION	BRIGALOW TEC	*LEPIDIUM MONOPLOCOIDES*	*WESTRINGIA PARVIFLORA*	*XEROTHAMNELLA HERBACEA*
Fire management	Establish fire break network. Exclude fire in core Brigalow patches to prevent structural changes in vegetation, reduce fuel loads in areas directly adjacent to remnant patches through slashing or cool burns.	Establish fire break network, taking locations of the species into consideration where possible. Not much is known about the effects of fire, so consider setting up small burn trials.	Establish fire break network, taking locations of the species into consideration where possible.	Establish fire break network, taking locations of the species into consideration where possible. Since *Xerothamnella herbacea* is associated with brigalow/belah, fire exclusion is required.
(Pest) Fauna management	Conduct pest fauna management (pig control) when species are negatively impacting the vegetation condition. Remove cattle grazing.	Conduct pest fauna management (pig control) when species are negatively impacting the species. Remove cattle grazing.	Conduct pest fauna management (pig control) when species are negatively impacting the species. Remove cattle grazing.	Conduct pest fauna management (pig control) when species are negatively impacting the species. Remove cattle grazing.
Weed management	Undertake weed control when monitoring shows that weeds are negatively impacting the vegetation condition.	Undertake weed control when monitoring shows that weeds are negatively impacting the growth conditions of the species.	Undertake weed control when monitoring shows that weeds are negatively impacting the growth conditions of the species.	Undertake weed control when monitoring shows that weeds are negatively impacting the growth conditions of the species.
Habitat restoration	Remove cattle to promote recruitment of brigalow/belah species. Conduct weed control where required.	Consider seed collection and direct seeding in suitable habitat to establish new subpopulations. Conduct weed control where required.	Consider seed collection and direct seeding in suitable habitat to establish new subpopulations. Conduct weed control where required.	Conduct weed control where required or remove dense native species impacting on the survival of the species.
Revegetation	Not applicable.	Consider seed collection of populations impacted by the railway construction and disperse the seed on Glenlovely.	Consider seed collection of populations impacted by the railway construction and disperse the seed on Glenlovely.	Consider direct translocation or further growing and splitting of salvaged plants.

MANAGEMENT ACTION	PAINTED HONEYEATER	PAINTED SNIPE	DIAMOND FIRETAIL	GLOSSY BLACK COCKATOO	SOUTHERN WHITEFACE
Fire management	Establish fire break network. Avoid fire in nesting habitats; manage fire to preserve mistletoe plants (food source).	Establish fire break network. Maintain water sources and avoid burning riparian zones where nesting could occur.	Establish fire break network. Maintain open woodland areas with shrubs and patchy groundlayer through a low intensity ecological burning regime.	Establish fire break network. Exclude fire from regenerating feed trees (allo)casuarina trees.	Establish fire break network. Maintain open woodland areas with shrubs and patchy groundlayer through a low intensity ecological burning regime.
(Pest) Fauna management	Control predators like cats and foxes on the property.	Reduce predation by managing feral cats and foxes near wetland habitats. Control pigs to avoid damage to wetland habitats.	Predator control (cats, foxes).	Reduce feral animals (cats, foxes) to protect chicks and adult birds.	Control invasive predators like cats and foxes that may prey on nests and young birds.
Habitat restoration	Avoid clearing of vegetation to protect trees with mistletoe growing in them. Undertake low ecological burn regime to protect areas with mistletoe.	Avoid clearing of native vegetation around wetland areas. Undertake weed control where weeds significantly impact the vegetation condition of the wetlands.	Undertake weed control where weeds significantly impact the vegetation condition of the woodlands. Conduct low intensity ecological burns.	Exclude fire from regenerating feed trees (allo) casuarina trees. Conduct low intensity ecological burns to avoid hot uncontrolled wildfires that can destroy nesting habitat.	Undertake weed control where weeds significantly impact the vegetation condition of the woodlands. Conduct low intensity ecological burns.
Revegetation	Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.

MANAGEMENT ACTION	KOALA
Fire management	Establish fire break network. Use low-intensity, patchy burns to reduce fuel load without harming key eucalyptus trees or their regrowth.
(Pest) Fauna management	Monitor and control domestic and feral dogs, which can pose predation risks.
Weed management	Not applicable.
Habitat restoration	Remove internal barrier fencing across the property. Conduct low intensity ecological burn.
Revegetation	Restore eucalyptus-dominated woodlands through regeneration, with an emphasis on preferred koala food species and enhancing connectivity.

5.6 Hillside

The Hillside property is intersected by the Project footprint on the southern boundary and has been acquired by ARTC. The property contains some areas of actively grazed open eucalypt woodland, that contain patches of remnant, regrowth and non-remnant vegetation with high native grass cover through most sections. The property has been previously selectively cleared through the eucalypt woodland sections on the hills, with the lower flats having been extensively cleared and cultivated for cropping.

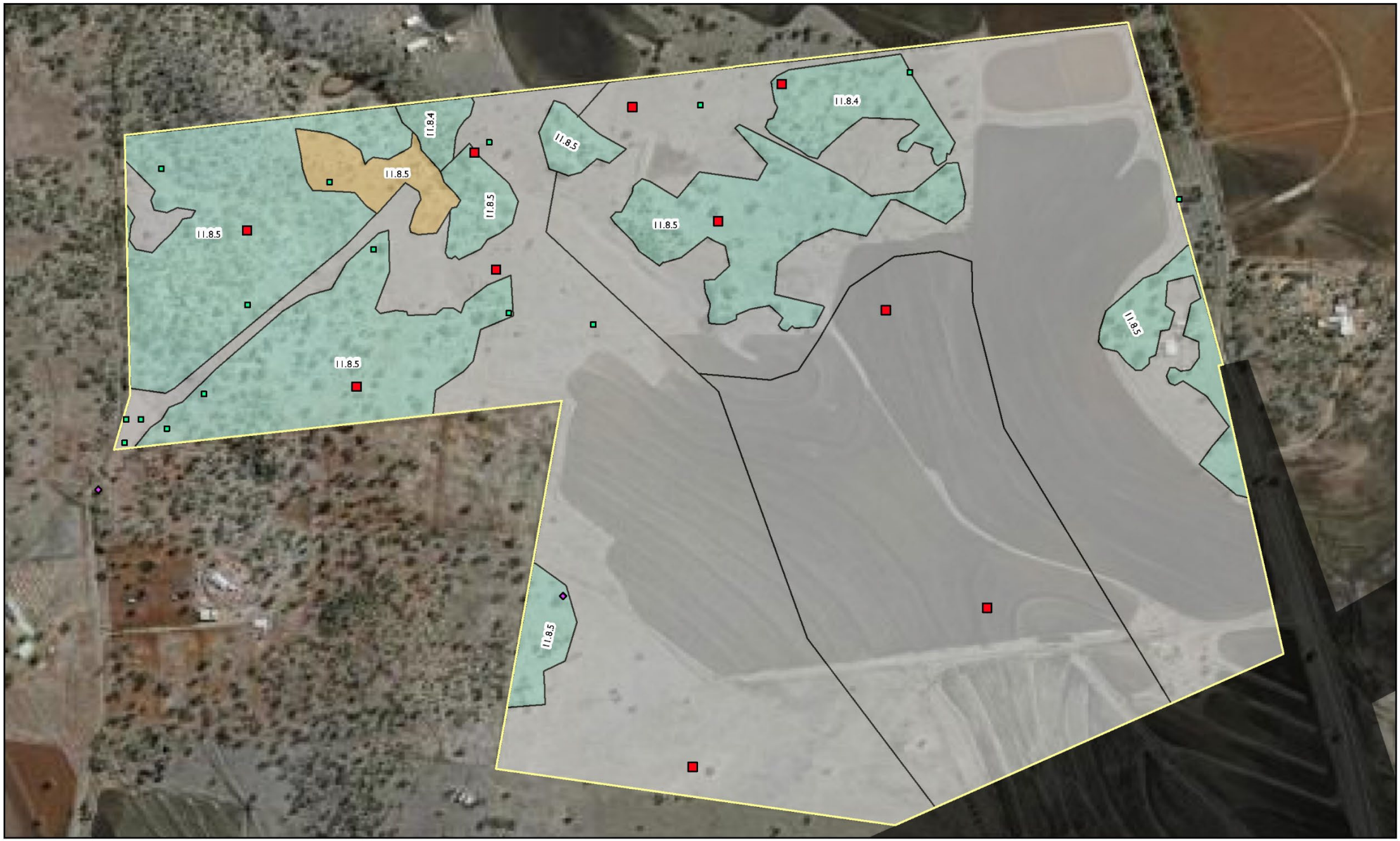
The property contains confirmed habitat for one MSES flora species, *Cyperus clarus*. In total, a population of ~900 individuals were recorded across Hillside, particularly within the north-west corner of the property.

Confirmed koala occupation during tracking as well as signs of scats and tracks (e.g. scratch marks) were found on the property. No other MNES/MSES fauna have been confirmed on the site to date but seasonal fauna surveys will be required as potential habitat exists for multiple MNES/MSES fauna species.

The property is predominantly used for grazing and cropping and does not contain any competing land uses such as mining leases, petroleum leases, or forestry. The property is owned by ARTC and is proposed to be wholly used for offsets with grazing to continue where required for fire management purposes.

The property is located in a highly fragmented landscape but has connectivity to Category B vegetation and contiguous habitat. Given this, using the site for revegetation and enhancing the current regrowth would make it an important offset given the limited protected habitat for koala in the areas around Pittsworth and the known important koala population in this area.

An overview map of Hillside is provided in Figure 5-31 and a summary of the Hillside property, including the sites potential and confirmed offset matters, is provided in Table 5-12.



Ausecology

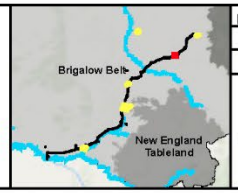
FIGURE 5-33:
GTRE and BioCondition Survey Sites
B2G - 'Hillside - Pittsworth'

- BioCondition Centre Point
- Offset Boundary
- Project Footprint

EVNT Fauna Records (NCA/EPBC)
- Koala (*Phascolarctos cinereus*) (E/E)

EVNT Flora Records (NCA/EPBC)
- *Cyperus clarus* (A sedge) (V/-)

Ground-Truthed Regional Ecosystem (VM Status)
- Remnant - Least Concern
- Non Remnant - Regrowth
- Non Remnant



REVISION	AUTHOR	REVIEWER	DATE
0	NC	LG	23/10/2024

COORDINATE SYSTEM: GDA2020
SCALE: 1:8,000
N W E S
0 100 200
Metres

Table 5-12 Hillside offset property summary

CATEGORY	DETAILS		
Lot and Plan	1RP117820,2RP142680,1RP142680		
Tenure	Freehold		
Land use	Grazing native vegetation, Cropping		
Total property size (ha)	152 ha		
LGA	Toowoomba Regional		
Bioregion and Subregion	The site sits within the Brigalow Belt Bioregion and the Eastern Darling Downs Subregion of Southern Queensland		
Confirmed vegetation communities			
Community type	**TEC (EPBC Act status)**	**Equivalent RE (BD status)**	
Eucalyptus orgadophila open woodland on Cainozoic igneous rocks	-	11.8.5 (LC)	
Eucalyptus melanophloia woodland to open woodland on Cainozoic igneous rocks	-	11.8.4 (LC)	
Dichanthium sericeum grassland on Cainozoic igneous rocks	-	11.8.11 (OC)	
Confirmed threatened species			
Species	**EPBC Act status**	**NC Act status**	**Notes**
Koala *(Phascolarctos cinereus)*	E	E	Scats and scratches found on the site
Cyperus clarus	-	V	~ 900 individuals were recorded in open eucalyptus woodland
Additional potential threatened species			
Species	**EPBC Act status**	**NC Act status**	**Habitat on site**
Five-clawed worm-skink (*Anomalopus mackayi)*	V	E	Presence of remnant and non-remnant woodlands and grasslands.
Picris evae	V	V	*Eucalyptus* open woodland, *Dichanthium* spp. grassland, as well as areas of non-remnant vegetation.
Picris barbarorum	-	V	Presence of non-remnant grassland.

Figure 5-32 *Cyperus clarus* individual from the Hillside property

Figure 5-33 area of 11.8.5 on Hillside

Figure 5-34 general landscape of open woodlands in Hillside

Figure 5-35 Koala scat found at the base of eucalypt species

Figure 5-36 Koala scratch marks found on *E. tereticornis*

Figure 5-37 areas of 11.8.4 on Hillside

5.6.1 Offset protection and management – habitat quality loss/gain

Management of Hillside under an OAMP will prevent future habitat degradation, most notably in the current regrowth and remnant areas which are subject to threats from fire, cropping, clearing, grazing pressures and climate change.

Table 5-13 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 under an approved OAMP in accordance with proposed management measures 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 over the next 20 years.

The current property is predominantly mapped as Category X and is subject to grazing and cropping. There is little regeneration and weed density is expected to increase with these continual pressures.

The offset will be managed to improve habitat quality for MNES and MSES and includes an area to return cultivation to natural grassland. Therefore, habitat quality is generally expected to increase with the removal of cropping and grazing pressures.

An OAMP will be developed for the property that will include specific management actions targeting threats to each MNES/MSES being offset and improving the quality of habitat within the offset area. The vegetation condition and associated habitat quality on the property can be improved with implementation of management actions as detailed further in Table 5-14 with further details to be provided in the OAMP to be developed for the Hillside offset. In general, this will include:

- Revegetation of native grassland and koala food tree planting
- Livestock removal
- Slashing at appropriate times to promote regeneration, nutrient cycling, and reduction of hazardous fuel loads
- Managing weeds that may invade the grassland and elevate fuel loads
- Delineating fuel hazard reduction buffer zones surrounding future regeneration areas.

Table 5-13 – 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	51	Decrease	Increase
Native plant species richness – trees	32	Decrease	Increase
Native plant species richness – shrubs	17	-	Increase
Native plant species richness – grasses	99	Decrease	-
Native plant species richness – forbes	109	Decrease	-
Tree emergent height	36	Decrease	Increase
Tree canopy height		Decrease	Increase
Tree sub-canopy height		Decrease	Increase
Tree emergent cover	12	-	Increase
Tree canopy cover		-	Increase
Tree sub-canopy cover		-	Increase
Shrub canopy cover	8	-	Increase
Native grass cover	119	Decrease	-
Organic litter	1	-	Increase
Large trees	2	-	Increase
Coarse woody debris	31	Decrease	Increase
Non-native plant cover	90	Decrease	-

Table 5-14 Proposed management actions for matters on Hillside

MANAGEMENT ACTION	KOALA	*ANOMALOPUS MACKAYII*	*CYPERUS CLARUS*
Fire management	Establish fire break network Use low-intensity, patchy burns to reduce fuel load without harming key eucalyptus trees or their regrowth.	Establish fire break network Use low-intensity, patchy mosaic burns where possible to maintain areas with ground cover and leaf litter.	Establish fire break network, taking locations of the species into consideration where possible.
(Pest) Fauna management	Control domestic and feral dogs, which can pose predation risks.	Control invasive species like feral cats and foxes that may prey on skinks.	Conduct pest fauna management if any species are negatively impacting the species. Remove cattle grazing.

MANAGEMENT ACTION	KOALA	*ANOMALOPUS MACKAYII*	*CYPERUS CLARUS*
Weed management	Not applicable.	Undertake weed management where required for general vegetation condition improvement.	Undertake weed control when monitoring shows that weeds are negatively impacting the growth conditions of the species.
Habitat restoration	Restore eucalyptus-dominated woodlands through regeneration to increase patch size and buffers to existing remnant vegetation, with an emphasis on preferred koala food species and enhancing connectivity. Conduct low intensity ecological burn.	Use low-intensity, patchy mosaic burns where possible to promote a healthy groundlayer and protect areas with significant coarse woody debris. Removal of cattle that contribute to soil compaction and reduction in leaf litter.	Consider seed collection from healthy *Cyperus clarus* plants from construction during the appropriate season. Consider propagating them in nurseries to establish seedlings before introducing them to Hillside in suitable habitat to establish new subpopulations. Conduct weed control where required.
Revegetation	Undertake revegetation in non-remnant areas to restore habitat for koala.	Not applicable.	Consider seed collection of populations impacted by the railway construction.

5.7 Longsdale

Longsdale property is 1.6 km southwest of the township of Gowrie and 10 km northwest of Toowoomba and located within the Toowoomba Regional LGA. The site is located within the Brigalow Belt South Bioregion and the Eastern Darling Downs Subregion of Southern Queensland. The property is situated adjacent to approximately 2.2 km of the Project footprint and therefore contains similar vegetation communities and habitat for species compared to the adjacent impact area. Longsdale supports a mix of non-remnant and remnant REs comprising natural grasslands, eucalypt woodlands, and cleared areas of pasture and cropland/cultivation.

In total, the property is approx. 124 ha in size and consists of 16 individual Lot DPs. The layout of the 16 lots indicates a planned development that was not seen through to completion, and there is no on-ground evidence of the development, nor separation of the lots.

The property contains a mosaic of historically treeless natural grasslands, cleared paddocks that were once open grassy woodland, and patches of remnant open grassy woodland with large mature trees. Despite the long history of agricultural use, most of the site has a ground layer dominated by native grasses and forbs, with only sparse cover of exotic grass species and pasture weeds and scattered Indian boxthorn shrubs.

Longsdale contains confirmed and potential habitat for several listed matters the principal being Critically Endangered Natural grassland TEC, flora species *Dichanthium queenslandicum*, *Leuzea australis*, *Picris evae* and *Thesium australe*, and fauna species Five-clawed worm-skink (*Anomalopus mackayi*) and koala (*Phascolarctos cinereus*). The property has a long history of clearing, cultivation and grazing which has moderately to heavily deteriorated the ecological condition across the property.

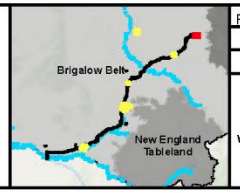
An area on non-remnant 11.8.11 currently supporting a plantation of mixed *Eucalyptus* spp. is likely to cover an area that once supported the TEC, and therefore could be converted back to the natural grassland.

Ausecology

FIGURE 5-40:
Potential Offset
GTRE and BioCondition Survey Sites
B2G - 'Longsdale'

BioCondition Centre Point
Grassland TEC
Offset Boundary

Ground-Truthed Regional Ecosystem (VM Status)
Remnant - Of Concern
Remnant - Least Concern
Non Remnant - Regrowth
Non Remnant



REVISION	AUTHOR	REVIEWER	DATE
0	NC	LG	23/10/2024
1	NC	LG	12/11/2024

COORDINATE SYSTEM: GDA2020
SCALE: 1:10,000
N W E S
0 100 200
Metres

Table 5-15 Offset property analysis – Longsdale

CATEGORY	DETAILS
Lot and Plan	157AG2455, 466AG3378, 467AG3378, 468AG3378, 469AG3378, 470AG3378, 471A34873, 472A34873, 473A34873, 474A34873, 475A34873, 476A34873, 477A34873, 478A34873, 479A34873, 480A34873
Tenure	Freehold
Land use	Grazing and cropping
Total property size (ha)	124
LGA	Toowoomba Regional
Bioregion and Subregion	The site sits within the Brigalow Belt Bioregion, Eastern Darling Downs Subregion of Southern Queensland.

Confirmed vegetation communities

Community type	TEC (EPBC Act status)	Equivalent RE (BD status)
Dichanthium sericeum grassland on alluvial plain with cracking clay soils	Natural Grassland TEC (E)	11.3.21 (E)
Dichanthium sericeum grassland on Cainozoic igneous rocks	Natural Grassland TEC (E)	11.8.11 (E)
Eucalyptus orgadophila open woodland on Cainozoic igneous rocks	NA	11.8.5 (NC)

Confirmed threatened species

Species	EPBC Act status	NC Act status	Notes
Leuzea australis (syn. *Rhaponticum australe)*	V	V	Outside offset, off site in road reserve
Picris evae	V	V	Outside offset, onsite
Thesium australe	V	V	Outside offset, onsite

Additional potential threatened species

Species	EPBC Act status	NC Act status	Habitat on site
Five-clawed worm-skink (*Anomalopus mackayi)*	V	E	Mapped riparian zones and uncultivated grassy headlands, areas with good coarse woody debris and leaf litter.
Koala (*Phascolarctos cinereus)*	E	E	Remnant eucalypt open woodland and non-remnant communities with scattered eucalypt paddock trees.
Dichanthium queenslandicum	E	E	Natural grassland on the black cracking clay soil.

Figure 5- Area of RE 11.3.21 remnant and natural grassland TEC (BC4)

Figure 5-39 Area of remnant 11.8.11 and natural grassland TEC (BC3)

5.7.1 Offset protection and management – habitat quality loss/gain

Management of Longsdale under an OAMP will prevent future habitat degradation most notably in the current regrowth and remnant areas which are subject to threats from grazing pressures, weeds and future development. Table 5-16 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 under an approved OAMP in accordance with proposed management measures 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 over the next 20 years.

The majority of the natural grassland patches are in remnant condition, meaning they have not been cultivated in the last 15 years and are not dominated by non-native flora species. The BioCondition and habitat quality scores however suggest a history of disturbance, likely due to variable levels of livestock grazing over many decades. Recent periods of spelling, since grazing was ceased, has likely yielded some improvement in condition, but more is possible.

Weed control is recommended to target specific weeds that threatened the ecological integrity and sustainability of the ecosystem. Target weeds are those that are highly invasive in nature and have the potential to increase non-native cover and competition, and/or increase fuel load such that it may change fire intensity and threat. Control of non-native and native ground covers around planted trees and reintroduced threatened flora species would be recommended during aftercare and maintenance periods.

The reintroduction of ecological burning regimes, as per the regional ecosystem description database information and best practice, is recommended, in REs 11.8.5 and 11.8.11 only, to promote the restoration of natural nutrient cycling, biodiversity and promote seed germination (DEWHA, 2008). Protection of RE 11.3.21 patches from fire is recommended.

The vegetation condition and associated habitat quality on the property can be improved with implementation of management actions as detailed further in Table 5-17 with further details to be provided in the OAMP to be developed for the Longsdale offset. In general, this will include:

- Delineating fuel hazard reduction buffer zones surrounding RE 11.3.21 patches
- Slashing at appropriate times to promote regeneration, nutrient cycling, and reduction of hazardous fuel loads
- Managing weeds that may invade the grassland and elevate fuel loads
- Reintroduction of natural and ecologically beneficial fire regimes (REs 11.8.5 and 11.8.11 only)
- Restoring *Eucalyptus orgadophila* tree cover across suitable non-remnant RE 11.8.5 areas
- Seed collection, propagation and planting of threatened flora species.

Table 5-16 – 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	50	Decrease	Increase
Native plant species richness – trees	25	-	Increase
Native plant species richness – shrubs	83	Decrease	--
Native plant species richness – grasses	133	Decrease	-
Native plant species richness – forbes	228	Decrease	-
Tree emergent height	27	-	Increase
Tree canopy height		-	Increase
Tree sub-canopy height		-	Increase
Tree emergent cover	36	-	Increase
Tree canopy cover		-	Increase
Tree sub-canopy cover		-	Increase
Shrub canopy cover	203	Decrease	-
Native grass cover	62	Decrease	Increase
Organic litter	71	Decrease	Increase
Large trees	11	-	Increase
Coarse woody debris	5	-	Increase
Non-native plant cover	81	-	Increase

Table 5-17 Proposed management actions for matters on Longsdale

MANAGEMENT ACTION	GRASSLAND TEC	*PICRIS EVAE*	*ANOMALOPUS MACKAYII*	KOALA
Fire management	Establish fire break network. Conduct low intensity ecological burns (unless higher intensity is required for weed management) burns taking the REs fire guidelines into consideration.	Establish fire break network. Conduct low intensity ecological burns (unless higher intensity is required for weed management) burns taking the REs fire guidelines into consideration.	Establish fire break network. Use low-intensity, patchy mosaic burns where possible to maintain areas with ground cover and leaf litter.	Establish fire break network. Use low-intensity, patchy burns to reduce fuel load without harming key eucalyptus trees or their regrowth.
(Pest) Fauna management	Conduct pig control if deemed to be negatively impacting the grassland vegetation condition.	Conduct pig control if deemed to be negatively impacting the grassland vegetation condition.	Control invasive species like feral cats and foxes that may prey on skinks.	Control domestic and feral dogs, which can pose predation risks.
Weed management	Undertake weed control with an emphasis on species that will result in an uplift in the habitat quality score.	Conduct pig control if deemed to be negatively impacting the grassland vegetation condition.	Undertake weed management where required for general vegetation condition improvement.	Not applicable.

MANAGEMENT ACTION	GRASSLAND TEC	*PICRIS EVAE*	*ANOMALOPUS MACKAYII*	KOALA
Habitat restoration	Remove herbivores (like cattle) that degrade vegetation and soil. Conduct low intensity ecological burns.	Undertake weed control as part of good grassland management. Consider seed collection of populations impacted by the railway construction and disperse the seed on Longsdale.	Use low-intensity, patchy mosaic burns where possible to promote a healthy ground layer and protect areas with significant coarse woody debris.	Restore eucalyptus-dominated woodlands through regeneration, with an emphasis on preferred koala food species and enhancing connectivity. Conduct low intensity ecological burn.

5.8 Whitebox TEC lot

The White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (box-gum grassy woodland TEC) ecosystems in Queensland face severe scarcity due to extensive land clearing and agricultural expansion. These unique and biodiverse habitats, characterised by their distinct combination of eucalyptus species and native grasslands, have been drastically reduced from their original extent. The once widespread grassy woodlands, vital for a range of wildlife and ecological processes, are now fragmented and restricted to isolated patches. ARTC is aware of a patch of Whitebox TEC [redacted]. This lot has been assessed to contain areas confirmed as the TEC and areas that through regeneration could be returned to Whitebox TEC status. The lot is currently actively grazed and contains isolated patches of remnant, regrowth and non-remnant vegetation with high native grass cover through most sections.

One patch of vegetation was assessed to be consistent with the White Box TEC, covering 6.1 ha, located along a creek in the northeastern end of the lot and meets Class B Condition as defined in the conservation advice for the TEC. Another area directly adjacent to this patch has the potential to be revegetated to meet the White Box TEC thresholds

Homopholis belsonii is present immediately adjacent the lot in the road reserve. Though not observed during surveys of the lot, suitable habitat exists on site for *Homopholis belsonii and Picris evae*. The lot has suitable habitat for these species but they are likely prevented from establishing due to the presence and history of grazing and cultivation.

No evidence of EVNT fauna species was observed on the lot at the time of the survey. The lot would be suitable habitat for koalas, which are likely to be present on occasions but would not be resident due to the small extent of habitat on the lot to support a population.

An overview map of the Whitebox TEC lot is provided in Figure 5-40 and a summary of the lot, including the sites potential and confirmed offset matters, is provided in Table 5-18.

Map removed as it contains private information which is confidential and not suitable to be provided to third parties, in compliance with requirements of the Information Privacy Act 2009”

Figure 5-40 GTRE and BioCondition Survey Sites - B2G ‘Whitebox TEC lot’

Table 5-18 Whitebox lot Offset Property Summary

CATEGORY	DETAILS		
Lot and Plan	[redacted]		
Tenure	Freehold		
Land use	Grazing native vegetation, Cropping		
Total offset lot size (ha)	22.74 ha		
LGA	Toowoomba Regional		
Bioregion and Subregion	The site sits within the Brigalow Belt Bioregion and the Eastern Darling Downs Subregion of Southern Queensland		
Confirmed vegetation communities			
Community type	**TEC (EPBC Act status)**	**Equivalent RE (BD status)**	
A novel RE or minor component not described, *Eucalyptus albens* grassy woodland on Quaternary alluvium	Critically endangered	11.3.x (11.9.9a) (LC)	
Eucalyptus tereticornis and *E. melliodora* woodland occurring on low hills formed from basalt	-	11.8.2a (LC)	
Acacia harpophylla and/or *Casuarina cristata* open forest to woodland on fine-grained sedimentary rocks	-	11.9.5 (E)	
Eucalyptus populnea, Eremophila mitchellii shrubby woodland on fine-grained sedimentary rocks	-	11.9.7 (OC)	
Eucalyptus tereticornis or *E. camaldulensis* woodland fringing drainage lines	-	11.3.25 (OC)	
Confirmed threatened species			
Species	**EPBC Act status**	**NC Act status**	**Notes**
Homopholis belsonii	V	E	Present immediately adjacent to the lot in the road reserve.
Additional potential threatened species			
Species	**EPBC Act status**	**NC Act status**	**Habitat on site**
Koala *(Phascolarctos cinereus)*	E	E	
Picris evae	V	V	Note no records this far west of its extent.

Figure 5-41 White Box TEC patch along a creek near the northeastern extent of the property

Figure 5-42 Area of regrowth/non-remnant 11.3.x for potential revegetation of White Box TEC

5.8.1 Offset protection and management – habitat quality loss/gain

Management of the Whitebox TEC lot under an OAMP will prevent future habitat degradation most notably in the current regrowth and remnant areas which are subject to threats from grazing pressures, weeds and climate change. The site is currently highly fragmented and subject to edge effects with little regeneration given the grazing and clearing pressures.

Table 5-19 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 under an approved OAMP in accordance with proposed management measures 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 over the next 20 years.

The opportunities for uplift and score improvement include restoring *Eucalyptus albens* tree cover across suitable regrowth and non-remnant areas identified as potential to support the TEC. This could be facilitated by removal of grazing pressure and reintroduction of ecological burning regimes to promote regeneration and would also require revegetation to achieve results in habitat quality. Reducing non-native cover, particularly those that degrade the ecological integrity of the ground layer, are invasive, or supress regeneration would need to be managed. The native species integrity of the ground layer is an important factor in the validity and viability of the White Box TEC.

The potential offset could also work as an offset for protected plant species following removal and control of exotic weeds, and reintroduction of propagated specimens at a scale appropriate for a self-sustaining, genetically diverse population. The vegetation condition and associated habitat quality on the property can be improved with implementation of management actions as detailed further in Table 5-20 with further details to be provided in the OAMP to be developed for the Whitebox TEC offset. In general, this will include:

- Operational planning for revegetation
- Reintroduction of natural fire regimes and exotic weed management
- Restoration of functional habitat values to a property that would otherwise deteriorate without any active management of habitat values currently present
- Revegetation of a critically endangered TEC and potentially unique RE 11.3.x.

Table 5-19 – 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	100	Decrease	--
Native plant species richness – trees	108	--	--
Native plant species richness – shrubs	187	--	--
Native plant species richness – grasses	133	–	–
Native plant species richness – forbes	62	Decrease	Increase
Tree emergent height	88	Decrease	Increase
Tree canopy height		Decrease	Increase
Tree sub-canopy height		Decrease	Increase
Tree emergent cover	116	Decrease	Increase
Tree canopy cover		Decrease	Increase
Tree sub-canopy cover		Decrease	Increase
Shrub canopy cover	20	–	Increase
Native grass cover	8	–	Increase
Organic litter	12	Decrease	Increase
Large trees	34	Decrease	Increase
Coarse woody debris	62	Decrease	Increase
Non-native plant cover	18	–	Increase

Table 5-20 Proposed management actions for matters on Whitebox TEC

MANAGEMENT ACTION	WHITEBOX TEC
Fire management	Establish fire break network. Conduct low intensity mosaic ecological burns taking the REs fire guidelines into consideration and where possible conducted after native plants have seeded but before weeds begin to flower and seed.
(Pest) Fauna and flora management	Remove grazing pressure and implement a weed monitoring and control program to control weed invasion. Ensure machinery hygiene protocols are implemented to prevent the spread of weeds.
Weed management	Undertake weed control with an emphasis on species that will result in an uplift in the habitat quality score.
Habitat restoration	Expand the current isolated patch to increase patch size and allow for a buffer to the exiting remnant.
Revegetation	Undertake plantings and revegetation using high quality local provenance seed where practical, otherwise use high quality non-local seed in preference to low quality local seed. Plant trees and shrubs at natural grassy woodland densities.

6 Matters of National Environmental Significance

This section details the offset portfolio proposed for MNES. Upon endorsement of the offset portfolio by the Commonwealth Government and State Government, detailed OAMPs will be developed for each property and detailed further in Section 8.

