Offset Management Plan
EPBC 2025/10390 & CPS 11686

Yathroo Wind Farm

Final

September 2026

umwelt

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Prepared by
Umwelt (Australia) Pty Limited

On behalf of
Neoen Australia Pty Ltd

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Abbreviations

Abbreviation	Definition
BBUS	Bird and Bat Utilisation Survey
BC Act	*Biodiversity Conservation Act 2016* (WA)
CBC	Carnaby's Black-Cockatoo
CEO	Chief Executive Officer
CPS	Clearing Permit System
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DPIRD	Department of Primary Industries and Regional Development
DWER	Department of Water and Environmental Regulation
EP Act	*Environmental Protection Act 1986* (WA)
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
FHQS	Foraging Habitat Quality Score
FRTBC	Forest Red-tailed Black-Cockatoo
GPS	Global positioning system
ha	Hectare
HQS	Habitat Quality Score
km	Kilometre
MNES	Matters of National Environmental Significance
MW	Megawatt
MWh	Megawatt-hour
NEPA	National Environmental Protection Agency
NES	National Environmental Standard
NVCP	Native Vegetation Clearing Permit
OMP	Offset Management Plan
SMART	Specific, Measurable, Achievable, Relevant and Time-bound
SWA	Swan Coastal Plain bioregion
SWA01	Dandaragan Plateau subregion
TEC	Threatened Ecological Community
VSA	Vegetation system association
WA	Western Australia
WoNS	Weed of National Significance

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1.0 Introduction

The Yathroo Wind Farm (the Project) is located within the Shire of Dandaragan and is within the Central Coast subregion of the Wheatbelt. It is approximately 5 km south of the town of Dandaragan, 6.3 km north of Regans Ford, and 120 km north of Perth, WA. The Project will involve the construction and operation of up to 65 wind turbines and associated infrastructure. The Project Area is 15,618 ha of predominantly cleared land used for agriculture and livestock grazing, containing patches of remnant and regrowth woodland.

The maximum area of land that will be cleared for installation of all Project infrastructure is referred to as the Indicative Project Footprint and is 729 ha (**Figure 1.1**).

The Project will include the following key infrastructure elements:

- Up to 65 wind turbines with a maximum generation capacity of 500 MW and a maximum blade tip height of 261 m.
- Turbine foundations and hardstands associated with turbine construction, operation and maintenance.
- Electrical connections, substations and grid connection infrastructure, including two substations and associated electrical infrastructure connecting the Project to the South West Interconnected System.
- Underground power and communication cabling connecting turbines, substations, the BESS and operational facilities.
- A Battery Energy Storage System (BESS) with a capacity of up to 400 MW / 3,200 MWh and associated electrical and support infrastructure.
- Operational and maintenance facilities for both the wind farm and BESS, including offices, workshops, amenities and equipment storage areas.
- Construction compounds, concrete batching facilities and laydown areas used during construction for workforce amenities, equipment storage and material handling.
- Borrow pits and quarries for the supply of construction materials, including gravel, fill and concrete batching material.
- Up to three permanent meteorological masts for monitoring wind and climatic conditions throughout the life of the Project.
- Up to two communication towers providing telecommunications and operational communications infrastructure.
- External site access infrastructure, including upgrades to existing roads, intersections and access points where required.
- Internal access roads providing access between turbines and other Project infrastructure.
- Firewater tanks and associated firefighting infrastructure to support emergency response requirements.
- Utilities and ancillary infrastructure, including drainage, communications, security and other services required for construction, operation and maintenance of the Project.

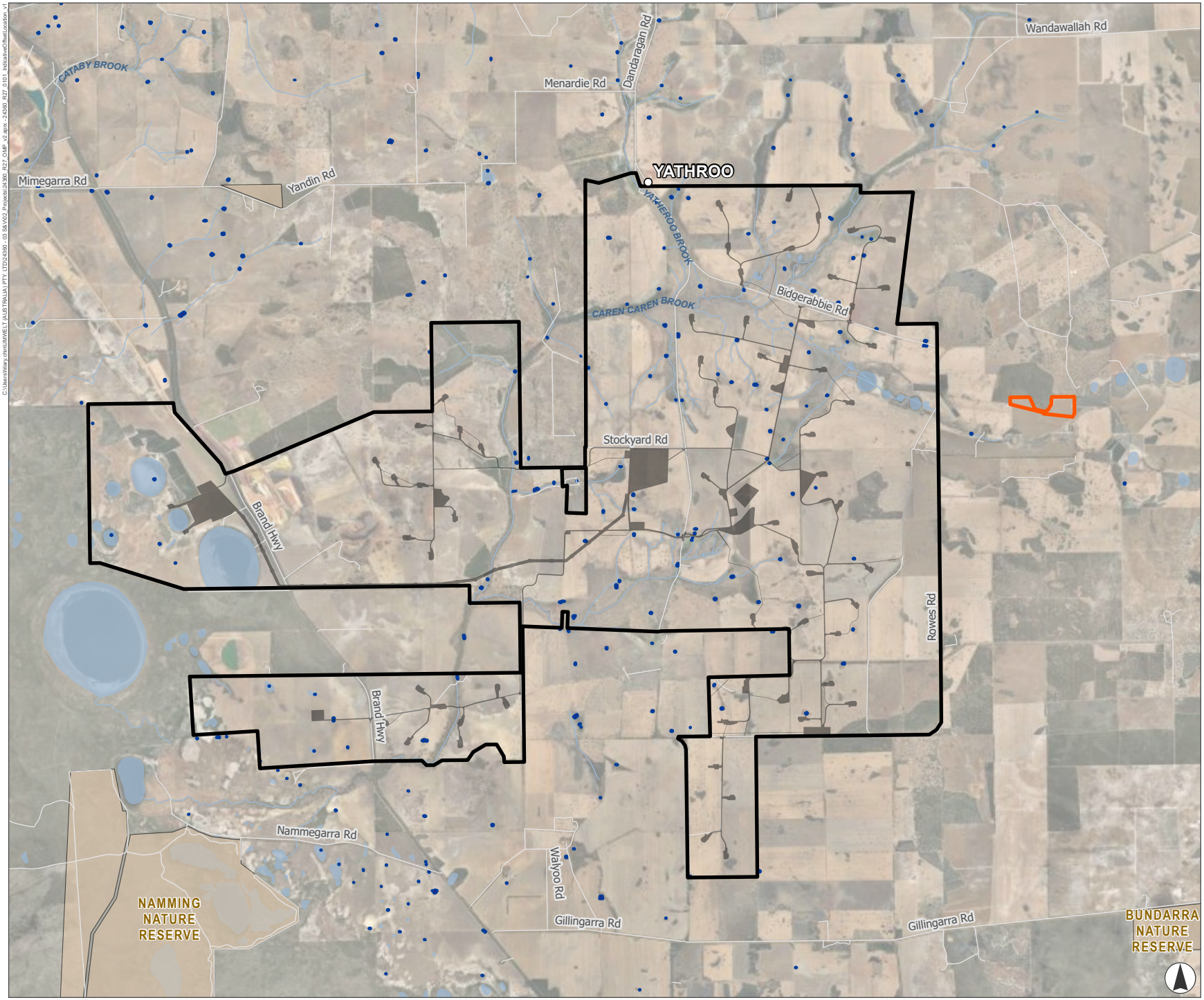


FIGURE 1.1

Indicative Offset Area Location

Legend

- Proposed Offset Area
- Project Area
- Disturbance Footprint
- Townsites
- Roads
- Watercourse
- Waterbody
- Farm Dams
- Nature Reserve



0 2 4

Kilometres

Scale 1:120,000 at A4
GDA2020 MGA Zone 50

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1.1 Project Environmental Approvals

The Project was referred to the National Environmental Protection Agency (NEPA; previously Department of Climate Change, Energy, the Environment and Water (DCCEEW)) and determined to be a Controlled Action on 10 February 2026, requiring assessment via preliminary documentation and approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC) Act. As part of the Controlled Action Request for Information, NEPA required:

- An offset package to compensate for residual significant impacts to MNES, including an offset proposal (strategy) and key commitments and management actions to deliver and implement a proposed offset, and align with the relevant Recovery Plans and Conservation Advice for the species.
- An offset management plan (OMP) to demonstrate how the proposed offset will meet the EPBC Act Offset Policy.

The Project was also referred under Part IV of the *Environmental Protection Act 1986* (WA) (EP Act) to the WA Environmental Protection Authority (EPA), with a 'not assess' decision received on 24 December 2024.

An application to clear native vegetation under Part V of the EP Act has been lodged with the Department of Water and Environmental Regulation (DWER). It is anticipated that DWER will require identification of environmental offsets and preparation of an OMP to support the Native Vegetation Clearing Permit (NVCP) application (Ref CPS 11686-1).

1.2 Offset Requirements

Offsets are required under the EPBC Act to counterbalance the following significant residual impacts to MNES:

- Clearing of up to 21.64 ha of foraging habitat (15.31 ha of native and 6.33 ha of planted vegetation) for:
    - Carnaby's Black-Cockatoo (*Zanda latirostris*) – EPBC Act Endangered
    - Forest Red-tailed black cockatoo (*Calyptorhynchus banksii naso*) – EPBC Act Vulnerable.
- Clearing of up to five Rank 3 potential black cockatoo breeding trees.

Offsets are also required under the EP Act to counterbalance significant residual impacts to native vegetation that includes:

- suitable foraging habitat for Carnaby's Black-Cockatoo (BC Act Endangered)
- suitable foraging habitat for Forest Red-tailed Black-Cockatoo (BC Act Vulnerable)
- degraded Banksia Woodlands of the Swan Coastal Plain Priority Ecological Community (PEC) that is unable to be avoided
- native vegetation that is a significant remnant within an extensively cleared landscape.

Impact areas and offset requirements are further described in **Section 4.0**.

1.3 Offset Description

To compensate for the Project impacts, the proposed offset includes:

- revegetation of a completely degraded area to achieve 22.71 ha of native vegetation that comprises suitable black cockatoo foraging habitat
- protection of the offset area in perpetuity through a conservation covenant and management
- installation of artificial hollows within the revegetation area or in nearby remnant vegetation.

Mature Marri trees within the offset area will also be retained as an additional impact mitigation measure.

1.4 Purpose of this OMP

The purpose of this OMP is to define the measures that will be implemented to counterbalance the significant residual impacts of the Yathroo Wind Farm from the clearing of Carnaby's Black-Cockatoo (*Zanda latirostris*) habitat, Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*) habitat and native vegetation. The OMP provides the framework for establishing, protecting and managing the offset area and for demonstrating achievement of the required offset outcomes under the relevant Commonwealth and Western Australian environmental approvals.