6.1 Threatened ecological communities

MNES	BRIGALOW TEC		NATURAL GRASSLAND TEC			BOX-GUM GRASSY WOODLAND TEC	
EPBC Act status	Endangered		Critically Endangered			Critically Endangered	
Impact area (ha)	104.5		66.07			2.54	
Impact quality	5		3			6	
Total quantum of impact	52.25		19.82			1.52	
Offset property	Canning Creek	Glenlovely	[redacted]		Longsdale	Whitebox TEC lot	
Total potential offset available area (ha)	324.4	53.5	222.3 remnant	290.4 non-remnant (revegetation area)	54.8	5.7	17 (revegetation area)
Start quality	6	4	6	1	5	5	4
Future quality without offset	5	3	5	1	4	4	3
Future quality with offset	7	5	7	4*	6	6	6*
Risk of loss (%) without offset	0.35	0.35	0.22	0.22	0.22	0.22	0.22
Risk of loss (%) with offset	0	0	0	0	0	0	0
Risk-related time horizon (years)	20	20	20	20	20	20	20
Time until ecological benefit (years)	20	20	20	20	20	20	20
Confidence in result (%) – risk	90	90	90	60	90	90	85
Confidence in result (%) – quality	90	90	90	60	90	90	85
Overall Net present value	46.40	7.63	10.71	13.99	2.64	0.28	1.34
% of impact offset	88.81	14.59	54.04	70.59	13.32	18.19	87.72
Predicted obligation achieved (yes/no)	Yes		Yes			Yes	
Total % of impact offset	103.4		137.95			105.91	

*greater than 1 point increase due to revegetation uplift given 100% of this area is non-remnant and currently cropped and will be converted back to natural grassland directly adjacent to the 222.3 ha of currently remnant grassland TEC

#greater than 1 point increase due to revegetation uplift given the area is non-remnant and the adjacent area scoring a 6

6.2 MNES fauna – birds

6.2.1 Australian painted snipe (*Rostratula australis*)

MNES	AUSTRALIAN PAINTED SNIPE	
EPBC Act status	Endangered	
Impact area (ha)	7.9	
Impact quality	5	
Total quantum of impact	3.95	
Offset property	Canning Creek	Glenlovely
Total potential offset available area (ha)	73	19.8
Start quality	4	5
Future quality without offset	3	4
Future quality with offset	5	6
Risk of loss (%) without offset	0.35	0.35
Risk of loss (%) with offset	0	0
Risk-related time horizon (years)	20	20
Time until ecological benefit (years)	20	20
Confidence in result (%) – risk	90	90
Confidence in result (%) – quality	90	90
Overall net present value	10.41	2.83
% of impact offset	263.43	71.57
Acquitted (yes/no)	Yes	
Total % of impact offset	335	

6.2.2 Painted honeyeater (*Grantiella picta*)

MNES	PAINTED HONEYEATER	
EPBC Act status	Vulnerable	
Impact area (ha)	330.7	
Impact quality	6	
Total quantum of impact	198.4	
Offset property	Canning Creek	Glenlovely
Total potential offset available area (ha)	1736.8	412.39
Start quality	5	5
Future quality without offset	4	4
Future quality with offset	6	6
Risk of loss (%) without offset	0.35	0.35
Risk of loss (%) with offset	0	0
Risk-related time horizon (years)	20	20
Time until ecological benefit (years)	20	20
Confidence in result (%) – risk	90	90
Confidence in result (%) – quality	90	90
Overall net present value	314.83	74.75
% of impact offset	158.69	37.68
Acquitted (yes/no)	Yes	
Total % of impact offset	196.37	

6.2.3 Squatter pigeon (*Geophaps scripta scripta scripta)*

MNES	SQUATTER PIGEON (SOUTHERN SUBSPECIES)
EPBC Act status	Vulnerable
Impact area (ha)	421.42
Impact quality	6
Total quantum of impact	252.85
Offset property	Canning Creek
Total potential offset available area (ha)	1562.0
Start quality	5
Future quality without offset	4
Future quality with offset	6
Risk of loss (%) without offset	0.35
Risk of loss (%) with offset	0
Risk-related time horizon (years)	20
Time until ecological benefit (years)	20
Confidence in result (%) – risk	90
Confidence in result (%) – quality	90
Overall net present value	283.13
% of impact offset	111.97
Acquitted (yes/no)	Yes
Total % of impact offset	111.97

6.3 MNES fauna – reptiles

6.3.1 Five-clawed worm-skink (*Anomalopus mackayi*)

MNES	FIVE-CLAWED WORM-SKINK		
EPBC Act status	Vulnerable		
Impact area (ha)	241.6		
Impact quality	5		
Total quantum of impact	120.8		
Offset property	Canning Creek	Hillside	Lonsdale
Total potential offset available area (ha)	797.6	107.8	122.4
Start quality	5	4	4
Future quality without offset	4	3	3
Future quality with offset	6	5	5
Risk of loss (%) without offset	0.35	0.22	0.22
Risk of loss (%) with offset	0	0	0
Risk-related time horizon (years)	20	20	20
Time until ecological benefit (years)	20	20	20
Confidence in result (%) – risk	90	90	90
Confidence in result (%) – quality	90	90	90
Overall net present value	138.91	18.74	21.28
% of impact offset	114.99	15.51	17.62
Acquitted (yes/no)	Yes		
Total % of impact offset	148.12		

6.3.2 Dunmall's snake (*Furina dunmalli*)

MNES	DUNMALL'S SNAKE
EPBC Act status	Vulnerable
Impact area (ha)	262.7
Impact quality	6
Total quantum of impact	157.62
Offset property	Canning Creek
Total potential offset available area (ha)	1517.4
Start quality	5
Future quality without offset	4
Future quality with offset	6
Risk of loss (%) without offset	0.35
Risk of loss (%) with offset	0
Risk-related time horizon (years)	20
Time until ecological benefit (years)	20
Confidence in result (%) – risk	90
Confidence in result (%) – quality	90
Overall net present value	264.27
% of impact offset	167.66
Acquitted (yes/no)	Yes
Total % of impact offset	167.66

6.3.3 Condamine earless dragon (*Tympanocryptis condaminensis*)

MNES	CONDAMINE EARLESS DRAGON
EPBC Act status	Endangered
Impact area (ha)	51.2
Impact quality	5
Total quantum of impact	25.6
Offset property	[redacted]
Total potential offset available area (ha)	512.7
Start quality	5
Future quality without offset	4
Future quality with offset	6
Risk of loss (%) without offset	0.22
Risk of loss (%) with offset	0
Risk-related time horizon (years)	20
Time until ecological benefit (years)	20
Confidence in result (%) – risk	90
Confidence in result (%) – quality	90
Overall net present value	73.02
% of impact offset	285.23
Acquitted (yes/no)	Yes
Total % of impact offset	285.23

6.4 MNES fauna – mammals

6.4.1 Spotted-tailed quoll (*Dasyurus maculatus maculatus maculatus*)

MNES	SPOTTED-TAILED QUOLL
EPBC Act status	Endangered
Impact Aaea (ha)	387.5
Impact quality	5
Total quantum of impact	230.68
Offset property	Canning Creek
Total potential offset available area (ha)	1900.4
Start quality	4
Future quality without offset	3
Future quality with offset	5
Risk of loss (%) without offset	0.35
Risk of loss (%) with offset	0
Risk-related time horizon (years)	20
Time until ecological benefit (years)	20
Confidence in result (%) – risk	90
Confidence in result (%) – quality	90
Overall net present value	270.88
% of impact offset	140.91
Acquitted (yes/no)	yes
Total % of impact offset	140.91

6.4.2 South-eastern long-eared bat (*Nyctophilus corbeni*)

MNES	SOUTH-EASTERN LONG-EARED BAT
EPBC Act status	Vulnerable
Impact area (ha)	696.3
Impact quality	5
Total quantum of impact	348.13
Offset property	Canning Creek
Total potential offset available area (ha)	2041.38
Start quality	6
Future quality without offset	5
Future quality with offset	7
Risk of loss (%) without offset	0.35
Risk of loss (%) with offset	0
Risk-related time horizon (years)	20
Time until ecological benefit (years)	20
Confidence in result (%) – risk	90
Confidence in result (%) – quality	90
Overall net present value	355.53
% of impact offset	102.13
Acquitted (yes/no)	Yes
Total % of impact offset	102.13

6.4.3 Koala (*Phascolarctos cinereus*)

MNES	KOALA		
EPBC Act status	Endangered		
Impact area (ha)	769.4		
Impact quality	6		
Total quantum of impact	461.6		
Offset property	Canning Creek	Glenlovely	Hillside
Total potential offset available area (ha)	2087.9	489.5	119.54
Start quality	5	4	4
Future quality without offset	4	3	3
Future quality with offset	6	6*	6#
Risk of loss (%) without offset	0.35	0.35	0.35
Risk of loss (%) with offset	0	0	0
Risk-related time horizon (years)	20	20	20
Time until ecological benefit (years)	20	20	20
Confidence in result (%) – risk	90	90	90
Confidence in result (%) – quality	90	90	90
Overall net present value	298.13	104.47	25.51
% of impact offset	64.58	22.63	31.73
Acquitted (yes/no)	Yes		
Total % of impact offset	118.94		

* 78% of areas are in regrowth condition with greater potential for uplift and requires 1.1 points to achieve a 6
# 70% of site is in non-remnant condition and proposed for planting and hence a 2-point uplift

6.5 MNES fauna – gastropoda

6.5.1 Brigalow woodland snail (*Adclarkia cameroni*)

MNES	BRIGALOW WOODLAND SNAIL
EPBC Act status	Endangered
Impact area (ha)	146.7
Impact quality	5
Total quantum of impact	73.4
Offset property	Canning Creek
Total potential offset available area (ha)	736.0
Start quality	5
Future quality without offset	4
Future quality with offset	6
Risk of loss (%) without offset	0.35
Risk of loss (%) with offset	0
Risk-related time horizon (years)	20
Time until ecological benefit (years)	20
Confidence in result (%) – risk	90
Confidence in result (%) – quality	90
Overall net present value	105.09
% of impact offset	143.27
Acquitted (yes/no)	Yes
Total % of impact offset	143.27

6.6 MNES flora

6.6.1 *Homopholis belsonii* (Belson's panic)

MNES	*HOMOPHOLIS BELSONII*
EPBC Act status	Vulnerable
Impact area (ha)	242.25
Impact quality	5
Total quantum of impact	121.13
Offset property	Canning Creek
Total potential offset available area (ha)	955.4
Start quality	6
Future quality without offset	5
Future quality with offset	7
Risk of loss (%) without offset	0.35
Risk of loss (%) with offset	0
Risk-related time horizon (years)	20
Time until ecological benefit (years)	20
Confidence in result (%) – risk	90
Confidence in result (%) – quality	90
Overall net present value	164.66
% of impact offset	135.94
Acquitted (yes/no)	Yes
Total % of impact offset	135.94

6.6.2 *Lepidium monoplocoides* (Winged peppercress)

MNES	*LEPIDIUM MONOPLOCOIDES*
EPBC Act status	Endangered
Impact area (ha)	79.86
Impact quality	6
Total quantum of impact	27.38
Offset property	Glenlovely
Total potential offset available area (ha)	460.06
Start quality	5
Future quality without offset	4
Future quality with offset	6
Risk of loss (%) without offset	0.35
Risk of loss (%) with offset	0
Risk-related time horizon (years)	20
Time until ecological benefit (years)	20
Confidence in result (%) – risk	90
Confidence in result (%) – quality	90
Overall net present value	65.01
% of impact offset	135.67
Acquitted (yes/no)	Yes
Total % of impact offset	135.67

6.6.3 *Picris evae* (Hawkweed)

MNES	*PICRIS EVAE*		
EPBC Act status	Vulnerable		
Impact area (ha)	110.67		
Impact quality	5		
Total quantum of impact	55.34		
Offset property	[redacted] - Remnant	[redacted] Non-remnant	Longsdale
Total potential offset available area (ha)	222.3	290.4	122.4
Start quality	5	2	5
Future quality without offset	4	2	4
Future quality with offset	6	5	6
Risk of loss (%) without offset	0.22	0.22	0.22
Risk of loss (%) with offset	0	0	0
Risk-related time horizon (years)	20	20	20
Time until ecological benefit (years)	20	20	20
Confidence in result (%) – risk	90	90	90
Confidence in result (%) – quality	90	90	90
Overall net present value	31.33	61.50	
% of impact offset	56.62	111.13	31.17
Acquitted (yes/no)	Yes		
Total % of impact offset	198.9		

6.6.4 *Westringia parvifolia* (Small-flowered westringia)

MNES	*WESTRINGIA PARVIFLORA*
EPBC Act status	Vulnerable
Impact area (ha)	27.19
Impact quality	5
Total quantum of impact	13.6
Offset property	Glenlovely
Total potential offset available area (ha)	322.53
Start quality	6
Future quality without offset	5
Future quality with offset	7
Risk of loss (%) without offset	0.35
Risk of loss (%) with offset	0
Risk-related time horizon (years)	20
Time until ecological benefit (years)	20
Confidence in result (%) – risk	90
Confidence in result (%) – quality	90
Overall net present value	55.59
% of impact offset	408.87
Acquitted (yes/no)	Yes
Total % of impact offset	408.87

6.6.5 *Xerothamnella herbacea*

MNES	*XEROTHAMNELLA HERBACEA*
EPBC Act status	Endangered
Impact area (ha)	11.99
Impact quality	6
Total quantum of impact	6.00
Offset property	Glenlovely
Total potential offset available area (ha)	122.43
Start quality	4
Future quality without offset	3
Future quality with offset	5
Risk of loss (%) without offset	0.35
Risk of loss (%) with offset	0
Risk-related time horizon (years)	20
Time until ecological benefit (years)	20
Confidence in result (%) – risk	90
Confidence in result (%) – quality	90
Overall net present value	17.3
% of impact offset	288.56
Acquitted (yes/no)	Yes
Total % of impact offset	288.56

7 Matters of State Environmental Significance

7.1 Same or substantially the same MNES and MSES

Table 7-1 outlines those matters that are the same or substantially the same and those that are considered to be remaining State-based matters requiring offsets are considered in Sections 7.1.1 and 7.1.2.

Table 7-1 Same or substantially the same MNES and MSES

SPECIES NAME	COMMON NAME	EPBC ACT STATUS	NC ACT STATUS	SAME/ SUBSTANTIALLY THE SAME
Homopholis belsonii	Belson's panic	V	E	✓
Picris evae	Hawkweed	V	V	✓
Westringia parvifolia	Small-flowered westringia	V	V	✓
Xerothamnella herbacea	N/A	E	E	✓
Grantiella picta	Painted honeyeater	V	V	✓
Rostratula australis	Australian painted snipe	E	E	✓
Nyctophilus corbeni	South-eastern long-eared bat	V	V	✓
Phascolarctos cinereus	Koala	E	E	✓
Anomalopus mackayi	Long-legged worm-skink	V	E	✓
Furina dunmalli	Dunmall's snake	V	V	✓
Tympanocryptis condaminensis	Condamine earless dragon	E	E	✓
Geophaps scripta scripta	Squatter pigeon (Southern Subspecies)	V	V	✓

THREATENED ECOLOGICAL COMMUNITY	REGIONAL ECOSYSTEM	EPBC ACT STATUS	NC ACT STATUS	SAME/ SUBSTANTIALLY THE SAME
Brigalow TEC	11.3.1	Endangered	Endangered	✓
Brigalow TEC	11.4.3	Endangered	Endangered	✓
Brigalow TEC	11.4.10	Endangered	Endangered	✓
Brigalow TEC	11.9.5	Endangered	Endangered	✓
Natural grasslands TEC	11.3.21	Endangered	Of Concern	✓
Natural grasslands TEC	11.8.11	Endangered	Of Concern	✓
Box-gum grassy woodland TEC	11.9.9a	Critically Endangered	Least Concern	✓

An overview of how the proposed offset portfolio will meet the Project SRIs on residual MSES (e.g., OCREs, EREs, and fauna and flora matters) is provided below. For areas not reaching 100% of impact offset, we will pursue full or partial acquittal through financial settlement. Final areas will be determined upon endorsement of this strategy and the completion of offset delivery plans for MSES.

7.1.1 Endangered and Of Concern Regional Ecosystems

Table 7-2 Summary of required offsets for MSES Of Concern and Threatened REs

BVG	17A
RE/s	11.3.2/11.9.7
Impact area (ha)	28.29
Impact quality	7
Required offset (ha) as per Queensland calculator	113.16
Offset property	Canning Creek
Total potential offset available area (ha)	778.4
Start quality	8
Acquitted (yes/no)	Yes
Total % of impact offset	688%

BVG	16C
RE/s	11.3.4
Impact area (ha)	7.57
Impact quality	7
Required offset (ha) as per Queensland calculator	30.28
Offset property	Canning Creek
Total potential offset available area (ha)	23.4
Start quality	5
Acquitted (yes/no)	No
Total % of impact offset	77%

BVG	33B
RE/s	11.5.14
Impact area (ha)	49.06
Impact quality	6
Required offset (ha) as per Queensland calculator	196.2
Offset property	Glenlovely
Total potential offset available area (ha)	77.07
Start quality	7
Acquitted (yes/no)	No
Total % of impact offset	40%

BVG	25A
RE/s	11.9.5/11.4.3
Impact area (ha)	24.68
Impact quality	6
Required offset (ha) as per Queensland calculator	98.72
Offset property	Glenlovely
Total potential offset available area (ha)	69
Start quality	6
Acquitted (yes/no)	No
Total % of impact offset	70%

BVG	33D
RE/s	11.9.13
Impact area (ha)	0.13
Impact quality	6
Required offset (ha) as per Queensland calculator	0.52
Offset property	Canning Creek
Total potential offset available area (ha)	5.7
Start quality	7
Acquitted (yes/no)	Yes
Total % of impact offset	1,096%

7.1.2 REs within a defined distance of a watercourse

BVG	18A
RE/s	11.3.14
Impact area (ha)	1.49
Impact quality	6
Required offset (ha) as per Queensland calculator	5.96
Offset property	Canning Creek
Total potential offset available area (ha)	7.9
Start quality	7
Acquitted (yes/no)	Yes
Total % of impact offset	132%

BVG	17A
RE/s	11.3.18
Impact area (ha)	0.15
Impact quality	7
Required offset (ha) as per Queensland calculator	0.6
Offset property	Canning Creek
Total potential offset available area (ha)	46.1
Start quality	7
Acquitted (yes/no)	Yes
Total % of impact offset	7683%

BVG	16A
RE/s	11.3.25
Impact area (ha)	1.88
Impact quality	7
Required offset (ha) as per Queensland calculator	7.52
Offset property	Canning Creek
Total potential offset available area (ha)	63.1
Start quality	5
Acquitted (yes/no)	Yes
Total % of impact offset	841%

BVG	34D
RE/s	11.3.27/11.3.27b
Impact area (ha)	0.04
Impact quality	7
Required offset (ha) as per Queensland calculator	0.16
Offset property	Canning Creek
Total potential offset available area (ha)	26
Start quality	7
Acquitted (yes/no)	Yes
Total % of impact offset	650%

BVG	18B
RE/s	11.5.1/11.5.4
Impact area (ha)	3.19
Impact quality	7
Required offset (ha) as per Queensland calculator	12.76
Offset property	Canning Creek
Total potential offset available area (ha)	20.46
Start quality	7
Acquitted (yes/no)	Yes
Total % of impact offset	160%

BVG	13D
RE/s	11.5.20
Impact area (ha)	0.34
Impact quality	8
Required offset (ha) as per Queensland calculator	1.36
Offset property	Glenlovely
Total potential offset available area (ha)	6.2
Start quality	5
Acquitted (yes/no)	Yes
Total % of impact offset	455%

BVG	12A
RE/s	11.7.4/11.7.7
Impact area (ha)	0.5
Impact quality	7
Required offset (ha) as per Queensland calculator	2
Offset property	-
Total potential offset available area (ha)	0
Start quality	-
Acquitted (yes/no)	No
Total % of impact offset	0

BVG	11A
RE/s	11.8.4/11.8.5
Impact area (ha)	0.45
Impact quality	7
Required offset (ha) as per Queensland calculator	1.8
Offset property	Hillside
Total potential offset available area (ha)	5.2
Start quality	7
Acquitted (yes/no)	Yes
Total % of impact offset	289%

BVG	13C
RE/s	11.9.9
Impact area (ha)	0.01
Impact quality	7
Required offset (ha) as per Queensland calculator	0.04
Offset property	Canning Creek
Total potential offset available area (ha)	2.2
Start quality	5
Acquitted (yes/no)	Yes
Total % of impact offset	5500%

BVG	15A
RE/s	11.9.9a
Impact area (ha)	0.01
Impact quality	7
Required offset (ha) as per Queensland calculator	0.04
Offset property	Whitebox TEC Lot
Total potential offset available area (ha)	9.9
Start quality	7
Acquitted (yes/no)	Yes
Total % of impact offset	24750%

7.1.3 REs intersecting a wetland

BVG	34D
RE/s	11.3.27/11.3.27b
Impact area (ha)	0.2
Impact quality	7
Required offset (ha) as per Queensland calculator	0.8
Offset property	-
Total potential offset available area (ha)	0
Start quality	-
Acquitted (yes/no)	No
Total % of impact offset	0

BVG	16A
RE/s	11.3.25
Impact area (ha)	0.66
Impact quality	7
Required offset (ha) as per Queensland calculator	2.64
Offset property	-
Total potential offset available area (ha)	0
Start quality	-
Acquitted (yes/no)	No
Total % of impact offset	0

7.1.4 Protected wildlife habitat

Table 7-3 Summary of required offsets for MSES fauna

MSES	SOUTHERN WHITEFACE	
NC Act status	Vulnerable	
Impact area (ha)	216.89	
Impact quality	4	
Required offset (ha) as per Queensland calculator	867.56	
Offset property	Canning Creek	Glenlovely
Total potential offset available area (ha)	880.54	348.3
Start quality	4	5
Acquitted (yes/no)	Yes	
Total % of impact offset	142%	

MSES	GLOSSY BLACK-COCKATOO (SOUTH-EASTERN)	
NC Act status	Vulnerable	
Impact area (ha)	120.01	
Impact quality	4	
Required offset (ha) as per Queensland calculator	480.04	
Offset property	Canning Creek	Glenlovely
Total potential offset available area (ha)	6	6
Start quality	1012.97	412.4
Acquitted (yes/no)	Yes	
Total % of impact offset	297%	

MSES	PALE IMPERIAL HAIRSTREAK
NC Act status	Vulnerable
Impact area (ha)	26.59
Impact quality	5
Required offset (ha) as per Queensland calculator	106.36
Offset property	Canning Creek
Total potential offset available area (ha)	254.2
Start quality	5
Acquitted (yes/no)	Yes
Total % of impact offset	239%

MSES	DIAMOND FIRETAIL	
NC Act status	Vulnerable	
Impact area (ha)	216.89	
Impact quality	4	
Required offset (ha) as per Queensland calculator	867.56	
Offset property	Canning Creek	Glenlovely
Total potential offset available area (ha)	935.7	384.3
Start quality	4	5
Acquitted (yes/no)	yes	
Total % of impact offset	152%	

Table 7-4 Summary of required offsets for MSES flora

MSES	*CYPERUS CLARUS*		
NC Act status	Vulnerable		
Impact area (ha)	166.07		
Impact quality	3		
Required offset (ha) as per Queensland calculator	664.28		
Offset property	[redacted]	Hillside	Longsdale
Total potential offset available area (ha)	512.7	151.6	122.4
Start quality	5	5	4
Acquitted (yes/no)	Yes		
Total % of impact offset	118%		

MSES	*PICRIS BARBARORUM*	
NC Act status	Vulnerable	
Impact area (ha)	174.98	
Impact quality	3	
Required offset (ha) as per Queensland calculator	699.9	
Offset property	[redacted]	Hillside
Total potential offset available area (ha)	512.7	151.61
Start quality	5	6
Acquitted (yes/no)	No	
Total % of impact offset	95%	

8 Offset Area Management Plans

Detailed OAMPs will be developed for each proposed offset site and submitted for Commonwealth and State Government approval prior to commencement of the action.

The goal of the OAMPs is to achieve habitat quality gains at each offset site for each respective matter, while maximising landscape conservation outcomes by increasing resilience of self-sustaining communities and populations and improving connectivity within the region.

Each OAMP will be developed in accordance with the *Environmental Management Plan Guidelines* (DCCEEW, 2024) and will define site-specific:

- Offset area details
- Conservation outcomes and associated management actions for each MNES/MSES
- Additional management action requirements for co-located MNES/MSES
- Monitoring activities and timeframes
- Performance criteria to be achieved for each MNES/MSES and interim milestones
- Corrective actions and triggers for corrective actions
- Auditing and reporting.

8.1 Management Actions

Management measures in each OAMP will be developed considering the relevant approved conservation advice and recovery plans for each MNES/MSES matter and are consistent with the measures in relevant recovery plans and threat abatement measures (Table 8-1). Management actions will also be targeted towards habitat quality gains and on those threats that have been identified during the impact assessment base on the nature and scale of impacts. Consideration of fire management actions for TECs is provided from Table 8-2–Table 8-4.

Table 8-1 – Relevant conservation priorities and management measures to be implemented within the offset area

MATTER	SPECIES THREATS IDENTIFIED IN RELEVANT CONSERVATION ADVICE AND THREAT ABATEMENT PLANS	PROPOSED MANAGEMENT ACTIVITY
Brigalow (*Acacia harpophylla* dominant and co-dominant)	Inappropriate fire regimes and the risk of increased fuel loads	Establish fire break network and ecological burn program over the life of the offset
	Inappropriate grazing regimes	Removal of livestock grazing in the offset area
	Non-native plant cover	Active weed control, removal of cattle, increased vegetation cover to shade out weeds
	Clearing of native vegetation/timber harvesting	Area previously cleared will be planted back to the TEC community
Natural grasslands on basalt and fine-textured alluvial plains of northern NSW and southern Queensland	Inappropriate grazing regimes	Removal of livestock grazing in the offset area
	Non-native plants	Targeted weed control and potential ecological burn program/trials
	Cropping	Removal of cropping and restoration of grassland (e.g. direct seeding)

MATTER	SPECIES THREATS IDENTIFIED IN RELEVANT CONSERVATION ADVICE AND THREAT ABATEMENT PLANS	PROPOSED MANAGEMENT ACTIVITY
White box-yellow box-Blakely's red gum grassy woodland and derived native grassland	Inappropriate grazing regimes	Removal of livestock grazing in the offset area
Winged peppercress (Lepidium monoplocoides)	Inappropriate grazing regimes	Removal of livestock grazing in the offset area
	Non-native plants	Targeted weed control and potential ecological burn program/trials
Xerothamnella herbacea	Inappropriate grazing regimes	Removal of livestock grazing in the offset area
	Non-native plants	Targeted weed control and potential ecological burn program/trials
Belson's panic (Homopholis belsonii)	Inappropriate land management practices	Avoid vegetation clearing, cropping (ploughing) and remove cattle grazing pressure resulting in increased canopy species recruitment (if not a grassland)
	Inappropriate grazing regimes	Removal of livestock grazing in the offset area
	Non-native plants	Targeted weed control and potential ecological burn program/trials
Hawkweed (*Picris evae*)	Inappropriate land management practices	Avoid vegetation clearing, cropping (ploughing) and remove cattle grazing pressure resulting in increased canopy species recruitment (if not a grassland)
	Inappropriate fire regimes and the risk of increased fuel loads	Establish fire break network and ecological burn program over the life of the offset
	Non-native plant cover	Active weed control, removal of cattle, increased vegetation cover to shade out weeds
	Clearing impacts	Propagation and plantings
Small-flowered westringia (*Westringia parvifolia*)	Inappropriate land management practices	Avoid vegetation clearing and remove cattle grazing pressure resulting in increased canopy species recruitment
	Clearing impacts	Propagation and plantings
Australian painted snipe (*Rostratula australis*)	Non-native plants	Targeted weed control and potential ecological burn program/trials
	Inappropriate grazing regimes	Removal of livestock grazing in the offset area
	Presence of feral predators and presence of sufficient shelter	Conduct pest management program

MATTER	SPECIES THREATS IDENTIFIED IN RELEVANT CONSERVATION ADVICE AND THREAT ABATEMENT PLANS	PROPOSED MANAGEMENT ACTIVITY
Condamine earless dragon (Tympanocryptis condaminensis)	Inappropriate land management practices	Avoid vegetation clearing, cropping (ploughing) and remove cattle grazing pressure resulting in increased canopy species recruitment (if not a grassland)
	Non-native plants	Targeted weed control and potential ecological burn program/trials
	Inappropriate grazing regimes	Removal of livestock grazing in the offset area
Brigalow woodland snail (*Adclarkia cameroni*)	Clearing of native vegetation/timber harvesting	Avoid any future vegetation clearing in the offset area unless for approved management practices; allow regrowth regeneration or undertake active planting (where appropriate and required)
	Inappropriate grazing regimes	Removal of livestock grazing in the offset area
	Non-native plants	Targeted weed control and potential ecological burn program/trials
	Inappropriate fire regimes and the risk of increased fuel loads	Establish fire break network and ecological burn program over the life of the offset
Painted honeyeater (*Grantiella picta*)	Clearing of native vegetation/timber harvesting	Avoid any future vegetation clearing in the offset area unless for approved management practices; allow regrowth regeneration or undertake active planting (where appropriate and required)
	Presence of feral predators	Conduct pest management program
	Inappropriate grazing regimes	Removal of livestock grazing in the offset area
Squatter pigeon (southern) (*Geophaps scripta scripta*	Clearing of native vegetation/timber harvesting	Avoid any future vegetation clearing in the offset area unless for approved management practices; allow regrowth regeneration or undertake active planting (where appropriate and required)
	Presence of feral predators and presence of sufficient shelter	Conduct pest management program
	Inappropriate grazing regimes	Removal of livestock grazing in the offset area
Koala (Phascolarctos cinereus)	Inappropriate fire regimes and the risk of increased fuel loads	Establish fire break network and ecological burn program over the life of the offset
	Clearing of native vegetation/timber harvesting	Avoid any future vegetation clearing in the offset area unless for approved management practices; allow regrowth regeneration or undertake active planting (where appropriate and required)
	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

MATTER	SPECIES THREATS IDENTIFIED IN RELEVANT CONSERVATION ADVICE AND THREAT ABATEMENT PLANS	PROPOSED MANAGEMENT ACTIVITY
Spotted-tailed quoll (Dasyurus maculatus maculatus)	Clearing of native vegetation/timber harvesting	Avoid any future vegetation clearing in the offset area unless for approved management practices; allow regrowth regeneration or undertake active planting (where appropriate and required)
	Presence of feral predators and presence of sufficient shelter	Conduct pest management program, and construct shelter log piles where appropriate
South-eastern long-eared bat (*Nyctophilus corbeni*)	Clearing of native vegetation/timber harvesting	Avoid any future vegetation clearing in the offset area unless for approved management practices; allow regrowth regeneration or undertake active planting (where appropriate and required);creation of roosting habitat
	Inappropriate fire regimes and the risk of increased fuel loads	Establish fire break network and ecological burn program over the life of the offset
Dunmall's snake (*Furina dunmalli*)	Clearing of native vegetation/timber harvesting	Avoid any future vegetation clearing in the offset area unless for approved management practices; allow regrowth regeneration or undertake active planting (where appropriate and required)
	Inappropriate grazing regimes	Removal of livestock grazing in the offset area
	Presence of feral predators and presence of sufficient shelter	Conduct pest management program
Five-clawed worm-skink (*Anomalopus mackayi*)	Inappropriate land management practices	Avoid vegetation clearing, cropping (ploughing) and remove cattle grazing pressure resulting in increased canopy species recruitment (if not a grassland)
	Inappropriate grazing regimes	Removal of livestock grazing in the offset area
	Presence of feral predators and presence of sufficient shelter	Conduct pest management program
South-eastern glossy black cockatoo (*Calyptorhynchus lathami lathami*)	Clearing of native vegetation/timber harvesting	Avoid any future vegetation clearing in the offset area unless for approved management practices; allow regrowth regeneration or undertake active planting (where appropriate and required)
	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 rabbits
Diamond firetail (Stagonopleura guttata)	Vegetation clearing	Avoid any future vegetation clearing in the offset area unless for approved management practices; allow regrowth regeneration or undertake active planting (where appropriate and required)

MATTER	SPECIES THREATS IDENTIFIED IN RELEVANT CONSERVATION ADVICE AND THREAT ABATEMENT PLANS	PROPOSED MANAGEMENT ACTIVITY
	Non-native plants	Targeted weed control and potential ecological burn program/trials
	Inappropriate grazing regimes	Removal of livestock grazing in the offset area
Southern whiteface (Aphelocephala leucopsis)	Vegetation clearing	Avoid any future vegetation clearing in the offset area unless for approved management practices; allow regrowth regeneration or undertake active planting (where appropriate and required)
	Inappropriate grazing regimes	Removal of livestock grazing in the offset area
Pale imperial hairstreak (*Jalmenus eubulus*)	Vegetation clearing	Avoid any future vegetation clearing in the offset area unless for approved management practices; allow regrowth regeneration or undertake active planting (where appropriate and required)
	Inappropriate fire regimes and the risk of increased fuel loads	Establish fire break network and ecological burn program over the life of the offset

8.2 Fire management for threatened ecological communities

Table 8-2 Fire management for Brigalow TEC

NAME	INTERVAL	MIN	MAX	STRATEGY	ISSUES
11.3.1	Occasional fires 5–10 years	5	10	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.	Casuarina cristata 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.
11.4.3	Fire return interval not relevant	100	100	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.	Casuarina cristata 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.
11.4.10	6–10 years	6	10	Burn less than 10% in any year. Burn in association with surrounding vegetation. 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. Fire exclusion is not necessary.	Avoid fires at the hottest and/or driest times of the year, when the extent of fires cannot be controlled. Low intensity fires with good soil moisture will be useful in reducing fuel loads and fire spread in later fires. Moderate fires may assist in regeneration of hard-seeded spp. Brigalow is soft-seeded, so germination is not promoted by fire. Casuarina cristata is fire sensitive, although germination can be good in bare areas. Best protection from wildfires is the creation of a multi-aged mosaic and perimeter burning. Fire increases risk from invasion by buffel grass. These REs often make up shade lines in paddocks and are heavily grazed.
11.9.5	Fire return interval not relevant	100	100	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.	Casuarina cristata 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.

Table 8-3 Fire management for Grassland TEC

NAME	INTERVAL	MIN	MAX	STRATEGY	ISSUES
11.3.21	Fire return interval not relevant	100	100	Do not burn deliberately. The grasses and forbs of Astrebla spp. dominated communities do not require fire for regeneration. Protection relies on management of fire in the surrounding country to prevent running fires entering Astrebla spp. communities, particularly at times of low soil moisture.	Fire can be used as a tool to control woody thickening and woody weeds in grasslands. Moderate intensity fire is required for a successful kill of the woody species but good moisture levels are required to ensure recovery of the ground layer. Large scale germination of woody species is most likely to occur in high rainfall years. The best management opportunity is after storms at the end of the subsequent dry season, although exclusion of grazing pressure may still be required to ensure sufficient fuel loads.
11.3.24	>3 years	3	50	Low to moderate burns can help limit the spread of fires. Burn less than 30% in any year. Burn under conditions of good soil moisture and when plants are actively growing. 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.	Fire can be used to control weed invasions, although there are also risks of promoting weeds. 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 *Arthraxon hispidus* and Dimeria 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.
11.8.11	>5 years	5	50	Low to moderate burns can help limit the spread of fires. Burn less than 30% in any year. Burn under conditions of good soil moisture and when plants are actively growing.	Fire can be used to control weed invasions, although there are also risks of promoting weeds.

Table 8-4 Fire management for Whitebox TEC

RE	INTERVAL	MIN	MAX	STRATEGY	ISSUES
11.8.2	6–10 years	6	10	Restrict to less than 30% in any year. Burn under conditions of good soil moisture and when plants are actively growing. Small amounts 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. *Eremophila spp*. and *A. stenophylla* in the red soil country in particular). Fire will also control cypress. Low to moderate intensity burns with good soil moisture are necessary to minimise loss of hollow trees. Avoid burning riparian communities as these can be critical habitat for some species. Planned burns have traditionally been carried out in the winter dry season; further research required.
11.8.8	6–10 years	6	10	Restrict to less than 30% in any year. Burn under conditions of good soil moisture and when plants are actively growing. Small amounts 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. *Eremophila spp.* and *A. stenophylla* in the red soil country in particular). Fire will also control cypress. Low to moderate intensity burns with good soil moisture are necessary to minimise loss of hollow trees. Avoid burning riparian communities as these can be critical habitat for some species. Planned burns have traditionally been carried out in the winter dry season; further research required.
11.9.9a	6–10 years	6	10	Restrict to less than 30% in any year. Burn under conditions of good soil moisture and when plants are actively growing. Small amounts 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. *Eremophila spp.* and *A. stenophylla* in the red soil country in particular). Fire will also control cypress. Low to moderate intensity burns with good soil moisture are necessary to minimise loss of hollow trees. Avoid burning riparian communities as these can be critical habitat for some species. Planned burns have traditionally been carried out in the winter dry season; further research required.

RE	INTERVAL	MIN	MAX	STRATEGY	ISSUES
11.9.13	6–10 years	6	10	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 *A. luehmannii*) and mitigate against wildfires. *Allocasuarina luehmannii* (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; high intensity fire (or fire that removes the litter layer) could be detrimental to survival. Allocasuarina is also an important food source for Glossy-black cockatoo.

8.3 Adaptive management framework

The management of natural systems inherently involves uncertainty, which can affect the success of management measures designed to achieve conservation outcomes. Therefore, the OAMP for each proposed offset site will incorporate an Adaptive Management Framework (AMF).

An AMF is an iterative framework that allows questions to evolve, new questions to be posed and new methodologies to be embraced when, for example, new technology arises to enhance fieldwork outcomes or the feedback/results from fieldwork necessitates new management actions be trialled (Lindenmayer and Likens, 2010). The AMF for each proposed offset site will include two key phases:

- Establishment phase, where the key components of the AMF are developed. This phase includes defining clear and measurable objectives and performance criteria, selecting potential management actions, and developing monitoring protocols to evaluate the progress of the offset site towards achieving the management objectives.
- An iterative learning phase, which will utilise the management framework to learn about the offset site and iteratively adapt management strategies and approaches based on what is learned.

8.4 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).

8.4.1 BioCondition and habitat quality scoring

The monitoring methodology detailed in each OAMP will reflect the methods utilised as part of the impact assessment. A habitat quality score 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. Site Assessment Units (AUs) will be based upon ground-truthed REs (Nelder et al., 2022; Queensland Herbarium, 2023) and condition.

8.4.2 Offset management units

To understand the potential for these offsets to deliver an overall conservation outcome the proposed offset areas will be broken down into high level management units to show the potential management actions required across the offset properties and are summarised in Table 8-5.

Table 8-5 High level assessment units and associated management

STATUS	REQUIREMENT	TECHNIQUES	MANAGEMENT ACTIONS
Remnant	Natural regeneration	Natural regeneration	Fire management, fencing, pest management, livestock exclusion (management), monitoring.
Regrowth	Assisted regeneration	Natural regeneration plus assisted regeneration	As above plus weed control, species specific management actions (e.g. thinning, burning, habitat creations), potential active restoration – infill planting.
Non-remnant	Active restoration	Natural regeneration plus assisted regeneration plus restoration	As above plus planting, maintenance, seed collection, propagation, direct seeding, soil amelioration.

9 Protection mechanisms

All offset areas identified in the approved the Project EODS and respective OAMP will be secured under a protection mechanism. There are a number of options for protecting an offset site, including as an offset protection area under the EO Act, a voluntary declaration under the VM Act, a protected area under the NC Act, statutory covenants under the *Land Title Act 1994* (Qld) or provisions under the EPBC Act. All options will be considered, and the final instruments chosen will depend on the specific circumstances of each offset site.

Due to the permanent nature of the impacts from the Project, legal security will be in perpetuity and the type of enduring protection mechanism will be negotiated depending on the circumstances and matters to be protected for each offset site.

Legal security will be discussed with the Australian Government and Queensland Government prior to formalisation.

10 Risk Assessment

There are several challenges and risks involved in delivering environmental offsets. These are evaluated and mitigation measures discussed in the following risk assessment matrix (Table 10-1 to Table 10-3).

Table 10-1 Risk matrix

		CONSEQUENCE				
		Very Minor	Minor	Moderate	Major	Critical
Likelihood	Almost Certain	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 10-2 Likelihood and consequence definitions

QUALITATIVE MEASURE OF LIKELIHOOD (HOW LIKELY IS IT THAT THIS EVENT/CIRCUMSTANCES WILL OCCUR AFTER MANAGEMENT ACTIONS HAVE BEEN PUT IN PLACE/ARE BEING IMPLEMENTED)	
Almost Certain (AC)	Is expected to occur in most circumstances.
Likely (LI)	Will probably occur during the life of the Project.
Possible (PO)	Might occur during the life of the Project.
Unlikely (UL)	Could occur but considered unlikely or doubtful.
Rare (RA)	May occur in exceptional circumstances.

QUALITATIVE MEASURE OF CONSEQUENCES (WHAT WILL BE THE CONSEQUENCE/RESULT IF THE ISSUE DOES OCCUR)	
Very Minor (VM)	Minor risk of failure to achieve the plan's objectives. Results in short term delays to achieving plan objectives, implementing low cost, well characterised corrective actions.
Minor (MI)	Moderate risk of failure to achieve the plan's objectives. Results in short term delays to achieving plan objectives, implementing well characterised, with high cost/effort corrective actions.
Moderate (MO)	High risk of failure to achieve the plan's objectives. Results in medium-long term delays to achieving plan objectives, implementing uncertain, with high cost/effort corrective actions.
Major (MA)	The plan's objectives are unlikely to be achieved, with significant legislative, technical, ecological and/or administrative barriers to attainment that have no evidenced mitigation strategies.
Critical (CR)	The plan's objectives are unable to be achieved, with no evidenced mitigation strategies.

Table 10-3 Risk assessment, including mitigation actions and residual risk

RISK FACTOR	LIKELIHOOD	CONSEQUENCE	RISK RATING	MITIGATION ACTIONS	RESIDUAL RISK
Land access restraints	AC	MO	H	▸ Utilise existing internal landowner negotiation team ▸ Implement custom LAAs for access to offset specific sites to streamline process ▸ Identification of alternate properties ▸ Use of specialist service provider experienced in offset and landowner negotiations ▸ Utilise Inland Rail land access professionals to arrange land access	M
Landowner negotiations stalling or falling through causing priority offset properties to not be secured	AC	MA	S	▸ Undertake early landowner contact, property assessment, negotiation and acquisition to rationalise offset portfolio and determine shortfalls as a priority ▸ Prioritise already acquired properties or properties with known and interested landowners ▸ Use MCDS tool to reassess properties to find alternative properties if negotiations unsuccessful ▸ Undertake due diligence and utilise land valuation calculator ▸ Develop spatial landowner database to capture and centralise key information ▸ Utilise existing internal specialist landowner negotiation team ▸ Use specialist service provider experienced in offset landowner negotiations ▸ Consider a range of dealing options to secure the targeted offset values such as whole or part property acquisition through to landowner agreements	M
Property selection not supported by due diligence survey data	LI	MO	H	▸ Use of high quality and up to date imagery and RE mapping ▸ Exclusion of any property containing mining/petroleum leases and resource production areas ▸ Consideration of non-remnant and regrowth areas that may prove beneficial for revegetation activities based on field assessments ▸ Optimal timing of surveys ▸ Multiple property selection through use of MCDS tool	M
Changes to EIS data and or increased SRIs causing different requirements for optimal offset selection	AC	MA	S	▸ Early communication of EIS changes and potential identification of new MSES and/or MNES to ARTC by consultants ▸ Reassess and refine property selections ▸ Undertake further gap analysis as required and utilise MCDS tool ▸ Keep initial property selection broad with additional options and multiple properties	**M**

RISK FACTOR	LIKELIHOOD	CONSEQUENCE	RISK RATING	MITIGATION ACTIONS	RESIDUAL RISK
Inappropriate survey timing causing matters to not be detected	PO	MA	H	▸ Choose suitable seasons for surveys to optimise results ▸ Align time land holder access requests with survey timing ▸ Early identification of properties to allow for seasonal variances ▸ Experienced ecology and offset team	L
Presence of unanticipated threats and/or events (e.g. fire or vegetation clearing) between initial property investigations and the establishment of an offset area	PO	MA	H	▸ Contract structure and contingency ▸ Due diligence study ▸ Use of experienced and local service providers ▸ Undertake management measures to appropriately manage the risk ▸ Open and transparent relationships with regulators	L
The feasibility of co-locating MNES/MSES should a shortfall of suitable offset site options occur. This may only be confirmed from detailed ground-truthing surveys.	PO	MO	M	▸ Preference to properties where they can acquit the majority of SRI's ▸ Preference to properties where multiple MNES/MSES can potentially be co-located ▸ Preference to properties where they intersect with the Southern Brigalow Strategic Offset Corridors and/or Queensland statewide corridors ▸ Open and transparent relationships with regulators	L
Exceeding approved budget for environmental offsets for Project	LI	MO	H	▸ Optimising the portfolio of properties required to acquit matters by co-location of MNES and MSES matters where applicable ▸ Reducing financial settlement by co-locating MSES with MNES ▸ Regular budget review based on current offset obligations/commitments ▸ Utilisation of the MCDS tool to optimise offset portfolio based on refined SRIs ▸ Utilisation of ARTC/TMR land where available ▸ Early acquisition of offset properties to establish and formalise offset property costs within budget constraints ▸ Understand broad management implications including long term management obligations and costs with respect to future management under OAMPs	M

RISK FACTOR	LIKELIHOOD	CONSEQUENCE	RISK RATING	MITIGATION ACTIONS	RESIDUAL RISK
Regulator not approving offset selections prior to the scheduled construction commencement	PO	MA	M	▸ Regular liaison with regulators ▸ Open and transparent relationships with regulators, providing approval documents to State and Commonwealth regulators through regular consultation ▸ Undertaking offset property investigations as SRI's are assessed ▸ Prioritising acquisition over landowner agreements ▸ Preference to properties where they intersect with the Southern Brigalow Strategic Offset Corridors and/or Queensland statewide corridors ▸ Due diligence study ▸ Experienced ecology and offset team ▸ Exclusion of any property containing mining/petroleum leases and resource production areas ▸ Consideration of areas of regrowth that may prove beneficial for revegetation activities (e.g. using Queensland regulated vegetation mapping and SLATS data) ▸ Regular review of P6 master schedule including key milestones and delivery items	L
Unavoidable disturbance after the establishment of the offset area (drought, flood, pest invasion, fire, vegetation clearing, intentional sabotage)	LI	MA	H	▸ Prioritise ARTC acquisition, ownership and management to ensure control over current and future management and land use ▸ Undertake data sampling at a level of detail and frequency that allows for accurate tracking of site quality and early identification of potential issues ▸ Adapting existing and adopting new management strategies to combat unforeseen issues ▸ Clear communication with landowners about suitable management actions and strategies ▸ Establishment of a robust and resilient offset area ▸ Experienced management team	M
Landowner breach of land use agreement (e.g. over grazing, hunting, vegetation clearing)	LI	MA	H	▸ Prioritise ARTC acquisition, ownership and management to ensure control over current and future management and land use ▸ Utilise existing internal landowner negotiation team ▸ Use of specialist service provider experienced in offset and landowner negotiations ▸ Frequent, clear and concise communication of conditions and consequences of breaches with landowner ▸ Breaching of landowner conditions having a meaningful weighting	M

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APPENDIX

Q

Environmental Offset Delivery Strategy

Appendix A Habitat quality assessment report

BORDER TO GOWRIE REVISED DRAFT ENVIRONMENTAL IMPACT STATEMENT

Inland Rail is a subsidiary of
Australian Rail Track Corporation

INLAND RAIL

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Tables

Acronym	Description
ARTC	Australia Rail Track Corporation
AU	Assessment Unit
Brigalow TEC	Brigalow (*Acacia harpophylla* dominant and co-dominant)
B2G	Border to Gowrie
DBH	Diameter at Breast Height
DCCEEW	Department of Climate Chane, Energy, and Environment and Water
EIS	Environmental Impact Statement
EO Act	*Environmental Offsets Act 2014* (Qld)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
FFJV	Future Freight Joint Venture
GTDTHQ	Guide to Determining Terrestrial Habitat Quality
HQS	Habitat Quality Scoring
HVR	High Value Regrowth
LoO	Likelihood of Occurrence
MNES	Matter of National Environmental Significance
MHQAT	Modified Habitat Quality Assessment Tool
MSES	Matter of State Environmental Significance
Natural grasslands TEC	Natural Grasslands on Basalt and Fine-textured Alluvial Plains of Northern New South Wales and Southern Queensland
PBFD	Psittacine Beak and Feather Disease
RE	Regional Ecosystem
REDD	Regional ecosystem description database
SRI	Significant Residual Impact
SSR	Species Stocking Rate
TEC	Threatened Ecological Community
White box TEC	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland

1 Introduction

1.1 Project background

Australian Rail Track Corporation (ARTC) is currently seeking project approval for the Inland Rail Border to Gowrie (B2G) section of the Inland Rail Project. This section comprises approximately 176 km of new dual gauge track and 78 km of upgraded track from the New South Wales/Queensland border to Gowrie - northwest of Toowoomba.

As part of Commonwealth and State approval processes for the B2G Project, significant impacts to Matters of National Environmental Significance (MNES) and Matters of State Environmental Significance (MSES), that cannot be avoided or mitigated, are required to be offset.

The *EPBC Act environmental offsets policy* (2012) outlines the Commonwealth's approach to the use of environmental offsets under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The policy is accompanied by the *Offsets Assessment Guide* and *How to use the Offsets Assessment Guide* which provide a framework to assess offset requirements for MNES.

The *Queensland Environmental Offsets Policy* outlines Queensland's approach to the use of environmental offsets under the *Environmental Offsets Act 2014* (EO Act) and *Environmental Offsets Regulation 2014*. The policy is accompanied by the *Guide to Determining Terrestrial Habitat Quality* (GTDTHQ), version 1.2 (2017). The GTDTHQ provides a detailed methodology for assessing habitat quality for MSES in Queensland.

1.2 Purpose and scope

This Habitat Quality Assessment Report has been prepared to detail the methodology used to assess the quality of terrestrial habitat for MNES and MSES that are likely to incur Significant Residual Impacts (SRIs) as a result of the B2G Project[1]. This Habitat Quality Assessment Report has been prepared following thorough consultation with both Commonwealth and State Government authorities to provide a detailed account of the assessment methodology and includes the following:

- A summary of relevant legislation and guidelines (Section 2)
- A summary of the detailed literature review undertaken to inform the habitat quality assessments (Section 3)
- An overview of the field surveys undertaken to inform the habitat quality assessments (Section 4)
- A summary of the habitat quality assessment methods (Section 5 and 6)

The report should be read in conjunction with the following Appendices to the revised EIS:

- Appendix L - Terrestrial and Aquatic Ecology Technical Report
- Appendix O - Matters of National Environmental Significance report
- Appendix Q - Environmental Offset Delivery Strategy

[1] Note that the term SRI is not used in EPBC Act (which uses only Significant Impact) but has been used as a collective term for impacts to both MNES and MSES in this report for the purpose of simplicity and readability.

2 Legislation and guidelines

2.1 Commonwealth

The Commonwealth's *Offsets Assessment Guide* and *How to use the Offsets Assessment Guide* documents provide a framework to assess offset requirements for MNES via three components of habitat quality scoring (HQS): site condition, site context and species stocking rate (SSR).

In order to assess these components of habitat quality, the Commonwealth produced the Modified Habitat Quality Assessment Tool (MHQAT 2022) based on version 1.2 of the Queensland State GTDTHQ (2017). The advice from the Department of Climate Change, Energy, the Environment and Water (DCCEEW) is that the MHQA is a customisable tool intended to be adapted to reflect the ecology of a protected matter and derive habitat quality scores using the habitat attributes most influential over a species viability. The use of MHQA is not mandated by the department but the EPBC offset policy frameworks requires all habitat quality scoring methods to be specific to a protected matter, be science-based, reliable (to support a robust comparison across impact and offset site and estimated for future offset site outcomes) and sufficiently detailed (for monitoring, evaluation, and compliance). The default MHQA method provided by DCCEEW was developed for koala HQS and the department communicated that it prefers this be applied for this species. For other MNES, scoring has generally followed the MHQAT (see Table 2-1). Justification for any deviation from Table 2-1 is provided per matter in Section 5.1 for TECs, Section 5.2 for fauna and Section 5.2.9 for flora.

It should be noted that site condition, site context and species stocking rate components are scored for fauna and flora, while Threated Ecological Communities (TECs) are scored using only site condition and site context components. Additionally, the quality and availability of food and foraging habitat, quality and availability of shelter, and species mobility capacity attributes are not assessed for TECs or flora.

2.2 State

A detailed methodology for assessing habitat quality for MSES is provided in the Qld state *Guide to Determining Terrestrial Habitat Quality* (GTDTHQ), version 1.2 (2017) and version 1.3 (2020). In order to be consistent with the approach used for Commonwealth matters, version 1.2 of the GTDTHQ has been used to assess habitat quality for all MSES by agreement from Qld State Government.

The GTDTHQ V1.2 assesses offset requirements for MSES via three components of habitat quality: site condition, site context and species habitat index. A summary of the site condition, site context and species habitat index attributes and weightings that are used to score habitat quality for MSES are provided in Table 2-2. Note site context and species habitat index is not used to score flora or regulated vegetation.

More specific detail concerning how the parameters were scored is provided for MSES regulated vegetation in Section 6.1, MSES fauna in Section 6.2, and MSES flora in Section 6.3.

Table 2-1 The three components of habitat quality and their associated max scores

Site condition		**Site context**		**Species stocking rate[2]**	
Attribute	**Max score**	**Attribute**	**Max score**	**Attribute**	**Max score**
Recruitment of woody perennial species in EDL	5	Size of patch	10	Presence detected on or adjacent to site (neighbouring property with connecting habitat)	10
Native plant species richness - trees	5	Connectedness	5	Species usage of the site (habitat type & evidenced usage)	15
Native plant species richness - shrubs	5	Context	5	Approximate density (per ha)	30
Native plant species richness - grasses	5	Ecological corridors	6	Role/importance of species population on site	15
Native plant species richness - forbs	5	Role of site location to species overall population in the state	5	**Total max score – flora / fauna**	**40**
Tree emergent height	5	Threats to the species	15		
Tree canopy height		Species mobility capacity[3]	10		
Tree sub-canopy height		**Total max score – TEC/flora**	**46**		
Tree emergent cover	5	**Total max score - fauna**	**56**		
Tree canopy cover					
Tree sub-canopy cover					
Shrub canopy cover	5				
Native grass cover	5				
Organic litter	5				
Large trees (eucalypts plus non-eucalypts)	15				
Coarse woody debris	5				
Non-native plant cover	10				
Quality and availability of food and foraging habitat[3]	10				
Quality and availability of shelter[3]	10				
Total max score – TEC/flora	**80**				
Total max score - fauna	**100**				
Total max score grassland habitat	**50**				

[2] Scored for fauna and flora matters only (not TEC)
[3] Scored for fauna matters only

Table 2-2 Attributes and scoring used to determine habitat quality for MSES

Site condition		Site context		Species habitat index	
Attribute	**Max score**	**Attribute**	**Max score**	**Attribute**	**Max score**
Recruitment of woody perennial species in EDL	5	Size of patch	10	Threats to species	15
Native plant species richness - trees	5	Connectedness	5	Quality and availability of food and foraging habitat	10
Native plant species richness - shrubs	5	Context	5	Quality and availability of shelter	10
Native plant species richness - grasses	5	Ecological corridors	6	Species mobility capacity	10
Native plant species richness - forbs	5	**Total max score**	**26**	Role of site location to overall population	**5**
Tree emergent height	5			**Total max score**	**50**
Tree canopy height					
Tree sub-canopy height					
Tree emergent cover	5				
Tree canopy cover					
Tree sub-canopy cover					
Shrub canopy cover	5				
Native grass cover	5				
Organic litter	5				
Large trees (eucalypts plus non-eucalypts)	15				
Coarse woody debris	5				
Non-native plant cover	10				
Total max score	**80**				

2.3 Notes on species specific alterations to HQS metrics

Feedback from the Commonwealth Government through the development of HQS for the Project has indicated the potential for targeted and matter specific alterations to the max scores and criteria weighting from the templates provided in Table 2-1 and Table 2-2. These changes are required to be justified and not deviate from relevant Approved Conservation Advice for targeted matters. These changes are detailed throughout Section 5.2 and form a key component of this report.

3 Summary of literature review

A detailed literature review was undertaken for each MNES/MSES subject to SRIs. The review included collating data from approved conservation advice, listing advice, adopted/made recovery plans, EPBC and QLD survey guidelines, essential habitat data, the Regional Ecosystem Description Database (REDD), as well as peer reviewed journals. The expert knowledge and experience of Ausecology staff members, including information obtained from other Ausecology surveys and assessments, was also utilised.

Specifically, the literature review was used to:

- Collate a list of associated REs for MNES fauna and flora;
- Develop a list of indicators (for each habitat quality attribute) per matter;
- Select the key indicators to be used for habitat quality scoring per matter and define an appropriate rating scale and weighting for each indicator;
- Collate a list of indicators (e.g., microhabitat features) that need to be searched for and recorded while undertaking habitat assessments.

4 Summary of relevant field surveys

A summary of the field assessments undertaken to determine HQS are provided below.

4.1 BioCondition assessments

In order to assess vegetation quality and condition, BioCondition assessments were undertaken in accordance with Eyre et al. (2015) and the GTDTHQ (2017). BioCondition assessments were undertaken by Cardno (2021) during spring 2020 and post wet 2021 surveys and by Ausecology during multiple survey events between August and December 2021.

Following collection of field data, further analysis was conducted to determine the BioCondition score for each site. To calculate the BioCondition score, the value for each site condition attribute collected during the field survey was compared to reference ('benchmark') site values. Benchmark site values are specific to each RE and are based on the average or median value from reference sites. Benchmarks or draft benchmarks (provided by the Queensland Herbarium) were available for all REs assessed with the exception of 11.9.9a. Due to the difficulty in finding an appropriate site to establish a new reference site for 11.9.9a, the Queensland Herbarium advised that 11.8.8 could be used as a surrogate benchmark (pers. Comms. Sandy Pollock, Queensland Herbarium).

Every effort was made to undertake full length (i.e., 100 m x 50 m) BioCondition plots where possible. In some cases, it was necessary to adjust the configuration of the 100 x 50 m plot area so that these attributes were adequately sampled (e.g. 50 x 25 m plot), especially where vegetation was in discrete or reduced patches. In these circumstances, BioCondition attribute values were adjusted to correspond with a full size BioCondition. Similarly, every effort was made to complete the recommended number of BioCondition sites for each assessment unit (Eyre et al. 2015). However, due to the small size and/or discrete patches of some assessment units, this was not always practical.

4.1.1 Assessment units

In order to assess the quality and condition of vegetation on the offsets, the area was delineated into homogenous 'assessment units' (AUs) defined by a unique RE and broad condition state (i.e., 'remnant' versus 'regrowth' versus 'non-remnant'). This was undertaken in accordance with the GTDTHQ. Note that regrowth

AUs were defined by areas that had stem counts and species composition indicative of a positive trajectory towards remnant status for specific RE rather being tied solely to the Queensland Government definition for 'High value regrowth' (HVR).

4.2 Habitat assessments

Habitat assessments were undertaken by Ausecology and were co-located at BioCondition sites. Additional habitat assessments were also undertaken opportunistically within the B2G Project footprint to capture particular habitat features and/or provide a more comprehensive sample of the condition of an assessment unit and the supporting habitat.

Habitat assessments were undertaken across all REs within the B2G Project footprint, including those areas that contained remnant, regrowth and non-remnant vegetation. Habitat assessments included the collection of habitat associated data required for undertaking the habitat quality assessment methodology (further details are discussed below). The assessments included the identification of notable habitat features that were representative of the general area, with a particular emphasis on specific habitat and microhabitat features for terrestrial MNES/MSES.

4.3 Fauna surveys

Multiple fauna surveys have been undertaken on the Project to inform this report and assessment of habitat quality. Details of fauna survey are presented in Section 4 of the offset strategy and further in Chapter 11 – Flora and Fauna and Appendix L – Terrestrial and Aquatic Ecology Technical Report of the EIS.

4.4 Analysis of zoning of species

Analysis of the species distribution along the impact was undertaken to understand if there was a benefit to dividing the Project, given its linear nature, into multiple impact zones for assessment. When species share the same environmental conditions, face similar threats, and occupy a single, continuous habitat, assessing them within a unified impact area accurately informs the habitat quality. Majority of the species by their nature were not distributed throughout all areas of habitat within the Project but rather were concentrated into areas of similar habitat which when analysed largely aligned to Queensland's sub-bioregion system.

The sub-bioregions covered by the Project include the Eastern Darling Downs, Inglewood Sandstones, and the Macintyre and Weir Rivers sub-basin within the Moonie River–Commoron Creek Floodout. These sub-bioregions across the Project represent a finer scale climatic, landform, geological, topographical, vegetation and biota pattern. The Eastern Darling Downs is a fertile agricultural area characterised by alluvial plains and rolling hills, with remnants of native grasslands and woodlands. This area supports species adapted to grassy open environments, though much of the natural vegetation has been modified for agriculture, putting pressure on local biodiversity, including rare grassland species and soil-dependent organisms. The Inglewood Sandstones sub-bioregion features dry forests, and woodland habitats dominated by ironbark and cypress pine, which provide habitat for a range of species. The Macintyre and Weir Rivers sub-basin within the Moonie River–Commoron Creek Floodout area consists of floodplains and clay soils that support low woodlands and riparian zones where there is seasonal water availability. This area also hosts the unique Yelarbon desert, a semi-arid landscape which unlike true deserts also has seasonal water availability and therefore supports unique plants adapted to its sandy soils and fluctuating water conditions.

It should also be noted for the Project that approximately 75% of the vegetation is in non-remnant condition, 8% is regrowth and only 17% is in remnant condition. Notwithstanding this many of the species that persist in

these areas may utilise areas of what is considered poor quality habitat when referenced against the benchmarks. This is reflected in the scoring that has a heavy reliance on BioCondition scoring to assess habitat quality.

Table 4 1- Table 4 3 show those matters that are unique to each of these sub-bioregions. Where a matter is across two sub-bioregions they were still noted to be predominantly in one sub-bioregion.

Table 4-4 shows the few matters that ran across all three sub-bioregions. Of these matters, there was also a clear preference for a specific sub-bioregion, except for the koala which showed a marked predominance in the Inglewood Sandstones but also maintained a notable presence in the other two areas as well. To provide an accurate assessment, koala scoring has been broken down by sub-bioregion for transparency and to ensure that ecological factors and threats specific to each area are accounted for without biasing the habitat evaluation in favour of any one region.

Of the matters assessed, there was a clear preference for a species-specific sub-bioregion, except for the koala which showed a marked predominance in the Inglewood Sandstones area but also maintained a notable presence in the other two sub-bioregions as well. To provide an accurate assessment, koala scoring has been broken down by sub-bioregion for transparency and to ensure that ecological factors and threats specific to each area are accounted for without biasing the habitat evaluation in favour of any one region.

Table 4-1 Species occupying one subregion

Species	Common name	Subregion	Ha
Picris barbarorum		Eastern Darling Downs	175
Picris evae	Hawkweed	Eastern Darling Downs	111
Tympanocryptis condaminensis	Condamine Earless Dragon	Eastern Darling Downs	51
Dasyurus maculatus	Spotted-tailed quoll	Inglewood Sandstones	388
Furina dunmalli	Dunmall's snake	Inglewood Sandstones	263
Nyctophilus corbeni	South-eastern long-eared bat	Inglewood Sandstones	696
Rostratula australis	Australian painted snipe	Inglewood Sandstones	8
Aphelocephala leucopsis	Southern whiteface	Inglewood Sandstones	217
Stagonopleura guttata	Diamond firetail	Inglewood Sandstones	217
Lepidium monoplocoides	Winged peppercress	Macintyre - Weir Fan & Moonie R.	80
Westringia parvifolia	Small-flowered westringia	Macintyre - Weir Fan & Moonie R.	27
Xerothamnella herbacea		Macintyre - Weir Fan & Moonie R.	12

Table 4-2 Species occupying two subregions

Species	Common name	Eastern Darling Downs	Ha	Inglewood Sandstones	Ha
Adclarkia cameroni	Brigalow woodland snail	x	25	x	122

Table 4-3 Species occupying two subregions

Species	Common name	Inglewood Sandstones	Ha	Macintyre - Weir Fan & Moonie R.	Ha
Aphelocephala leucopsis	Southern whiteface	x	215	x	2
Calyptorhynchus lathami lathami	Glossy black-cockatoo	x	15	x	105
Geophaps scripta	Squatter pigeon	x	411	x	10
Stagonopleura guttata	Diamond firetail	x	215	x	2

Table 4-4 Species occupying three subregions

Species	Common name	Eastern Darling Downs	Ha	Inglewood Sandstones	Ha	Macintyre - Weir Fan & Moonie R.	Ha
Anomalopus mackayi	five-clawed worm skink	x	183	x	34	x	25
Homopholis belsonii	Belson's panic	x	7	x	184	x	51
Grantiella picta	painted honeyeater	x	10	x	185	x	136
Phascolarctos cinereus	koala	x	134	x	482	x	153

5 Habitat quality scoring for MNES

5.1 Methodology for Threatened Ecological Communities (TECs)

Table 5-1 to Table 5-4 summarises the attributes and weightings used to score the two components of habitat quality for TECs using the Commonwealth's MHQAT.

In the context of this report all TECs use consistent weightings and scoring for Site Context, Site Condition and Role in the context of the State (see Table 5-1 to Table 5-4).

Table 5-1 TEC site condition attributes

Attribute	Max score
Recruitment of woody perennial species in EDL	5
Native plant species richness - trees	5
Native plant species richness - shrubs	5
Native plant species richness - grasses	5
Native plant species richness - forbs	5
Tree emergent height	5
Tree canopy height	
Tree sub-canopy height	
Tree emergent cover	5
Tree canopy cover	
Tree sub-canopy cover	
Shrub canopy cover	5
Native grass cover	5
Organic litter	5
Large trees (eucalypts plus non-eucalypts)	15
Coarse woody debris	5
Non-native plant cover	10
Total max score	**80**

Table 5-2 TEC site context attributes

Attribute	Max Score
Size of patch	10
Connectedness	5
Context	5
Ecological corridors	6
Role of site location to TECs overall population in the state	5
Threats to the TEC	15
Total max score	**46**

Table 5-3 Scoring matrix for TEC site context attributes

Attribute	Score					
Size of patch	Score	0	2	5	7	10
	Description	< 5 ha	5 – 25 ha	26 – 100 ha	101 – 200 ha	> 200 ha
Connectedness	Score	0	2	4	5	
	Description	0 – 10%	> 10 - < 50%	50 – 75%	> 75 - > 500%	
Context	Score	0	2	4	5	
	Description	<10% remnant	> 10 – 30% remnant	> 30% - 75% remnant	> 75% remnant	
Ecological corridors	Score	0	4	6		
	Description	Not within	Sharing a common boundary	Within (whole or part)		
Role of site location to species overall population in the state	Score	1	4	5		
	Description	Not or unlikely to be critical to the species' survival	Likely to be critical to species' survival	Critical to species survival		
Threats to the species	Score	1	7	15		
	Description	High threat level (i.e. likely to result in death, irreversible damage)	Moderate threat level	Low threat level (i.e. likely to survive)		

Table 5-4 Scoring matrix for Role of site location to TECs overall population in the state

	Score	1	4	5
Role of site location to TECs overall population in the state	Description	Not or unlikely to be critical to TECs survival	Likely to be critical to TECs survival	Critical to TECs survival
	Indicator	Habitat critical to the survival of the TEC does not or is unlikely to occur onsite.	Habitat critical to the survival of the TEC does is identified adjacent to the site, but not onsite.	Habitat identified as being critical to the survival of the TEC is identified onsite.
		According to the MNES Significant Impact Guidelines 1.1 (DoE, 2013a) 'Habitat critical to the survival of a species or ecological community' refers to areas that are necessary: ▪ for activities such as foraging, breeding, roosting, or dispersal; ▪ for the long-term maintenance of the ecological community (including the maintenance of species essential to the ecological community, such as pollinators); ▪ to maintain genetic diversity and long-term evolutionary development; and ▪ for the reintroduction of populations or recovery of the species or ecological community.		

5.1.1 Brigalow TEC

Brigalow (*Acacia harpophylla* dominant and co-dominant) (Brigalow TEC) within the B2G Project footprint is characterised by the presence of *Acacia harpophylla* (brigalow) as dominant or co-dominant with other species, particularly, *Casuarina cristata* (belah) or occasionally with other species of *Acacia* or *Eucalyptus* spp.

All patches of Brigalow TEC were 0.5 ha or more in size and contained <50% cover of exotic perennial plants.

The conservation advice for the Brigalow TEC (DoE 2013b) states that the most important threats to the TEC, in order of significance, are clearing, fire, weeds, feral animals and inappropriate grazing. Therefore, these threats have been used to score the 'threats to the TEC' site context attribute (see Table 5-5).

The areas considered critical to the survival of the Brigalow TEC includes all patches that meet the key diagnostic characteristics and condition thresholds for the ecological community; plus the buffer zones, particularly where these include native vegetation.

Table 5-5 Attributes, indicators and weightings used to determine threats to the Brigalow TEC score

MNES	Attribute	Indicator	Poor	Fair	Excellent	Weighting
Brigalow TEC	Threats to the TEC	Presence of fuel loads	Presence of high fuel loads/risk in and around TEC and/or Burnt more than the RE fire management guidelines resulting in impacts to Brigalow including death. No fire management infrastructure in place.	High fuel loads in and around the TEC	Located within proximity to fire break, low fuel loads in buffer areas to TEC. Burnt in line with the RE fire management guidelines	0.4
		Weed cover	>50% of benchmark for non-native plant cover	≥25 to 50% of benchmark for non-native plant cover	<25% of benchmark for non-native plant cover	0.2
		Presence of grazing pressure	Lack of palatable species (i.e., ground layer dominated by non-palatable species) **OR** Stubble height of palatable species <10 cm **OR** Bare ground >60% **OR** Evidence of significant soil compaction **OR** Evidence of significant shrub layer browsing	Ground layer mix of palatable and non-palatable species **OR** Stubble height of palatable species 10-15 cm **OR** Bare ground 30-60% **OR** Evidence of moderate soil compaction **OR** Evidence of moderate shrub layer browsing	Presence of highly palatable species **OR** Ground layer dominated by palatable species **OR** Stubble height of palatable species >15 cm **OR** Bare ground <30% **OR** Evidence of low levels of soil compaction **OR** Evidence of low levels of shrub layer browsing	0.4

5.1.2 Natural grasslands TEC

Natural Grasslands on Basalt and Fine-textured Alluvial Plains of Northern New South Wales and Southern Queensland Ecological Community (Natural Grasslands TEC) was recorded in several areas of the B2G Project footprint.

All patches of Natural Grassland TEC met the definition of 'best quality' or 'good quality' condition defined in the Commonwealth listing advice (TSSC 2009); having a patch size of at least 2 ha, at least 3 native perennial grass species from the indicator list, at least 200 native perennial grass tussocks and less than 30% cover of perennial non-woody introduced weeds. Where a comparison of site condition against the condition thresholds listed under the listing advice for Natural Grassland TECs was not able to be undertaken due to the timing and seasonality of the surveys or recent disturbance events (i.e. grazing and slashing), a precautionary measure was applied, and 'best quality' condition class was applied.

The conservation advice for the Natural Grasslands TEC (DEWHA 2008) states that the most significant threats to the TEC are heavy grazing, cropping, mining, weeds and dryland salinity. Grazing pressure, cropping activities and weed cover were considered the most significant and measurable threats in the project footprint, therefore, these indicators have been used to score the 'threats to the TEC' site context attribute (see Table 5-6). Other measures such as mining and dryland salinity are more difficult to measure or influence through the project and have therefore not been considered.

No area critical to the survival of this ecological community has been identified in either the conservation or listing advice, however it is assumed that all areas identified are areas critical to the survival of this ecological community given its Critically Endangered listing.

Table 5-6 Attributes, indicators and weightings used to determine threats to the Natural grasslands TEC score

MNES	Attribute	Indicator	Poor	Fair	Excellent	Weighting
Natural grassland TEC	Threats to the TEC	Cropping	Grassland is considered non-remnant i.e., grassland has been ploughed in the last 15 years, contains <20% of the native species normally found in the ecosystem under the same ecological and seasonal conditions and lacks a high ratio of native to exotic species (>5:1)	Grassland meets 2 out of the 3 criteria to meet remnant status	Grassland is considered remnant i.e., grassland has not been ploughed in the last 15 years, contains >20% of the native species normally found in the ecosystem under the same ecological and seasonal conditions and has a high ratio of native to exotic species (>5:1)	0.2
		Presence of grazing pressure	Lack of palatable species (i.e., ground layer dominated by non-palatable species)	Ground layer mix of palatable and non-palatable species **OR** Stubble height of	Presence of highly palatable species **OR** Ground layer dominated by palatable species	0.3

MNES	Attribute	Indicator	Poor	Fair	Excellent	Weighting
			OR Stubble height of palatable species <10 cm **OR** Bare ground >60% **OR** Evidence of significant soil compaction **OR** Evidence of significant shrub layer browsing	palatable species 10-15 cm **OR** Bare ground 30-60% **OR** Evidence of moderate soil compaction **OR** Evidence of moderate shrub layer browsing	**OR** Stubble height of palatable species >15 cm **OR** Bare ground <30% **OR** Evidence of low levels of soil compaction **OR** Evidence of low levels of shrub layer browsing	
		Weed cover	>50% of benchmark for non-native plant cover	≥25 to 50% of benchmark for non-native plant cover	<25% of benchmark for non-native plant cover	0.5

5.1.3 White box TEC

White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (White-Box TEC) was recoded in a single small patch (>0.1 ha) within the Project footprint. The White Box TEC had a canopy dominated by white box (*Eucalyptus albens*) and had at least 12 native species in the understorey this meeting the key diagnostic criteria for the TEC.

The recovery plan for the White Box TEC (DECCW 2010) states that the most important threats to the TEC, are ongoing clearing and modification (for urban development, mining and public infrastructure), grazing regimes, firewood collection, changed fire regimes, increased soil nutrients and use of chemicals, mowing or slashing regimes, weed invasion, climate change, salinity, acid soils and declining tree health. Severity of vegetation clearing, presence of grazing pressure, fire management and weed cover were considered the most significant and measurable threats, therefore, these indicators have been used to score the 'threats to the TEC' site context attribute (see Table 5-7).

Given the currently highly fragmented and degraded state of this ecological community, all areas of the ecological community that meet the minimum condition criteria outlined in section 2.3 should be considered critical to the survival of this ecological community (DECCW 2011). No Critical Habitat as defined under section 207A of the EPBC Act has been identified or included in the Register of Critical Habitat at this time.