An Offset Strategy was initially prepared to inform NEPA of the proposed offset approach and rationale for selection of the offset area. NEPA advised that the Offset Strategy was adequate for public consultation through advertising with the preliminary documentation.

This OMP supersedes the Offset Strategy and provides the detailed implementation framework for the proposed offset that will support the Project assessment under the EPBC Act. The OMP is expected to be published for public consultation after completion of NEPA's assessment.

2.0 Applicable Regulatory Framework

Offsets are measures that compensate for the residual significant impacts of a project on the environment, after avoidance and mitigation measures are taken. This section summarises the regulatory frameworks for environmental offsets under the Commonwealth EPBC Act and the WA EP Act, and how they have been applied to this OMP.

2.1 Commonwealth Legislation and Guidelines

The National Environmental Standard (Environmental Offsets) 2026 (Environmental Offsets Standard), was released on 19 August 2026 and provides:

- a consistent decision-making framework for approving offsets across all assessment pathways
- clear guidance for project Proponents on how to deliver appropriate offset measures.

Although it does not yet apply to EPBC assessments and approval decisions, the Environmental Offsets Standard has been considered in the design of the offset and preparation of this OMP as the new statutory framework and benchmark for offsets.

The following Commonwealth legislation, policies and guidelines have also been considered in identification of the environmental offset and preparation of this OMP:

- EPBC Act Environmental Offsets Policy (Commonwealth of Australia, 2012): outlines the approach for the use of environmental offsets under the EPBC Act. The offset has been developed to address the requirements applicable to the Project under the EPBC Act Environmental Offsets Policy.
- Commonwealth Offset Assessment Guide (DCCEEW, 2022): used to quantify impacts and offset requirements.
- Environmental Management Plan Guidelines (DCCEEW, 2024): used to guide management plan structure and content, where applicable to offset management.

Discussion of the proposed offset alignment with the Environmental Offsets Standard principles is addressed in **Section 3.3.**

2.2 Western Australia Legislation and Guidelines

WA legislation, policies and guidelines have also been considered in identification of the environmental offset and preparation of this OMP, and include:

- Environmental Offsets Policy (Government of Western Australia, 2011)
- Environmental Offsets Guidelines (Government of Western Australia, 2014b)
- Clearing of Native Vegetation Offsets Procedure (Government of Western Australia, 2014a)
- Instructions: How to prepare Environmental Protection Act 1986 Part IV environmental management plans (EPA, 2024).
- A Guide to Preparing Revegetation Plans for Clearing Permits (DWER, 2018)

The Environmental Offsets Policy (Government of Western Australia, 2011) and Environmental Offsets Guidelines (Government of Western Australia, 2014b) provide the overarching framework for offset design, quantification, and implementation in Western Australia. Offsets are required to address significant residual impacts to protected State matters and may be implemented under the *Biodiversity Conservation Act 2016* (WA) (BC Act), or Part IV or V of the EP Act. Depending on the legislation under which the offsets are implemented, the regulating agency may be EPA, DWER or the Department of Biodiversity, Conservation and Attractions (DBCA). The Environmental Offsets Calculator (DWER, 2021) is utilised to calculate the quantum of impact and associated quantum of offset required to counterbalance the impact that requires an offset under the BC Act or EP Act.

The Clearing of Native Vegetation Offsets Procedure (Government of Western Australia, 2014a) also provides guidance on preparation of offset strategies to native vegetation clearing permit applicants, based on the WA Environmental Offsets Policy and Guidelines.

Offsets implemented under the WA Environmental Offsets Policy are required to consider several key principles, which are addressed in **Section 3.4.**

3.0 Statement of Objectives and Outcomes

3.1 Offset Objectives

The overarching objective of the offset is to achieve a measurable and enduring net conservation benefit for Carnaby's Black-Cockatoo, Forest Red-tailed Black-Cockatoo and native vegetation. The specific offset objectives are to:

- Increase native vegetation: establish 22.71 ha of locally appropriate native vegetation on cleared agricultural land, including vegetation communities representative of the local area.
- Increase black cockatoo foraging habitat: establish and maintain 22.71 ha of vegetation containing suitable food species for Carnaby's Black-Cockatoo and Forest Red-tailed Black-Cockatoo
- Increase potential breeding habitat: install and maintain artificial hollows to compensate for suitable hollows confirmed within Rank 3 trees affected by the Project, at the ratio required by the approval conditions or otherwise agreed with the relevant regulators.
- Protect existing habitat values: retain and protect existing paddock trees within and adjacent to the offset area.
- Improve landscape habitat function: restore habitat adjoining existing remnants and improve ecological connectivity between native vegetation remnants within the local landscape.

The management actions through which these outcomes will be delivered are described in **Section 6.0**. Achievement of these objectives will be demonstrated against the progressive performance indicators and completion criteria identified in **Section 7.0**.

3.2 Offset Approach

A single offset is proposed to satisfy NEPA and DWER requirements for impacts to Carnaby's Black-Cockatoo and Forest Red-tailed Black-Cockatoo foraging habitat, as both species use similar habitat resources. The offset will also counterbalance the proposed impacts to native vegetation.

The offset objectives will be achieved through:

- revegetating cleared agricultural land with native vegetation that provides suitable foraging habitat for both black cockatoo species
- enhancing habitat resources through the installation of artificial hollows
- implementing ongoing management and monitoring
- protecting the offset area in perpetuity through a conservation covenant.

The revegetation is designed to provide ecological function equivalent to, or better than, the impacted habitat and to support the long-term viability of black cockatoo foraging habitat in the region. As an additional impact mitigation, the remaining mature Marri paddock trees in the offset area will be retained and assessed for presence of suitable hollows and suitability to host artificial hollows. The offset will be managed by the Proponent for a period of at least 22 years.

The required offset area was calculated using both the Commonwealth and State offset calculators for both MNES, and the State calculator for native vegetation. To ensure the offset is sufficient to meet both regulatory requirements, the Project has adopted the greater of the calculated offset requirements, which is 22.71 ha required by the Commonwealth OAG for Carnaby's Black-Cockatoo habitat. An additional 4.54 ha area of revegetation will be included to provide contingency for uncertainty in revegetation establishment and habitat development.

A summary of impact area, the required offset and proposed offset is provided in **Table 3.1**. Detailed calculations are provided in **Section 4.5** and calculator inputs and rationale are in **Appendix B**.

The proposed offset has been designed to provide direct, measurable and enduring conservation benefits for the environmental values affected by the Project, with consideration of the principles in the Commonwealth Environmental Offsets Standard and WA Environmental Offsets Policy. Alignment of the offset to these principles is summarised in the following sections.

Table 3.1 Reconciliation of Impact and Offset Areas

Quantity	Area (ha)	Regulatory purpose	Included vegetation
Native Vegetation			
Total vegetation impact	23.06	Project impact description	Native and planted vegetation
WA Offsets calculator impact area	15.73	EP Act NVCP impact area	Native vegetation, foraging habitat
WA Offsets calculator required direct offset area	16.05	EP Act NVCP offset requirement	Revegetation
Carnaby's Black-Cockatoo			
Foraging habitat impact	21.64	EPBC Act assessment	Native and planted foraging habitat
Commonwealth OAG impact area	14.92	EPBC Act impact area	Excludes vegetation with foraging HQS 1 (see **Section 4.5.1**)
Commonwealth OAG required direct offset area	22.71	EPBC Act offset requirement (excluding HQS 1)	Revegetation
WA Offsets calculator impact area	15.31	EP Act NVCP impact area	Native vegetation, foraging habitat
WA Offsets calculator required direct offset area	15.89	EP Act NVCP offset requirement	Revegetation
Forest Red-tailed Black-Cockatoo			
Foraging habitat impact	9.36	EPBC Act assessment	Native and planted foraging habitat
Commonwealth OAG impact area	9.05	EPBC Act impact area	Excludes vegetation with foraging HQS 1 (see **Section 4.5.1**)
Commonwealth OAG required direct offset area	10.06	EPBC Act offset requirement (excluding HQS 1)	Revegetation
WA Offsets calculator impact area	8.65	EP Act NVCP impact area	Native remnant foraging habitat
WA Offsets calculator required direct offset area	8.99	EP Act NVCP offset requirement	Revegetation
Proposed offset commitment	**22.71**	**Revegetation offset commitment**	**Revegetation with native vegetation and foraging habitat**
Contingency	**4.54**		**20% additional area for contingency**
Approximate Total Revegetation Area	**27.25**		

3.3 Offset Alignment with National Environmental Standard (Environmental Offsets) 2026

The Environmental Offsets Standard establishes eight principles for offset activities. The alignment of the proposed offset with the eight principles is summarised in **Table 3.2.**

The Environmental Offsets Standard aims to ensure that offset activities:

1. Compensate for the damage that will or may be caused by residual significant impacts of actions or classes of actions on affected protected matters to protect, conserve, restore or recover that protected matter;
2. Provide a measurable improvement to the affected protected matter (compared to the relevant offset area baseline for the affected protected matter) that is equal to or greater than the required net gain for the protected matter; and
3. Provide a high level of confidence that the long-term survival and continuation of the affected protected matter will be promoted and enhanced.