Table 5-7 Attributes, indicators and weightings used to determine threats to the White Box TEC score

MNES	Attribute	Indicator	Poor	Fair	Excellent	Weighting
White Box TEC	Threats to the TEC	Presence of grazing pressure	Lack of palatable species (i.e., ground layer dominated by non-palatable species) **OR** Stubble height of palatable species <10 cm **OR** Bare ground >60% **OR** Evidence of significant soil compaction **OR** Evidence of significant shrub layer browsing	Ground layer mix of palatable and non-palatable species **OR** Stubble height of palatable species 10-15 cm **OR** Bare ground 30-60% **OR** Evidence of moderate soil compaction **OR** Evidence of moderate shrub layer browsing	Presence of highly palatable species **OR** Ground layer dominated by palatable species **OR** Stubble height of palatable species >15 cm **OR** Bare ground <30% **OR** Evidence of low levels of soil compaction **OR** Evidence of low levels of shrub layer browsing	0.3
		Presence of fuel loads	Presence of high fuel loads/risk AND Not in line with RE fire management guidelines	Not burnt and/or burnt more than the RE fire management guidelines	Low fuel loads/risk AND In line with the recommended RE fire management guidelines	0.3
		Weed cover	>50% of benchmark for non-native plant cover	≥25 to 50% of benchmark for non-native plant cover	<25% of benchmark for non-native plant cover	0.4

5.2 Methodology for MNES fauna

Table 5-8 to Table 5-38 summarise the attributes and weightings used to score the three components of habitat quality for threatened fauna using the Commonwealth's MHQAT, building on the parameters set in Table 2-1 and Table 2-2. Alterations to the weightings and scoring of individuals metrics as well as the three major components as a whole have been identified and justified within each table and highlighted below.

5.2.1.1 Project Rules for Site Condition

Site condition attributes relating to quality of food and foraging habitat and quality of shelter/breeding habitat, have been modified per species based on species specific requirements, as per guidance from the DCCEEW. Results of the literature review were used to determine habitat attributes that are important for each species and the weightings modified accordingly along with appropriate justification. Proposed weightings and justification per species are provided in this section. To assess the quality and availability of food and foraging habitat, quality and availability of shelter/breeding habitat, threats to the species and species mobility capacity, the following steps were undertaken:

1. Potential indicators for each attribute were determined (via literature review) and ranked in order of significance;
2. Following an in-house peer review assessment process, several key indicators were selected for each attribute that were considered most appropriate for the matter;
3. A rating scale was developed for each indicator;
4. Each indicator was scored using the developed rating scale and weighting.

5.2.1.2 Project Rules for Site Context

The site context component's weightings and scorings remain unchanged (Table 5-8), except for 'Threats to the species' and 'Species mobility capacity' for certain species. This adjustment acknowledges that specific threats may be a large component on certain species ability to occupy habitat regardless of the site condition. The remaining landscape-scale attributes are important in demonstrating that a proposed offset is set in an appropriate position in the landscape compared to the impact and to achieve offset outcomes, however these may be adjusted in weighting where they will not contribute towards the 20-year conservation outcome for a species.

When assessing the species mobility capacity, the GTDTHQ explains species mobility should discuss the presence of barriers, such as fencing, weeds and other factors that limit a species ability to move through a landscape. Notably, for many species in this Project, this attribute may not be relevant at all due to a species' ability to fly for example or given the location of the Project is in areas of low weed loads (weeds that impact mobility) ie lantana that inhibits koala movement in more coastal regions. This has been adjusted accordingly for species where barriers are not present.

Note that many impacted matters have feral predators listed as a key threat in their Site Context scoring, with specific measures around presence or density of predators. To create a spatially meaningful, repeatable and temporarily relevant measure of predator density a Predation Pressure model was created using the Kernal Density Tool, giving a standardised score of 0 to 5. This tool uses public and Project records of feral predators to create a density map scaled to square hectare estimates of density. Sampling bias in public records concentrated in populated areas was actively reduced through weighting and normalising the model. Min-Max Normalisation was used to standardised the variables across the offset sites and impact sites.

$$Scaled\ Predation\ Pressure\ (Imapct\ Site)/km^2 = \frac{(Estimated\ Predation\ Pressure\ (BS\ Score) - Min\ Density)}{Max\ Density - Min\ Density} \times 5$$

Table 5-8 Scoring matrix for threatened fauna site context attributes

Attribute	Score					
Size of patch	**Score**	**0**	**2**	**5**	**7**	**10**
	Description	< 5 ha	5 – 25 ha	26 – 100 ha	101 – 200 ha	> 200 ha
Connectedness	**Score**	**0**	**2**	**4**	**5**	
	Description	0 – 10%	> 10 - < 50%	50 – 75%	> 75 - > 500%	
Context	**Score**	**0**	**2**	**4**	**5**	
	Description	<10% remnant	> 10 – 30% remnant	> 30% - 75% remnant	> 75% remnant	
Ecological Corridors	**Score**	**0**	**4**	**6**		
	Description	Not within	Sharing a common boundary	Within (whole or part)		
Threats to the species	**Score**	**1**	**7**	**15**		
	Description	High threat level (i.e. likely to result in death, irreversible damage)	Moderate threat level	Low threat level (i.e. likely to survive)		
Species Mobility Capacity	**Score**	**1**	**4**	**7**	**10**	
	Description	Severely restricted (76 – 100% reduction)	Highly restricted (51 – 75% reduction)	Moderately restricted (26 – 50% reduction)	Minor restriction (0 – 25% reduction)	

5.2.1.3 Project Rules for Species Stocking Rate

The species stocking rate is the third component of habitat quality, contributing 40% to the final habitat quality score as defined by the MHQA. This component assesses sub-attributes of presence, usage, and the population's importance to indicate the site's carrying capacity and its significance for the species' survival. Four key attributes are evaluated, providing a maximum score of 70, which is then scaled to a score out of 4.

When reliable data on species was unavailable due to their cryptic nature, the standard 40% weighting was adjusted as necessary. In most cases, this adjustment occurred despite targeted surveys for each MNES fauna species using best-practice methods, as attributes could not always be measured with confidence. Fauna species density is difficult to estimate accurately (Monks et al. 2021; Couturier et al. 2013) and often, density is measured using mark-recapture surveys and requires long-term monitoring data over multiple survey periods and larger areas (Lettink and Armstrong 2003). If a species is cryptic, or occurs at naturally low density, it makes it even more difficult to gather sufficient data for robust statistical analysis (Katzner et al. 2011). Consequently, limitations in directly measuring SSR attributes occasionally necessitated a reduction in the weighting for this metric.

In discussions with DCCEEW, it was noted that the MHQA was specifically designed for koalas, and thus this methodology has been applied to koala without modification. There has been a tagging and telemetry study conducted by the University of Southern Queensland within the Project area and population estimates have been based on this data and other data as referenced in Section 5.2.7.

Methodology for each SSR attribute is provided throughout the remainder of Section 5.2, with scoring, weighting and species habitat index questions per individual species summarised in Table 5-9 to Table 5-38 along with justifications where required. Based on individual dispersal and home ranges, the following proposed buffer distances taken from the MHQAT (DCCEEW) have been used from the limit of the species range when scoring 'near the limit of the species' range':

- Australian painted snipe and painted honeyeater – 30 km
- Squatter pigeon (southern) – 20 km
- Koala and spotted quoll – 20 km

- South-eastern long-eared bat – 10 km
- Dunmall's snake, yakka skink and Condamine earless dragon – 5 km
- Five-clawed worm-skink and Brigalow woodland snail – 1 km

5.2.2 Australian painted snipe (*Rostratula australis*)

Table 5-9 Habitat quality scoring metrics and weightings for Australian Painted Snipe

Habitat Quality Scoring Metrics	***Max Score***	***Justification***
Site Condition		
Recruitment of woody perennial species in EDL	*5*	*The Australian Painted Snipe generally inhabits shallow terrestrial wetlands, including lakes, swamps and claypans (DSEWPC 2013). These habitat types are not well represented in the BioCondition method nor are the complex microhabitat requirements required for suitable breeding habitat.* *For example, shallow wetlands with areas of bare wet mud (DOE 2024) are difficult to score using BioCondition metrics as bare ground (which mud would be categorised as) does not contribute to any positively scoring criteria. Additionally, there is no measure of water depth or quality of riparian vegetation other than a measure of raw cover, underestimating the highly dynamic and variable nature of wetland habitats. Painted snipes are also known to occur on islands in the middle of wetlands where undertaking a BioCondition assessment is not likely to be possible.* *The weightings for foraging and shelter habitat been increased accordingly to ensure that more complex indictors of wetland habitat quality are better reflected in the overall weighted score.* *The total weighting for "Site Condition" has also been increased by 10% to reflect the high level of difficulty of detecting the species and determining a meaningful species stocking rate. In the absence of detailed record data to adequately inform the SSR, Site Condition data becomes more important as a surrogate.**See *Table 5-11*
Native plant species richness - trees	*5*	
Native plant species richness - shrubs	*5*	
Native plant species richness - grasses	*5*	
Native plant species richness - forbs	*5*	
Tree emergent height	*5*	
Tree canopy height		
Tree sub-canopy height		
Tree emergent cover	*5*	
Tree canopy cover		
Tree sub-canopy cover		
Shrub canopy cover	*5*	
Native grass cover	*5*	
Organic litter	*5*	
Large trees	*15*	
Coarse woody debris	*5*	
Non-native plant cover	*10*	
*Quality and availability of food and foraging habitat**	*20*	
*Quality and availability of shelter**	*20*	
MAX Site Condition Score	*120*	
Site Condition Score - out of 4	*40% weighting*	
Site Context		
Size of patch	*10*	*The species is primarily threatened by the loss and degradation of its wetland habitat (TSSC/DCCEEW 2013). The Australian Painted Snipe has a broad range of applicable threats as listed in the National Recovery Plan (2022), including climate change, agriculture, weed cover, predation, invasive herbivores, cattle trampling and fire. The weighting for threats has been increased given the other metrics in site context (connectivity) are less*
Connectedness	*5*	
Context	*5*	
Ecological Corridors	*6*	
Role of site location to species overall population in the state	*5*	
*Threats to the species**	*25*	

Habitat Quality Scoring Metrics	*Max Score*	*Justification*
Species mobility capacity	*0*	*relevant given the species ability to fly between patches of suitable habitat. Species mobility capacity has been removed given that this metric refers to barriers to movement and given the species ability to fly, there are no barriers to its mobility. *See Table 5-11*
MAX Site Context Score	*56*	
Site Context Score - out of 4	*40% weighting*	
Species Stocking Rate (SSR)		
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	*10*	*Taken from DCCEEW 2013 Listing advice "The Australian painted snipe is a cryptic species. It is inconspicuous, erratic and opportunistic in its movements and is notoriously difficult to detect (BirdLife Australia, pers. comm., 2012; Jaensch, pers. comm., 2012). The species has a widespread distribution and it is therefore difficult to conduct comprehensive, targeted surveys across the full range (BirdLife Australia, pers. comm., 2012). With this in mind the overall weighting of SSR has been reduced with greater emphasis being placed on reduction of threats and presence/quality of key microhabitat features as a surrogate.* *Density estimates has been replaced with a surrogate to measure the habitats distance to a wetland, this also acknowledges the area directly adjacent to the wetland as supporting habitat that should be removed of threats.*
Species usage of the site (habitat type & evidenced usage)	*15*	
Approximate density (per ha)	*30*	
*Role/importance of species population on site**	*15*	
Max SSR Score	*70*	
SSR Score (out of 2)	*20% Weighting*	

Note in these sections green coloured cells represents an increase and orange represents a decrease on the current methodology.

Table 5-10 Species stocking rate scoring metrics – Australian painted snipe

Species Stocking Rate (SSR)					
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	Score	0	5		10
		No	Yes - adjacent		Yes - on site
Species usage of the site (habitat type & evidenced usage)	Score	0	5	10	15
		Not habitat	Dispersal	Foraging	Breeding
Distance to wetland habitat (m)	Score	0	10	20	30
		>500	>100-500	>50-100	<50
Role/importance of species population on site*	Score	0	5	10	15
		0	5 - 15	20 - 35	40 - 45
***SSR Supplementary Table**					
*Key source population for breeding	Score	0	10		
		No	Yes/ Possibly		
*Key source population for dispersal	Score	0	5		
		No	Yes/ Possibly		
*Necessary for maintaining genetic diversity	Score	0	15		
		No	Yes/ Possibly		
*Near the limit of the species range	Score	0	15		
		No	Yes		

Table 5-11 Species Habitat Indicator questions and weightings used to determine habitat quality scoring for Australian painted snipe

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
Australian painted snipe	*Rostratula australis*	**1. Quality and availability of food and habitat required for foraging**	Presence of wetland indicator species	0-10% cover OR >90% cover	11-20% cover OR 81-90% cover	Between 21 – 80% cover	1
		2. Quality and availability of habitat required for shelter and breeding	Presence of wetland indicator species	0-10% cover OR >90% cover	11-20% cover OR 81-90% cover	Between 21 – 80% cover	0.50
			Bare ground / bare wet mud cover	0-10% cover OR >90% cover	11-20% cover OR 81-90% cover	Between 21 – 80% cover	0.50
		3. Species mobility capacity					NA
		4. Absence of threats	Weed abundance	>50% of benchmark for non-native plant cover	≥5 to 50% of benchmark for non-native plant cover	<5% of benchmark for non-native plant cover	0.60
			Presence of grazing pressure	Lack of palatable species, ground layer dominated by non-palatable species OR Stubble height of palatable species <10 cm OR Bare ground >60% OR Evidence of significant soil compaction	Ground layer mix of palatable and non-palatable species OR Stubble height of palatable species 10-15 cm OR Bare ground 30-60% OR Evidence of moderate soil compaction OR Evidence of moderate	Presence of highly palatable species OR Ground layer dominated by palatable species OR Stubble height of palatable species >15 cm OR Bare ground <30% OR Evidence of low levels of soil compaction OR Evidence of	0.20

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
				OR Evidence of significant shrub layer browsing	shrub layer browsing	low levels of shrub layer browsing	
			Presence of feral predators	Predation pressure Score 4-5	Predation pressure Score 2-3	Predation pressure Score 0-1	0.20

5.2.3 Condamine earless dragon (Tympanocryptis condaminensis)

Table 5-12 Habitat quality scoring metrics and weightings for Condamine Earless Dragon

Habitat Quality Scoring Metrics	***Max Score***	***Justification***
Site Condition		
Recruitment of woody perennial species in EDL	*5*	*No changes to scores recommended.* **See Table 5-14.* .
Native plant species richness - trees	*5*	
Native plant species richness - shrubs	*5*	
Native plant species richness - grasses	*5*	
Native plant species richness - forbs	*5*	
Tree emergent height	*5*	
Tree canopy height		
Tree sub-canopy height		
Tree emergent cover	*5*	
Tree canopy cover		
Tree sub-canopy cover		
Shrub canopy cover	*5*	
Native grass cover	*5*	
Organic litter	*5*	
Large trees	*15*	
Coarse woody debris	*5*	
Non-native plant cover	*10*	
*Quality and availability of food and foraging habitat**	*10*	
*Quality and availability of shelter**	*10*	
MAX Site Condition Score	*100*	
Site Condition Score - out of 3	*30% weighting*	
Site Context		
Size of patch	*10*	*The conservation advice for the species (TSSC 2016) states that the main identified threats to the*
Connectedness	*5*	

Habitat Quality Scoring Metrics	*Max Score*	*Justification*
Context	*5*	*species are vegetation clearing (for road development), road maintenance (e.g., slashing of grassland verges), changed cropping practices (e.g., timing of harvesting) or expansion of cropping areas, weed invasion and predation by feral predators. The recovery plan for a similar congener, the grassland earless dragon (Tympanocryptis pinguicolla), also identified changed fire regimes and changed grazing regimes as potential impacts.* *Given the project nor its offsets are likely to influence road maintenance, indicators related to agricultural impacts, weed invasion and presence of grazing pressure have been used to score the 'threats to the species' site context attribute. The advice also lists the presence of feral predators however there is no evidence or research to support this and this has been removed from the threats below.* *Given the species ability to move between relatively hostile matrix or cropping, agriculture and roadsides, its mobility capacity is not considered an important feature in estimating habitat quality and has therefore not been weighted.* **See Table 5-14.*
Ecological Corridors	*6*	
Role of site location to species overall population in the state	*5*	
*Threats to the species**	*25*	
Species mobility capacity	*0*	
MAX Site Context Score	*56*	
Site Context Score - out of 3	*30% weighting*	
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	*10*	*Detection of Condamine earless dragon appears to be an important factor in determining suitable habitat given many areas of seemingly suitable habitat are void of evidence of the species (Hobson 2015). Additionally given the highly modified landscapes and habitat types it is known to occur in, it is recommended that presence of the species is an important factor in determining habitat quality. Given the inclusion of cropped paddocks as habitat, they will score poorly in site condition and context making detection of the species an important factor in determining an areas suitability and quality. This has been left at 40%* *Approximate stocking rates have been taken from the below sources. Refer to Table 5-16, approximate density data has been taken from the below sources.*
Species usage of the site (habitat type & evidenced usage)	*15*	
Approximate density (per ha)[#]	*30*	
Role/importance of species population on site	*15*	
Max SSR Score	*70*	
SSR Score (out of 4)	*40% Weighting*	

Table 5-13 Species stocking rate scoring metrics – Condamine Earless dragon

Species Stocking Rate (SSR)					
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	Score	0		5	10
		No	Yes - adjacent		Yes - on site
Species usage of the site (habitat type & evidenced usage)	Score	0	5	10	15
		Not habitat	Dispersal	Foraging	Breeding
Approximate density (per ha)#	Score	0	10	20	30
		0	<0.1	0.1-0.5	>0.5
Role/importance of species population on site*	Score	0	5	10	15
		0	5 - 15	20 - 35	40 - 45
***SSR Supplementary Table**					
*Key source population for breeding	Score	0	10		
		No	Yes/ Possibly		
*Key source population for dispersal	Score	0	5		
		No	Yes/ Possibly		
*Necessary for maintaining genetic diversity	Score	0	15		
		No	Yes/ Possibly		
*Near the limit of the species range	Score	0	15		
		No	Yes		

#Stevens Toni A., Evans Murray C., Osborne William S., Sarre Stephen D. (2010) *Home ranges of, and habitat use by, the grassland earless dragon* (*Tympanocryptis pinguicolla*) in remnant native grasslands near Canberra. *Australian Journal of Zoology*
#Starr, Carly R., and Luke K.-P. Leung. *Habitat Use by the Darling Downs Population of the Grassland Earless Dragon: Implications for Conservation*. *The Journal of Wildlife Management*

Table 5-14 Attributes, indicators and weightings used to determine habitat quality for Condamine earless dragon

Common name	**Scientific name**	**Attribute**	**Indicator**	**Poor**	**Fair**	**Excellent**	**Weighting**
Condamine earless dragon	*Tympanocryptis condaminensis*	**1. Quality and availability of food and habitat required for foraging**	Presence of remnant/non remnant grasslands (11.8.11 and 11.3.21), crop fields (e.g. sorghum stubbles) and/or grass verges	Absent	-	Present	1.00
		2. Quality and availability of habitat required for shelter and breeding	Soil crack/ burrow abundance	Absent to scattered (0-10%) within 1m x 1m quadrat	Common (11-50%) within 1m x 1m quadrat	Abundant (>50%) within 1m x 1m quadrat	1.00
		3. Quality and availability of habitat required for mobility					NA
			Severity of vegetation	For grasslands	For grasslan	For grasslands	0.4

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
		4. Absence of threats	clearing/agricultural impacts	REs - Grassland is considered non-remnant i.e., grassland has been ploughed in the last 15 years, contains <25% of the native species normally found in the ecosystem under the same ecological and seasonal conditions and lacks a high ratio of native to exotic species (>5:1)	d REs - grassland meets 2 out of the 3 criteria to meet remnant status	REs - Grassland is considered remnant i.e., grassland has not been ploughed in the last 15 years, contains >25% of the native species normally found in the ecosystem under the same ecological and seasonal conditions and has a high ratio of native to exotic species (>5:1)	
			Weed abundance	>50% of vegetation cover are non-native plants	≥10 – 50% of vegetation cover are non-native plants	<10 of vegetation cover of non native plants	0.3
			Presence of grazing pressure	Lack of palatable species, ground layer dominated by non-palatable species **OR** Stubble	Ground layer mix of palatable and non-palatable species **OR** Stubble height of palatable	Presence of highly palatable species **OR** Ground layer dominated by palatable species	0.3

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
				height of palatable species <10 cm **OR** Bare ground >60% **OR** Evidence of significant soil compaction **OR** Evidence of significant shrub layer browsing	species 10-15 cm **OR** Bare ground 30-60% **OR** Evidence of moderate soil compaction **OR** Evidence of moderate shrub layer browsing	**OR** Stubble height of palatable species >15 cm **OR** Bare ground <30% **OR** Evidence of low levels of soil compaction **OR** Evidence of low levels of shrub layer browsing	

5.2.4 Dunmall's snake (*Furina dunmalli*)

Table 5-15 Habitat quality scoring metrics and weightings for Dunmall's snake

Habitat Quality Scoring Metrics	***Max Score***	***Justification***
Site Condition		
Recruitment of woody perennial species in EDL	*5*	*Very little is known about Dunmall's snake and its habitat. However, it is generally recognised that coarse woody debris and organic litter are the most important microhabitat features, and loss of these features presenting one of the major threats (Brigalow Belt Reptiles Workshop 2010; Cogger et al. 1993). Other habitat features of note include soil cracks in alluvial clay soils (QLD DERM 2010; Richardson 2006), details of which are not adequately captured in BioCondition.* *To reflect the importance of these microhabitat features, both have been increased to add further weighting in measuring site condition from the perspective of Dunmall's snake as well as being represented within the foraging and shelter indicator questions.* *The total weighting for site condition has also been increased by 20% to reflect the high level of difficulty of detecting this species and determining a meaningful species stocking rate.* *In the absence of detailed record data to adequately inform the SSR, site condition data becomes more important as a surrogate.* ** See Table 5-17*
Native plant species richness - trees	*5*	
Native plant species richness - shrubs	*5*	
Native plant species richness - grasses	*5*	
Native plant species richness - forbs	*5*	
Tree emergent height	*5*	
Tree canopy height		
Tree sub-canopy height		
Tree emergent cover	*5*	
Tree canopy cover		
Tree sub-canopy cover		
Shrub canopy cover	*5*	
Native grass cover	*5*	
Organic litter	*5*	
Large trees	*15*	
Coarse woody debris	*5*	
Non-native plant cover	*10*	
Quality and availability of food and foraging habitat	*20**	
Quality and availability of shelter	*20**	
MAX Site Condition Score	*120*	
Site Condition Score - out of 5	*50% weighting*	
Site Context		
Size of patch	*10*	*The conservation advice for Dunmall's snake (Doe 2014) states that the main identified threat to the species is a continued legacy of past broadscale land clearing and habitat modification. Other potential threats include, overgrazing by stock and modification of habitat for grazing and agriculture, pasture improvement, crop production and urban development. Predation by feral animals has also been identified as a potential threat (DERM 2007).* *These indicators related to severity of vegetation clearing and presence of feral predators and presence of sufficient shelter*
Connectedness	*5*	
Context	*5*	
Ecological Corridors	*6*	
Role of site location to species overall population in the state	*5*	
Threats to the species	*25**	
Species mobility capacity	*0*	
MAX Site Context Score	*56*	
Site Context Score - out of 3	*30% weighting*	

Habitat Quality Scoring Metrics	*Max Score*	*Justification*
		have been used to score the 'threats to the species' site context attribute. * See *Table 5-17*
Species Stocking Rate (SSR)		
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	*10*	*Detecting Dunmall's snake in the field is extremely challenging and there are very few records of the species across its entire range. Given and no information available on the species populations, a low level of stocking rate has been used with the assumption that one snake present would represent good habitat and the likely presence of a population and receive max score. The species is also secretive and commonly misidentified (DSEWPC 2011). As a result, it is recommended that Species Stocking Rate be weighted lower than 40% as all measures rely on detection to some degree. In the absence of reliable records and potential detection issues it is recommended that greater emphasis be placed on site condition scoring as a surrogate. Given just determining whether the species is present comes with great difficulty, it is therefore nearly impossible to measure approximate density. It is therefore recommended that presence be weighted higher than the approximate density.*
Species usage of the site (habitat type & evidenced usage)	*15*	
Approximate density (per ha)	*30*	
*Role/importance of species population on site**	*15*	
Max SSR Score	*70*	
SSR Score (out of 2)	*20% Weighting*	

Table 5-16 Species stocking rate scoring metrics – Dunmall's snake

Species Stocking Rate (SSR)					
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	Score	0	5		10
		No	Yes - adjacent		Yes - on site
Species usage of the site (habitat type & evidenced usage)	Score	0	5	10	15
		Not habitat	Dispersal	Foraging	Breeding
Approximate density (per ha)	Score	0	10	20	30
		0	<0.05	0.05-0.1	>0.1
Role/importance of species population on site*	Score	0	5	10	15
		0	5 - 15	20 - 35	40 - 45
***SSR Supplementary Table**					
*Key source population for breeding	Score	0	10		
		No	Yes/ Possibly		
*Key source population for dispersal	Score	0	5		
		No	Yes/ Possibly		
*Necessary for maintaining genetic diversity	Score	0	15		
		No	Yes/ Possibly		
*Near the limit of the species range	Score	0	15		
		No	Yes		

Table 5-17 Attributes, indicators and weightings used to determine habitat quality for Dunmall's snake

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
Dunmall's snake	*Furina dunmalli*	**1. Quality and availability of food and habitat required for foraging**	Leaf litter cover	Absent to scattered (0-10%)	Common (11-50%)	Abundant (>50%)	0.80
			Number of small logs <30 cm Diameter at Breast Height (DBH)	Absent to scattered (0-10)	Common (11-20)	Abundant (>20)	0.05
			Number of large logs (>30 cm DBH)	Absent to scattered (0-5)	Common (6-10)	Abundant (>10)	0.15
		2. Quality and availability of habitat required for shelter and breeding	Number of small logs (<30 cm DBH)	Absent to scattered (0-10)	Common (11-20)	Abundant (>20)	0.20
			Number of large logs (>30 cm DBH)	Absent to scattered (0-5)	Common (6-10)	Abundant (>10)	0.40
			Large rock (>20 cm) cover	Absent to scattered (0-10%)	Common (11-50%)	Abundant (>50%)	0.40
		3. Quality and availability of habitat required for mobility					NA
		4. Absence of threats	Severity of vegetation clearing	High to severe (<25% of benchmark canopy height and/or <10% of benchmark canopy cover) OR For grasslands REs - Grassland is considered non-remnant i.e., grassland has been ploughed in the last 15 years, contains <25% of the native species	Moderate (26-69% of BM canopy height and/or 11-49% of benchmark canopy cover) OR For grassland REs - grassland meets 2 out of the 3 criteria to meet remnant status	Low to absent (≥70% of benchmark canopy height and ≥50% of benchmark canopy cover) OR For grasslands REs - Grassland is considered remnant i.e., grassland has not been ploughed in the last 15 years, contains >25% of the native species	0.5

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
				normally found in the ecosystem under the same ecological and seasonal conditions and lacks a high ratio of native to exotic species (>5:1)		normally found in the ecosystem under the same ecological and seasonal conditions and has a high ratio of native to exotic species (>5:1)	
			Presence of grazing pressure	Lack of palatable species, ground layer dominated by non-palatable species OR Stubble height of palatable species <10cm OR Bare ground >60% OR Evidence of significant soil compaction OR Evidence of significant shrub layer browsing	Ground layer mix of palatable and non-palatable species OR Stubble height of palatable species 10-15 cm OR Bare ground 30-60% OR Evidence of moderate soil compaction OR Evidence of moderate shrub layer browsing	Presence of highly palatable species OR Ground layer dominated by palatable species OR Stubble height of palatable species >15cm OR Bare ground <30% OR Evidence of low levels of soil compaction OR Evidence of low levels of shrub layer browsing	0.2
			Presence of feral predators	Predation pressure Score 4-5	Predation pressure Score 2-3	Predation pressure Score 0-1	0.3

5.2.5 South-eastern long-eared bat (*Nyctophilus corbeni)*

Table 5-18 Habitat quality scoring metrics and weightings for the south-eastern long-eared bat

Habitat Quality Scoring Metrics	***Max Score***	***Justification***
Site Condition		
Recruitment of woody perennial species in EDL	*5*	*The south-eastern long-eared bat is a specialised, insectivorous bat that feeds in flight, typically capturing flying prey or foliage-gleaning. Foraging is typically concentrated around remnant vegetation, with a distinct tree canopy, and a dense, uncluttered shrub layer (Lumsden and Bennett 2000, TSSC 2015b).* *Studies of the species in NSW, within comparable habitat, have found that areas with a high tree stem density and many hollows provide significant roosting habitat (Law et al. 2016; Law et al. 2018; Gonsalves et al. 2022). Quality of shelter habitat has subsequently been increased in order to emphasise the importance of hollow trees, data of which is not captured through BioCondition.* *In comparison to terrestrial mammals, bats are generally less sensitive to changes in the ground layer (Lumsden and Bennett 2000). To reflect the reduced importance of these habitat features, quality of food and foraging habitat has been increased to add further weighting and emphasis on the importance of canopy-related habitat features.* *Note that the overall weighting for site condition score has been increased from 30% to 40% for the south-eastern long-eared bat. The reason for this adjustment is discussed below where it relates to species stocking rate (SSR).*
Native plant species richness - trees	*5*	
Native plant species richness - shrubs	*5*	
Native plant species richness - grasses	*5*	
Native plant species richness - forbs	*5*	
Tree emergent height	*5*	
Tree canopy height		
Tree sub-canopy height		
Tree emergent cover	*5*	
Tree canopy cover		
Tree sub-canopy cover		
Shrub canopy cover	*5*	
Native grass cover	*5*	
Organic litter	*5*	
Large trees	*15*	
Coarse woody debris	*5*	
Non-native plant cover	*10*	
Quality and availability of food and foraging habitat	*20*	
Quality and availability of shelter	*20*	
MAX Site Condition Score	*120*	
Site Condition Score - out of 4	*40% weighting*	
Site Context		
Size of patch	*10*	*The south-eastern long-eared bat is likely dependent on connectivity with adjacent native vegetation, requiring dense vegetation for foraging and shelter. Connectedness, context and ecological corridors are likely important metrics in measuring connectivity for this species.* *The conservation advice states that likely threats include habitat loss and fragmentation, fire, reduction in hollow availability, exposure to agrichemicals, grazing and predation by feral animals (TSSC 2015a).* *Therefore, indicators related to severity of vegetation clearing and presence of fuel loads have been used to score the 'threats to the species' site context attribute. Given the species ability to fly and move between relatively hostile matrix, its mobility capacity is not considered an important feature in estimating habitat quality and has therefore not been weighted.*
Connectedness	*5*	
Context	*5*	
Ecological Corridors	*6*	
Role of site location to species overall population in the state	*5*	
Threats to the species	*15*	
Species mobility capacity	*0*	
MAX Site Context Score	*46*	
Site Context Score - out of 3	*30% weighting*	
Species Stocking Rate (SSR)		

Habitat Quality Scoring Metrics	*Max Score*	*Justification*
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	*10*	*The historic distribution of south-eastern long-eared bat is unclear due to taxonomic changes; however, it is known that approximately 30% of the total known population occurs in Queensland, from less than 30 localities (Parnaby 2009, Reardon 2012). The species is recorded infrequently and generally uncommon within its distribution (TSSC, 2015b). In the absence of reliable records and potential detection issues, it is recommended that SSR be slightly reduced and greater emphasis be placed on site condition scoring inferring that the species is likely to be present within good quality habitat within its range. See Table 5-19. Approximate stocking rates have been taken from the below sources.*
Species usage of the site (habitat type & evidenced usage)	*15*	
Approximate density (per ha)#	*30*	
*Role/importance of species population on site**	*15*	
Max SSR Score	*70*	
SSR Score (out of 3)	*30% Weighting*	

Table 5-19 Species stocking rate scoring metrics – South-eastern long-eared bat

Species Stocking Rate (SSR)					
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	Score	0		5	10
		No	Yes - adjacent		Yes - on site
Species usage of the site (habitat type & evidenced usage)	Score	0	5	10	15
		Not habitat	Dispersal	Foraging	Breeding
Approximate density (per ha)#	Score	0	10	20	30
		0	0.005	0.005-0.1	>0.1
Role/importance of species population on site*	Score	0	5	10	15
		0	5 - 15	20 - 35	40 - 45

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

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Dwyer, P. D. (1966). The population pattern of *Miniopterus schrebersii* (Chiroptera) in north-eastern New South Wales. Australian Journal of Zoology, 14(6), 1073–1137. 10.1071/ZO966107

Law, B. S. , & Chidel, M. (2006). Eucalypt plantings on farms: Use by insectivorous bats in south-eastern Australia. Biological Conservation, 133(2), 236–249. 10.1016/j.biocon.2006.06.016

Law, B., Brassil, T., Proud, R. and Potts, J., 2023. Estimating density of forest bats and their long-term trends in a climate refuge. *Ecology and Evolution*, *13*(6), p.e10215.

Table 5-20 Attributes, indicators and weightings used to determine habitat quality for South-eastern long-eared bat

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
eastern long-eared bat	*Nyctophilus corbeni*	**1. Quality and availability of food and habitat required for foraging**	Shrub density	Absent to scattered (0-10%)	Moderate (11-50%)	Mid-Dense to very dense (>50%)	0.30
			Canopy tree cover	Absent to scattered (0-10%)	Common to very common (11-70%)	Abundant (>70%)	0.20
			Abundance of *Allocasuarina luehmannii*	Absent to associated in RE (0-10%)	Sub-dominant in RE (11-50%)	Co-dominant to dominant in RE (>50%)	0.50
		2. Quality and availability of habitat required for shelter and breeding	Condition of hollow bearing trees	Absent	Alive to mostly alive	Mostly dead to dead (stags)	0.60
			Number of small tree hollows and fissures (>2 cm-10 cm diameter)	Absent to scattered (0-5)	Common (6-10)	Abundant (>10)	0.20
			Number of large tree hollows and fissures (>20 cm diameter)	Absent to scattered (0-5)	Common (6-10)	Abundant (>10)	0.20
		3. Quality and availability of habitat required for mobility					NA
		4. Absence of threats	Severity of vegetation clearing	High to severe (<25% of benchmark canopy height and/or <10% of benchmark canopy cover)	Moderate (26-69% of BM canopy height and/or 11-49% of benchmark canopy cover)	Low to absent (≥70% of benchmark canopy height and ≥50% of benchmark canopy cover)	0.5
			Inappropriate fire regime: infrequent fire resulting in loss 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	Not in line with RE fire management guidelines AND Presence of high fuel loads/risk	Not burnt and/or burnt more the RE fire management guidelines	In line with recommended RE fire management guidelines	0.5

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
			suitable shelter trees and/or high fuel loads from inappropriate burns resulting in high weed cover/fuel load				

5.2.6 Five-clawed worm-skink (*Anomalopus mackayi*)

Table 5-21 Habitat quality score metrics and weightings for five-clawed worm-skink

Habitat Quality Scoring	***Max Score***	***Justification***
Site Condition		
Recruitment of woody perennial species in EDL	*5*	*The five-clawed worm-skink is known to inhabit tunnel-like burrows and deep soil cracks in clay to clay-loam or self-mulching, friable basalt soils. The species is known to utilise organic litter and fallen woody debris as shelter when traversing the surface, indicating that these are important microhabitat features (DEWHA 2008b). Native grass cover is also recognised as a particularly important habitat feature.* *As a result, quality of shelter habitat has been increased to highlight the importance of these microhabitat features, particularly hollow logs, which is not considered within the BioCondition metrics. Other BioCondition metrics such as large trees and canopy cover appear to be of little consequence for the species based on the available knowledge.*
Native plant species richness - trees	*5*	
Native plant species richness - shrubs	*5*	
Native plant species richness - grasses	*5*	
Native plant species richness - forbs	*5*	
Tree emergent height	*5*	
Tree canopy height		
Tree sub-canopy height		
Tree emergent cover	*5*	
Tree canopy cover		
Tree sub-canopy cover		
Shrub canopy cover	*5*	
Native grass cover	*5*	
Organic litter	*5*	
Large trees	*15*	
Coarse woody debris	*5*	
Non-native plant cover	*10*	
Quality and availability of food and foraging habitat	*10*	
Quality and availability of shelter	*20*	
MAX Site Condition Score	*110*	
Site Condition Score - out of 3	*30% weighting*	
Site Context		
Size of patch	*10*	*Based on the information above, mobility for this species is considered to already be quite limited. Habitat connectivity is essential (DCCEEW 2023). All site context metrics related to connectivity will be of importance.*
Connectedness	*5*	
Context	*5*	
Ecological Corridors	*6*	

Habitat Quality Scoring	***Max Score***	***Justification***
Role of site location to species overall population in the state	*5*	*Therefore the overall weighting for site context score has been left at 30%.* *Given the species spends most of its time underground, burrowing in loose soil, leaf litter, and under logs, where it is protected from predators and extreme weather conditions its mobility capacity is not considered an important feature in estimating habitat quality and has therefore not been weighted.*
Threats to the species	*15*	
Species mobility capacity	*0*	
MAX Site Context Score	*46*	
Site Context Score - out of 3.5	*30% weighting*	
Species Stocking Rate (SSR)		
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	*10*	*All Brigalow Belt reptiles are generally considered difficult to detect (DCCEEW 2023). There is limited specific data on exact population density due to its elusive, fossorial (burrowing) lifestyle and patchy distribution. However, based on its ecology and what is known about similar skink species in Australia, an approximate density might range from 0.1 to 2 individuals per hectare in suitable habitat areas like leaf litter-rich woodlands, grasslands, or undisturbed soils in moist environments. In areas with high-quality, connected habitat, density could be at the upper end of this range, around 1-2 individuals per hectare, where ground cover and soil conditions support its burrowing and foraging needs. In contrast, in fragmented or degraded habitats, densities would likely be on the lower end, closer to 0.1 individuals per hectare, as habitat loss and fragmentation restrict viable population sizes.*
Species usage of the site (habitat type & evidenced usage)	*15*	
Approximate density (per ha)	*30*	
*Role/importance of species population on site**	*15*	
Max SSR Score	*70*	
SSR Score (out of 2)	*40% Weighting*	

Table 5-22 Species stocking rate scoring metrics – five-clawed worm-skink

Species Stocking Rate (SSR)					
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	Score	0	5		10
		No	Yes - adjacent		Yes - on site
Species usage of the site (habitat type & evidenced usage)	Score	0	5	10	15
		Not habitat	Dispersal	Foraging	Breeding
Approximate density (per ha)	Score	0	10	20	30
		0	<0.1	0.1-1	>1
Role/importance of species population on site*	Score	0	5	10	15
		0	5 - 15	20 - 35	40 - 45

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

Table 5-23 Attributes, indicators and weightings used to determine habitat quality for the five-clawed worm-skink

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
five-clawed worm-skink	*Anomalopus mackayi*	**1. Quality and availability of food and habitat required for foraging**	Leaf litter cover	Absent to scattered (0-10%)	Common (11-50%)	Abundant (>50%)	0.40
			Native grass cover	Absent to scattered (1-10%)	Common to very common (11-70%)	Abundant (>70%)	0.60
		2. Quality and availability of habitat required for shelter and breeding	Leaf litter cover	Absent to scattered (0-10%)	Common (11-50%)	Abundant (>50%)	0.50
			Number of small logs (<30 cm DBH)	Absent to scattered (0-10)	Common (11-20)	Abundant (>20)	0.20
			Number of large logs (>30 cm DBH)	Absent to scattered (0-5)	Common (6-10)	Abundant (>10)	0.30
		3. Quality and availability of habitat required for mobility	Severity of vegetation clearing	High to severe (<25% of benchmark canopy height and/or <10% of benchmark canopy cover) OR For grasslands REs - Grassland is considered non-remnant i.e., grassland has been ploughed in the last 15 years, contains <25% of the native species normally found in the ecosystem under the same	Moderate (26-69% of BM canopy height and/or 11-49% of benchmark canopy cover) OR For grassland REs - grassland meets 2 out of the 3 criteria to meet remnant status	Low to absent (≥70% of benchmark canopy height and ≥50% of benchmark canopy cover) OR For grasslands REs - Grassland is considered remnant i.e., grassland has not been ploughed in the last 15 years, contains >25% of the native species normally found in the ecosystem under the same ecological	1

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
				ecological and seasonal conditions and lacks a high ratio of native to exotic species (>5:1)		and seasonal conditions and has a high ratio of native to exotic species (>5:1)	
		4. Absence of threats	Severity of vegetation clearing	High to severe (<25% of benchmark canopy height and/or <10% of benchmark canopy cover) OR For grasslands REs - Grassland is considered non-remnant i.e., grassland has been ploughed in the last 15 years, contains <25% of the native species normally found in the ecosystem under the same ecological and seasonal conditions and lacks a high ratio of native to exotic species (>5:1)	Moderate (26-69% of BM canopy height and/or 11-49% of benchmark canopy cover) OR For grassland REs - grassland meets 2 out of the 3 criteria to meet remnant status	Low to absent (≥70% of benchmark canopy height and ≥50% of benchmark canopy cover) OR For grasslands REs - Grassland is considered remnant i.e., grassland has not been ploughed in the last 15 years, contains >25% of the native species normally found in the ecosystem under the same ecological and seasonal conditions and has a high ratio of native to exotic species (>5:1)	0.6

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
			Presence of grazing pressure	Lack of palatable species, ground layer dominated by non-palatable species OR Stubble height of palatable species <10cm OR Bare ground >60% OR Evidence of significant soil compaction OR Evidence of significant shrub layer browsing	Ground layer mix of palatable and non-palatable species OR Stubble height of palatable species 10-15 cm OR Bare ground 30-60% OR Evidence of moderate soil compaction OR Evidence of moderate shrub layer browsing	Presence of highly palatable species OR Ground layer dominated by palatable species OR Stubble height of palatable species >15cm OR Bare ground <30% OR Evidence of low levels of soil compaction OR Evidence of low levels of shrub layer browsing	0.20
			Presence of feral predators	Predation pressure Score 4-5	Predation pressure Score 2-3	Predation pressure Score 0-1	0.20

5.2.7 Koala (Phascolarctos cinereus)

Table 5-24 Habitat quality score metrics and weightings for the koala

Habitat Quality Scoring Metrics	***Max Score***	***Justification***
Site Condition		
Recruitment of woody perennial species in EDL	*5*	*No changes*
Native plant species richness - trees	*5*	
Native plant species richness - shrubs	*5*	
Native plant species richness - grasses	*5*	
Native plant species richness - forbs	*5*	
Tree emergent height	*5*	
Tree canopy height		
Tree sub-canopy height		
Tree emergent cover	*5*	
Tree canopy cover		
Tree sub-canopy cover		

Habitat Quality Scoring Metrics	*Max Score*	*Justification*
Shrub canopy cover	*5*	
Native grass cover	*5*	
Organic litter	*5*	
Large trees	*15*	
Coarse woody debris	*5*	
Non-native plant cover	*10*	
Quality and availability of food and foraging habitat	*10*	
Quality and availability of shelter	*10*	
MAX Site Condition Score	*100*	
Site Condition Score - out of 3	*30% weighting*	
Site Context		
Size of patch	*10*	*The recovery plan for the koala (DAWE 2021b) states that the species is at most risk from climate change, with clearing of habitat and the impact of disease cited as other major (national scale) threats. Additional threats also include: altered fire regimes and mortality from dogs and vehicles. The level and variety of different threats to koalas in certain areas is one of the biggest predicators of a populations viability. As a number of these threats could not be readily measured (i.e., climate change), the severity of vegetation clearing, presence of feral predators and presence of sufficient shelter and inappropriate fire regimes have been used to score the 'threats to the species' site context attribute (# see Table 5-26).*
Connectedness	*5*	
Context	*5*	
Ecological Corridors	*6*	
Role of site location to species overall population in the state	*5*	
Threats to the species#	*15*	
Species mobility capacity	*0*	
MAX Site Context Score	*46*	
Site Context Score - out of 3	*30% weighting*	
Species Stocking Rate (SSR)		
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	*10*	*No changes*
Species usage of the site (habitat type & evidenced usage)	*15*	
Approximate density (per ha)	*30*	
*Role/importance of species population on site**	*15*	
Max SSR Score	*70*	
SSR Score (out o f4)	*40% Weighting*	

Table 5-25 Species stocking rate scoring metrics – Koala

Species Stocking Rate (SSR)					
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	Score	0		5	10
		No	Yes - adjacent		Yes - on site
Species usage of the site (habitat type & evidenced usage)	Score	0	5	10	15
		Not habitat	Dispersal	Foraging	Breeding
Approximate density (per ha)#	Score	0	10	20	30
		0	<0.005	0.005-0.05	>0.05
Role/importance of species population on site*	Score	0	5	10	15
		0	5 - 15	20 - 35	40 - 45
***SSR Supplementary Table**					
*Key source population for breeding	Score	0	10		
		No	Yes/ Possibly		
*Key source population for dispersal	Score	0	5		
		No	Yes/ Possibly		
*Necessary for maintaining genetic diversity	Score	0	15		
		No	Yes/ Possibly		
*Near the limit of the species range	Score	0	15		
		No	Yes		

#Density data based on Koala records collected over the course of the Project and the following sources:
Conservation Advice for Phascolarctos cinereus (Koala) combined populations of Queensland, New South Wales and the Australian Capital Territory
Dissanayake, R. B., Giorgi, E., Stevenson, M., Allavena, R., & Henning, J. (2021). Estimating koala density from incidental koala sightings in South-East Queensland, Australia (1997–2013), using a self-exciting spatio-temporal point process model. *Ecology and Evolution*
Biolinks (2019)Redlands Coast Koala Population and Habitat Assessment, For Redlands mainland "density estimate of 0.04 ± 0.03 (SE) koalas ha^{-1} North Stradbroke "density estimate of 0.15 ± 0.12 (SE) koalas ha^{-1}"

Table 5-26 Attributes, indicators and weightings used to determine habitat quality for the koala

Common name	**Scientific name**	**Attribute**	**Indicator**	**Poor**	**Fair**	**Excellent**	**Weighting**
koala	*Phascolarctos cinereus*	**1. Quality and availability of food and habitat required for foraging**	Abundance of large trees	Absent	1 to 49% of benchmark number of large trees	≥50% of benchmark number of large trees	0.50
			Canopy cover of koala food trees	Absent	Scattered to common (1-50%)	Abundant (>50%)	0.50
		2. Quality and availability of habitat required for shelter and breeding	Tree canopy cover	<10% of benchmark	≥10% and <50% of the benchmark **OR** >200% of the benchmark	≥50% and ≤200% of the benchmark	0.50
			Recruitment of canopy species	<25% of dominant canopy species present as regeneration	≥25 – 70% of dominant canopy species present as regeneration	≥70% of dominant canopy species present as regeneration	0.50
		3. Quality and availability of habitat required for mobility					NA
		4. Absence of threats	Severity of vegetation clearing	High to severe (<25% of	Moderate (26-69% of BM canopy	Low to absent (≥70% of benchmark	0.40

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
				benchmark canopy height and/or <10% of benchmark canopy cover) **OR** For grasslands REs - Grassland is considered non-remnant i.e., grassland has been ploughed in the last 15 years, contains <25% of the native species normally found in the ecosystem under the same ecological and seasonal conditions and lacks a high ratio of native to exotic species (>5:1)	height and/or 11-49% of benchmark canopy cover) **OR** For grassland REs - grassland meets 2 out of the 3 criteria to meet remnant status	canopy height and ≥50% of benchmark canopy cover) **OR** For grasslands REs - Grassland is considered remnant i.e., grassland has not been ploughed in the last 15 years, contains >25% of the native species normally found in the ecosystem under the same ecological and seasonal conditions and has a high ratio of native to exotic species (>5:1)	
			Inappropriate fire regime: infrequent fire resulting in loss 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	Not in line with RE fire management guidelines **AND** Presence of high fuel loads/risk	Not burnt **AND/OR** Burnt more the RE fire management guidelines	In line with recommended RE fire management guidelines	0.3

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
			shelter trees and/or high fuel loads from inappropriate burns resulting in high weed cover/fuel load				

5.2.8 Brigalow woodland snail *(Adclarkia cameroni)*

Table 5-27 Habitat quality score metrics and weightings for Brigalow Woodland Snail

Habitat Quality Scoring Metrics	***Max Score***	***Justification***
Site Condition		
Recruitment of woody perennial species in EDL	*5*	*The Brigalow woodland snail inhabits a small number of remnant and scattered brigalow (Acacia harpophylla) and eucalypt woodland patches (such as road verges and riparian corridors) on alluvial black soils.* *The species is known to occur under logs and leaf litter and requires both canopy and on-ground timber cover for survival and egg-laying (Stanisic, 2011). Desiccation is the greatest threat to land snail eggs and hence ground debris, as well as an over-storey of trees and shrubs is required in order to maintain high levels of relative humidity at the substrate level. The main food source for the Brigalow woodland snail includes fungi, lichen and other detritus growing on fallen debris (e.g. cryptogams) (Stanisic, 2011). Although cryptogam cover is measured in the BioCondition methodology, it is not included in the final score but has been added in food and foraging habitat score and weighted higher given its importance in the healthy functioning of an ecosystem.* *There are several key attributes required for the Brigalow woodland snail which are not represented by the BioCondition methodology, namely the presence of timber piles and fallen logs suitable for sheltering, breeding and harbouring appropriate food sources and the presence of cryptogams for food. Subsequently, the weighting for quality and availability of food and foraging habitat and shelter have been increased from 10 to 20.*
Native plant species richness - trees	*5*	
Native plant species richness - shrubs	*5*	
Native plant species richness - grasses	*5*	
Native plant species richness - forbs	*5*	
Tree emergent height	*5*	
Tree canopy height		
Tree sub-canopy height		
Tree emergent cover	*5*	
Tree canopy cover		
Tree sub-canopy cover		
Shrub canopy cover	*5*	
Native grass cover	*5*	
Organic litter	*5*	
Large trees	*15*	
Coarse woody debris	*5*	
Non-native plant cover	*10*	
Quality and availability of food and foraging habitat	*20*	
Quality and availability of shelter	*20*	
MAX Site Condition Score	*120*	
Site Condition Score - out of 4	*40% weighting*	
Site Context		
Size of patch	*10*	*Connectivity, ecological corridors and species mobility capacity provide metrics on connectivity to other suitable vegetation which is likely to be a significant factor impacting the species. Species mobility capacity has been set to areas <30m as impairing the species ability to move in the landscape.* *The conservation advice for the Brigalow woodland snail (TSSC 2016b) states that the main identified threats to the species, in order of significance are: land clearing, habitat disturbance, predation by feral animals, invasion by weeds (particularly buffel grass), trampling by cattle and horses, and fire. Given the vast number of variable threats from multiple sources it is recommended that threats be considered more heavily in the*
Connectedness	*5*	
Context	*5*	
Ecological Corridors	*6*	
Role of site location to species overall population in the state	*5*	
Threats to the species#	*30*	
Species mobility capacity	*10*	
MAX Site Context Score	*71*	
Site Context Score - out of 2	*30% weighting*	

Habitat Quality Scoring Metrics	*Max Score*	*Justification*
		HQS and has therefore being increased by 15 points (see Table 5-29)
Species Stocking Rate (SSR)		
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	*10*	*Detecting the Brigalow woodland snail in the field is extremely challenging and there are very few records of the species across its entire range. As a result, it is recommended that the weighting of SSR be decreased to 10% as all measures rely on detection to some degree.*
Species usage of the site (habitat type & evidenced usage)	*15*	
Approximate density (per ha)	*30*	
*Role/importance of species population on site**	*15*	
Max SSR Score	*70*	
SSR Score (out of 4)	*30% Weighting*	

Table 5-28 Species stocking rate scoring metrics – Brigalow woodland snail

Species Stocking Rate (SSR)					
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	Score	0	5		10
		No	Yes - adjacent		Yes - on site
Species usage of the site (habitat type & evidenced usage)	Score	0	5	10	15
		Not habitat	Dispersal	Foraging	Breeding
Approximate density (per ha)#	Score	0	10	20	30
		0	<0.005	0.005-0.05	>0.05
Role/importance of species population on site*	Score	0	5	10	15
		0	5 - 15	20 - 35	40 - 45
***SSR Supplementary Table**					
*Key source population for breeding	Score	0	10		
		No	Yes/ Possibly		
*Key source population for dispersal	Score	0	5		
		No	Yes/ Possibly		
*Necessary for maintaining genetic diversity	Score	0	15		
		No	Yes/ Possibly		
*Near the limit of the species range	Score	0	15		
		No	Yes		

#Density data based on Koala records collected over the course of the Project and the following sources:
Conservation Advice for Phascolarctos cinereus (Koala) combined populations of Queensland, New South Wales and the Australian Capital Territory
Dissanayake, R. B., Giorgi, E., Stevenson, M., Allavena, R., & Henning, J. (2021). Estimating koala density from incidental koala sightings in South-East Queensland, Australia (1997–2013), using a self-exciting spatio-temporal point process model. *Ecology and Evolution*
Biolinks (2019)Redlands Coast Koala Population and Habitat Assessment, For Redlands mainland "density estimate of 0.04 ± 0.03 (SE) koalas ha^{-1} North Stradbroke "density estimate of 0.15 ± 0.12 (SE) koalas ha^{-1}"

Table 5-29 Species Habitat Indicator questions and weightings used to determine habitat quality scoring for Brigalow Woodland Snail

Common name	Scientific name	Attribute	Indicator	Score (1)	Score (15)	Score (25)	Weighting
Brigalow Woodland snail	*Adclarkia cameroni*	**1. Quality and availability of food and habitat required for foraging**	Coarse woody debris	<10% of benchmark number or total length of CWD	>/= 10 to <50% or >200% of benchmark number or total length of CWD	≥50% or ≤200% of benchmark number or total length of CWD	0.5
			Cryptograms/lichen/ fungi	0	>0 -<20 cover in quadrat	>20% cover in quadrat	0.5
		2. Quality and availability of habitat required for shelter and breeding	Canopy tree cover **AND/OR** Shrub canopy cover	Absent to scattered (0-10%)	Common to very common (11-70%)	Abundant (>70%)	0.5
			Leaf Litter	<10% of benchmark organic litter	≥ 10 to <50% or >200% of benchmark organic litter	≥50% or ≤200% of benchmark organic litter	0.5
		3. Quality and availability of habitat required for mobility	Vegetation width	<30m	na	>30m width	1
		4. Absence of threats	Presence of Agriculture impact	Signs of agriculture presence exceeds 50%	Signs of agriculture presence is within 11% to 49%	Signs of agriculture presence is less than 10%	0.2
			Severity of vegetation clearing	High to severe (<25% of benchmark canopy height and/or <10% of benchmark canopy cover) **OR** For grasslands REs - Grassland is considered non-remnant i.e., grassland has been ploughed in the last 15 years, contains <25% of the native species normally found in the ecosystem under the same ecological and	Moderate (26-69% of BM canopy height and/or 11-49% of benchmark canopy cover) **OR** For grassland REs - grassland meets 2 out of the 3 criteria to meet remnant status	Low to absent (≥70% of benchmark canopy height and ≥50% of benchmark canopy cover) **OR** For grasslands REs - Grassland is considered remnant i.e., grassland has not been ploughed in the last 15 years, contains >25% of the native species normally found in the ecosystem	0.4

Common name	Scientific name	Attribute	Indicator	Score (1)	Score (15)	Score (25)	Weighting
				seasonal conditions and lacks a high ratio of native to exotic species (>5:1)		under the same ecological and seasonal conditions and has a high ratio of native to exotic species (>5:1)	
			Presence of fuel loads	Not in line with RE fire management guidelines **AND** Presence of high fuel loads/risk	Not burnt and/or burnt more the RE fire management guidelines	In line with recommended RE fire management guidelines	0.2
			Trampling pressure	Signs of soil compaction and soil disturbance exceeds 50%	Signs of soil compaction and soil disturbance are within 11% to 49%	Signs of soil compaction and soil disturbance less than 10%	0.2

5.2.9 Spotted-tail quoll (southern subspecies) *(Dasyurus maculatus maculatus)*

Table 5-30 Habitat quality scoring metrics and weightings for Spotted-Tail Quoll

Habitat Quality Scoring Metrics	***Max Score***	***Justification***
Site Condition		
Recruitment of woody perennial species in EDL	*5*	*Overall, the importance of high-quality habitat with structural heterogeneity and a variety of sheltering options for the species as well as its prey, which consists of a variety of small to medium sized fauna, cannot be overstated. The weighting for Site Condition has been increased with appreciation for the value of a fully functioning, intact ecosystem for this species and its varied prey to shelter, forage and breed.* *There are several key attributes required by spotted-tail quoll which are not represented by the BioCondition methodology, namely the presence of large tree hollows, large hollow logs/log piles and rock formations suitable for sheltering and breeding. Subsequently, the weighting for quality and availability of shelter has been doubled, with attributes most distantly related to structural heterogeneity for shelter conversely decreasing and attributes indirectly contributing remaining the same. Large trees can also be an indicator of ecosystem maturity and time since major disturbance given they are typically the slowest BC metric to reach the benchmarks. Mature forest is generally associated with quality quoll habitat.*
Native plant species richness - trees	*5*	
Native plant species richness - shrubs	*5*	
Native plant species richness - grasses	*5*	
Native plant species richness - forbs	*5*	
Tree emergent height	*5*	
Tree canopy height		
Tree sub-canopy height		
Tree emergent cover	*5*	
Tree canopy cover		
Tree sub-canopy cover		
Shrub canopy cover	*5*	
Native grass cover	*5*	
Organic litter	*5*	
Large trees	*15*	
Coarse woody debris	*5*	
Non-native plant cover	*10*	
Quality and availability of food and foraging habitat	*20*	
Quality and availability of shelter	*20*	
MAX Site Condition Score	*120*	
Site Condition Score - out of 4	***40%***	
Site Context		
Size of patch	*10*	*Habitat loss and fragmentation is likely the biggest threat to spotted-tail quolls, as they typically require large patches of vegetation with good connectivity to complete long-distance journeys. Additionally, as female home ranges typically do not overlap (Claridge et al. 2005), even highly suitable habitat will have a low carrying capacity for Spotted-tail quoll if the patch is small. As the threat of habitat loss to this species relates directly to all site context attributes, the weighting of Site Context has stayed at 30%. Indicators related to the severity of vegetation clearing, presence of feral predators and fire risks to score the 'threats to the species' site context attribute (# see Table 5 29). The dog fence was seen as a potential barrier and has been scored in the species mobility capacity based on its home range.*
Connectedness	*5*	
Context	*5*	
Ecological Corridors	*6*	
Role of site location to species overall population in the state	*5*	
Threats to the species#	*15*	
Species mobility capacity	*10*	
MAX Site Context Score	*46*	
Site Context Score - out of 3	***30%***	
Species Stocking Rate (SSR)		
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	*10*	*Spotted-tail quolls are a highly cryptic species, naturally occurring at low densities (Kortner et al. 2015). The overall weighting for SSR for this species has been decreased accordingly (considering also that the department has previously acknowledged efforts to survey and ascertain precise population estimates are unreliable (TSSC 2004, Woinarsky et al. 2014)). The weighting for presence detected has been raised to reflect the importance of sightings as a measure of habitat quality and an indicator of potential "stronghold populations" (TSSC 2020). With the chances of sighting or detecting the presence of quolls being so low, it is far less important to observe usage of habitat features than it is to observe the species directly and hence, this metric weighting has been reduced.*
Species usage of the site (habitat type & evidenced usage)	*15*	
Approximate density (per ha)	*30*	
*Role/importance of species population on site**	*15*	
Max SSR Score	*70*	
SSR Score (out of 3)	***30%***	

Table 5-31 Species stocking rate scoring metrics – Spotted-tail quoll

Species Stocking Rate (SSR)					
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	Score	0	5		10
		No	Yes - adjacent		Yes - on site
Species usage of the site (habitat type & evidenced usage)	Score	0	5	10	15
		Not habitat	Dispersal	Foraging	Breeding
Approximate density (per ha)#	Score	0	10	20	30
		0	0.0005–0.004	0.004 - 0.01	> 0.01
Role/importance of species population on site*	Score	0	5	10	15
		0	5 - 15	20 - 35	40 - 45
***SSR Supplementary Table**					
*Key source population for breeding	Score	0	10		
		No	Yes/ Possibly		
*Key source population for dispersal	Score	0	5		
		No	Yes/ Possibly		
*Necessary for maintaining genetic diversity	Score	0	15		
		No	Yes/ Possibly		
*Near the limit of the species range	Score	0	15		
		No	Yes		

Henderson, T., Fancourt, B.A., Rajaratnam, R. *et al.* Density estimates reveal that fragmented landscapes provide important habitat for conserving an endangered mesopredator, the spotted-tailed quoll. *Sci Rep* **12**, 12688 (2022).

Table 5-32 Species Habitat Indicator questions and weightings used to determine habitat quality scoring for Spotted-Tail Quoll (southern subspecies)

Common name	**Scientific name**	**Attribute**	**Indicator**	**Poor**	**Fair**	**Excellent**	**Weighting**
Spotted-Tail Quoll (southern subspecies)	*Dasyurus maculatus maculatus*	**1. Quality and availability of food and habitat required for foraging**	Presence of large trees (eucalypts and allies)	<50% of the RE benchmark for number of large trees (eucalypts)	≥50 to 100% of RE benchmark for number of large trees (eucalypts)	≥ RE benchmark number of large trees (eucalypts)	1
		2. Quality and availability of habitat required for shelter and breeding	Number of hollow logs (>20 cm diameter)	Scattered (1-5)	Common (6-10)	Abundant (>10)	0.5
			Number of medium hollows (10-20cm entrance diameter)	Scattered (1-5)	Common (6-10)	Abundant (>10)	0.5
		3. Quality and availability of habitat required for mobility	Distance from dog fence	Within 0-5 km of the dog fence or other exclusion fencing	Within 6-10 km of the dog fence	Within 11-15 km of the dog fence or other exclusion fencing	1

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
		4. Absence of threats	Presence of feral predators	Predation pressure Score 4-5	Predation pressure Score 2-3	Predation pressure Score 0-1	0.4
			Severity of vegetation clearing	High to severe (<25% of benchmark canopy height and/or <10% of benchmark canopy cover) **OR** For grasslands REs - Grassland is considered non-remnant i.e., grassland has been ploughed in the last 15 years, contains <25% of the native species normally found in the ecosystem under the same ecological and seasonal conditions and lacks a high ratio of native to exotic species (>5:1)	Moderate (26-69% of BM canopy height and/or 11-49% of benchmark canopy cover) **OR** For grassland REs - grassland meets 2 out of the 3 criteria to meet remnant status	Low to absent (≥70% of benchmark canopy height and ≥50% of benchmark canopy cover) **OR** For grasslands REs - Grassland is considered remnant i.e., grassland has not been ploughed in the last 15 years, contains >25% of the native species normally found in the ecosystem under the same ecological and seasonal conditions and has a high ratio of native to exotic species (>5:1)	0.3
			Presence of fuel loads	Not in line with RE fire management guidelines **AND** Presence of high fuel loads/risk	Not burnt and/or burnt more the RE fire management guidelines	In line with recommended RE fire management guidelines	0.3

5.2.10 Painted honeyeater (*Grantiella picta*)

Table 5-33 Habitat quality scoring metrics and weightings for painted honeyeater

Habitat Quality Scoring Metrics	***Max Score***	***Justification***
Site Condition		
Recruitment of woody perennial species in EDL	*5*	*The species prefers woodlands which contain a higher number of mature trees (DoE, 2015), as these host more mistletoes. However, the species can be seen in areas of scattered eucalypts or patches of forest in farmland and in narrow roadside strips if ample flowering and fruiting mistletoe and flowering eucalypts are available. They are less often found in patches of Acacia with mistletoes, in woodlands dominated by cypress-pine (Callitris), woodlands of Eucalyptus camaldulensis and in paperbark (Melaleuca) association (Higgins et al. 2001).* *Presence and abundance of flowering mistletoes and eucalypts are not sufficiently represented in the BioCondition methodology. Flowering eucalypts can be partially reflected in Number of Large Trees, assuming that they are of reproductive maturity, however this may be unreliable. Therefore, quality of food and foraging habitat has been doubled to better represent the presence of these key attributes.*
Native plant species richness - trees	*5*	
Native plant species richness - shrubs	*5*	
Native plant species richness - grasses	*5*	
Native plant species richness - forbs	*5*	
Tree emergent height	*5*	
Tree canopy height		
Tree sub-canopy height		
Tree emergent cover	*5*	
Tree canopy cover		
Tree sub-canopy cover		
Shrub canopy cover	*5*	
Native grass cover	*5*	
Organic litter	*5*	
Large trees	*15*	
Coarse woody debris	*5*	
Non-native plant cover	*10*	
Quality and availability of food and foraging habitat	*20*	
Quality and availability of shelter	*10*	
MAX Site Condition Score	*110*	
Site Condition Score - out of 3	*30% weighting*	
Site Context		
Size of patch	*10*	*Connectedness to other suitable vegetation and the species mobility capacity is unlikely to be a significant factor impacting the ability for the species to access habitat within the site given its ability to fly. However, the painted honeyeater has a broad range of applicable threats throughout the B2G alignment, including vegetation clearing, predation, cattle trampling and altered fire regimes.* *For this reason, the overall weighting of site context has not changed. Indicators related to severity of vegetation clearing, presence of feral predators and presence of sufficient shelter, and presence of grazing pressure were selected to score the 'threats to the species' site context attribute (# refer to Table 5-35). Given the species ability to fly and move between relatively hostile matrix, its mobility capacity is not considered an important feature in estimating habitat quality and has therefore not been weighted.*
Connectedness	*5*	
Context	*5*	
Ecological Corridors	*6*	
Role of site location to species overall population in the state	*5*	
Threats to the species#	*15*	
Species mobility capacity	*0*	
MAX Site Context Score	*46*	
Site Context Score - out of 3	*30% weighting*	

Habitat Quality Scoring Metrics	*Max Score*	*Justification*
Species Stocking Rate (SSR)		
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	*10*	*The painted honeyeater occurs as a single wide-ranging population that is sparsely dispersed across their known distribution (DoE, 2015), the overall weighting has remained given the detection of the species during Project surveys.*
Species usage of the site (habitat type & evidenced usage)	*15*	
Approximate density (per ha)	*30*	
*Role/importance of species population on site**	*15*	
Max SSR Score	*70*	
SSR Score (out of 4)	*40% Weighting*	

Table 5-34 Species stocking rate scoring metrics – Painted honeyeater

Species Stocking Rate (SSR)					
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	Score	0		5	10
		No	Yes - adjacent		Yes - on site
Species usage of the site (habitat type & evidenced usage)	Score	0	5	10	15
		Not habitat	Dispersal	Foraging	Breeding
Approximate density (per ha)#	Score	0	10	20	30
		0	<0.2	0.2-0.3	>0.3
Role/importance of species population on site*	Score	0	5	10	15
		0	5 - 15	20 - 35	40 - 45
***SSR Supplementary Table**					
*Key source population for breeding	Score	0	10		
		No	Yes/ Possibly		
*Key source population for dispersal	Score	0	5		
		No	Yes/ Possibly		
*Necessary for maintaining genetic diversity	Score	0	15		
		No	Yes/ Possibly		
*Near the limit of the species range	Score	0	15		
		No	Yes		

#Species records on alignment were used to and DataZone, Birdlife Australia and used both the upper and lower population estimates over estimated extent of occurrence.

Damon L. Oliver, Matthew A. Chambers & David G. Parked (2003) Habitat and resource selection of the Painted Honeyeater (Grantiella picta) on the northern floodplains region of New South Wales, Emu - Austral Ornithology
Major, R. E. , Christie, F. J. , Gowing, G. , & Ivison, T. J. (1999). Age structure and density of red-capped robin populations vary with habitat size and shape. Journal of Applied Ecology
Debus, S. J. S. (2006). Breeding and population parameters of robins in a woodland remnant in northern New South Wales, Australia. Emu – Austral Ornithology
Bennett Andrew F., Watson David M. (2011) Declining woodland birds – is our science making a difference?. Emu
Barea, L.P., 2008. Nest-site selection by the Painted Honeyeater (Grantiella picta), a mistletoe specialist. Emu-Austral Ornithology"

Table 5-35 Species Habitat Indicator questions and weightings used to determine habitat quality scoring for painted honeyeater

Common name	**Scientific name**	**Attribute**	**Indicator**	**Poor**	**Fair**	**Excellent**	**Weighting**
	Grantiella picta	**1. Quality and availability of**	Presence of mistletoes	Absent	-	Present	0.5

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
Painted honeyeater		**food and habitat required for foraging**	Presence of large trees with the potential to host mistletoe	0 to 50% of benchmark number of large trees	≥50% to 100% of benchmark number of large trees	≥ benchmark number of large trees	0.5
		2. Quality and availability of habitat required for shelter and breeding	Presence of remnant/regrowth box-ironbark woodlands and/or Casuarina forests	Absent	Present without evidence of recruitment of tree species within box-ironbark woodlands and/or Casuarina forests	Present with evidence of recruitment of tree species within box-ironbark woodlands and/or Casuarina forests	1.00
		3. Quality and availability of habitat required for mobility	NA				
		4. Absence of threats	Severity of vegetation clearing	High to severe (<25% of benchmark canopy height and/or <10% of benchmark canopy cover) OR For grasslands REs - Grassland is considered non-remnant i.e., grassland has been ploughed in the last 15 years, contains <25% of the native species normally found in the ecosystem under the same ecological	Moderate (26-69% of BM canopy height and/or 11-49% of benchmark canopy cover) OR For grassland REs - grassland meets 2 out of the 3 criteria to meet remnant status	Low to absent (≥70% of benchmark canopy height and ≥50% of benchmark canopy cover) OR For grasslands REs - Grassland is considered remnant i.e., grassland has not been ploughed in the last 15 years, contains >25% of the native species normally found in the ecosystem under the same ecological and seasonal conditions and has a	0.6

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
				and seasonal conditions and lacks a high ratio of native to exotic species (>5:1)		high ratio of native to exotic species (>5:1)	
			Presence of grazing pressure	Lack of palatable species, ground layer dominated by non-palatable species OR Stubble height of palatable species <10cm OR Bare ground >60% OR Evidence of significant soil compaction OR Evidence of significant shrub layer browsing	Ground layer mix of palatable and non-palatable species OR Stubble height of palatable species 10-15 cm OR Bare ground 30-60% OR Evidence of moderate soil compaction OR Evidence of moderate shrub layer browsing	Presence of highly palatable species OR Ground layer dominated by palatable species OR Stubble height of palatable species >15cm OR Bare ground <30% OR Evidence of low levels of soil compaction OR Evidence of low levels of shrub layer browsing	0.2
			Inappropriate fire regime: infrequent fire resulting in loss 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 shelter trees	Not in line with RE fire management guidelines AND Presence of high fuel loads/risk	Not burnt and/or burnt more the RE fire management guidelines	In line with recommended RE fire management guidelines	0.3

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
			and/or high fuel loads from inappropriate burns resulting in high weed cover/fuel load				

5.2.11 Squatter pigeon (southern) *(Geophaps scripta scripta)*

Table 5-36 Habitat quality scoring metrics and weightings for squatter pigeon (southern)

Habitat Quality Scoring Metrics	***Max Score***	***Justification***
Site Condition		
Recruitment of woody perennial species in EDL	*5*	*Suitable breeding habitat occurs on stony rises occurring on sandy or gravelly soils, within 1 km proximity to a permanent waterbody (Squatter Pigeon Workshop, 2011). The subspecies nests on the ground, usually laying two eggs among or under vegetation. It forages for seeds among sparse and low grass, litter and coarse woody debris, in improved pastures, and beside railway lines (DCCEEW, 2023b).* *BioCondition does not include important attributes such as distance to water, making the project specific metrics around quality of foraging and shelter habitat integral in determining the overall habitat quality score for the squatter pigeon (southern). More emphasis should also be placed on native grass cover as an indication of shelter quality as well as a general food resource.* *The weightings for these two criteria have been increased accordingly to ensure that more complex indicators of habitat quality are better reflected in the overall weighted score.*
Native plant species richness - trees	*5*	
Native plant species richness - shrubs	*5*	
Native plant species richness - grasses	*5*	
Native plant species richness - forbs	*5*	
Tree emergent height	*5*	
Tree canopy height		
Tree sub-canopy height		
Tree emergent cover	*5*	
Tree canopy cover		
Tree sub-canopy cover		
Shrub canopy cover	*5*	
Native grass cover	*5*	
Organic litter	*5*	
Large trees	*15*	
Coarse woody debris	*5*	
Non-native plant cover	*10*	
Quality and availability of food and foraging habitat	*10*	
Quality and availability of shelter	*20*	
MAX Site Condition Score	*110*	
Site Condition Score - out of 3	*30% weighting*	
Site Context		
Size of patch	*10*	*The conservation advice for squatter pigeon (southern) indicates that the main threats to the species are ongoing vegetation clearing and fragmentation, overgrazing of habitat by livestock and feral herbivores such as rabbits, weeds, inappropriate fire regimes, thickening of understorey vegetation, predation by feral cats and foxes, trampling of nests by domestic stock and illegal shooting. Given the species ability to fly and move between relatively hostile matrix, its mobility capacity is not considered an important feature in estimating habitat quality and has therefore not been weighted.*
Connectedness	*5*	
Context	*5*	
Ecological Corridors	*6*	
Role of site location to species overall population in the state	*5*	
Threats to the species	*15*	
Species mobility capacity	*0*	
MAX Site Context Score	*46*	
Site Context Score - out of 3	*30% weighting*	

Habitat Quality Scoring Metrics	*Max Score*	*Justification*
		Indicators related to severity of vegetation clearing, presence of feral predators and presence of sufficient shelter, and presence of grazing pressure were selected to score the 'threats to the species' site context attribute (# Table 5-38).
Species Stocking Rate (SSR)		
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	*10*	No changes proposed given the detectability of the species during Project surveys.
Species usage of the site (habitat type & evidenced usage)	*15*	
Approximate density (per ha)	*30*	
*Role/importance of species population on site**	*15*	
Max SSR Score	*70*	
SSR Score (out of 4)	*40% Weighting*	

Table 5-37 Species stocking rate scoring metrics – squatter pigeon (southern)

Species Stocking Rate (SSR)					
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	Score	0	5		10
		No	Yes - adjacent		Yes - on site
Species usage of the site (habitat type & evidenced usage)	Score	0	5	10	15
		Not habitat	Dispersal	Foraging	Breeding
Approximate density (per ha)#	Score	0	10	20	30
		0	<0.1	0.1-0.2	>0.2
Role/importance of species population on site*	Score	0	5	10	15
		0	5 - 15	20 - 35	40 - 45

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

#Threatened Species Scientific Committee (2015). Conservation Advice Geophaps scripta scripta squatter pigeon (southern). Canberra: Department of the Environment. In effect under the EPBC Act from 27-Oct-2015
Ward MS, Reside AE, Garnett ST (2021) Southern Squatter Pigeon Geophaps scripta scripta. In The Action Plan for Australian Birds 2020. (Eds ST Garnett and GB Baker) pp. 44–47. CSIRO Publishing, Melbourne.
Garnett ST, Crowley GM, Barrett G (2002) 'Patterns and trends in Australian bird distributions and abundance: analysis of data from the New Atlas of Australian Birds'. Report to the National Land & Water Resources Audit, Canberra.