Table 3.2 Alignment of the Offset with the National Environmental Standard (Environmental Offsets) 2026

NES principle	Alignment of the proposed offset
Principle 1: Feasibility	The proposed offset comprises the restoration and long-term protection of 22.71 ha of cleared agricultural land, including 21.38 ha Marri woodland targeted to achieve a black cockatoo foraging Habitat Quality Score (HQS) of 6 and 1.33 ha Banksia woodland targeted to achieve an HQS of 7. The offset will also include the installation and maintenance of artificial hollows to compensate for the removal of suitable hollows confirmed within Rank 3 potential breeding trees. The offset area was selected following desktop review, field inspection and consideration of ecological suitability, restoration feasibility, landscape context, implementation risks and landholder requirements, with input from experienced ecologists and a specialist revegetation consultant. The site is considered suitable because it: • is large enough to accommodate the proposed revegetation requirement and associated contingency • adjoins existing native vegetation and black cockatoo foraging habitat • contains soils considered potentially suitable for restoration of locally occurring vegetation communities, subject to confirmation through soil assessment • provides an opportunity to restore cleared land rather than relying solely on protection of existing habitat • can be excluded from agricultural activity and legally protected in perpetuity • is accessible for establishment, maintenance and monitoring • has the support, in principle, of the landholder for use as an environmental offset. Soil assessment, reference site identification and habitat tree assessment will be completed before implementation to refine the revegetation design and artificial nest hollow requirements. Feasibility will be supported through specialist-designed revegetation, approximately five years of intensive establishment and maintenance, monitoring against progressive performance indicators, and adaptive management where the required ecological trajectory is not achieved. These measures are intended to provide a high level of confidence that the offset can contribute to the protection, restoration and recovery of the affected protected matters and achieve the required habitat improvements within the relevant timeframe.
Principle 2: Security	The offset area will be removed from agricultural production and protected in perpetuity through an appropriate legally enforceable mechanism that will be determined in consultation with the landholder and relevant authorities. A surveyor will delineate the offset boundary, and the covenant will prevent clearing, development and land uses inconsistent with the approved offset purpose. The offset area will also be protected through fencing, lockable gates, signage, restricted access, cessation of cropping, livestock exclusion and ongoing management under the OMP. The OMP provides for monitoring, reporting, corrective action and periodic review, with Neoen retaining responsibility for delivery of the offset outcomes. Monitoring against progressive performance indicators and completion criteria will define when the restored habitat is self-sustaining and durable, and whether continued maintenance will be required to maintain the offset result for the applicable maintenance period.
Principle 3: Tangible	The offset consists of direct, on-ground activities that will provide tangible benefits to Carnaby's Black-Cockatoo and Forest Red-tailed Black-Cockatoo, and native vegetation extent within the local area. Revegetation of 22.71 ha of cleared agricultural land will establish native

NES principle	Alignment of the proposed offset
	vegetation containing suitable forage species and increase the extent, quality and connectivity of black cockatoo foraging habitat. The offset will improve connectivity between remnant vegetation adjoining the northern, eastern and western parts of the offset area. Seven mature Marri paddock trees that remain in the offset area will be retained as additional impact mitigation. Artificial hollows will provide an additional and more immediate increase in potential breeding-habitat availability while the revegetation matures. Supporting actions, including fencing, access control, weed and disease hygiene, grazing management, establishment maintenance and adaptive management, are directed at protecting and sustaining these benefits. No indirect offset measures are relied upon. The anticipated benefits can be quantified through the area restored, vegetation condition, forage-species density and cover, HQS, retention of paddock trees, and the number and functionality of artificial hollows.
Principle 4: Measurable improvements	The offset will restore land that is currently used for cropping and is classified as Completely Degraded vegetation, with a current black cockatoo foraging HQS of 2 due to the presence of only very isolated paddock trees. Without the offset, cropping is expected to continue, natural regeneration would remain suppressed and the remaining paddock trees may be progressively lost. The offset is intended to establish 22.71 ha of native vegetation which will be restored from HQS 2 to minimum HQS of 6. The OMP anticipates that the resulting foraging habitat quality will be achieved by Year 17, comprising two years to commence revegetation and approximately 15 years for the vegetation to become self-sustaining. It is estimated that the revegetation will provide foraging habitat benefits for black cockatoos after approximately ten years (Year 12). This is supported by published studies from south-west Western Australia (Doherty et al., 2016; Lee et al., 2013) that recorded black cockatoos feeding on revegetated Marri and Banksia species within 7-8 years of revegetation in the Jarrah forest, with an additional two-year timeframe considered likely due to the regional climatic differences. The proposed offset is a direct offset, with Commonwealth OAG Calculator indicating that the proposed 22.71 ha of revegetation equates to 100% of the required offset. Change will be measured against the offset area baseline using permanent monitoring quadrats, and monitoring of native cover, density, species richness, recruitment and forage-species abundance. Artificial hollows will be assessed for condition, security, functionality and availability. Progressive performance indicators are to be used to identify whether the offset is following the required trajectory and to trigger corrective action where necessary.
Principle 5: Additionality	The offset will deliver conservation benefits that would not otherwise occur. The offset area is currently used for cropping and is not subject to an existing requirement to restore native vegetation, establish black cockatoo habitat, install artificial hollows or manage the land for conservation. In the absence of the offset, agricultural use is expected to continue, suppressing natural regeneration and preventing the establishment of a structurally and floristically diverse native vegetation community. The proposed revegetation, retention and protection of paddock trees, artificial hollows, conservation covenant, monitoring and adaptive management will be undertaken specifically to compensate for the residual impacts of the Project. The same offset is proposed to address Commonwealth and WA requirements for the same Project impacts and environmental values, which is not precluded by the NES. Offset activities are not funded, required or credited under another unrelated approval, program or environmental market arrangement.

NES principle	Alignment of the proposed offset
Principle 6: Like-for-like	The offset is directed to the same protected matters and habitat attributes affected by the Project. The Project will affect foraging habitat for Carnaby's Black-Cockatoo and Forest Red-tailed Black-Cockatoo, together with potential breeding habitat represented by Rank 3 potential breeding trees. The offset will compensate for these impacts by: • establishing native vegetation that includes suitable forage species for both black cockatoo species • increasing the extent and quality of foraging habitat available within the local landscape • increasing available breeding habitat through artificial hollows based on the number of suitable hollows confirmed within affected Rank 3 trees • protecting remnant paddock trees • improving connectivity between existing vegetation remnants • permanently removing the offset area from agricultural production. The revegetation design will be informed by soil assessment, local reference vegetation communities and specialist advice and will include locally appropriate habitat-forming and forage species. The offset is targeted to achieve foraging habitat with HQS 6 and 7, corresponding to the highest quality habitat affected by the Project (Moderate to Moderate-high quality), although the majority of foraging habitat impacted comprises foraging habitat with HQS of 5 (Low to Moderate) or lower. See **Section 4.2 f**or further description on impact and offset area assessment methods and **Section 4.5** for quantification of Project impacts. The offset will also include retention of existing mature Marri paddock trees and will improve habitat connectivity with nearby remnant Marri and Banksia woodland. The final revegetation species list, reference-community targets and nest-hollow requirements will be developed to counterbalance the environmental features and functions impacted by the Project and those delivered through the offset.
Principle 7: Relevant area	The offset area is co-located with the Project Area within the Shire of Dandaragan, in the Swan Coastal Plain bioregion and Dandaragan Plateau subregion, and within the broader landscape used by Carnaby's Black-Cockatoo and Forest Red-tailed Black-Cockatoo. The offset comprises 22.71 ha of cleared agricultural land adjoining remnant native vegetation to the north, east and west, including Marri woodland, York Gum woodland and Banksia woodland, some of which provides Moderate-quality black cockatoo foraging habitat (HQS 6). Evidence of black cockatoo foraging was recorded within adjacent remnant vegetation, indicating that the offset area already forms part of an existing habitat network utilised by black cockatoos The offset area was selected because it can deliver direct benefits to the same environmental values affected by the Project. Revegetation will restore native vegetation representative of the local area and establish suitable black cockatoo foraging habitat adjoining existing remnants, thereby increasing habitat extent, improving habitat quality and strengthening connectivity within the local landscape. The offset will also include retention of mature Marri paddock trees and installation of artificial hollows to increase the availability of breeding habitat resources. The offset area occurs within a landscape that supports known black cockatoo breeding, roosting and foraging habitat. The nearest known Carnaby's Black-Cockatoo breeding site and associated roost are located approximately 9 km west of the offset area, with additional breeding sites recorded near Regans Ford and Moora. Water resources are also available in the surrounding landscape, including a dam

NES principle	Alignment of the proposed offset
	within approximately 1.2 km and a chain of lakes, including Lake Yangy, approximately 3 km from the offset area. These attributes demonstrate that the offset is located within an ecologically relevant area and has a high likelihood of contributing to the long-term protection, restoration and enhancement of habitat for the affected black cockatoo species.
Principle 8: Offset commenced prior to impact	The offset will be secured and implementation commenced prior to the occurrence of the relevant residual impacts. Neoen has reached in-principle agreement with the landholder to secure the offset area through a suitable conservation covenant, and implementation of the offset will commence in accordance with the implementation schedule outlined in **Section 6.7**. Activities demonstrating commencement of the offset may include establishment or progression of the conservation covenant, cessation of cropping, soil assessment, reference site identification, habitat tree assessments, installation of fencing and access controls, implementation of weed management and hygiene measures, completion of site preparation works, procurement of seed and planting stock, commencement of revegetation, and preparation of the Nest Hollow Management Plan. The OMP provides a structured implementation framework that links legal protection, technical investigations, revegetation, artificial nest hollow installation, monitoring and adaptive management. Early commencement of these activities will ensure that restoration trajectory, habitat establishment and long-term management obligations are initiated as soon as practicable and before the full residual impacts of the Project are realised. The offset will then continue to be implemented, monitored and managed until completion criteria are achieved, with protection of the offset area maintained in perpetuity through the conservation covenant

3.4 Offset Alignment with WA Environmental Offset Policy Principles

The alignment of the proposed offset with the WA Environmental Offset Policy is summarised in **Table 3.3.**

Table 3.3 WA Offset Policy Alignment

Policy Principle	Alignment of the Offset
1. Environmental offsets will only be considered after avoidance and mitigation options have been pursued	The Project has implemented extensive avoidance and minimisation wherever practicable through the design and planning phase (see **Section 4.1**). The Project has specifically been adapted to avoid ecological values wherever possible, with remaining impacts minimised via management measures during construction and operation. The residual impact presented here and proposed to be counterbalanced through offsetting represents unavoidable clearing that is necessary for the Project to remain viable. Almost all clearing consists of degraded vegetation or individual trees at the perimeter of fragmented habitat patches.
2. Environmental offsets are not appropriate for all projects	The protected values which are affected by the residual impacts presented here are not considered to be unique or irreplaceable to the extent that the offsetting of these impacts is not appropriate. The degraded and fragmented nature of the values presented, as well as the distribution of small patches of clearing across the Project, are considered suitable for counterbalancing by providing better quality habitat areas that are protected in-perpetuity.
3. Environmental offsets will be cost-effective, as well as relevant and proportionate to the significance of the environmental value being impacted	The WA Environmental Offsets Guidelines, field and desktop assessments by experienced ecologists and revegetation specialists were used to ensure that the proposed offset is relevant and proportionate to the residual impacts to black cockatoo foraging and breeding habitat, and native vegetation. The proposed offset comprises native vegetation that will also provide habitat for threatened fauna species and improve ecological linkages in the landscape. The proposed offset is a direct offset, with the WA Environmental Offsets Calculator indicating that the proposed 22.71 ha of revegetation equates to more than 100% of the required offset.
4. Environmental offsets will be based on sound environmental information and knowledge	The offset has been informed by detailed flora, vegetation and fauna assessments, black cockatoo habitat surveys, habitat quality scoring, offset calculations, a site inspection and specialist revegetation advice. Further soil assessment, reference site identification and habitat tree assessment will be completed before implementation to refine the revegetation prescription, progressive performance indicators and completion criteria, and artificial hollow requirements.
5. Environmental offsets will be applied within a framework of adaptive management	This OMP establishes an adaptive management framework supported by monitoring, progressive performance indicators and completion criteria, trigger values, corrective actions and periodic review. Monitoring results will be assessed against the required ecological trajectory and corrective actions implemented where performance is below the applicable progressive performance indicator. The OMP also includes an implementation schedule, monitoring program, risk management framework and review process.