Table 5-38 Species Habitat Indicator questions and weightings used to determine habitat quality scoring for squatter pigeon (southern)

Common name	**Scientific name**	**Attribute**	**Indicator**	**Poor**	**Fair**	**Excellent**	**Weighting**
Squatter pigeon (southern)	*Geophaps scripta scripta*	**1. Quality and availability of food**	Native grass cover	Absent to scattered (0-<15%)	Very common to abundant (>45%)	Common (≥15-45%)	1.00

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
		and habitat required for foraging					
		2. Quality and availability of habitat required for shelter and breeding	Distance to water	>3 km	1 to 3 km	<1 km	0.5
			Native grass cover	≥10 to 50% of benchmark native perennial (or preferred and intermediate) grass cover	≥50 – 90% of benchmark native perennial (or preferred and intermediate) grass cover	≥90% of benchmark native perennial (or preferred and intermediate) grass cover	0.3
			Presence of Grassy Tussock Understory (Squatter Pigeon Nesting)	Absent to scattered (0-<10%) or Abundant (<70%)	Very Common (>20%-70%)	Common (11-20%)	0.2
		3. Quality and availability of habitat required for mobility					NA
		4. Absence of threats	Presence of feral predators	Predation pressure Score 4-5	Predation pressure Score 2-3	Predation pressure Score 0-1	0.5
			Presence of grazing pressure	Lack of palatable species, ground layer dominated by non-palatable species OR Stubble height of palatable species <10cm OR Bare ground >60% OR Evidence of significant soil compaction OR Evidence of significant shrub layer browsing	Ground layer mix of palatable and non-palatable species OR Stubble height of palatable species 10-15 cm OR Bare ground 30-60% OR Evidence of moderate soil compaction OR Evidence of moderate shrub layer browsing	Presence of highly palatable species OR Ground layer dominated by palatable species OR Stubble height of palatable species >15cm OR Bare ground <30% OR Evidence of low levels of soil compaction OR Evidence of low levels of shrub layer browsing	0.5

5.3 Methodology for MNES flora

Table 5-39 to Table 5-50 summarise the attributes and weightings used to score the three components of habitat quality for threatened flora using the Commonwealth's MHQAT. Alterations to the methodology have been identified and justified within each table.

No departures from the MHQAT attributes were used for site condition with all BioCondition metrics used as per standard (see Table 5-39). Similarly, site context will be scored in accordance with the MHQAT, with the exception of threats which will have an increase weighting for all species (Table 5-40). Given flora are not mobile, they are significantly more vulnerable to local based and stochastic threats. Most Site Condition metrics may all be high quality, but species-specific local scale threats may results in populations becoming locally extinct despite otherwise high quality habitat. Many of these threats may also not be represented within any other HQS metric or be too specific to be captured, e.g. one specific weed species that is a threat. Thus, it is recommended that threats be recognised higher in the overall weighting for MNES Flora.

"Threats to the species" is also the only attribute in this component in Site Context that can be directly and immediately influenced by the project as well as managed as part of an offset, and so should weigh heavily in this scoring (refer to *Table 5-40*) in order to achieve up lift / habitat quality gains.

To assess threats to each threatened flora species, the following steps were undertaken:

1. Threats to the species were determined (via literature review) and ranked in order of significance
2. Based on the literature review and expert ecological knowledge and experience, the main threats to the species were selected
3. Following an in-house peer review assessment process, a number of indicators were selected for each attribute
4. A rating scale was developed for each indicator
5. Each indicator was scored using the developed rating scale and weighting.

The attributes, indicators, weightings, and rating scale developed for threats to MNES Flora are provided separately for each threatened flora species in Section 5.3.2 to 5.3.6.

Table 5-39 MNES Flora Site Condition attribute scoring

Attribute	Max score
Recruitment of woody perennial species in EDL	5
Native plant species richness - trees	5
Native plant species richness - shrubs	5
Native plant species richness - grasses	5
Native plant species richness - forbs	5
Tree emergent height	5
Tree canopy height	
Tree sub-canopy height	
Tree emergent cover	5
Tree canopy cover	
Tree sub-canopy cover	
Shrub canopy cover	5
Native grass cover	5
Organic litter	5

Attribute	Max score
Large trees (eucalypts plus non-eucalypts)	15
Coarse woody debris	5
Non-native plant cover	10
Total max score	**80**

Table 5-40 Flora site context attributes

Attribute	Max score	Proposed score	Justification
Size of patch	10	10	Scored as per Eyre et al. 2015, however recognise that this attribute cannot be managed as part of the offset as per GTDTHQ v1.3
Connectedness	5	5	Scored as per Eyre et al. 2015
Context	5	5	Scored as per Eyre et al. 2015 and MHQAT (2022).
Ecological corridors	6	6	Scored as per Eyre et al. 2015, however recognise that this attribute cannot be managed as part of the offset as per GTDTHQ v1.3
Threats to the species	15	15	Scored as per GTDTHQ v1.2 and MHQAT (2022) categories, however max. score modified as this attribute can be managed as part of the offset and contribute to the conservation outcome. See scoring methodology for each threatened flora species below.
Total max score	**46**	**61**	Scored as per GTDTHQ v1.2 and MHQAT (2022). Revised scoring matrix is provided in *Table 5-41*.

Table 5-41 Scoring matrix for threatened flora Site Context attributes

Attribute	Score					
Size of patch	**Score**	**0**	**2**	**5**	**7**	**10**
	Description	< 5 ha	5 – 25 ha	26 – 100 ha	101 – 200 ha	> 200 ha
Connectedness	**Score**	**0**	**2**	**4**	**5**	
	Description	0 – 10%	> 10 - < 50%	50 – 75%	> 75 - > 500%	
Context	**Score**	**0**	**2**	**4**	**5**	
	Description	<10% remnant	> 10 – 30% remnant	> 30% - 75% remnant	> 75% remnant	
Ecological corridors	**Score**	**0**	**4**	**6**		
	Description	Not within	Sharing a common boundary	Within (whole or part)		
Threats to the species	**Score**	**1**	**15**	**30**		
	Description	High threat level (i.e. likely to result in death, irreversible damage)	Moderate threat level	Low threat level (i.e. likely to survive)		

5.3.1 MNES Flora Species Stocking Rate

Species Stocking Rate (SSR) has been scored as per the MHQAT (2022) with no alterations to the maximum possible scores to any attributes. Two SSR metrics have species specific criteria and detailed methodologies are included below for 'role/importance of population on site', and density per hectare (Table 5-42 to Table 5-45) also outlines the scoring thresholds for each of the SSR metrics. If further density information becomes available this data can be reviewed and the scoring updated accordingly to ensure that SSR calculations reflect the impact data on these species.

Where it is not clear whether a population was an important from a genetic or source population perspective, a precautionary approach was taken and each population within the Project was assumed important given its conservation listing.

Table 5-42 Threatened flora Species Stocking Rate attribute weighting

Attribute	Max score	Justification
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	10	Scored as per MHQAT (2022)
Number of plants on site	30	Scored as per MHQAT (2022)
Extent of population on site (ha)	30	Scored as per MHQAT (2022)
Approximate density (per ha) over suitable habitat within project area	20	Species specific method. See Density per hectare calculations based on the Project impacts Table 5-45.
Role/importance of species population on site	15	See scoring methodology below in Table 5-43
Total max score	**105**	Scored as per MHQAT (2022), however with total score weighting decrease. Refer to *Table 5-44* for the scoring matrix.

Table 5-43 Scoring matrix for role/importance of species population on site

Attribute	Max score
Key source population for germination and seed/gamete dispersal	15
Necessary for maintaining genetic diversity	15
Near the limit of the species range	15
Total max score	**45**

Table 5-44 Score weightings for the threatened flora species stocking rate attributes

Attribute						
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	**Score**	**0**		**5**		**10**
	Description	No		Yes – adjacent		Yes – on site
Number of plants on site	**Score**	**0**	**10**	**15**	**20**	**30**
	Description	Species specific – refer to Table 5-45				
Extent of population on site (ha)	**Score**	**0**	**10**	**15**	**20**	**30**
	Description	Nil 0%	1-10%	11-30%	31-60%	>61%
Approximate density (per ha) over suitable habitat within project area	**Score**	**0**	**5**	**10**	**15**	**20**
	Description	Species specific – refer to Table 5-45				
Role/importance of species population on site	**Score**	**0**	**5**	**10**	**15**	
	Description	0-10	11-20	21-30	31-45	

Table 5-45 'Approximate density (per ha) over suitable habitat within project area'. scoring matrix for threatened flora species

Approximate density (per ha) over suitable habitat within project area	Justification	Score				
		0	5	10	15	20
Lepidium monoplocoides	ARTC surveys in 2020, 2022 and 2023 provide accurate counts made within definable areas using searches and direct counts. The results are 92 sph at a roadside in Yelarbon, 188 sph and 469 sph for two populations on 'Glenlovely' property near, Yelarbon. There are 13 known populations within Australia with data provided in The National Recovery Plan for the species documents 13 known populations within Australia at the time of writing. Available densities within this document range from 5.4 plants per ha to 1,800 plants per ha (Mavromihalis, 2010). Surveys conducted in Pilliga National Park for White Haven Coal as part of their EIS identified a population with approximately 353 plants per ha (Niche, 2013).	0	1-125	125-250	251-375	>376
Xerothamnella herbacea	ARTC surveys in 2021 recorded two definable areas, with accurate counts made. The results are 17 sph and 117 sph on a roadside of Yelarbon Kurumbul Road, Kurumbul. Majority of the identified populations consisted of less than 100 plants within the Brigalow belt (Shapcott et al., 2016).	0	1-30	31-60	61-90	>91
Homopholis belsonii	Ausecology and Cardno survey data for ARTC 2021, searches of habitat and direct counts were recorded and GPS captured per cluster/plant. Population densities derived from measure of the area of occupation using GIS and sum	0	1-50	51-150	151-300	>301

Approximate density (per ha) over suitable habitat within project area	Justification	Score				
		0	5	10	15	20
	of the record counts, resulted in population densities ranging from two plants per hectare across suitable habitat with cattle grazing, to 800 plants per hectare of actual area of occupancy in a narrow roadside remnant that is relatively undisturbed. 6.83 plants per ha (Ecosmart Ecology, 2023). Two populations covering less than 10m^2 in NSW, reported in the 2020-2021 annual report card (Environment and Heritage, 2021).					
Picris evae	Accurate counts within two definable areas for ARTC in November 2020 and October 2021 recorded the following results: 3 sph on McEwans Lane, Pittsworth and 428 sph on Leesons Road, Gowrie. Two populations in NSW with varying population densities; Myall Creek with 11 plants per ha and Barayamal with 0.42 plants per ha (Environment and Heritage, 2015).	0	1-150	151-300	301-450	>451
Westringia parvifolialora	ARTC surveys in February 2021 provide accurate counts made within a definable area using searches and direct counts. The results were 110 sph near Suttons Road, Yelarbon. No information is available on population sizes for this species (DCCEEW, 2008b).	0	1-35	36-70	71-100	>101

5.3.2 Winged peppercress

Targeted surveys of the Project footprint detected 180 individuals of the species in RE 11.5.14 (remnant and non-remnant) and 11.5.20 (remnant and non-remnant).

The recovery plan for winged peppercress (Mavromihalis 2010) states the current major threats to the species are: altered hydrology, increasing salinity, weed invasion, grazing, physical damage and climate change.

Therefore, the presence of grazing pressure and weed cover have been used to score the 'threats to the species' site context attribute (Table 5-46).

Table 5-46 Attributes, indicators and weightings used to determine habitat quality for winged peppercress

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
Winged peppercress	*Lepidium monoplocoides*	**Absence of threats**	Presence of grazing pressure	Lack of palatable species, ground layer dominated by non-palatable species **OR** Stubble height of palatable species <10cm **OR** Bare ground >60% **OR** Evidence of significant soil compaction **OR** Evidence of significant shrub layer browsing	Ground layer mix of palatable and non-palatable species **OR** Stubble height of palatable species 10-15 cm **OR** Bare ground 30-60% **OR** Evidence of moderate soil compaction **OR** Evidence of moderate shrub layer browsing	Presence of highly palatable species **OR** Ground layer dominated by palatable species **OR** Stubble height of palatable species >15cm **OR** Bare ground <30% **OR** Evidence of low levels of soil compaction **OR** Evidence of low levels of shrub layer browsing	0.5
			Weed cover	>50% of benchmark for non-native plant cover	≥5 to 50% of benchmark for non-native plant cover	<5% of benchmark for non-native plant cover	0.5

5.3.3 Xerothamnella herbacea

Targeted surveys of the Project footprint detected 70 individuals of the species in regrowth RE 11.4.3.

The conservation advice for *Xerothamnella herbacea* (DEWHA 2008d) states the main identified threat to the species is competition from invasive plant species, as it occurs in a niche with few other ground layer species. Other potential threats to the species include road widening and maintenance activities; surface erosion; and grazing and trampling by cattle and native macropods.

Therefore, the cover of weeds, presence of grazing pressure and severity of vegetation clearing have been used to score the 'threats to the species' site context attribute (Table 5-47). As the cover of weeds was considered the most significant threat, this indicator has been given a higher weighting.

Table 5-47 Attributes, indicators and weightings used to determine habitat quality for Xerothamnella herbacea

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
-	*Xerothamnella herbacea*	**Absence of threats**	Presence of grazing pressure	Lack of palatable species, ground layer dominated by non-palatable species **OR** Stubble height of palatable species <10cm **OR** Bare ground >60% **OR** Evidence of significant soil compaction **OR** Evidence of significant shrub layer browsing	Ground layer mix of palatable and non-palatable species **OR** Stubble height of palatable species 10-15 cm **OR** Bare ground 30-60% **OR** Evidence of moderate soil compaction **OR** Evidence of moderate shrub layer browsing	Presence of highly palatable species **OR** Ground layer dominated by palatable species **OR** Stubble height of palatable species >15cm **OR** Bare ground <30% **OR** Evidence of low levels of soil compaction **OR** Evidence of low levels of shrub layer browsing	0.4
			Weed cover	>50% of benchmark for non-native plant cover	≥5 to 50% of benchmark for non-native plant cover	<5% of benchmark for non-native plant cover	0.6

5.3.4 Belson's panic

Targeted surveys of the Project footprint detected 1864 individuals of the species in a number of REs and condition states (remnant, regrowth and non-remnant).

The conservation advice for Belson's panic (DEWHA 2008e) states the main identified threats to the species are: clearing of habitat for agriculture, development or pasture improvement; overgrazing by domestic stock; invasion of habitat by introduced weeds; and clearing of habitat for mining.

Therefore, the severity of vegetation clearing, presence of grazing pressure, and cover of weeds have been used to score the 'threats to the species' site context attribute (see Table 5-48).

Table 5-48 Attributes, indicators and weightings used to determine habitat quality for Belson's panic

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
Belson's panic	*Homopholis belsonii*	**Absence of threats**	Cropping/land management practices	High to severe (<30% of benchmark canopy height and/or <25% of benchmark canopy cover) **OR** For grasslands REs - Grassland is considered non-remnant i.e., grassland has been ploughed in the last 15 years, contains <20% of the native species normally found in the ecosystem under the same ecological and seasonal conditions and lacks a high ratio of native to exotic species (>5:1)	Moderate (30-69% of benchmark canopy height and/or 25-49% of benchmark canopy cover) **OR** For grassland REs - grassland meets 2 out of the 3 criteria to meet remnant status	Low to absent (≥70% of benchmark canopy height and ≥50% of benchmark canopy cover) **OR** For grasslands REs - Grassland is considered remnant i.e., grassland has not been ploughed in the last 15 years, contains >20% of the native species normally found in the ecosystem under the same ecological and seasonal conditions and has a high ratio of native to exotic species (>5:1)	0.4

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
			Presence of grazing pressure	Lack of palatable species, ground layer dominated by non-palatable species **OR** Stubble height of palatable species <10cm **OR** Bare ground >60% **OR** Evidence of significant soil compaction **OR** Evidence of significant shrub layer browsing	Ground layer mix of palatable and non-palatable species **OR** Stubble height of palatable species 10-15 cm **OR** Bare ground 30-60% **OR** Evidence of moderate soil compaction **OR** Evidence of moderate shrub layer browsing	Presence of highly palatable species **OR** Ground layer dominated by palatable species **OR** Stubble height of palatable species >15cm **OR** Bare ground <30% **OR** Evidence of low levels of soil compaction **OR** Evidence of low levels of shrub layer browsing	0.3
			Weed cover	>50% of benchmark for non-native plant cover	≥5 to 50% of benchmark for non-native plant cover	<5% of benchmark for non-native plant cover	0.3

5.3.5 Picris evae

Targeted surveys of the Project footprint detected 129 individuals of the species in non-remnant RE 11.8.11.

The conservation advice for *Picris evae* (DEWHA 2008f) states the main identified threats to the species are: weed invasion, inappropriate fire regimes, habitat fragmentation and clearing of vegetation for cropping and grazing.

Therefore, the severity of vegetation clearing, presence of fuel loads, and cover of weeds have been used to score the 'threats to the species' site context attribute (Table 5-49).

Table 5-49 Attributes, indicators and weightings used to determine habitat quality for Picris evae

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
Hawkweed	*Picris evae*	**Absence of threats**	Cropping/land management practices	High to severe (<30% of benchmark canopy height and/or <25% of benchmark canopy cover) **OR** For grasslands REs - Grassland is considered non-remnant i.e., grassland has been ploughed in the last 15 years, contains <20% of the native species normally found in the ecosystem under the same ecological and seasonal conditions and lacks a high ratio of native to exotic species (>5:1)	Moderate (30-69% of benchmark canopy height and/or 25-49% of benchmark canopy cover) **OR** For grassland REs - grassland meets 2 out of the 3 criteria to meet remnant status	Low to absent (≥70% of benchmark canopy height and ≥50% of benchmark canopy cover) **OR** For grasslands REs - Grassland is considered remnant i.e., grassland has not been ploughed in the last 15 years, contains >20% of the native species normally found in the ecosystem under the same ecological and seasonal conditions and has a high ratio of native to exotic species (>5:1)	0.4
			Presence of fuel loads	Not in line with RE fire management guidelines **AND** Presence of high fuel loads/risk	Not burnt **AND/OR** burnt more the RE fire management guidelines	In line with recommended RE fire management guidelines	0.3
			Weed cover	>50% of benchmark for non-native plant cover	≥5 to 50% of benchmark for non-native plant cover	<5% of benchmark for non-native plant cover	0.3

5.3.6 Westringia parvifolia

Targeted surveys of the Project footprint detected 214 individuals of the species in remnant RE 11.5.14 and regrowth and non-remnant 11.5.20.

The conservation advice for *Westringia parvifolia* (DEWHA 2008h) states the main potential threats to the species are: broad-scale vegetation clearing, increasing fragmentation and loss of remnants, hydrological change, and pollution.

As the hydrological change and pollution could not be readily measured, severity of vegetation clearing and connectivity have been used to score the 'threats to the species' site context attribute (see

Table 5-50).

Table 5-50 Attributes, indicators and weightings used to determine habitat quality for Westringia parvifolia

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
-	*Westringia parvifolia*	**Absence of threats**	Land management practices	High to severe (<30% of benchmark canopy height and/or <25% of benchmark canopy cover)	Moderate (30-69% of benchmark canopy height and/or 25-49% of benchmark canopy cover)	Low to absent (≥70% of benchmark canopy height and ≥50% of benchmark canopy cover)	0.5
			Connectivity	No connectivity BioCondition Assessment Manual - Connectivity Score = 0	Connected with adjacent remnant vegetation along >10% to <50% of its perimeter **OR** is connected with adjacent remnant vegetation along <10% of its perimeter **AND** is connected with adjacent regrowth native vegetation >25% of its perimeter BioCondition Assessment Manual - Connectivity Score = 2	Connected with adjacent remnant vegetation along >75% of its perimeter **OR** Includes >500 ha of remnant vegetation BioCondition Assessment Manual - Connectivity Score = 4 or 5	0.5

6 Habitat quality scoring for MSES

6.1 Methodology for MSES regulated vegetation

Table 2-2 summarises the attributes and weightings used to score the three components of habitat quality using the GTDTHQ V1.2. Note, to assess habitat quality for MSES regulated vegetation, only the site condition component was used. Alterations to the methodology have not been made.

6.2 Methodology for MSES fauna

Table 2-2 summarises the attributes and weightings used to score the three components of habitat quality for threatened fauna using the GTDTHQ V1.2. Alterations to the methodology have not been made.

To assess quality and availability of food and foraging habitat, quality and availability of shelter/breeding habitat, threats to the species, and species mobility capacity, the following steps were undertaken:

1. Potential indicators for each attribute were determined (via literature review) and ranked in order of significance;
2. Following an in-house peer review assessment process, several key indicators were selected for each attribute;
3. A rating scale was developed for each indicator;
4. Each indicator was scored using the developed rating scale and weighting.

The attributes, indicators, weightings, and rating scale developed are provided separately for each threatened fauna species in Table 6-2 to Table 6-5.

To assess role of the site location to the species overall population in the state, the following indicators, shown in Table 6-1, were used.

Table 6-1 Scoring matrix for role of site location to species overall population in the state

	Score	**1**	**5**
Role of site location to species overall population in the state	Description	Not or unlikely to be critical to species' survival	Critical to species survival
	Indicator	Species not detected onsite or adjacent to site **AND/OR** Habitat on the site does not or is unlikely to meet the definition of being critical to the survival of the species (DoE, 2013).	Species detected onsite or adjacent to site **AND/OR** Habitat on the site meets the definition of being critical to the survival of the species (DoE, 2013).
	According to the MNES Significant Impact Guidelines 1.1 (DoE, 2013a) 'Habitat critical to the survival of a species or ecological community' refers to areas that are necessary: ▪ for activities such as foraging, breeding, roosting, or dispersal; ▪ for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators); ▪ to maintain genetic diversity and long term evolutionary development; ▪ for the reintroduction of populations or recovery of the species or ecological community.		

6.2.1 Diamond Firetail

Table 6-2 Attributes, indicators and weightings used to determine habitat quality for diamond firetail

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
Diamond firetail	*Stagonopleura guttata*	**1. Quality and availability of food and habitat required for foraging**	Native grass cover	<10% of benchmark for native perennial grass cover	≥10% - <50% of benchmark for perennial grass cover	≥50% of benchmark for native perennial grass cover	0.40
			Leaf litter cover	≥50% of benchmark for organic litter cover	≥10% - <50% of benchmark for organic litter cover	<10% of benchmark for organic litter cover	0.40
			Coarse woody debris	≥50% of benchmark for coarse woody debris	≥10% - <50% of benchmark for coarse woody debris	<10% of benchmark for coarse woody debris	0.20
			Tree stem density[4]				0.20
		2. Quality and availability of habitat required for shelter and breeding	Native grass cover	<10% of benchmark for native perennial grass cover	≥10% - <50% of benchmark for perennial grass cover	≥50% of benchmark for native perennial grass cover	0.50
			Presence of dense shrubs	<10% of benchmark for shrub cover	≥10% - <50% or >200% of benchmark for shrub cover	>50% - <200% of benchmark for shrub cover	0.50
		3. Quality and availability of habitat required for mobility	Connectivity	No connectivity	Connected with adjacent remnant vegetation along >10% to <50% of its perimeter **OR** is connected with adjacent remnant vegetation along <10% of its perimeter **AND** is connected with adjacent regrowth native vegetation	Connected with adjacent remnant vegetation >50% of its perimeter	0.70

[4] Using the stem count method as described in Neldner et al. 2023)

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
					>25% of its perimeter		
			Average patch size	<25 ha remnant **AND/OR** Regrowth	≥25-100 ha remnant **OR** ≥25-200 ha remnant and regrowth **OR** ≥25-200 ha regrowth	≥100 ha remnant **OR** >200 ha remnant and regrowth **OR** >200ha regrowth	0.30
		4. Absence of threats	Severity of vegetation clearing	High to severe (<30% of benchmark canopy height and/or <25% of benchmark canopy cover) **OR** For grasslands REs - Grassland is considered non-remnant i.e., grassland has been ploughed in the last 15 years, contains <20% of the native species normally found in the ecosystem under the same ecological and seasonal conditions and lacks a high ratio of native to exotic species (>5:1)	Moderate (30-69% of benchmark canopy height and/or 25-49% of benchmark canopy cover) **OR** For grassland REs - grassland meets 2 out of the 3 criteria to meet remnant status	Low to absent (≥70% of benchmark canopy height **and** ≥50% of benchmark canopy cover) **OR** For grasslands REs - Grassland is considered remnant i.e., grassland has not been ploughed in the last 15 years, contains >20% of the native species normally found in the ecosystem under the same ecological and seasonal conditions and has a high ratio of native to exotic species (>5:1)	0.50
			Weed cover	>50% of benchmark for non-native plant cover	≥5 to 50% of benchmark for non-native plant cover	<5% of benchmark for non-native plant cover	0.20

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
			Presence of grazing pressure	Lack of palatable species, ground layer dominated by non-palatable species **OR** Stubble height of palatable species <10cm **OR** Bare ground >60% **OR** Evidence of significant soil compaction **OR** Evidence of significant shrub layer browsing	Ground layer mix of palatable and non-palatable species **OR** Stubble height of palatable species 10-15 cm **OR** Bare ground 30-60% **OR** Evidence of moderate soil compaction **OR** Evidence of moderate shrub layer browsing	Presence of highly palatable species **OR** Ground layer dominated by palatable species **OR** Stubble height of palatable species >15cm **OR** Bare ground <30% **OR** Evidence of low levels of soil compaction **OR** Evidence of low levels of shrub layer browsing	0.20
			Presence of fuel loads	Not in line with RE fire management guidelines **AND** Presence of high fuel loads/risk	Not burnt **AND/OR** burnt more the RE fire management guidelines	In line with recommended RE fire management guidelines	0.10

6.2.2 Glossy black-cockatoo

Table 6-3 Attributes, indicators and weightings used to determine habitat quality for glossy black-cockatoo

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
glossy black-cockatoo (eastern)	*Calyptorhynchus lathami lathami*	**1. Quality and availability of food and habitat required for foraging**	Cover of *Casuarina/Allocasuarina* spp.	Absent to scattered (0-10%)	Common to very common (11-70%)	Abundant (>70%)	1.00
		2. Quality and availability of	Number of large tree hollows and fissures (>20 cm diameter)	Absent to scattered (0-5)	Common (6-10)	Abundant (>10)	1.00

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
		habitat required for shelter and breeding					
		3. Quality and availability of habitat required for mobility	Connectivity	No connectivity	Connected with adjacent remnant vegetation along >10% to <50% of its perimeter **OR** is connected with adjacent remnant vegetation along <10% of its perimeter **AND** is connected with adjacent regrowth native vegetation >25% of its perimeter	Connected with adjacent remnant vegetation >50% of its perimeter	0.70
			Average patch size	<25 ha remnant **AND/OR** Regrowth	≥25-100 ha remnant **OR** ≥25-200 ha remnant and regrowth **OR** ≥25-200 ha regrowth	≥100 ha remnant **OR** >200 ha remnant and regrowth **OR** >200ha regrowth	0.30
		4. Absence of threats	Severity of vegetation clearing	High to severe (<30% of benchmark canopy height and/or <25% of benchmark canopy cover) **OR** For	Moderate (30-69% of benchmark canopy height and/or 25-49% of benchmark canopy cover) **OR** For grassland	Low to absent (≥70% of benchmark canopy height **and** ≥50% of benchmark canopy cover) **OR** For grasslands	0.60

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
				grasslands REs - Grassland is considered non-remnant i.e., grassland has been ploughed in the last 15 years, contains <20% of the native species normally found in the ecosystem under the same ecological and seasonal conditions and lacks a high ratio of native to exotic species (>5:1)	REs - grassland meets 2 out of the 3 criteria to meet remnant status	REs - Grassland is considered remnant i.e., grassland has not been ploughed in the last 15 years, contains >20% of the native species normally found in the ecosystem under the same ecological and seasonal conditions and has a high ratio of native to exotic species (>5:1)	
			Presence of fuel loads	Not in line with RE fire management guidelines **AND** Presence of high fuel loads/risk	Not burnt **AND/OR** burnt more the RE fire management guidelines	In line with recommended RE fire management guidelines	0.30
			Presence of feral predators and presence of sufficient shelter	Pest predator levels are >/= 'D'; **OR** Quality of habitat for shelter is poor	Feral predator density is up to 10% **less than** the benchmark value 'D' **OR** Quality of habitat for shelter is moderate	Feral predator density is >10% **below** the benchmark value 'D' **OR** Quality of habitat for shelter is high	0.10

6.2.3 Southern whiteface

Table 6-4 Attributes, indicators and weightings used to determine habitat quality for southern whiteface

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
Southern whiteface	*Aphelocephala leucopsis*	**1. Quality and availability of food and habitat required for foraging**	Native grass cover	<10% of benchmark for native perennial grass cover	≥10% - <50% of benchmark for perennial grass cover	≥50% of benchmark for native perennial grass cover	0.30
			Shrub cover	<10% of benchmark for shrub cover	≥10% - <50% or >200% of benchmark for shrub cover	>50% - <200% of benchmark for shrub cover	0.30
			Leaf litter cover	<10% of benchmark for organic litter cover	≥10% - <50% of benchmark for organic litter cover	≥50% of benchmark for organic litter cover	0.30
			Tree stem density				0.10
		2. Quality and availability of habitat required for shelter and breeding	Number of tree hollows and crevices in live and dead trees (>15 cm diameter)	Absent to scattered (0-5)	Common (6-10)	Abundant (>10)	1.00
		3. Quality and availability of habitat required for mobility	Connectivity	No connectivity	Connected with adjacent remnant vegetation along >10% to <50% of its perimeter **OR** is connected with adjacent remnant vegetation along <10% of its perimeter **AND** is connected with adjacent regrowth native	Connected with adjacent remnant vegetation >50% of its perimeter	0.70

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
					vegetation >25% of its perimeter		
			Average patch size	<25 ha remnant **AND/OR** Regrowth	≥25-100 ha remnant **OR** ≥25-200 ha remnant and regrowth **OR** ≥25-200 ha regrowth	≥100 ha remnant **OR** >200 ha remnant and regrowth **OR** >200ha regrowth	0.30
		4. Absence of threats	Severity of vegetation clearing	High to severe (<30% of benchmark canopy height and/or <25% of benchmark canopy cover) **OR** For grasslands REs - Grassland is considered non-remnant i.e., grassland has been ploughed in the last 15 years, contains <20% of the native species normally found in the ecosystem under the same ecological and seasonal	Moderate (30-69% of benchmark canopy height and/or 25-49% of benchmark canopy cover) **OR** For grassland REs - grassland meets 2 out of the 3 criteria to meet remnant status	Low to absent (≥70% of benchmark canopy height and ≥50% of benchmark canopy cover) **OR** For grasslands REs - Grassland is considered remnant i.e., grassland has not been ploughed in the last 15 years, contains >20% of the native species normally found in the ecosystem under the same ecological and seasonal conditions	0.50

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
				conditions and lacks a high ratio of native to exotic species (>5:1)		and has a high ratio of native to exotic species (>5:1)	
			Presence of grazing pressure	Lack of palatable species, ground layer dominated by non-palatable species **OR** Stubble height of palatable species <10cm **OR** Bare ground >60% **OR** Evidence of significant soil compaction **OR** Evidence of significant shrub layer browsing	Ground layer mix of palatable and non-palatable species **OR** Stubble height of palatable species 10-15 cm **OR** Bare ground 30-60% **OR** Evidence of moderate soil compaction **OR** Evidence of moderate shrub layer browsing	Presence of highly palatable species **OR** Ground layer dominated by palatable species **OR** Stubble height of palatable species >15cm **OR** Bare ground <30% **OR** Evidence of low levels of soil compaction **OR** Evidence of low levels of shrub layer browsing	0.50

6.2.4 Pale imperial hairstreak

Table 6-5 Attributes, indicators and weightings used to determine habitat quality for pale imperial hairstreak

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
Pale imperial hairstreak	*Jalmenus eubulus*	**1. Quality and availability of food and habitat required for foraging**	Presence of remnant *Acacia harpophylla* dominated open forest or woodlands	Absent	-	Present	1.00
		2. Quality and availability of habitat required for shelter and breeding	Presence of remnant *Acacia harpophylla* dominated open forest or woodlands	Absent	-	Present	1.00
		3. Quality and availability of habitat required for mobility	Connectivity	No connectivity	Connected with adjacent remnant vegetation along >10% to <50% of its perimeter **OR** Is connected with adjacent remnant vegetation along <10% of its perimeter **AND** Is connected with adjacent regrowth native vegetation >25% of its perimeter	Connected with adjacent remnant vegetation >50% of its perimeter	0.70
			Average patch size	<25 ha remnant **AND/OR** Regrowth	≥25-100 ha remnant **OR** ≥25-200 ha remnant	≥100 ha remnant **OR** >200 ha remnant and regrowth	0.30

Common name	Scientific name	Attribute	Indicator	Poor	Fair	Excellent	Weighting
					and regrowth **OR** ≥25-200 ha regrowth	**OR** >200ha regrowth	
		4. Absence of threats	Severity of vegetation clearing	High to severe (<30% of benchmark canopy height and/or <25% of benchmark canopy cover)	Moderate (30-69% of benchmark canopy height and/or 25-49% of benchmark canopy cover)	Low to absent (≥70% of benchmark canopy height **and** ≥50% of benchmark canopy cover)	0.70
			Presence of fuel loads	Not in line with RE fire management guidelines **AND** Presence of high fuel loads/risk	Not burnt **AND/OR** Burnt more the RE fire management guidelines	In line with recommended RE fire management guidelines	0.30

6.3 Methodology for MSES flora

Table 2-2 in the first section above summarises the attributes and weightings used to score the three components of habitat quality using the GTDTHQ V1.2. Note, to assess habitat quality for MSES flora, only the site condition component was used. Alterations to the methodology have not been made.