Policy Principle	Alignment of the Offset
6. Environmental offsets will be focused on longer term strategic outcomes.	The offset will provide long-term conservation benefits through restoration of 22.71 ha of native vegetation that provides suitable black cockatoo foraging habitat, installation and maintenance of artificial hollows, and retention of mature Marri paddock trees. The offset area will be protected in perpetuity through a conservation covenant. Revegetation adjoining existing remnants will increase habitat extent and improve ecological connectivity within the local landscape, with monitoring and management continuing until the completion criteria are achieved and legal protection continuing in perpetuity.

3.5 Offset Alignment with Black Cockatoo Recovery Documents

The alignment of the OMP with the recovery documents relevant to Carnaby's Black-Cockatoo and Forest Red-tailed Black-Cockatoo is summarised in **Table 3.4**. The table focuses on threats and recovery actions relevant to the proposed offset, which comprises the revegetation, protection and management of black-cockatoo foraging habitat and the provision of artificial breeding hollows.

Carnaby's Black-Cockatoo is considered with reference to the 'Carnaby's black cockatoo (*Calyptorhynchus latirostris*) Recovery Plan' (DPAW, 2013), which is an adopted recovery plan under the EPBC Act. There is currently no approved Conservation Advice for this species.

Forest Red-tailed Black-Cockatoo is considered against the following:

- Approved Conservation Advice for *Calyptorhynchus banksii naso* (Forest Red-tailed Black Cockatoo) (DEWHA, 2009).
- Forest Black Cockatoo (Baudin's Cockatoo *Calyptorhynchus baudinii* and Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso*) Recovery Plan (DEC, 2008).

The following additional documentation was used to inform the proposed offset and management actions:

- Referral guideline for 3 WA threatened black cockatoo species (DAWE, 2022).
- Information Sheet Carnaby's black cockatoo *Calyptorhynchus latirostris* (R. Johnstone, 2010).
- Fauna Notes – Artificial Hollows for Black Cockatoos (DBCA, 2023).

The OMP directly responds to the principal threats to black cockatoos of habitat loss and fragmentation, declining foraging resources, shortage of suitable breeding hollows, competition for hollows and deterioration of habitat condition. The proposed revegetation, legal protection, artificial hollow installation, monitoring and adaptive-management measures contribute to the recovery objectives relating to protecting and restoring important habitat, improving breeding opportunities and monitoring habitat use. The actions proposed are directly relevant and proportionate to the Project's residual impacts and the ecological functions to be provided by the offset.

Table 3.4 Alignment with Black Cockatoo Recovery Documents

Recovery Document	Relevant Threat or Recovery Action	Alignment with OMP Management Actions
Carnaby's Cockatoo Recovery Plan (2013)	• Threat: Loss and fragmentation of foraging habitat. • Recovery action: protection and restoration of important habitat.	• Revegetate and legally protect cleared land using locally appropriate forage species. • Locate revegetation to improve habitat extent and connectivity.
	• Threat: Loss of breeding habitat and shortage of suitable nesting hollows.	• Retain mature trees and install artificial hollows at the approved ratio in suitable locations near foraging habitat. • Maintain hollows and manage pest occupation where required.
	• Threat: Decline in habitat condition and tree health from weeds, grazing, fire, disease and climatic stress. • Recovery action: Long-term management of threats and adaptive management.	• Implement fencing, weed and herbivore control, biosecurity, fire-risk management, revegetation maintenance and infill planting. • Apply corrective actions where monitoring indicates poor establishment or declining condition.
	• Recovery Action: Monitoring habitat condition, habitat use and management effectiveness.	• Monitor revegetation establishment, habitat quality development, forage production, black cockatoo use and artificial hollows. • Use results to guide adaptive management.
Forest Red-tailed Black-Cockatoo Forest Black Cockatoo Recovery Plan (2008); Approved Conservation Advice (2009)	• Threat: Habitat loss and fragmentation. • Recovery action: identification, protection and management of important feeding habitat.	• Legally secure the offset in perpetuity. • Revegetate using suitable forage species. • Locate revegetation to improve habitat extent and connectivity.
	• Threat: Loss and deterioration of feeding habitat.	• Establish revegetation using a species mix that provides long-term forage. • Protect retained mature trees and manage weeds, grazing, fire and plant health to support canopy development and food production.
	• Threat: Nest-hollow shortage, competition for hollows and feral honeybee occupation.	• Install, monitor and maintain artificial hollows in suitable locations. • Manage feral honeybees and other unsuitable occupants where required and legally permissible.
	• Recovery action: Monitoring population distribution, movement and habitat use.	• Record black cockatoo sightings, flock size, flight direction, foraging evidence, food species used and artificial hollow use during monitoring. Use findings to refine management.
	• Recovery action: Long-term management of threats and adaptive management.	• Legally secure the offset in perpetuity. • Implement ongoing fencing, weed control, herbivore management, biosecurity, revegetation maintenance and hollow maintenance. • Implement monitoring and adaptive management.

4.0 Residual Impacts and Mitigation Hierarchy

The following sections demonstrate the mitigation hierarchy applied to the Project and describe the residual impacts of the Project.

4.1 Application of the Mitigation Hierarchy

The Proponent has undertaken an iterative design review process for the Project to apply the Offsets Mitigation Hierarchy to reduce potential impacts to MNES and native vegetation as far as practicable. The measures applied through the Project design are outlined below.

4.1.1 Avoid

The following actions were undertaken to avoid impacts:

- Early identification and avoidance of key blocks of native remnant vegetation, including approximately 300 ha presumed to be in Good condition or better.
- Avoiding clearing of Rank 1 and Rank 2 black cockatoo nesting trees.
- Avoiding areas of higher black cockatoo foraging value to reduce the likelihood of turbine collision.
- Avoiding clearing of native vegetation in Very Good condition or better.
- Avoiding known black cockatoo roosting sites, including a 4 km turbine setback from the main observed roosting site.
- Avoiding Threatened Ecological Community (TEC) in Good condition or better, including relocating the access route from Brand Highway to the proposed BESS site from a TEC patch in Good condition to existing cleared tracks and adjacent Degraded vegetation.
- Avoiding larger areas of intact native vegetation, with proposed clearing primarily limited to the edges of degraded or completely degraded vegetation patches.
- Avoiding the area where *Grevillea curviloba* was recorded.

4.1.2 Minimise

The following actions were undertaken to minimise impacts:

- Minimising clearing of native vegetation mapped as Good, particularly in road reserves where infrastructure must traverse these areas, by reducing clearing widths and crossing vegetation perpendicularly where practicable.
- Locating 97% of Project infrastructure on cleared agricultural land to minimise native vegetation clearing and direct impacts to black cockatoo habitat.
- Minimising the number of creek crossings and using existing creek crossings where practicable to reduce clearing.
- Further reducing native vegetation clearing during detailed design.

4.1.3 Mitigate

The following actions were undertaken to mitigate impacts:

- Adopting a minimum blade tip height above the typical flight height for black cockatoos.
- Setting turbines back from Lake Guraga by 5 km and from wetlands in the western part of the Project Area by 3.5 km as an initial precautionary setback pending completion of surveys for potential migratory bird presence.
- Developing and committing to implement a Project Construction Environmental Management Plan, Bushfire Management Plan and Bird and Bat Adaptive Management Plan.

4.2 Impact Area Baseline Assessment

The impact areas were surveyed by Umwelt (2025a, 2025b) to support the Project environmental impact assessment and referrals. Studies included 27 months of quarterly Bird and Bat Utilisation Surveys (BBUS), seven monthly targeted shorebird surveys (September 2025 – March 2026), targeted black cockatoo foraging habitat and nest-tree assessments, and detailed and targeted flora and vegetation surveys.

Vegetation quality was described using the vegetation condition scale presented by EPA (EPA, 2016) for the South West and Interzone Botanical Provinces (Umwelt, 2025a). Assessment of black cockatoo foraging habitat quality was undertaken using the Bamford (2020) system (**Appendix A)** (Umwelt, 2025b) as described further in **Section 4.3**.

Assessment of black cockatoo potential breeding trees was undertaken using a widely adopted method by Bamford (2023) of assigning a ranking to trees based on assessment of tree hollow entrances from the ground. Prior to clearing, pole inspection of the Rank 3 trees will be required to determine the number of suitable hollow entrances, which will inform the final offset requirement for artificial hollows.

4.3 Foraging Habitat Quality Scores

Black cockatoo foraging value was assessed using the Bamford (2020) foraging habitat quality scoring system. The Bamford method was specifically developed for the three threatened black cockatoo species occurring in Western Australia (Carnaby's, Baudin's and Forest Red-tailed Black-Cockatoo) and is widely applied in environmental impact assessment and referrals to the Commonwealth and State regulators.

The method incorporates assessment of three scoring components, the sum of which provides an overall Foraging Habitat Quality Score (HQS) (Bamford, 2020):

1. Site Condition: the composition, structure and condition of vegetation within the assessment area, including the density and maturity of suitable forage species, canopy cover and overall vegetation health.
2. Site Context: the extent and quality of foraging habitat within the surrounding landscape, including the proximity and connectivity of the site to known breeding sites, roosting sites, water resources and other areas of suitable habitat.

3. Species Density: the abundance and distribution of black cockatoo records within the local and regional area, based on available occurrence data and evidence of species use, including observations and signs of foraging activity.

Further details of the Bamford (2020) method are provided in **Appendix A**.

4.4 Potential Residual Impacts Summary

Following application of the mitigation hierarchy as outlined above, the Project proposes clearing of up to 23.06 ha of vegetation comprising:

- 10.28 ha of remnant native vegetation
- 5.45 ha of isolated remnant native trees and shrubs
- 5.05 ha of planted native vegetation
- 2.28 ha of planted non-native trees and shrubs.

Of the remnant native vegetation proposed to be cleared (up to 15.73 ha), the majority (13.5 ha/ 82.82%) is in Completely Degraded and Degraded condition and comprises small, isolated strips or patches of vegetation surrounded by cleared land or agriculture. No more than 2.23 ha (14.17%) of native vegetation proposed to be cleared are in Good condition.

Of the 23.06 ha of vegetation to be cleared, 6.73 ha are Negligible to Low quality (HQS 1), 4.33 ha are Low quality (HQS 2), 7.26 ha are Low to Moderate quality (HQS 5), 2.68 ha are Moderate quality (HQS 6) and 0.65 ha are Moderate/High quality (HQS 7) black cockatoo foraging habitat (**Table 4.1**).

Five Rank 3 potential black cockatoo nest trees, with suitable hollow entrances but no evidence of nesting, will be impacted by the Project. Up to seven Rank 4 trees and 100 Rank 5 trees will also be cleared (see **Table 4.1**).

Significant residual impacts on environmental values are summarised in **Table 10.1.**and this OMP seeks to compensate these impacts.

Table 4.1 Residual Impacts of the Project on Environmental Values

Environmental Value	Habitat Quality (1-10; (Bamford, 2020))	Native Vegetation Residual Impact (ha)	Planted Vegetation Residual Impact (ha)	Maximum Residual Impact (ha)
Carnaby's Black-Cockatoo (*Zanda latirostris*) (Endangered) foraging habitat	Negligible to Low (1)	2.99	3.74	6.73
	Low (2)	3.55	0.78	4.33
	Low to Moderate (5)	5.67	1.59	7.26
	Moderate (6)	2.45	0.23	2.68
	Moderate to High (7)	0.65	0	0.65
Total		**15.31**	**6.33**	**21.64**
Forest Red-tailed black cockatoo (*Calyptorhynchus banksii naso*) (Vulnerable) foraging habitat	Negligible to Low (1)	0.19	0.02	0.21
	Low (2)	2.39	0.37	2.76
	Low to Moderate (5)	3.00	0.09	3.09
	Moderate (6)	3.04	0.23	3.27
	Moderate to High (7)	0.03	0	0.03
Total		**8.65**	**0.71**	**9.36**
Potential breeding trees for black cockatoos (Rank 5^, no nesting hollows, broken branches or cavities)				**100**

Environmental Value	Habitat Quality (1-10; (Bamford, 2020))	Native Vegetation Residual Impact (ha)	Planted Vegetation Residual Impact (ha)	Maximum Residual Impact (ha)
Potential breeding trees for black cockatoos (Rank 4^, large hollows or broken branches; not preferred orientation)				**7**
Potential breeding trees for black cockatoos (Rank 3^, suitable hollow entrances)				**5**
Remnant native vegetation				**15.73**

^ Bamford (2023)

Assessment of black cockatoo potential breeding trees was undertaken using a widely adopted method by Bamford (2023) of assessing tree hollow entrances from the ground. Further inspection of Rank 3 trees will be required to determine the number of suitable hollow entrances, to inform the final offset requirement for artificial hollows.

4.5 Offset Calculations

Both the Commonwealth and WA Environmental Offsets Calculators were used to provide adjusted impact quanta, based on the habitat quality scores of the associated residual impact areas. The impact quanta for each of these values is provided in the following sections.

4.5.1 Commonwealth Offset Assessment Guide Impact Quantum

Table 4.2 presents the adjusted impact quantum and the required area to achieve a 100% direct offset for black cockatoo foraging habitat, determined using the Commonwealth Offset Assessment Guide (OAG). Calculator input assumptions are provided in **Appendix B** and outputs from the OAG are provided in **Appendix C**.

As discussed during a meeting with NEPA on 3 June 2026, black cockatoo foraging habitat scored as 'Negligible to Low' quality has not been included in impact quantum calculations contributing to a required offset, as reflected in **Table 4.2**. Justification for this approach is provided below.

Vegetation scored as 'Negligible to Low' using the Bamford (2020) system is assigned a value of 1 for Site Condition and a score of 0 for both Site Context and Species Density (see **Section 4.3** and **Appendix A** for further explanation of foraging habitat quality scoring). For the Project, a Site Condition score of '1' was generally applied to bare paddock areas that may or may not have had any evidence of palatable plant taxa present but that at least had the potential to support one or more of the following:

- lower-preference plants
- palatable plants at very low densities
- forage sources that are unreliable or transient in their availability or accessibility
- plants that have poor condition or quality.

In a practical sense, most of these areas offer little to no value to black cockatoos almost all the time and are not expected to support black cockatoo foraging but they have some minor potential, on occasion, to provide a food resource if suitable conditions occur. Typical examples of these at the Project include palatable planted annual crops (such as canola, *Brassica napus*), palatable weed species (such as Afghan or Camel Melon, *Citrullus lanatus*, and Stork's-bill species, *Erodium* spp.), and eucalypts that are rarely foraged (e.g. nuts and blossoms of native wandoos, *Eucalyptus*

accedens and *E. wandoo*, or exotic Blue Gum, *Eucalyptus globulus*). Loss or disruption to areas with a Site Condition score (and, hence, overall FHQS) of '1' are not expected to have any material impact to black cockatoo foraging and, therefore, black cockatoo ecology. The implication is that these areas have practically no conservation value in relation to foraging for black cockatoos.

Table 4.2 EPBC Act OAG Calculations: Black-Cockatoo Species Foraging Habitat

Species	Habitat Quality Score	Residual Impact Area (ha)	Impact Quantum (adjusted ha)	Required Offset Area (ha)
Carnaby's Black-Cockatoo	Negligible to Low (1)	6.73	0.67	N/A
	Low (2)	4.33	0.87	3.04
	Low to Moderate (5)	7.26	3.63	12.71
	Moderate (6)	2.68	1.61	5.63
	Moderate to High (7)	0.65	0.46	1.33
	Total	**21.64**	**7.24**	**22.71**
Forest Red-tailed Black-Cockatoo	Negligible to Low (1)	0.21	0.02	N/A
	Low (2)	2.76	0.55	1.36
	Low to Moderate (5)	3.09	1.55	3.81
	Moderate (6)	3.27	1.96	4.84
	Moderate to High (7)	0.03	0.02	0.05
	Total	**9.36**	**4.10**	**10.06**

4.5.2 WA Environmental Offsets Calculator Impact Quantum

The EP Act Part V NVCP application seeks approval to clear up to 15.73 ha of remnant native vegetation within a purpose permit boundary, however the actual area of clearing may reduce as the Project proceeds through detailed design. Non-native vegetation and planted native vegetation (for purposes other than for conservation) is excluded from the NVCP application, as it does not meet the definition of native vegetation under the EP Act.

Table 4.3 presents the adjusted impact quantum and the required area to achieve a 100% direct offset for black cockatoo foraging habitat and native vegetation, determined using the WA Environmental Offsets Calculator. Calculator input assumptions are provided in **Appendix B** and outputs from the WA Environmental Offsets Calculator are provided in **Appendix D**.

Table 4.3 WA Environmental Offsets Calculator Offset Calculations

Species	Habitat Quality Score	Residual Impact Area (ha)	Impact Quantum (adjusted ha)	Required Offset Area (ha)
Carnaby's Black-Cockatoo Foraging Habitat	Negligible to Low (1)	2.99	0.30	2.99
	Low (2)	3.55	0.71	3.55
	Low to Moderate (5)	5.67	2.84	5.67
	Moderate (6)	2.45	1.47	2.91
	Moderate to High (7)	0.65	0.46	0.77
	Total	**15.31**	**5.78**	**15.89**
Forest Red-tailed Black-Cockatoo Foraging Habitat	Negligible to Low (1)	0.19	0.02	0.19
	Low (2)	2.39	0.48	2.39
	Low to Moderate (5)	3.00	1.50	3.00
	Moderate (6)	3.04	1.82	3.37
	Moderate to High (7)	0.03	0.02	0.04
	Total	**8.65**	**3.84**	**8.99**

Species	Habitat Quality Score	Residual Impact Area (ha)	Impact Quantum (adjusted ha)	Required Offset Area (ha)
Native Vegetation	Completely Degraded (1)	5.45	0.55	5.45
	Degraded (2)	8.05	1.61	8.05
	Good (5)	2.23	1.12	2.55
	Total	**15.73**	**3.28**	**16.05**

5.0 Offset Area Selection and Baseline

5.1 Offset area Selection and Baseline Assessment

Four potential revegetation offset areas were assessed to identify the most suitable site to counterbalance the Project's maximum impact area. A desktop review of aerial imagery and regional soil and historical vegetation type mapping was undertaken in and around the Project Area. Several sites were identified within appropriate soil and vegetation types, and with connectivity to adjacent remnant native vegetation, that could provide a suitable offset for the Project residual impacts to cockatoo foraging habitat and native vegetation.

In assessing site suitability, the following factors were considered:

- presence of existing values required to be offset
- potential for averted loss and quality gains to produce an overall net benefit to the impacted values
- connectivity with similar values in the broader landscape and their ability to act as an ecological linkage between areas of suitable habitat
- feasibility and risk profile of achieving the forecasted averted loss and quality gains
- landowner preferences and requirements regarding different parcels of land.

The methodology for assessing suitability of potential sites included:

- Desktop review of flora, vegetation and fauna habitat survey reports and data for the Project impact areas.
- Desktop review of public datasets and flora, vegetation and fauna survey reports, where available, for the potential offset areas.
- A site assessment by a Principal Ecologist and a Consultant from Tranen Revegetation Systems to ground-truth information from previous survey reports and desktop information.

The offset area and adjacent remnant vegetation within the same landholding was accessed on foot or by vehicle. Observations of the remnants to the north of the offset area were made from the property boundary.

Advice on offset area suitability and management provided by Umwelt Principal Ecologists and a Consultant from Tranen Revegetation Systems.

5.2 Offset Area Description

The offset area for the Yathroo Wind Farm Project is a portion of Lot 2301 on Plan 090172, Yathroo, WA within the Shire of Dandaragan. The offset area is located approximately 1.7 km east of the Yathroo Wind Farm Project Area, and approximately 3.4 km from the nearest proposed wind turbine.

The offset comprises revegetation of 22.71 ha of agricultural land that is cleared except for up to seven isolated paddock trees, and is historically and currently used for cropping. The site is adjoining farmland and remnant native vegetation.

The offset area was selected in preference to other potential sites because it supports a range of values relevant to the proposed offset outcomes as outlined in **Section 3.0**. Description of the offset area values is provided in **Table 5.1**.