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APPENDIX Q

Environmental Offset Delivery Strategy

Appendix B OAG calculations

BORDER TO GOWRIE REVISED DRAFT ENVIRONMENTAL IMPACT STATEMENT

Inland Rail is a subsidiary of
Australian Rail Track Corporation

INLAND RAIL

Offsets Assessment Guide

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

Matter of National Environmental Significance	
Name	Brigalow
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	1.2%

Impact calculator

Ecological communities

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	Yes		Area *(Hectares)*	104.5	
			Quality *(Scale 0-10)*	5	
		Total quantum of impact *(Adjusted Hectares)*		52.25	

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	No		Area *(Hectares)*		
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*			

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Number of features e.g. Nest hollows, habitat trees	No			
Condition of habitat Change in habitat condition, but no change in extent	No			

Threatened species

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Birth rate e.g. Change in nest success	No			
Mortality rate e.g Change in number of road kills per year	No			
Number of individuals e.g. Individual plants/animals	No			

Offset calculator

Ecological Communities

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of community	Yes	52.25	Canning Creek	Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	324.4	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	1.14	90%	1.02	0.80	Overall net present value	46.40	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	6	Future quality without offset *(scale of 0-10)*	5	Future quality with offset *(scale of 0-10)*	7	2.00	90%	1.80	1.42	% of impact offset	88.81%	
								Future area without offset	323.3	Future area with offset	324.4			Minimum (90%) direct offset requirement met?		FALSE		

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of habitat	Yes			Risk-related time horizon *(max. 20 years)*		Start area *(hectares)*		Risk of loss without offset *(%)*		Risk of loss with offset *(%)*		0.00		0.00	0.00	Overall net present value	0.00	
				Time until ecological benefit		Start quality *(scale of 0-10)*		Future quality without offset *(scale of 0-10)*		Future quality with offset *(scale of 0-10)*		0.00		0.00	0.00	% of impact offset	0.00%	
								Future area without offset	0.0	Future area with offset	0.0			Minimum (90%) direct offset requirement met?		FALSE		

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Number of features e.g. Nest hollows, habitat trees	No							0.00		0.00	0.00	0.00%	FALSE	
Condition of habitat Change in habitat condition, but no change in extent	No							0.00		0.00	0.00	0.00%	FALSE	

Threatened species

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Birth rate e.g. Change in nest success	No							0.00		0.00	0.00	0.00%	FALSE	
Mortality rate e.g Change in number of road kills per year	No							0.00		0.00	0.00	0.00%	FALSE	
Number of individuals e.g. Individual plants/animals	No							0.00		0.00	0.00	0.00%	FALSE	

Summary

					Cost ($)		
Protected matter attributes	Quantum of impact	Net present value	% of impact offset	Direct offset adequate?	Direct offset	Other compensatory measures	Total
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of features	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Condition of habitat	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Area of habitat		0.00	0.00	FALSE	0.00	N/A	0.00
Area of community	52.25	46.40	0.89	FALSE	0.00	#DIV/0!	#DIV/0!
					$0.00	**#DIV/0!**	**#DIV/0!**

Offsets Assessment Guide

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

Matter of National Environmental Significance	
Name	Brigalow
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	1.2%

Impact calculator

Ecological communities

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	Yes		Area *(Hectares)*	104.5	
			Quality *(Scale 0-10)*	5	
		Total quantum of impact *(Adjusted Hectares)*		52.25	

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	No		Area *(Hectares)*		
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*			

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Number of features e.g. Nest hollows, habitat trees	No			
Condition of habitat Change in habitat condition, but no change in extent	No			

Threatened species

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Birth rate e.g. Change in nest success	No			
Mortality rate e.g Change in number of road kills per year	No			
Number of individuals e.g. Individual plants/animals	No			

Offset calculator

Ecological Communities

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of community	Yes	52.25	Glenlovely	Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	53.5	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	0.19	90%	0.17	0.13	Overall net present value	7.63	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	4	Future quality without offset *(scale of 0-10)*	3	Future quality with offset *(scale of 0-10)*	5	2.00	90%	1.80	1.42	% of impact offset	14.59%	
								Future area without offset	53.3	Future area with offset	53.5			Minimum (90%) direct offset requirement met?			FALSE	

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of habitat	Yes			Risk-related time horizon *(max. 20 years)*		Start area *(hectares)*		Risk of loss without offset *(%)*		Risk of loss with offset *(%)*		0.00		0.00	0.00	Overall net present value	0.00	
				Time until ecological benefit		Start quality *(scale of 0-10)*		Future quality without offset *(scale of 0-10)*		Future quality with offset *(scale of 0-10)*		0.00		0.00	0.00	% of impact offset	0.00%	
								Future area without offset	0.0	Future area with offset	0.0			Minimum (90%) direct offset requirement met?			FALSE	

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Number of features e.g. Nest hollows, habitat trees	No							0.00		0.00	0.00	0.00%	FALSE	
Condition of habitat Change in habitat condition, but no change in extent	No							0.00		0.00	0.00	0.00%	FALSE	

Threatened species

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Birth rate e.g. Change in nest success	No							0.00		0.00	0.00	0.00%	FALSE	
Mortality rate e.g Change in number of road kills per year	No							0.00		0.00	0.00	0.00%	FALSE	
Number of individuals e.g. Individual plants/animals	No							0.00		0.00	0.00	0.00%	FALSE	

Summary

					Cost ($)		
Protected matter attributes	Quantum of impact	Net present value	% of impact offset	Direct offset adequate?	Direct offset	Other compensatory measures	Total
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of features	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Condition of habitat	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Area of habitat		0.00	0.00	FALSE	0.00	N/A	0.00
Area of community	52.25	7.63	0.15	FALSE	0.00	#DIV/0!	#DIV/0!
					$0.00	**#DIV/0!**	**#DIV/0!**

Offsets Assessment Guide

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

Matter of National Environmental Significance	
Name	Grassland
EPBC Act status	Critically Endangered
Annual probability of extinction Based on IUCN category definitions	6.8%

Impact calculator

Ecological communities

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	Yes		Area *(Hectares)*	66.07	
			Quality *(Scale 0-10)*	3	
		Total quantum of impact *(Adjusted Hectares)*		19.82	

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	Yes		Area *(Hectares)*		
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*		0.00	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Number of features e.g. Nest hollows, habitat trees	No			
Condition of habitat Change in habitat condition, but no change in extent	No			

Threatened species

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Birth rate e.g. Change in nest success	No			
Mortality rate e.g Change in number of road kills per year	No			
Number of individuals e.g. Individual plants/animals	No			

Offset calculator

Ecological Communities

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of community	Yes	19.82	[redacted] - remnant	Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	222.3	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	0.00	90%	0.00	0.00	Overall net present value	10.71	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	6	Future quality without offset *(scale of 0-10)*	5	Future quality with offset *(scale of 0-10)*	7	2.00	90%	1.80	0.48	% of impact offset	54.04%	
								Future area without offset	221.8	Future area with offset	221.8			Minimum (90%) direct offset requirement met?			FALSE	

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of habitat	Yes	0.00		Risk-related time horizon *(max. 20 years)*		Start area *(hectares)*		Risk of loss without offset *(%)*		Risk of loss with offset *(%)*		0.00		0.00	0.00	Overall net present value	0.00	
				Time until ecological benefit		Start quality *(scale of 0-10)*		Future quality without offset *(scale of 0-10)*		Future quality with offset *(scale of 0-10)*		0.00		0.00	0.00	% of impact offset	0.00%	
								Future area without offset	0.0	Future area with offset	0.0			Minimum (90%) direct offset requirement met?			FALSE	

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Number of features e.g. Nest hollows, habitat trees	No							0.00		0.00	0.00	0.00%	FALSE	
Condition of habitat Change in habitat condition, but no change in extent	No							0.00		0.00	0.00	0.00%	FALSE	

Threatened species

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Birth rate e.g. Change in nest success	No							0.00		0.00	0.00	0.00%	FALSE	
Mortality rate e.g Change in number of road kills per year	No							0.00		0.00	0.00	0.00%	FALSE	
Number of individuals e.g. Individual plants/animals	No							0.00		0.00	0.00	0.00%	FALSE	

Summary

					Cost ($)		
Protected matter attributes	Quantum of impact	Net present value	% of impact offset	Direct offset adequate?	Direct offset	Other compensatory measures	Total
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of features	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Condition of habitat	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Area of habitat	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Area of community	19.82	10.71	0.54	FALSE	0.00	#DIV/0!	#DIV/0!
					$0.00	**#DIV/0!**	**#DIV/0!**

Offsets Assessment Guide

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

Matter of National Environmental Significance	
Name	Grassland
EPBC Act status	Critically Endangered
Annual probability of extinction Based on IUCN category definitions	6.8%

Impact calculator

Ecological communities

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	Yes		Area *(Hectares)*	66.07	
			Quality *(Scale 0-10)*	3	
		Total quantum of impact *(Adjusted Hectares)*		19.82	

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	Yes		Area *(Hectares)*		
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*		0.00	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Number of features e.g. Nest hollows, habitat trees	No			
Condition of habitat Change in habitat condition, but no change in extent	No			

Threatened species

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Birth rate e.g. Change in nest success	No			
Mortality rate e.g Change in number of road kills per year	No			
Number of individuals e.g. Individual plants/animals	No			

Offset calculator

Ecological Communities

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of community	Yes	19.82	[redacted] reveg	Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	290.4	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	0.00	60%	0.00	0.00	Overall net present value	13.99	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	1	Future quality without offset *(scale of 0-10)*	1	Future quality with offset *(scale of 0-10)*	4	3.00	60%	1.80	0.48	% of impact offset	70.59%	
								Future area without offset	289.8	Future area with offset	289.8			Minimum (90%) direct offset requirement met?			FALSE	

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of habitat	Yes	0.00		Risk-related time horizon *(max. 20 years)*		Start area *(hectares)*		Risk of loss without offset *(%)*		Risk of loss with offset *(%)*		0.00		0.00	0.00	Overall net present value	0.00	
				Time until ecological benefit		Start quality *(scale of 0-10)*		Future quality without offset *(scale of 0-10)*		Future quality with offset *(scale of 0-10)*		0.00		0.00	0.00	% of impact offset	0.00%	
								Future area without offset	0.0	Future area with offset	0.0			Minimum (90%) direct offset requirement met?			FALSE	

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Number of features e.g. Nest hollows, habitat trees	No							0.00		0.00	0.00	0.00%	FALSE	
Condition of habitat Change in habitat condition, but no change in extent	No							0.00		0.00	0.00	0.00%	FALSE	

Threatened species

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Birth rate e.g. Change in nest success	No							0.00		0.00	0.00	0.00%	FALSE	
Mortality rate e.g Change in number of road kills per year	No							0.00		0.00	0.00	0.00%	FALSE	
Number of individuals e.g. Individual plants/animals	No							0.00		0.00	0.00	0.00%	FALSE	

Summary

					Cost ($)		
Protected matter attributes	Quantum of impact	Net present value	% of impact offset	Direct offset adequate?	Direct offset	Other compensatory measures	Total
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of features	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Condition of habitat	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Area of habitat	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Area of community	19.82	13.99	0.71	FALSE	0.00	#DIV/0!	#DIV/0!
					$0.00	**#DIV/0!**	**#DIV/0!**

Offsets Assessment Guide

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

Matter of National Environmental Significance	
Name	Whitebox TEC
EPBC Act status	Critically Endangered
Annual probability of extinction Based on IUCN category definitions	6.8%

Impact calculator

Ecological communities

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	Yes		Area *(Hectares)*	2.54	
			Quality *(Scale 0-10)*	**6**	
		Total quantum of impact *(Adjusted Hectares)*		1.52	

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	Yes		Area *(Hectares)*		
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*		0.00	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Number of features e.g. Nest hollows, habitat trees	No			
Condition of habitat Change in habitat condition, but no change in extent	No			

Threatened species

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Birth rate e.g. Change in nest success	No			
Mortality rate e.g Change in number of road kills per year	No			
Number of individuals e.g. Individual plants/animals	No			

Offset calculator

Ecological Communities

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of community	Yes	1.52	TEC lot reveg	Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	19.5	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	0.04	85%	0.04	0.01	Overall net present value	1.34	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	4	Future quality without offset *(scale of 0-10)*	3	Future quality with offset *(scale of 0-10)*	6	3.00	85%	2.55	0.68	% of impact offset	87.72%	
								Future area without offset	19.5	Future area with offset	19.5			Minimum (90%) direct offset requirement met?		FALSE		

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of habitat	Yes	0.00		Risk-related time horizon *(max. 20 years)*		Start area *(hectares)*		Risk of loss without offset *(%)*		Risk of loss with offset *(%)*		0.00		0.00	0.00	Overall net present value	0.00	
				Time until ecological benefit		Start quality *(scale of 0-10)*		Future quality without offset *(scale of 0-10)*		Future quality with offset *(scale of 0-10)*		0.00		0.00	0.00	% of impact offset	0.00%	
								Future area without offset	0.0	Future area with offset	0.0			Minimum (90%) direct offset requirement met?		FALSE		

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Number of features e.g. Nest hollows, habitat trees	No							0.00		0.00	0.00	0.00%	FALSE	
Condition of habitat Change in habitat condition, but no change in extent	No							0.00		0.00	0.00	0.00%	FALSE	

Threatened species

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Birth rate e.g. Change in nest success	No							0.00		0.00	0.00	0.00%	FALSE	
Mortality rate e.g Change in number of road kills per year	No							0.00		0.00	0.00	0.00%	FALSE	
Number of individuals e.g. Individual plants/animals	No							0.00		0.00	0.00	0.00%	FALSE	

Summary

					Cost ($)		
Protected matter attributes	Quantum of impact	Net present value	% of impact offset	Direct offset adequate?	Direct offset	Other compensatory measures	Total
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of features	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Condition of habitat	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Area of habitat	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Area of community	1.52	1.34	0.88	FALSE	0.00	#DIV/0!	#DIV/0!
					$0.00	**#DIV/0!**	**#DIV/0!**

Offsets Assessment Guide

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

Matter of National Environmental Significance	
Name	Whitebox TEC
EPBC Act status	Critically Endangered
Annual probability of extinction Based on IUCN category definitions	6.8%

Impact calculator

Ecological communities

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	Yes		Area *(Hectares)*	2.54	
			Quality *(Scale 0-10)*	**6**	
		Total quantum of impact *(Adjusted Hectares)*		1.52	

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	Yes		Area *(Hectares)*		
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*		0.00	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Number of features e.g. Nest hollows, habitat trees	No			
Condition of habitat Change in habitat condition, but no change in extent	No			

Threatened species

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Birth rate e.g. Change in nest success	No			
Mortality rate e.g Change in number of road kills per year	No			
Number of individuals e.g. Individual plants/animals	No			

Offset calculator

Ecological Communities

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of community	Yes	1.52	TEC lot rem	Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	5.7	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	0.02	90%	0.02	0.00	Overall net present value	0.28	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	5	Future quality without offset *(scale of 0-10)*	4	Future quality with offset *(scale of 0-10)*	6	2.00	90%	1.80	0.48	% of impact offset	18.19%	
								Future area without offset	5.7	Future area with offset	5.7			Minimum (90%) direct offset requirement met?		FALSE		

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of habitat	Yes	0.00		Risk-related time horizon *(max. 20 years)*		Start area *(hectares)*		Risk of loss without offset *(%)*		Risk of loss with offset *(%)*		0.00		0.00	0.00	Overall net present value	0.00	
				Time until ecological benefit		Start quality *(scale of 0-10)*		Future quality without offset *(scale of 0-10)*		Future quality with offset *(scale of 0-10)*		0.00		0.00	0.00	% of impact offset	0.00%	
								Future area without offset	0.0	Future area with offset	0.0			Minimum (90%) direct offset requirement met?		FALSE		

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Number of features e.g. Nest hollows, habitat trees	No							0.00		0.00	0.00	0.00%	FALSE	
Condition of habitat Change in habitat condition, but no change in extent	No							0.00		0.00	0.00	0.00%	FALSE	

Threatened species

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Birth rate e.g. Change in nest success	No							0.00		0.00	0.00	0.00%	FALSE	
Mortality rate e.g Change in number of road kills per year	No							0.00		0.00	0.00	0.00%	FALSE	
Number of individuals e.g. Individual plants/animals	No							0.00		0.00	0.00	0.00%	FALSE	

Summary

Protected matter attributes	Quantum of impact	Net present value	% of impact offset	Direct offset adequate?	Cost ($) Direct offset	Other compensatory measures	Total
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of features	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Condition of habitat	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Area of habitat	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Area of community	1.52	0.28	0.18	FALSE	0.00	#DIV/0!	#DIV/0!
					$0.00	**#DIV/0!**	**#DIV/0!**

Offsets Assessment Guide

For use in determining offsets under the Environment Protection and Biodiversity Conservation Act 1999
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Matter of National Environmental Significance	
Name	Painted Snipe
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	1.2%

Impact calculator

Ecological communities

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	No		Area *(Hectares)*		
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*			

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	Yes	B2G	Area *(Hectares)*	7.9	
			Quality *(Scale 0-10)*	6	
		Total quantum of impact *(Adjusted Hectares)*		4.74	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Number of features e.g. Nest hollows, habitat trees	No			
Condition of habitat Change in habitat condition, but no change in extent	No			

Threatened species

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Birth rate e.g. Change in nest success	No			
Mortality rate e.g Change in number of road kills per year	No			
Number of individuals e.g. Individual plants/animals	No			

Offset calculator

Ecological Communities

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of community	No			Risk-related time horizon *(max. 20 years)*		Start area *(hectares)*		Risk of loss without offset *(%)*		Risk of loss with offset *(%)*		0.00		0.00	0.00	Overall net present value	0.00	
				Time until ecological benefit		Start quality *(scale of 0-10)*		Future quality without offset *(scale of 0-10)*		Future quality with offset *(scale of 0-10)*		0.00		0.00	0.00	% of impact offset	0.00%	
								Future area without offset	0.0	Future area with offset	0.0			Minimum (90%) direct offset requirement met?		FALSE		

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of habitat	Yes	4.74	Canning Creek	Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	63.9	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	0.22	90%	0.20	0.16	Overall net present value	9.12	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	5	Future quality without offset *(scale of 0-10)*	4	Future quality with offset *(scale of 0-10)*	6	2.00	90%	1.80	1.42	% of impact offset	192.49%	
								Future area without offset	63.7	Future area with offset	63.9			Minimum (90%) direct offset requirement met?		TRUE		

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Number of features e.g. Nest hollows, habitat trees	No							0.00		0.00	0.00	0.00%	FALSE	
Condition of habitat Change in habitat condition, but no change in extent	No							0.00		0.00	0.00	0.00%	FALSE	

Threatened species

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Birth rate e.g. Change in nest success	No							0.00		0.00	0.00	0.00%	FALSE	
Mortality rate e.g Change in number of road kills per year	No							0.00		0.00	0.00	0.00%	FALSE	
Number of individuals e.g. Individual plants/animals	No							0.00		0.00	0.00	0.00%	FALSE	

Summary

					Cost ($)		
Protected matter attributes	Quantum of impact	Net present value	% of impact offset	Direct offset adequate?	Direct offset	Other compensatory measures	Total
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of features	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Condition of habitat	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Area of habitat	4.74	9.12	1.92	TRUE	0.00	N/A	0.00
Area of community		0.00	0.00	FALSE	0.00	N/A	0.00
					$0.00	**$0.00**	**$0.00**

Offsets Assessment Guide

For use in determining offsets under the Environment Protection and Biodiversity Conservation Act 1999
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Matter of National Environmental Significance	
Name	Painted Snipe
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	1.2%

Impact calculator

Ecological communities

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	No		Area *(Hectares)*		
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*			

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	Yes	B2G	Area *(Hectares)*	7.9	
			Quality *(Scale 0-10)*	**6**	
		Total quantum of impact *(Adjusted Hectares)*		4.74	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Number of features e.g. Nest hollows, habitat trees	No			
Condition of habitat Change in habitat condition, but no change in extent	No			

Threatened species

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Birth rate e.g. Change in nest success	No			
Mortality rate e.g Change in number of road kills per year	No			
Number of individuals e.g. Individual plants/animals	No			

Offset calculator

Ecological Communities

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of community	No			Risk-related time horizon *(max. 20 years)*		Start area *(hectares)*		Risk of loss without offset *(%)*		Risk of loss with offset *(%)*		0.00		0.00	0.00	Overall net present value	0.00	
				Time until ecological benefit		Start quality *(scale of 0-10)*		Future quality without offset *(scale of 0-10)*		Future quality with offset *(scale of 0-10)*		0.00		0.00	0.00	% of impact offset	0.00%	
								Future area without offset	0.0	Future area with offset	0.0			Minimum (90%) direct offset requirement met?		FALSE		

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of habitat	Yes	4.74	Glenlovely	Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	24.84	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	0.09	90%	0.08	0.06	Overall net present value	3.55	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	**5**	Future quality without offset *(scale of 0-10)*	**4**	Future quality with offset *(scale of 0-10)*	**6**	2.00	90%	1.80	1.42	% of impact offset	74.83%	
								Future area without offset	24.8	Future area with offset	24.8			Minimum (90%) direct offset requirement met?		FALSE		

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Number of features e.g. Nest hollows, habitat trees	No							0.00		0.00	0.00	0.00%	FALSE	
Condition of habitat Change in habitat condition, but no change in extent	No							0.00		0.00	0.00	0.00%	FALSE	

Threatened species

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Birth rate e.g. Change in nest success	No							0.00		0.00	0.00	0.00%	FALSE	
Mortality rate e.g Change in number of road kills per year	No							0.00		0.00	0.00	0.00%	FALSE	
Number of individuals e.g. Individual plants/animals	No							0.00		0.00	0.00	0.00%	FALSE	

Summary

					Cost ($)		
Protected matter attributes	Quantum of impact	Net present value	% of impact offset	Direct offset adequate?	Direct offset	Other compensatory measures	Total
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of features	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Condition of habitat	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Area of habitat	4.74	3.55	0.75	FALSE	0.00	#DIV/0!	#DIV/0!
Area of community		0.00	0.00	FALSE	0.00	N/A	0.00
					$0.00	**#DIV/0!**	**#DIV/0!**

Offsets Assessment Guide

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

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

Impact calculator

Ecological communities

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	No		Area *(Hectares)*		
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*			

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	Yes		Area *(Hectares)*	330.66	
			Quality *(Scale 0-10)*	6	
		Total quantum of impact *(Adjusted Hectares)*		198.40	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Number of features e.g. Nest hollows, habitat trees	No			
Condition of habitat Change in habitat condition, but no change in extent	No			

Threatened species

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Birth rate e.g. Change in nest success	No			
Mortality rate e.g Change in number of road kills per year	No			
Number of individuals e.g. Individual plants/animals	No			

Offset calculator

Ecological Communities

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of community	Yes			Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	49.63	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	0.17	80%	0.14	0.13	Overall net present value	7.68	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	5	Future quality without offset *(scale of 0-10)*	4	Future quality with offset *(scale of 0-10)*	6	2.00	80%	1.60	1.54	% of impact offset	0.00%	
								Future area without offset	49.5	Future area with offset	49.6			Minimum (90%) direct offset requirement met?		FALSE		

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of habitat	Yes	198.40	Canning Creek	Risk-related time horizon *(max. 20 years)*		Start area *(hectares)*	1736.9	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	6.08	90%	5.47	5.47	Overall net present value	314.83	
				Time until ecological benefit		Start quality *(scale of 0-10)*	5	Future quality without offset *(scale of 0-10)*	4	Future quality with offset *(scale of 0-10)*	6	2.00	90%	1.80	1.80	% of impact offset	158.69%	
								Future area without offset	1730.8	Future area with offset	1736.9			Minimum (90%) direct offset requirement met?		TRUE		

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Number of features e.g. Nest hollows, habitat trees	No							0.00		0.00	0.00	0.00%	FALSE	
Condition of habitat Change in habitat condition, but no change in extent	No							0.00		0.00	0.00	0.00%	FALSE	

Threatened species

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Birth rate e.g. Change in nest success	No							0.00		0.00	0.00	0.00%	FALSE	
Mortality rate e.g Change in number of road kills per year	No							0.00		0.00	0.00	0.00%	FALSE	
Number of individuals e.g. Individual plants/animals	No							0.00		0.00	0.00	0.00%	FALSE	

Summary

					Cost ($)		
Protected matter attributes	Quantum of impact	Net present value	% of impact offset	Direct offset adequate?	Direct offset	Other compensatory measures	Total
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of features	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Condition of habitat	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Area of habitat	198.40	314.83	1.59	TRUE	0.00	N/A	0.00
Area of community		7.68	0.00	FALSE	0.00	N/A	0.00
					$0.00	**$0.00**	**$0.00**

Offsets Assessment Guide

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

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

Impact calculator

Ecological communities

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	No		Area *(Hectares)*		
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*			

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	Yes		Area *(Hectares)*	330.66	
			Quality *(Scale 0-10)*	6	
		Total quantum of impact *(Adjusted Hectares)*		198.40	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Number of features e.g. Nest hollows, habitat trees	No			
Condition of habitat Change in habitat condition, but no change in extent	No			

Threatened species

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Birth rate e.g. Change in nest success	No			
Mortality rate e.g Change in number of road kills per year	No			
Number of individuals e.g. Individual plants/animals	No			

Offset calculator

Ecological Communities

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of community	Yes			Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	49.63	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	0.17	80%	0.14	0.13	Overall net present value	7.68	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	5	Future quality without offset *(scale of 0-10)*	4	Future quality with offset *(scale of 0-10)*	6	2.00	80%	1.60	1.54	% of impact offset	0.00%	
								Future area without offset	49.5	Future area with offset	49.6			Minimum (90%) direct offset requirement met?		FALSE		

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of habitat	Yes	198.40	Glenlovely	Risk-related time horizon *(max. 20 years)*		Start area *(hectares)*	412.39	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	1.44	90%	1.30	1.30	Overall net present value	74.75	
				Time until ecological benefit		Start quality *(scale of 0-10)*	5	Future quality without offset *(scale of 0-10)*	4	Future quality with offset *(scale of 0-10)*	6	2.00	90%	1.80	1.80	% of impact offset	37.68%	
								Future area without offset	410.9	Future area with offset	412.4			Minimum (90%) direct offset requirement met?		FALSE		

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Number of features e.g. Nest hollows, habitat trees	No							0.00		0.00	0.00	0.00%	FALSE	
Condition of habitat Change in habitat condition, but no change in extent	No							0.00		0.00	0.00	0.00%	FALSE	

Threatened species

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Birth rate e.g. Change in nest success	No							0.00		0.00	0.00	0.00%	FALSE	
Mortality rate e.g Change in number of road kills per year	No							0.00		0.00	0.00	0.00%	FALSE	
Number of individuals e.g. Individual plants/animals	No							0.00		0.00	0.00	0.00%	FALSE	

Summary

Protected matter attributes	Quantum of impact	Net present value	% of impact offset	Direct offset adequate?	Cost ($) Direct offset	Other compensatory measures	Total
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of features	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Condition of habitat	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Area of habitat	198.40	74.75	0.38	FALSE	0.00	#DIV/0!	#DIV/0!
Area of community		7.68	0.00	FALSE	0.00	N/A	0.00
					$0.00	**#DIV/0!**	**#DIV/0!**

Offsets Assessment Guide

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

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

Impact calculator

Ecological communities

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	No		Area *(Hectares)*		
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*			

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	Yes		Area *(Hectares)*	421.42	
			Quality *(Scale 0-10)*	6	
		Total quantum of impact *(Adjusted Hectares)*		252.85	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Number of features e.g. Nest hollows, habitat trees	No			
Condition of habitat Change in habitat condition, but no change in extent	No			

Threatened species

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Birth rate e.g. Change in nest success	No			
Mortality rate e.g Change in number of road kills per year	No			
Number of individuals e.g. Individual plants/animals	No			

Offset calculator

Ecological Communities

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of community	No			Risk-related time horizon *(max. 20 years)*		Start area *(hectares)*		Risk of loss without offset *(%)*		Risk of loss with offset *(%)*		0.00		0.00	0.00	Overall net present value	0.00	
				Time until ecological benefit		Start quality *(scale of 0-10)*		Future quality without offset *(scale of 0-10)*		Future quality with offset *(scale of 0-10)*		0.00		0.00	0.00	% of impact offset	0.00%	
								Future area without offset	0.0	Future area with offset	0.0			Minimum (90%) direct offset requirement met?		FALSE		

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of habitat	Yes	252.85	Canning Creek	Risk-related time horizon *(max. 20 years)*		Start area *(hectares)*	1562	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	5.47	90%	4.92	4.92	Overall net present value	283.13	
				Time until ecological benefit		Start quality *(scale of 0-10)*	5	Future quality without offset *(scale of 0-10)*	4	Future quality with offset *(scale of 0-10)*	6	2.00	90%	1.80	1.80	% of impact offset	111.97%	
								Future area without offset	1556.5	Future area with offset	1562.0			Minimum (90%) direct offset requirement met?		TRUE		

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Number of features e.g. Nest hollows, habitat trees	No							0.00		0.00	0.00	0.00%	FALSE	
Condition of habitat Change in habitat condition, but no change in extent	No							0.00		0.00	0.00	0.00%	FALSE	

Threatened species

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Birth rate e.g. Change in nest success	No							0.00		0.00	0.00	0.00%	FALSE	
Mortality rate e.g Change in number of road kills per year	No							0.00		0.00	0.00	0.00%	FALSE	
Number of individuals e.g. Individual plants/animals	No							0.00		0.00	0.00	0.00%	FALSE	

Summary

					Cost ($)		
Protected matter attributes	Quantum of impact	Net present value	% of impact offset	Direct offset adequate?	Direct offset	Other compensatory measures	Total
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of features	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Condition of habitat	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Area of habitat	252.85	283.13	1.12	TRUE	0.00	N/A	0.00
Area of community		0.00	0.00	FALSE	0.00	N/A	0.00
					$0.00	**$0.00**	**$0.00**

Offsets Assessment Guide

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

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

Impact calculator

Ecological communities

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	No		Area *(Hectares)*		
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*			

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	Yes		Area *(Hectares)*	241.6	
			Quality *(Scale 0-10)*	5	
		Total quantum of impact *(Adjusted Hectares)*		120.80	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Number of features e.g. Nest hollows, habitat trees	No			
Condition of habitat Change in habitat condition, but no change in extent	No			

Threatened species

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Birth rate e.g. Change in nest success	No			
Mortality rate e.g Change in number of road kills per year	No			
Number of individuals e.g. Individual plants/animals	No			

Offset calculator

Ecological Communities

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of community	No			Risk-related time horizon *(max. 20 years)*		Start area *(hectares)*		Risk of loss without offset *(%)*		Risk of loss with offset *(%)*		0.00		0.00	0.00	Overall net present value	0.00	
				Time until ecological benefit		Start quality *(scale of 0-10)*		Future quality without offset *(scale of 0-10)*		Future quality with offset *(scale of 0-10)*		0.00		0.00	0.00	% of impact offset	0.00%	
								Future area without offset	0.0	Future area with offset	0.0			Minimum (90%) direct offset requirement met?		FALSE		

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of habitat	Yes	120.80	Canning Creek	Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	797.6	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	2.79	90%	2.51	2.41	Overall net present value	138.91	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	5	Future quality without offset *(scale of 0-10)*	4	Future quality with offset *(scale of 0-10)*	6	2.00	90%	1.80	1.73	% of impact offset	114.99%	
								Future area without offset	794.8	Future area with offset	797.6			Minimum (90%) direct offset requirement met?		TRUE		

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Number of features e.g. Nest hollows, habitat trees	No							0.00		0.00	0.00	0.00%	FALSE	
Condition of habitat Change in habitat condition, but no change in extent	No							0.00		0.00	0.00	0.00%	FALSE	

Threatened species

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Birth rate e.g. Change in nest success	No							0.00		0.00	0.00	0.00%	FALSE	
Mortality rate e.g Change in number of road kills per year	No							0.00		0.00	0.00	0.00%	FALSE	
Number of individuals e.g. Individual plants/animals	No							0.00		0.00	0.00	0.00%	FALSE	

Summary

					Cost ($)		
Protected matter attributes	Quantum of impact	Net present value	% of impact offset	Direct offset adequate?	Direct offset	Other compensatory measures	Total
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of features	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Condition of habitat	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Area of habitat	120.80	138.91	1.15	TRUE	0.00	N/A	0.00
Area of community		0.00	0.00	FALSE	0.00	N/A	0.00
					$0.00	**$0.00**	**$0.00**

Offsets Assessment Guide

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

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

Impact calculator

Ecological communities

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	No		Area *(Hectares)*		
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*			

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	Yes		Area *(Hectares)*	241.6	
			Quality *(Scale 0-10)*	5	
		Total quantum of impact *(Adjusted Hectares)*		120.80	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Number of features e.g. Nest hollows, habitat trees	No			
Condition of habitat Change in habitat condition, but no change in extent	No			

Threatened species

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Birth rate e.g. Change in nest success	No			
Mortality rate e.g Change in number of road kills per year	No			
Number of individuals e.g. Individual plants/animals	No			

Offset calculator

Ecological Communities

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of community	No			Risk-related time horizon *(max. 20 years)*		Start area *(hectares)*		Risk of loss without offset *(%)*		Risk of loss with offset *(%)*		0.00		0.00	0.00	Overall net present value	0.00	
				Time until ecological benefit		Start quality *(scale of 0-10)*		Future quality without offset *(scale of 0-10)*		Future quality with offset *(scale of 0-10)*		0.00		0.00	0.00	% of impact offset	0.00%	
								Future area without offset	0.0	Future area with offset	0.0			Minimum (90%) direct offset requirement met?		FALSE		

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of habitat	Yes	120.80	Hillside	Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	107.8	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	0.24	90%	0.21	0.21	Overall net present value	18.71	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	4	Future quality without offset *(scale of 0-10)*	3	Future quality with offset *(scale of 0-10)*	5	2.00	90%	1.80	1.73	% of impact offset	15.48%	
								Future area without offset	107.6	Future area with offset	107.8			Minimum (90%) direct offset requirement met?		FALSE		

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Number of features e.g. Nest hollows, habitat trees	No							0.00		0.00	0.00	0.00%	FALSE	
Condition of habitat Change in habitat condition, but no change in extent	No							0.00		0.00	0.00	0.00%	FALSE	

Threatened species

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Birth rate e.g. Change in nest success	No							0.00		0.00	0.00	0.00%	FALSE	
Mortality rate e.g Change in number of road kills per year	No							0.00		0.00	0.00	0.00%	FALSE	
Number of individuals e.g. Individual plants/animals	No							0.00		0.00	0.00	0.00%	FALSE	

Summary

					Cost ($)		
Protected matter attributes	Quantum of impact	Net present value	% of impact offset	Direct offset adequate?	Direct offset	Other compensatory measures	Total
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of features	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Condition of habitat	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Area of habitat	120.80	18.71	0.15	FALSE	0.00	#DIV/0!	#DIV/0!
Area of community		0.00	0.00	FALSE	0.00	N/A	0.00
					$0.00	**#DIV/0!**	**#DIV/0!**

Offsets Assessment Guide

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

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

Impact calculator

Ecological communities

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	No		Area *(Hectares)*		
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*			

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	Yes		Area *(Hectares)*	241.6	
			Quality *(Scale 0-10)*	5	
		Total quantum of impact *(Adjusted Hectares)*		120.80	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Number of features e.g. Nest hollows, habitat trees	No			
Condition of habitat Change in habitat condition, but no change in extent	No			

Threatened species

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Birth rate e.g. Change in nest success	No			
Mortality rate e.g Change in number of road kills per year	No			
Number of individuals e.g. Individual plants/animals	No			

Offset calculator

Ecological Communities

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of community	No			Risk-related time horizon *(max. 20 years)*		Start area *(hectares)*		Risk of loss without offset *(%)*		Risk of loss with offset *(%)*		0.00		0.00	0.00	Overall net present value	0.00	
				Time until ecological benefit		Start quality *(scale of 0-10)*		Future quality without offset *(scale of 0-10)*		Future quality with offset *(scale of 0-10)*		0.00		0.00	0.00	% of impact offset	0.00%	
								Future area without offset	0.0	Future area with offset	0.0			Minimum (90%) direct offset requirement met?		FALSE		

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of habitat	Yes	120.80	Longsdale	Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	122.4	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	0.43	90%	0.39	0.37	Overall net present value	21.28	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	4	Future quality without offset *(scale of 0-10)*	3	Future quality with offset *(scale of 0-10)*	5	2.00	90%	1.80	1.73	% of impact offset	17.62%	
								Future area without offset	122.0	Future area with offset	122.4			Minimum (90%) direct offset requirement met?		FALSE		

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Number of features e.g. Nest hollows, habitat trees	No							0.00		0.00	0.00	0.00%	FALSE	
Condition of habitat Change in habitat condition, but no change in extent	No							0.00		0.00	0.00	0.00%	FALSE	

Threatened species

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Birth rate e.g. Change in nest success	No							0.00		0.00	0.00	0.00%	FALSE	
Mortality rate e.g Change in number of road kills per year	No							0.00		0.00	0.00	0.00%	FALSE	
Number of individuals e.g. Individual plants/animals	No							0.00		0.00	0.00	0.00%	FALSE	

Summary

					Cost ($)		
Protected matter attributes	Quantum of impact	Net present value	% of impact offset	Direct offset adequate?	Direct offset	Other compensatory measures	Total
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of features	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Condition of habitat	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Area of habitat	120.80	21.28	0.18	FALSE	0.00	#DIV/0!	#DIV/0!
Area of community		0.00	0.00	FALSE	0.00	N/A	0.00
					$0.00	**#DIV/0!**	**#DIV/0!**

Offsets Assessment Guide

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

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

Impact calculator

Ecological communities

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	No		Area *(Hectares)*		
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*			

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	Yes		Area *(Hectares)*	262.7	
			Quality *(Scale 0-10)*	**6**	
		Total quantum of impact *(Adjusted Hectares)*		157.62	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Number of features e.g. Nest hollows, habitat trees	No			
Condition of habitat Change in habitat condition, but no change in extent	No			

Threatened species

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Birth rate e.g. Change in nest success	No			
Mortality rate e.g Change in number of road kills per year	No			
Number of individuals e.g. Individual plants/animals	No			

Offset calculator

Ecological Communities

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of community	No			Risk-related time horizon *(max. 20 years)*		Start area *(hectares)*		Risk of loss without offset *(%)*		Risk of loss with offset *(%)*		0.00		0.00	0.00	Overall net present value	0.00	
				Time until ecological benefit		Start quality *(scale of 0-10)*		Future quality without offset *(scale of 0-10)*		Future quality with offset *(scale of 0-10)*		0.00		0.00	0.00	% of impact offset	0.00%	
								Future area without offset	0.0	Future area with offset	0.0			Minimum (90%) direct offset requirement met?		FALSE		

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of habitat	Yes	157.62	Canning Creek	Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	1517.4	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	5.31	90%	4.78	4.59	Overall net present value	264.27	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	5	Future quality without offset *(scale of 0-10)*	4	Future quality with offset *(scale of 0-10)*	6	2.00	90%	1.80	1.73	% of impact offset	167.66%	
								Future area without offset	1512.1	Future area with offset	1517.4			Minimum (90%) direct offset requirement met?		TRUE		

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Number of features e.g. Nest hollows, habitat trees	No							0.00		0.00	0.00	0.00%	FALSE	
Condition of habitat Change in habitat condition, but no change in extent	No							0.00		0.00	0.00	0.00%	FALSE	

Threatened species

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Birth rate e.g. Change in nest success	No							0.00		0.00	0.00	0.00%	FALSE	
Mortality rate e.g Change in number of road kills per year	No							0.00		0.00	0.00	0.00%	FALSE	
Number of individuals e.g. Individual plants/animals	No							0.00		0.00	0.00	0.00%	FALSE	

Summary

Protected matter attributes	Quantum of impact	Net present value	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset	Other compensatory measures	Total
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of features	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Condition of habitat	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Area of habitat	157.62	264.27	1.68	TRUE	0.00	N/A	0.00
Area of community		0.00	0.00	FALSE	0.00	N/A	0.00
					$0.00	**$0.00**	**$0.00**

Offsets Assessment Guide

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

Matter of National Environmental Significance	
Name	CED
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	1.2%

Impact calculator

Ecological communities

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	No		Area *(Hectares)*		
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*			

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	Yes	B2G	Area *(Hectares)*	51.2	
			Quality *(Scale 0-10)*	5	
		Total quantum of impact *(Adjusted Hectares)*		25.60	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Number of features e.g. Nest hollows, habitat trees	No			
Condition of habitat Change in habitat condition, but no change in extent	No			

Threatened species

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Birth rate e.g. Change in nest success	No			
Mortality rate e.g Change in number of road kills per year	No			
Number of individuals e.g. Individual plants/animals	No			

Offset calculator

Ecological Communities

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of community	Yes			Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	53.5	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	0.19	90%	0.17	0.13	Overall net present value	7.63	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	4	Future quality without offset *(scale of 0-10)*	3	Future quality with offset *(scale of 0-10)*	5	2.00	90%	1.80	1.42	% of impact offset	0.00%	
								Future area without offset	53.3	Future area with offset	53.5			Minimum (90%) direct offset requirement met?		FALSE		

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of habitat	Yes	25.60	[redacted]	Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	512.7	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	1.13	90%	1.02	0.80	Overall net present value	73.02	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	5	Future quality without offset *(scale of 0-10)*	4	Future quality with offset *(scale of 0-10)*	6	2.00	90%	1.80	1.42	% of impact offset	285.23%	
								Future area without offset	511.6	Future area with offset	512.7			Minimum (90%) direct offset requirement met?		TRUE		

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Number of features e.g. Nest hollows, habitat trees	No							0.00		0.00	0.00	0.00%	FALSE	
Condition of habitat Change in habitat condition, but no change in extent	No							0.00		0.00	0.00	0.00%	FALSE	

Threatened species

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Birth rate e.g. Change in nest success	No							0.00		0.00	0.00	0.00%	FALSE	
Mortality rate e.g Change in number of road kills per year	No							0.00		0.00	0.00	0.00%	FALSE	
Number of individuals e.g. Individual plants/animals	No							0.00		0.00	0.00	0.00%	FALSE	

Summary

Protected matter attributes	Quantum of impact	Net present value	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset	Other compensatory measures	Total
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of features	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Condition of habitat	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Area of habitat	25.60	73.02	2.85	TRUE	0.00	N/A	0.00
Area of community		7.63	0.00	FALSE	0.00	N/A	0.00
					$0.00	**$0.00**	**$0.00**

Offsets Assessment Guide

For use in determining offsets under the Environment Protection and Biodiversity Conservation Act 1999
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Matter of National Environmental Significance	
Name	Spotted tailed Quoll
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	1.2%

Impact calculator

Ecological communities

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	No		Area *(Hectares)*		
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*			

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	Yes	B2G	Area *(Hectares)*	384.47	
			Quality *(Scale 0-10)*	5	
		Total quantum of impact *(Adjusted Hectares)*		192.24	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Number of features e.g. Nest hollows, habitat trees	No			
Condition of habitat Change in habitat condition, but no change in extent	No			

Threatened species

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Birth rate e.g. Change in nest success	No			
Mortality rate e.g Change in number of road kills per year	No			
Number of individuals e.g. Individual plants/animals	No			

Offset calculator

Ecological Communities

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of community	Yes			Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	53.5	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	0.19	90%	0.17	0.13	Overall net present value	7.63	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	4	Future quality without offset *(scale of 0-10)*	3	Future quality with offset *(scale of 0-10)*	5	2.00	90%	1.80	1.42	% of impact offset	0.00%	
								Future area without offset	53.3	Future area with offset	53.5			Minimum (90%) direct offset requirement met?		FALSE		

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of habitat	Yes	192.24	Canning Creek	Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	1900.4	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	6.65	90%	5.99	4.72	Overall net present value	270.88	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	4	Future quality without offset *(scale of 0-10)*	3	Future quality with offset *(scale of 0-10)*	5	2.00	90%	1.80	1.42	% of impact offset	140.91%	
								Future area without offset	1893.7	Future area with offset	1900.4			Minimum (90%) direct offset requirement met?		TRUE		

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Number of features e.g. Nest hollows, habitat trees	No							0.00		0.00	0.00	0.00%	FALSE	
Condition of habitat Change in habitat condition, but no change in extent	No							0.00		0.00	0.00	0.00%	FALSE	

Threatened species

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Birth rate e.g. Change in nest success	No							0.00		0.00	0.00	0.00%	FALSE	
Mortality rate e.g Change in number of road kills per year	No							0.00		0.00	0.00	0.00%	FALSE	
Number of individuals e.g. Individual plants/animals	No							0.00		0.00	0.00	0.00%	FALSE	

Summary

Protected matter attributes	Quantum of impact	Net present value	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset	Other compensatory measures	Total
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of features	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Condition of habitat	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Area of habitat	192.24	270.88	1.41	TRUE	0.00	N/A	0.00
Area of community		7.63	0.00	FALSE	0.00	N/A	0.00
					$0.00	**$0.00**	**$0.00**

Offsets Assessment Guide

For use in determining offsets under the Environment Protection and Biodiversity Conservation Act 1999
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Matter of National Environmental Significance	
Name	SELEB
EPBC Act status	Vulnerable
Annual probability of extinction Based on IUCN category definitions	0.2%

Impact calculator

Ecological communities

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	No		Area *(Hectares)*		
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*			

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	Yes	B2G	Area *(Hectares)*	696.25	
			Quality *(Scale 0-10)*	5	
		Total quantum of impact *(Adjusted Hectares)*		348.13	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Number of features e.g. Nest hollows, habitat trees	No			
Condition of habitat Change in habitat condition, but no change in extent	No			

Threatened species

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Birth rate e.g. Change in nest success	No			
Mortality rate e.g Change in number of road kills per year	No			
Number of individuals e.g. Individual plants/animals	No			

Offset calculator

Ecological Communities

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of community	Yes			Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	53.5	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	0.19	90%	0.17	0.16	Overall net present value	9.30	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	4	Future quality without offset *(scale of 0-10)*	3	Future quality with offset *(scale of 0-10)*	5	2.00	90%	1.80	1.73	% of impact offset	0.00%	
								Future area without offset	53.3	Future area with offset	53.5			Minimum (90%) direct offset requirement met?		FALSE		

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of habitat	Yes	348.13	Canning Creek	Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	2041.38	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	7.14	90%	6.43	6.18	Overall net present value	355.53	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	5	Future quality without offset *(scale of 0-10)*	4	Future quality with offset *(scale of 0-10)*	6	2.00	90%	1.80	1.73	% of impact offset	102.13%	
								Future area without offset	2034.2	Future area with offset	2041.4			Minimum (90%) direct offset requirement met?		TRUE		

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Number of features e.g. Nest hollows, habitat trees	No							0.00		0.00	0.00	0.00%	FALSE	
Condition of habitat Change in habitat condition, but no change in extent	No							0.00		0.00	0.00	0.00%	FALSE	

Threatened species

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Birth rate e.g. Change in nest success	No							0.00		0.00	0.00	0.00%	FALSE	
Mortality rate e.g Change in number of road kills per year	No							0.00		0.00	0.00	0.00%	FALSE	
Number of individuals e.g. Individual plants/animals	No							0.00		0.00	0.00	0.00%	FALSE	

Summary

					Cost ($)		
Protected matter attributes	Quantum of impact	Net present value	% of impact offset	Direct offset adequate?	Direct offset	Other compensatory measures	Total
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of features	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Condition of habitat	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Area of habitat	348.13	355.53	1.02	TRUE	0.00	N/A	0.00
Area of community		9.30	0.00	FALSE	0.00	N/A	0.00
					$0.00	**$0.00**	**$0.00**

Offsets Assessment Guide

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

Matter of National Environmental Significance	
Name	Koala
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	1.2%

Impact calculator

Ecological communities

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	No		Area *(Hectares)*		
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*			

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	Yes	B2G	Area *(Hectares)*	769.4	
			Quality *(Scale 0-10)*	6	
		Total quantum of impact *(Adjusted Hectares)*		461.64	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Number of features e.g. Nest hollows, habitat trees	No			
Condition of habitat Change in habitat condition, but no change in extent	No			

Threatened species

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Birth rate e.g. Change in nest success	No			
Mortality rate e.g Change in number of road kills per year	No			
Number of individuals e.g. Individual plants/animals	No			

Offset calculator

Ecological Communities

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of community	No			Risk-related time horizon *(max. 20 years)*		Start area *(hectares)*		Risk of loss without offset *(%)*		Risk of loss with offset *(%)*		0.00		0.00	0.00	Overall net present value	0.00	
				Time until ecological benefit		Start quality *(scale of 0-10)*		Future quality without offset *(scale of 0-10)*		Future quality with offset *(scale of 0-10)*		0.00		0.00	0.00	% of impact offset	0.00%	
								Future area without offset	0.0	Future area with offset	0.0			Minimum (90%) direct offset requirement met?			FALSE	

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of habitat	Yes	461.64	Canning Creek	Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	2087.9	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	7.31	90%	6.58	5.18	Overall net present value	298.13	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	5	Future quality without offset *(scale of 0-10)*	4	Future quality with offset *(scale of 0-10)*	6	2.00	90%	1.80	1.42	% of impact offset	64.58%	
								Future area without offset	2080.6	Future area with offset	2087.9			Minimum (90%) direct offset requirement met?			FALSE	

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Number of features e.g. Nest hollows, habitat trees	No							0.00		0.00	0.00	0.00%	FALSE	
Condition of habitat Change in habitat condition, but no change in extent	No							0.00		0.00	0.00	0.00%	FALSE	

Threatened species

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Birth rate e.g. Change in nest success	No							0.00		0.00	0.00	0.00%	FALSE	
Mortality rate e.g Change in number of road kills per year	No							0.00		0.00	0.00	0.00%	FALSE	
Number of individuals e.g. Individual plants/animals	No							0.00		0.00	0.00	0.00%	FALSE	

Summary

					Cost ($)		
Protected matter attributes	Quantum of impact	Net present value	% of impact offset	Direct offset adequate?	Direct offset	Other compensatory measures	Total
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of features	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Condition of habitat	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Area of habitat	461.64	298.13	0.65	FALSE	0.00	#DIV/0!	#DIV/0!
Area of community		0.00	0.00	FALSE	0.00	N/A	0.00
					$0.00	**#DIV/0!**	**#DIV/0!**

Offsets Assessment Guide

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

Matter of National Environmental Significance	
Name	Koala
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	1.2%

Impact calculator

Ecological communities

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	No		Area *(Hectares)*		
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*			

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	Yes	B2G	Area *(Hectares)*	769.4	
			Quality *(Scale 0-10)*	6	
		Total quantum of impact *(Adjusted Hectares)*		461.64	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Number of features e.g. Nest hollows, habitat trees	No			
Condition of habitat Change in habitat condition, but no change in extent	No			

Threatened species

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Birth rate e.g. Change in nest success	No			
Mortality rate e.g Change in number of road kills per year	No			
Number of individuals e.g. Individual plants/animals	No			

Offset calculator

Ecological Communities

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of community	No			Risk-related time horizon *(max. 20 years)*		Start area *(hectares)*		Risk of loss without offset *(%)*		Risk of loss with offset *(%)*		0.00		0.00	0.00	Overall net present value	0.00	
				Time until ecological benefit		Start quality *(scale of 0-10)*		Future quality without offset *(scale of 0-10)*		Future quality with offset *(scale of 0-10)*		0.00		0.00	0.00	% of impact offset	0.00%	
								Future area without offset	0.0	Future area with offset	0.0			Minimum (90%) direct offset requirement met?			FALSE	

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of habitat	Yes	461.64	Glenlovely	Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	489.46	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	1.71	90%	1.54	1.21	Overall net present value	104.47	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	4	Future quality without offset *(scale of 0-10)*	3	Future quality with offset *(scale of 0-10)*	6	3.00	90%	2.70	2.13	% of impact offset	22.63%	
								Future area without offset	487.7	Future area with offset	489.5			Minimum (90%) direct offset requirement met?			FALSE	

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Number of features e.g. Nest hollows, habitat trees	No							0.00		0.00	0.00	0.00%	FALSE	
Condition of habitat Change in habitat condition, but no change in extent	No							0.00		0.00	0.00	0.00%	FALSE	

Threatened species

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Birth rate e.g. Change in nest success	No							0.00		0.00	0.00	0.00%	FALSE	
Mortality rate e.g Change in number of road kills per year	No							0.00		0.00	0.00	0.00%	FALSE	
Number of individuals e.g. Individual plants/animals	No							0.00		0.00	0.00	0.00%	FALSE	

Summary

					Cost ($)		
Protected matter attributes	Quantum of impact	Net present value	% of impact offset	Direct offset adequate?	Direct offset	Other compensatory measures	Total
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of features	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Condition of habitat	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Area of habitat	461.64	104.47	0.23	FALSE	0.00	#DIV/0!	#DIV/0!
Area of community		0.00	0.00	FALSE	0.00	N/A	0.00
					$0.00	**#DIV/0!**	**#DIV/0!**

Offsets Assessment Guide

For use in determining offsets under the Environment Protection and Biodiversity Conservation Act 1999
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Matter of National Environmental Significance	
Name	Koala
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	1.2%

Impact calculator

Ecological communities

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	No		Area *(Hectares)*		
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*			

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	Yes	B2G	Area *(Hectares)*	134.03	
			Quality *(Scale 0-10)*	6	
		Total quantum of impact *(Adjusted Hectares)*		80.42	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Number of features e.g. Nest hollows, habitat trees	No			
Condition of habitat Change in habitat condition, but no change in extent	No			

Threatened species

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Birth rate e.g. Change in nest success	No			
Mortality rate e.g Change in number of road kills per year	No			
Number of individuals e.g. Individual plants/animals	No			

Offset calculator

Ecological Communities

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of community	No			Risk-related time horizon *(max. 20 years)*		Start area *(hectares)*		Risk of loss without offset *(%)*		Risk of loss with offset *(%)*		0.00		0.00	0.00	Overall net present value	0.00	
				Time until ecological benefit		Start quality *(scale of 0-10)*		Future quality without offset *(scale of 0-10)*		Future quality with offset *(scale of 0-10)*		0.00		0.00	0.00	% of impact offset	0.00%	
								Future area without offset	0.0	Future area with offset	0.0			Minimum (90%) direct offset requirement met?			FALSE	

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of habitat	Yes	80.42	Hillside	Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	119.54	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	0.42	90%	0.38	0.30	Overall net present value	25.51	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	4	Future quality without offset *(scale of 0-10)*	3	Future quality with offset *(scale of 0-10)*	6	3.00	90%	2.70	2.13	% of impact offset	31.73%	
								Future area without offset	119.1	Future area with offset	119.5			Minimum (90%) direct offset requirement met?			FALSE	

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Number of features e.g. Nest hollows, habitat trees	No							0.00		0.00	0.00	0.00%	FALSE	
Condition of habitat Change in habitat condition, but no change in extent	No							0.00		0.00	0.00	0.00%	FALSE	

Threatened species

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Birth rate e.g. Change in nest success	No							0.00		0.00	0.00	0.00%	FALSE	
Mortality rate e.g Change in number of road kills per year	No							0.00		0.00	0.00	0.00%	FALSE	
Number of individuals e.g. Individual plants/animals	No							0.00		0.00	0.00	0.00%	FALSE	

Summary

					Cost ($)		
Protected matter attributes	**Quantum of impact**	**Net present value**	**% of impact offset**	**Direct offset adequate?**	**Direct offset**	**Other compensatory measures**	**Total**
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of features	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Condition of habitat	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Area of habitat	80.42	25.51	0.32	FALSE	0.00	#DIV/0!	#DIV/0!
Area of community		0.00	0.00	FALSE	0.00	N/A	0.00
					$0.00	**#DIV/0!**	**#DIV/0!**

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For use in determining offsets under the Environment Protection and Biodiversity Conservation Act 1999
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Matter of National Environmental Significance	
Name	Adclarkia cameroni
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	1.2%

Impact calculator

Ecological communities

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	No		Area *(Hectares)*		
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*			

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	Yes	B2G	Area *(Hectares)*	146.7	
			Quality *(Scale 0-10)*	5	
		Total quantum of impact *(Adjusted Hectares)*		73.35	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Number of features e.g. Nest hollows, habitat trees	No			
Condition of habitat Change in habitat condition, but no change in extent	No			

Threatened species

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Birth rate e.g. Change in nest success	No			
Mortality rate e.g Change in number of road kills per year	No			
Number of individuals e.g. Individual plants/animals	No			

Offset calculator

Ecological Communities

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of community	Yes			Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	53.5	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	0.19	90%	0.17	0.13	Overall net present value	7.63	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	4	Future quality without offset *(scale of 0-10)*	3	Future quality with offset *(scale of 0-10)*	5	2.00	90%	1.80	1.42	% of impact offset	0.00%	
								Future area without offset	53.3	Future area with offset	53.5			Minimum (90%) direct offset requirement met?		FALSE		

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of habitat	Yes	73.35	Canning Creek	Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	736	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	2.58	90%	2.32	1.83	Overall net present value	105.09	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	5	Future quality without offset *(scale of 0-10)*	4	Future quality with offset *(scale of 0-10)*	6	2.00	90%	1.80	1.42	% of impact offset	143.27%	
								Future area without offset	733.4	Future area with offset	736.0			Minimum (90%) direct offset requirement met?		TRUE		

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Number of features e.g. Nest hollows, habitat trees	No							0.00		0.00	0.00	0.00%	FALSE	
Condition of habitat Change in habitat condition, but no change in extent	No							0.00		0.00	0.00	0.00%	FALSE	

Threatened species

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Birth rate e.g. Change in nest success	No							0.00		0.00	0.00	0.00%	FALSE	
Mortality rate e.g Change in number of road kills per year	No							0.00		0.00	0.00	0.00%	FALSE	
Number of individuals e.g. Individual plants/animals	No							0.00		0.00	0.00	0.00%	FALSE	

Summary

					Cost ($)		
Protected matter attributes	Quantum of impact	Net present value	% of impact offset	Direct offset adequate?	Direct offset	Other compensatory measures	Total
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of features	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Condition of habitat	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Area of habitat	73.35	105.09	1.43	TRUE	0.00	N/A	0.00
Area of community		7.63	0.00	FALSE	0.00	N/A	0.00
					$0.00	**$0.00**	**$0.00**

Offsets Assessment Guide

For use in determining offsets under the Environment Protection and Biodiversity Conservation Act 1999
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Matter of National Environmental Significance	
Name	Belsons panic
EPBC Act status	Vulnerable
Annual probability of extinction Based on IUCN category definitions	0.2%

Impact calculator

Ecological communities

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	No		Area *(Hectares)*		
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*			

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	Yes		Area *(Hectares)*	242.25	
			Quality *(Scale 0-10)*	5	
		Total quantum of impact *(Adjusted Hectares)*		121.13	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Number of features e.g. Nest hollows, habitat trees	No			
Condition of habitat Change in habitat condition, but no change in extent	No			

Threatened species

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Birth rate e.g. Change in nest success	No			
Mortality rate e.g Change in number of road kills per year	No			
Number of individuals e.g. Individual plants/animals	No			

Offset calculator

Ecological Communities

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of community	Yes			Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	49.63	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	0.17	80%	0.14	0.13	Overall net present value	7.68	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	5	Future quality without offset *(scale of 0-10)*	4	Future quality with offset *(scale of 0-10)*	6	2.00	80%	1.60	1.54	% of impact offset	0.00%	
								Future area without offset	49.5	Future area with offset	49.6			Minimum (90%) direct offset requirement met?		FALSE		

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of habitat	Yes	121.13	Canning	Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	955.4	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	0.00	90%	0.00	0.00	Overall net present value	164.66	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	6	Future quality without offset *(scale of 0-10)*	5	Future quality with offset *(scale of 0-10)*	7	2.00	90%	1.80	1.73	% of impact offset	135.94%	
								Future area without offset	952.1	Future area with offset	952.1			Minimum (90%) direct offset requirement met?		TRUE		

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Number of features e.g. Nest hollows, habitat trees	No							0.00		0.00	0.00	0.00%	FALSE	
Condition of habitat Change in habitat condition, but no change in extent	No							0.00		0.00	0.00	0.00%	FALSE	

Threatened species

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Birth rate e.g. Change in nest success	No							0.00		0.00	0.00	0.00%	FALSE	
Mortality rate e.g Change in number of road kills per year	No							0.00		0.00	0.00	0.00%	FALSE	
Number of individuals e.g. Individual plants/animals	No							0.00		0.00	0.00	0.00%	FALSE	

Summary

					Cost ($)		
Protected matter attributes	Quantum of impact	Net present value	% of impact offset	Direct offset adequate?	Direct offset	Other compensatory measures	Total
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of features	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Condition of habitat	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Area of habitat	121.13	164.66	1.36	TRUE	0.00	N/A	0.00
Area of community		7.68	0.00	FALSE	0.00	N/A	0.00
					$0.00	**$0.00**	**$0.00**

Offsets Assessment Guide

For use in determining offsets under the Environment Protection and Biodiversity Conservation Act 1999
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Matter of National Environmental Significance	
Name	Lepidium monoplocoides
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	1.2%

Impact calculator

Ecological communities

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	No		Area *(Hectares)*		
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*			

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	Yes		Area *(Hectares)*	79.86	
			Quality *(Scale 0-10)*	**6**	
		Total quantum of impact *(Adjusted Hectares)*		47.92	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Number of features e.g. Nest hollows, habitat trees	No			
Condition of habitat Change in habitat condition, but no change in extent	No			

Threatened species

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Birth rate e.g. Change in nest success	No			
Mortality rate e.g Change in number of road kills per year	No			
Number of individuals e.g. Individual plants/animals	No			

Offset calculator

Ecological Communities

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of community	Yes			Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	49.63	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	0.17	80%	0.14	0.11	Overall net present value	6.30	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	5	Future quality without offset *(scale of 0-10)*	4	Future quality with offset *(scale of 0-10)*	6	2.00	80%	1.60	1.26	% of impact offset	0.00%	
								Future area without offset	49.5	Future area with offset	49.6			Minimum (90%) direct offset requirement met?		FALSE		

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of habitat	Yes	47.92	Glenlovely	Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	460.06	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	0.00	90%	0.00	0.00	Overall net present value	65.01	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	5	Future quality without offset *(scale of 0-10)*	4	Future quality with offset *(scale of 0-10)*	6	2.00	90%	1.80	1.42	% of impact offset	135.67%	
								Future area without offset	458.4	Future area with offset	458.4			Minimum (90%) direct offset requirement met?		TRUE		

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Number of features e.g. Nest hollows, habitat trees	No							0.00		0.00	0.00	0.00%	FALSE	
Condition of habitat Change in habitat condition, but no change in extent	No							0.00		0.00	0.00	0.00%	FALSE	

Threatened species

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Birth rate e.g. Change in nest success	No							0.00		0.00	0.00	0.00%	FALSE	
Mortality rate e.g Change in number of road kills per year	No							0.00		0.00	0.00	0.00%	FALSE	
Number of individuals e.g. Individual plants/animals	No							0.00		0.00	0.00	0.00%	FALSE	

Summary

					Cost ($)		
Protected matter attributes	Quantum of impact	Net present value	% of impact offset	Direct offset adequate?	Direct offset	Other compensatory measures	Total
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of features	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Condition of habitat	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Area of habitat	47.92	65.01	1.36	TRUE	0.00	N/A	0.00
Area of community		6.30	0.00	FALSE	0.00	N/A	0.00
					$0.00	**$0.00**	**$0.00**

Offsets Assessment Guide

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

Matter of National Environmental Significance	
Name	Picris Evae
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	1.2%

Impact calculator

Ecological communities

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	No		Area *(Hectares)*		
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*			

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	Yes		Area *(Hectares)*	110.67	
			Quality *(Scale 0-10)*	5	
		Total quantum of impact *(Adjusted Hectares)*		55.34	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Number of features e.g. Nest hollows, habitat trees	No			
Condition of habitat Change in habitat condition, but no change in extent	No			

Threatened species

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Birth rate e.g. Change in nest success	No			
Mortality rate e.g Change in number of road kills per year	No			
Number of individuals e.g. Individual plants/animals	No			

Offset calculator

Ecological Communities

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of community	No			Risk-related time horizon *(max. 20 years)*		Start area *(hectares)*		Risk of loss without offset *(%)*		Risk of loss with offset *(%)*		0.00		0.00	0.00	Overall net present value	0.00	
				Time until ecological benefit		Start quality *(scale of 0-10)*		Future quality without offset *(scale of 0-10)*		Future quality with offset *(scale of 0-10)*		0.00		0.00	0.00	% of impact offset	0.00%	
								Future area without offset	0.0	Future area with offset	0.0			Minimum (90%) direct offset requirement met?		FALSE		

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of habitat	Yes	55.34	[redacted]	Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	290.4	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	-0.38	90%	-0.34	-0.27	Overall net present value	61.50	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	2	Future quality without offset *(scale of 0-10)*	2	Future quality with offset *(scale of 0-10)*	5	3.00	90%	2.70	2.13	% of impact offset	111.13%	
								Future area without offset	289.8	Future area with offset	289.4			Minimum (90%) direct offset requirement met?		TRUE		

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Number of features e.g. Nest hollows, habitat trees	No							0.00		0.00	0.00	0.00%	FALSE	
Condition of habitat Change in habitat condition, but no change in extent	No							0.00		0.00	0.00	0.00%	FALSE	

Threatened species

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Birth rate e.g. Change in nest success	No							0.00		0.00	0.00	0.00%	FALSE	
Mortality rate e.g Change in number of road kills per year	No							0.00		0.00	0.00	0.00%	FALSE	
Number of individuals e.g. Individual plants/animals	No							0.00		0.00	0.00	0.00%	FALSE	

Summary

					Cost ($)		
Protected matter attributes	Quantum of impact	Net present value	% of impact offset	Direct offset adequate?	Direct offset	Other compensatory measures	Total
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of features	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Condition of habitat	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Area of habitat	55.34	61.50	1.11	TRUE	0.00	N/A	0.00
Area of community		0.00	0.00	FALSE	0.00	N/A	0.00
					$0.00	**$0.00**	**$0.00**

Offsets Assessment Guide

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

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

Impact calculator

Ecological communities

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	No		Area *(Hectares)*		
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*			

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	Yes		Area *(Hectares)*	27.19	
			Quality *(Scale 0-10)*	5	
		Total quantum of impact *(Adjusted Hectares)*		13.60	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Number of features e.g. Nest hollows, habitat trees	No			
Condition of habitat Change in habitat condition, but no change in extent	No			

Threatened species

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Birth rate e.g. Change in nest success	No			
Mortality rate e.g Change in number of road kills per year	No			
Number of individuals e.g. Individual plants/animals	No			

Offset calculator

Ecological Communities

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of community	No			Risk-related time horizon *(max. 20 years)*		Start area *(hectares)*		Risk of loss without offset *(%)*		Risk of loss with offset *(%)*		0.00		0.00	0.00	Overall net present value	0.00	
				Time until ecological benefit		Start quality *(scale of 0-10)*		Future quality without offset *(scale of 0-10)*		Future quality with offset *(scale of 0-10)*		0.00		0.00	0.00	% of impact offset	0.00%	
								Future area without offset	0.0	Future area with offset	0.0			Minimum (90%) direct offset requirement met?		FALSE		

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of habitat	Yes	13.60	Glenlovely	Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	322.53	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	0.00	90%	0.00	0.00	Overall net present value	55.59	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	6	Future quality without offset *(scale of 0-10)*	5	Future quality with offset *(scale of 0-10)*	7	2.00	90%	1.80	1.73	% of impact offset	408.87%	
								Future area without offset	321.4	Future area with offset	321.4			Minimum (90%) direct offset requirement met?		TRUE		

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Number of features e.g. Nest hollows, habitat trees	No							0.00		0.00	0.00	0.00%	FALSE	
Condition of habitat Change in habitat condition, but no change in extent	No							0.00		0.00	0.00	0.00%	FALSE	

Threatened species

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Birth rate e.g. Change in nest success	No							0.00		0.00	0.00	0.00%	FALSE	
Mortality rate e.g Change in number of road kills per year	No							0.00		0.00	0.00	0.00%	FALSE	
Number of individuals e.g. Individual plants/animals	No							0.00		0.00	0.00	0.00%	FALSE	

Summary

					Cost ($)		
Protected matter attributes	Quantum of impact	Net present value	% of impact offset	Direct offset adequate?	Direct offset	Other compensatory measures	Total
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of features	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Condition of habitat	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Area of habitat	13.60	55.59	4.09	TRUE	0.00	N/A	0.00
Area of community		0.00	0.00	FALSE	0.00	N/A	0.00
					$0.00	**$0.00**	**$0.00**

Offsets Assessment Guide

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

Matter of National Environmental Significance	
Name	Xerothamnella
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	1.2%

Impact calculator

Ecological communities

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	No		Area *(Hectares)*		
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*			

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	Yes		Area *(Hectares)*	11.99	
			Quality *(Scale 0-10)*	5	
		Total quantum of impact *(Adjusted Hectares)*		6.00	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Number of features e.g. Nest hollows, habitat trees	No			
Condition of habitat Change in habitat condition, but no change in extent	No			

Threatened species

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Birth rate e.g. Change in nest success	No			
Mortality rate e.g Change in number of road kills per year	No			
Number of individuals e.g. Individual plants/animals	No			

Offset calculator

Ecological Communities

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of community	Yes			Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	49.63	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	0.17	80%	0.14	0.11	Overall net present value	6.30	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	5	Future quality without offset *(scale of 0-10)*	4	Future quality with offset *(scale of 0-10)*	6	2.00	80%	1.60	1.26	% of impact offset	0.00%	
								Future area without offset	49.5	Future area with offset	49.6			Minimum (90%) direct offset requirement met?		FALSE		

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of habitat	Yes	6.00	Glenlovely	Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	122.43	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	0.00	90%	0.00	0.00	Overall net present value	17.30	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	4	Future quality without offset *(scale of 0-10)*	3	Future quality with offset *(scale of 0-10)*	5	2.00	90%	1.80	1.42	% of impact offset	288.56%	
								Future area without offset	122.0	Future area with offset	122.0			Minimum (90%) direct offset requirement met?		TRUE		

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Number of features e.g. Nest hollows, habitat trees	No							0.00		0.00	0.00	0.00%	FALSE	
Condition of habitat Change in habitat condition, but no change in extent	No							0.00		0.00	0.00	0.00%	FALSE	

Threatened species

Protected matter attributes	Attribute relevant to case?	Quantum of impact	Proposed offset	Time horizon *(years)*	Start Value	Future value without offset	Future value with offset	Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost *($ total)*
Birth rate e.g. Change in nest success	No							0.00		0.00	0.00	0.00%	FALSE	
Mortality rate e.g Change in number of road kills per year	No							0.00		0.00	0.00	0.00%	FALSE	
Number of individuals e.g. Individual plants/animals	No							0.00		0.00	0.00	0.00%	FALSE	

Summary

					Cost ($)		
Protected matter attributes	Quantum of impact	Net present value	% of impact offset	Direct offset adequate?	Direct offset	Other compensatory measures	Total
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of features	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Condition of habitat	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Area of habitat	6.00	17.30	2.89	TRUE	0.00	N/A	0.00
Area of community		6.30	0.00	FALSE	0.00	N/A	0.00
					$0.00	**$0.00**	**$0.00**