Table 5.1 Description of Offset Area

Value	Description
Biogeography	The offset area is located within the Swan Coastal Plain (SWA) bioregion and Dandaragan Plateau (SWA01) subregion. The Swan Coastal Plain bioregion is characterised by a warm Mediterranean climate, with hot dry summers and cool wet winters. The Dandaragan Plateau forms the north-eastern portion of the bioregion and comprises Cretaceous marine sediments overlain by sands and lateritic gravels. Native vegetation within the subregion is characterised by Banksia low woodlands, Jarrah-Marri and Marri woodlands, and scrub-heath communities occurring on lateritic pavements and gravelly sandplains. Annual rainfall is approximately 700 mm, reflecting the warm Mediterranean climate of the region.
Topography	The offset area is located on the upper slopes of the landscape with no evidence of salinity or water logging.
Soil types	Based on desktop mapping (Department of Primary Industries and Regional Development (DPIRD), 2022), soils in the offset area comprise red and yellow deep sands that are known to be suitable for revegetation with Marri woodland and Banksia woodland.
Description of vegetation	One Vegetation System Association (VSA) is mapped within the offset area: Dandaragan 999 (Medium woodland; marri). The vegetation type pre-clearing would have been Marri woodland on the red sands and Banksia woodland on the yellow sands. The offset area is now cleared agricultural land and vegetation is limited to seven mature Marri trees. The vegetation is therefore mapped as being in Completely Degraded condition. No evidence of disease was observed during the site visit. No perennial weeds were observed during the site inspection. The area is bounded by remnant native vegetation to the north, east and west.
Presence of MNES and habitat for MNES	The nearest recorded occurrences of Carnaby's Black-Cockatoo relating to the Yathroo Wind Farm are approximately 9 km to the west of the offset area. During surveys for the Project, Carnaby's Black-Cockatoo was recorded on 101 occasions in flocks of up to 240 individuals (Umwelt, 2026). Carnaby's Black-Cockatoo has also been recorded approximately 6.8 km to the east (DBCA, 2024). Forest Red-tailed Black-Cockatoo was recorded on five occasions in the Yathroo Wind Farm Project Area, however only in flocks of 2-8 individuals. The Project Area falls outside of the currently modelled distributions for both this and the next closest subspecies (Western Red-tailed Black-Cockatoo [*C. banksii escondidus*]); however, the Forest Red-tailed Black-Cockatoo formerly had a distribution extending to Dandaragan (R. E. Johnstone & Storr, 1998). The Forest Red-tailed Black-Cockatoo is likely to be an intermittent and transient visitor to the Project Area and the offset area (Umwelt, 2026). <u>Foraging Habitat</u> • During the site visit the offset area was identified as having a foraging HQS of 2 (Very Low) for both Carnaby's Black-Cockatoo and Forest Red-tailed Black-Cockatoo (**Figure 5.3** and **Figure 5.4**). This HQS comprises a site condition score of 2, with the area being cleared agricultural land with very isolated paddock trees (<2% cover), and score of 0 for both site context and species density. • The offset area is split into two parts located either side of an area of remnant vegetation that extends to the north of the landholding, comprising:

Value	Description
	○ York Gum woodland: HQS 2 (Very Low) for Carnaby's Black-Cockatoo and HQS 0 (Negligible) for Forest Red-tailed Black-Cockatoo, and ○ Marri woodland: HQS 6 (Moderate; 4 for site condition, 1 for site context and 1 for species density) for Carnaby's Black-Cockatoo and HQS 7 (Moderate-High) for Forest Red-tailed Black-Cockatoo. • Evidence of black cockatoo foraging was recorded in the central remnant vegetation during the site visit (**Figure 5.3**), indicating that the offset area already forms part of a broader habitat network. • Remnant vegetation to the west and northeast of the offset area was recorded as HQS 6 (Moderate) for both species of black cockatoo. • Vegetation to the east of the offset areas comprises Banksia woodland, also recorded as Moderate quality foraging habitat for Carnaby's Black-Cockatoo (HQS 6; 4 for site condition, 1 for site context and 1 for species density) (**Figure 5.3**) and a FHQ of 0 for Forest Red-tailed Black-Cockatoo (**Figure 5.4**). • The offset area provides considerable opportunity to increase the extent and condition of local foraging habitat through revegetation. Establishment of locally appropriate vegetation communities containing species such as Marri, Banksia and other locally indigenous forage species is expected to improve the availability, diversity and resilience of food resources over time. <u>Breeding Habitat</u> • No potential black cockatoo breeding trees were observed within the immediate vicinity of the proposed offset area during the site visit. • Mature Marri trees in the offset area may provide suitable breeding habitat for black cockatoos or may provide suitable locations for artificial hollows. Further assessment of the trees will be undertaken to inform nest hollow placement and management activities. • The nearest known black cockatoo breeding site (comprising of one nest tree) is a Carnaby's Black-Cockatoo breeding site located approximately 9 km to the west within the Yathroo Wind Farm Project Area. A known roost site is located adjacent to this breeding site. There are also known breeding sites approximately 20 km to the south at Regans Ford and 30 km to the east near Moora (Department of Biodiversity, Conservation and Attractions (DBCA), 2025). • Provision of artificial hollows within the paddock trees of the offset area, or in nearby remnant vegetation, will increase breeding habitat availability for black cockatoos in the short to medium term while revegetation establishes and matures.
Landscape connectivity	The offset area occurs within a landscape that contains patches of remnant native vegetation and habitat resources for black cockatoos. While black cockatoos can move considerable distances across fragmented landscapes, restoration of the cleared offset area adjacent to existing remnants is expected to expand the availability and connectivity of foraging resources, increase the long-term ecological value of the site for black cockatoos and contribute positively to broader biodiversity outcomes. Revegetation of the offset area will provide an ecological linkage in the landscape between adjacent remnants where there is currently a gap. This additional connectivity is likely to also benefit ground dwelling and arboreal fauna and contribute to the longevity of the currently isolated remnant.
Water resources	A range of existing water sources occur near to the offset area, including a dam within 1.2 km, stock watering infrastructure, drainage lines and natural water bodies. There is a chain of lakes including Lake Yangy, 3 km from the proposed offset area (**Figure 5.1**). These features may currently provide drinking water resources for black cockatoos using the broader landscape.

Value	Description
Current and surrounding land use and management	The offset area was historically, and is currently, used and managed for agricultural purposes (cropping). The area forms part of extensive farmland to the south held by the same landowner. The offset area is bounded by remnant native vegetation to the north, east and west.
Historic and current threats	In the absence of the proposed offset, ongoing agricultural land use and cropping would continue to suppress natural regeneration and limit the establishment of native vegetation in the offset area. Review of aerial photography suggests that remnant trees in the offset area appear to have reduced by approximately 50% in the past 10 years, and paddock trees in adjacent areas have also been impacted. Therefore, there is a high likelihood that in the next 20 years the remaining paddock trees in the offset area will no longer exist. Historical reduction in isolated paddock trees within the broader agricultural landscape also indicates a risk of continued habitat loss over time. Key threats for black cockatoos may include: • habitat loss and degradation • lack of habitat • competition for artificial hollows by bees or other bird species • predation by feral cats and foxes; fox dens were observed at another location on the property. Key threats for native vegetation include: • clearing • overgrazing by fauna; kangaroos were present and rabbits were observed at another location on the property • bushfire.

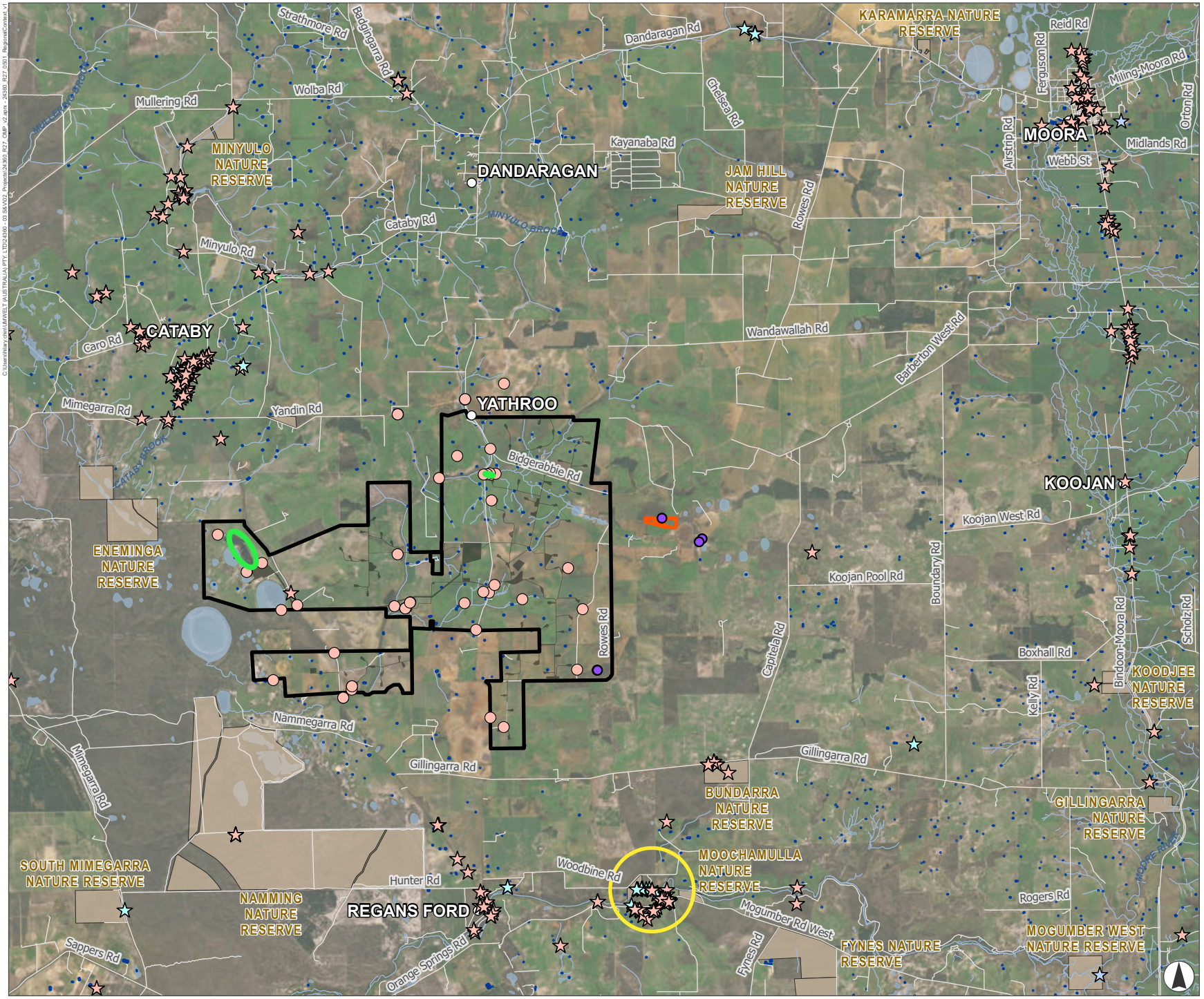


FIGURE 5.1

Regional Context

Legend

- Proposed Offset Area
- Project Area
- Disturbance Footprint
- Nature Reserve
- Farm Dams
- Waterbody
- Watercourse
- Roads
- Townsites
- Cockatoo Foraging Evidence Locations
- Black Cockatoo Roost Sites (Umwelt 2026)
- Black Cockatoo Breeding Sites Buffer (DBCA 2026)

Black Cockatoo Records (DBCA 2024)

Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo (EPBC – VU, WA – VU)
Zanda baudinii	Baudin's Black Cockatoo (EPBC – EN, WA – EN)
Zanda latirostris	Carnaby's Black Cockatoo (EPBC – EN, WA – EN)
Zanda sp. 'White-tailed Black-Cockatoo'	White-tailed Black-Cockatoo (EPBC – EN, WA – EN)

Black Cockatoo Records (Umwelt 2024)

Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo (EPBC – VU, WA – VU)
Zanda latirostris	Carnaby's Black Cockatoo (EPBC – EN, WA – EN)

0 5 10

Kilometres

Scale 1:250,000 at A4
GDA2020 MGA Zone 50

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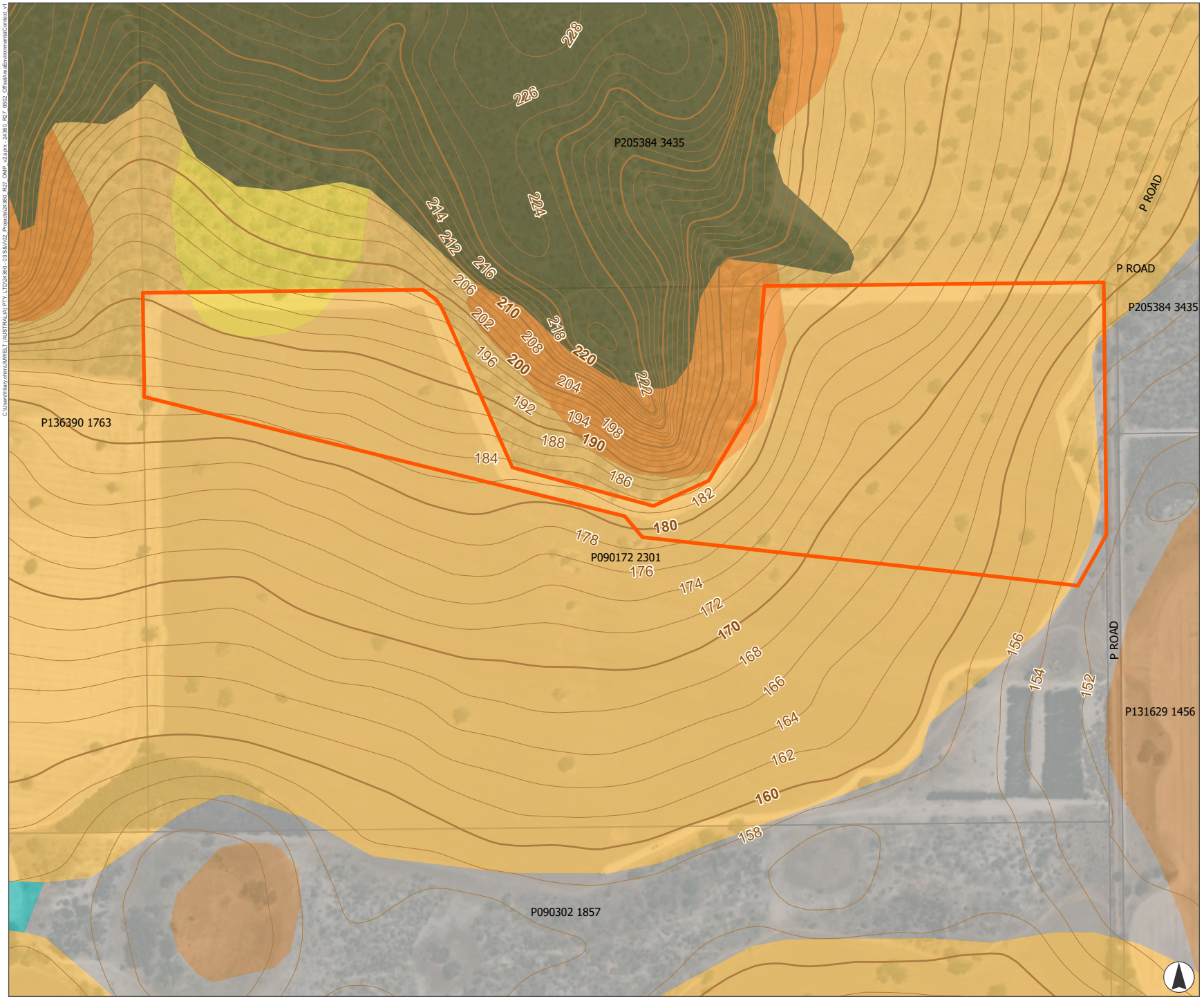


FIGURE 5.2

Offset Area Environmental Context

Legend

- Proposed Offset Area
- Cadastre
- 2m contours (Major)
- 2m contours (Minor)

Soil Landscape Mapping

- Deep sandy duplex gravel
- Pale deep sand
- Red deep sand
- Red loamy earth
- Semi-wet soil
- Yellow deep sand
- Yellow deep sandy duplex

0 100 200
Meters

Scale 1:8,000 at A4
GDA2020 MGA Zone 50

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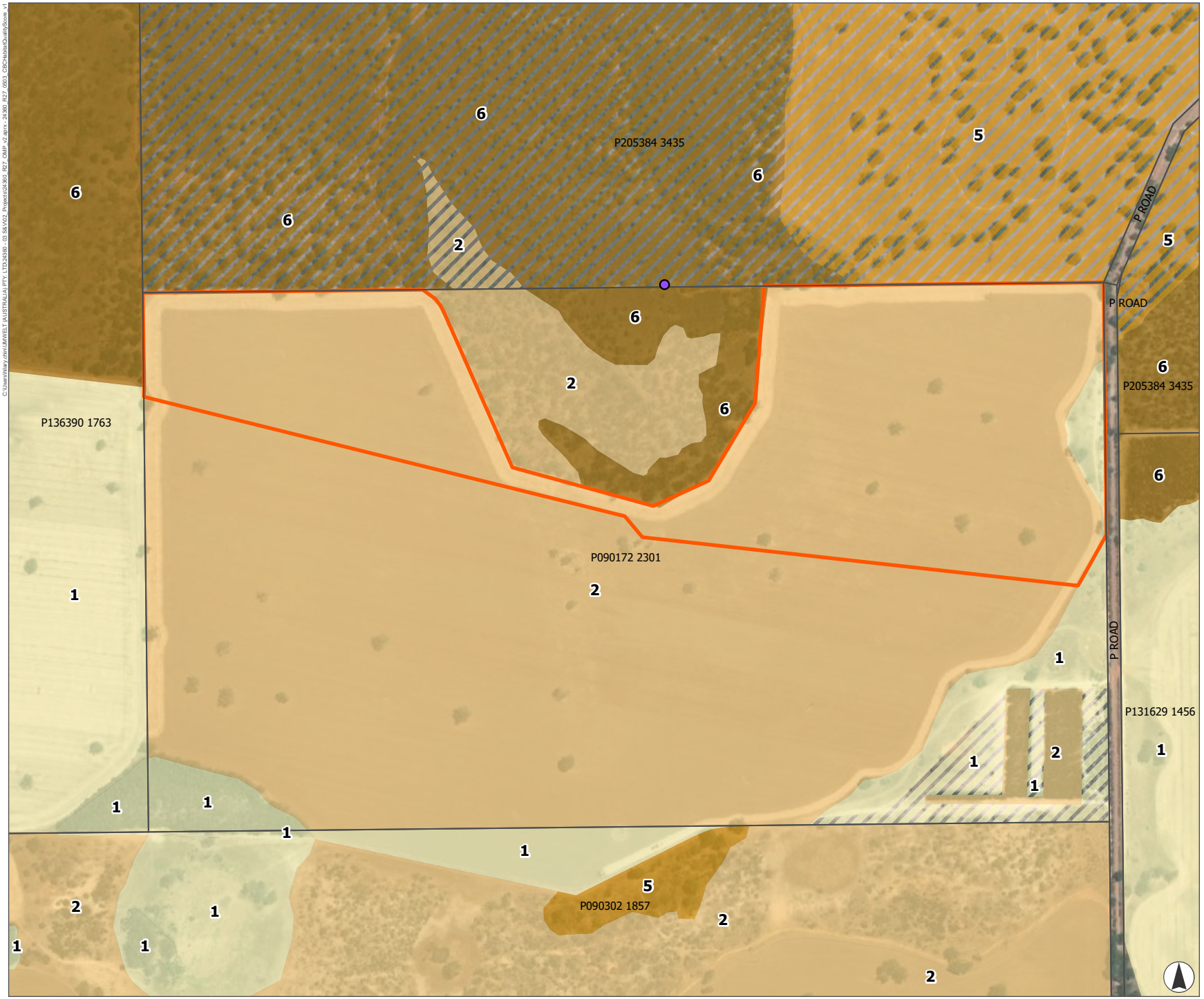


FIGURE 5.3

Foraging Habitat Quality Scores for Carnaby's Black-Cockatoo

Legend

- Proposed Offset Area
- Cadastre
- Cockatoo Foraging Evidence Locations

Carnaby's Black Cockatoo Foraging Habitat Quality Score (Umwelt 2026)

- 1: Negligible
- 2: Very Low
- 5: Moderate
- 6: Moderate

Carnaby's Black Cockatoo Foraging Habitat Quality Score (Desktop Assessed)

- 1: Negligible
- 2: Very Low
- 5: Moderate
- 6: Moderate

0 100 200

Meters

Scale 1:8,000 at A4
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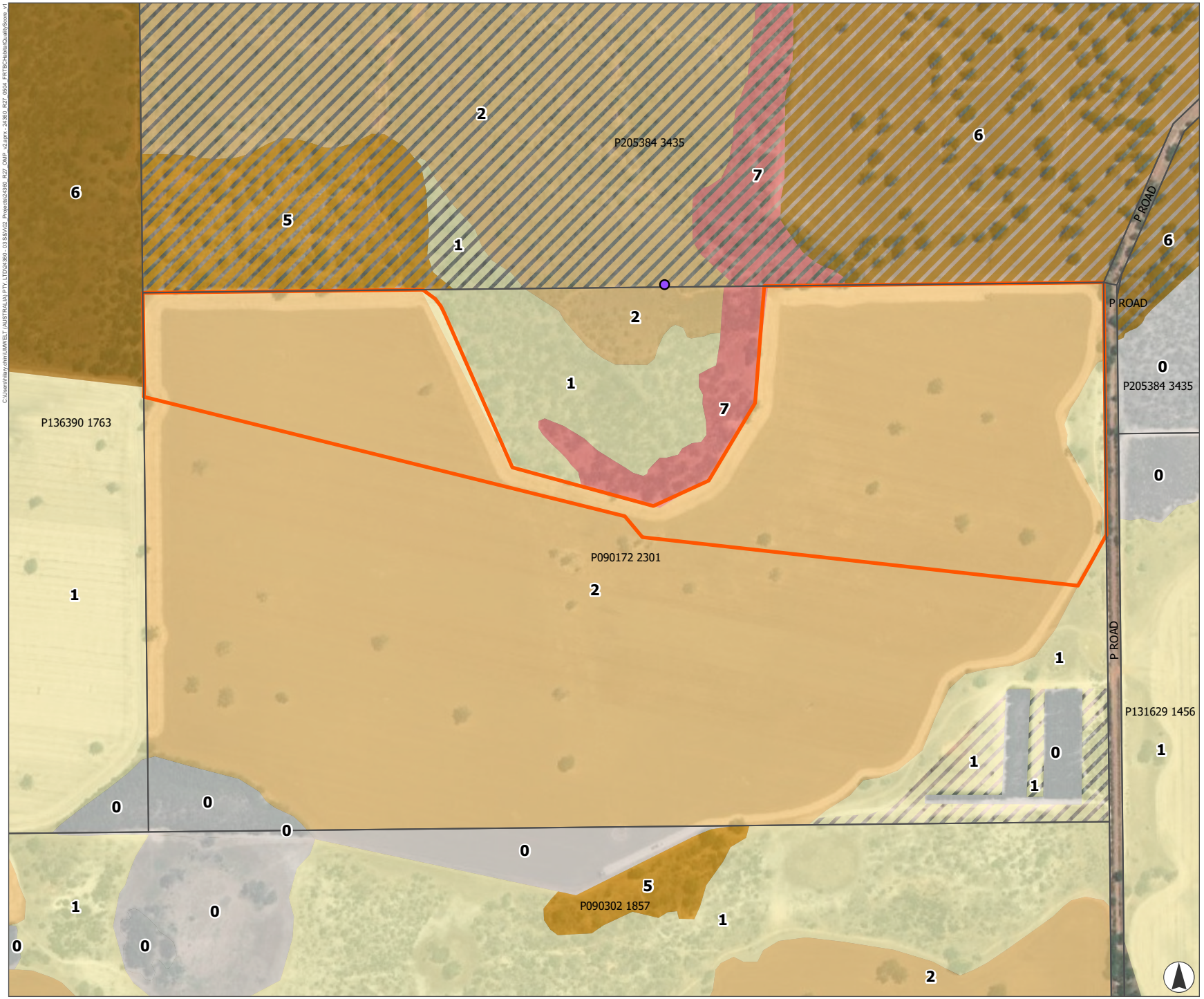


FIGURE 5.4

Foraging Habitat Quality Scores for Forest Red-tailed Black-Cockatoo

Legend

- Proposed Offset Area
- Cadastre
- Cockatoo Foraging Evidence Locations

Forest Red-tailed Black-Cockatoo Foraging Habitat Quality Score (Umwelt 2026)

- 0: Nil
- 1: Negligible
- 2: Very Low
- 5: Moderate
- 6: Moderate
- 7: Moderate to High

Forest Red-tailed Black-Cockatoo Foraging Habitat Quality Score (Desktop Assessed)

- 1: Negligible
- 2: Very Low
- 5: Moderate
- 6: Moderate
- 7: Moderate to High

0 100 200
Meters

Scale 1:8,000 at A4
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6.0 Management Actions

The following sections outline the management objectives and the required actions to achieve the offset completion criteria for native vegetation and habitat for black cockatoos.

6.1 Management Objectives

The objective of the OMP is to guide the protection, restoration and long-term management of the offset area to achieve a net gain of native vegetation and habitat for Carnaby's Black-Cockatoo and Forest Red-tailed Black-Cockatoo.

The management objectives have been developed to address the key threats to native vegetation and black cockatoos, support the establishment and maintenance of suitable habitat, and ensure that offset outcomes are achieved and maintained in accordance with the relevant EPBC Act and EP Act approval conditions. Progress towards these objectives will be assessed through monitoring against the progressive performance indicators described in this OMP. Where monitoring indicates that indicators and objectives are not being achieved, adaptive management measures will be implemented.

The management objectives for the offset area are:

1. Secure the offset area in perpetuity and ensure management actions remain effective through conservation mechanisms, monitoring and adaptive management.
2. Establish a self-sustaining vegetation community representative of native vegetation in the local area.
3. Increase available foraging habitat for local populations of Carnaby's Black-Cockatoo and Forest Red-tailed Black-Cockatoo through revegetation with suitable native vegetation communities.
4. Increase available breeding habitat for local populations of Carnaby's Black-Cockatoo and Forest Red-tailed Black-Cockatoo through installation and maintenance of artificial hollows.
5. Minimise the introduction and spread of weeds and disease within the offset area.
6. Protect the offset area from activities or disturbances that could result in the loss, degradation or fragmentation of native vegetation and black cockatoo habitat.

6.2 Further Studies and Technical Works

Several additional investigations and technical assessments will be undertaken prior to implementation of the offset to inform restoration design and monitoring methods. These investigations will ensure that management actions are based on site-specific environmental conditions and that restoration efforts are directed towards achieving the approved offset outcomes for native vegetation and black cockatoos.

The outcomes of these studies will be used to refine revegetation prescriptions, identify habitat enhancement opportunities and inform adaptive management throughout implementation of this OMP.

6.2.1 Soil Assessment

A soil assessment will be undertaken across the offset area to characterise soil types and assess key soil properties relevant to revegetation success. The assessment may include analysis of soil profile characteristics, texture, fertility, pH, salinity, soil depth and other factors that may influence vegetation establishment and long-term ecosystem development.

The results will be used to inform species selection, revegetation methods, seeding rates, soil preparation requirements and management actions necessary to improve restoration outcomes.

6.2.2 Reference Site Identification

Reference sites representative of the target vegetation communities will be identified to provide benchmarks for restoration planning, monitoring and evaluation. Reference sites will be selected from remnant vegetation communities within the local area that are considered representative of the desired vegetation structure, composition and condition to be achieved within the offset area.

Data collected from reference sites will be used to inform the development of completion criteria and progressive performance indicators, including target vegetation structure, species composition, species richness and habitat attributes.

6.2.3 Black Cockatoo Habitat Tree Assessment

Targeted inspections will be undertaken to assess the value of existing trees within both the offset area and the impact area as breeding habitat for black cockatoos.

Within the offset area, paddock trees will be inspected to identify any existing hollows or other habitat features that may be used by black cockatoos for breeding. The assessment will assist in identifying the value of remnant trees for the purposes of management and will inform the potential placement of artificial hollows.

Within the impact area, all trees previously identified as Rank 3 habitat trees will be inspected to determine the presence and suitability of natural hollows for black cockatoo breeding. The results will be used to quantify the extent of breeding habitat potentially affected by the project and to inform the required number of artificial hollows required as part of the offset.

The findings of the habitat tree assessments will be incorporated into the Nest Hollow Management Plan and will assist in ensuring that habitat enhancement measures are appropriately targeted to maximise conservation outcomes for black cockatoos.

6.3 Management Framework

Table 6.1 summarises the relationship between management objectives, key threats of MNES, management actions and implementation timing. Detailed progressive performance indicators and completion criteria are provided in **Section 7.0**, monitoring methods and frequencies are provided in **Section 9.0**, and adaptive management triggers and responses are provided in **Section 9.3**.

Table 6.1 Management Framework

Management objective	Key threat addressed	Management action	Timing / frequency
Secure the offset area in perpetuity.	<u>Black cockatoos</u> • Loss of breeding habitat • Loss of non-breeding foraging and night roosting habitat <u>Native vegetation</u> • Land clearing	• Establish and maintain a conservation covenant. • Discontinue agricultural activities. • Prevent incompatible land uses.	• Establish within the timeframe required by the EPBC Act and EP Act approval conditions. • Maintain in perpetuity.
Establish a self-sustaining native vegetation community.	<u>Native vegetation</u> • Land clearing	Undertake appropriate site preparation, direct seeding and tubestock planting using locally appropriate species and provenance.	• Site preparation before planting; • revegetation during suitable seasonal conditions.
		Undertake infill planting, supplementary seeding, weed management and other establishment maintenance.	• Maintenance for approximately five years, reducing as vegetation establishes. • Continue as required by adaptive management.
Increase black cockatoo foraging habitat.	<u>Black cockatoos</u> • Loss of non-breeding foraging and night roosting habitat	Establish and maintain suitable locally occurring forage species.	During revegetation establishment and maintenance.
Increase black cockatoo breeding habitat.	<u>Black cockatoos</u> • Loss of breeding habitat	Install and maintain artificial hollows in accordance with the Nest Hollow Management Plan.	• Install within the approved timeframe. • Inspect and maintain as specified in the Nest Hollow Management Plan.
Protect native vegetation and black cockatoo habitat from disturbance.	<u>Black cockatoos</u> • Loss of breeding habitat • Loss of non-breeding foraging and night roosting habitat <u>Native vegetation</u> • Land clearing • Disturbance from fire	• Install and maintain fencing, lockable gates and signage. • Restrict access and vehicle use to authorised management activities. • Maintain fire breaks.	• Install before revegetation works. • Maintain throughout the offset period. • Inspect routinely and following disturbance.

Management objective	Key threat addressed	Management action	Timing / frequency
Protect native vegetation and black cockatoo habitat from livestock grazing and animal disturbance.	Black cockatoos • Loss of habitat through degradation by grazing Native vegetation • Degradation of vegetation condition	• Install and maintain grazing-exclusion fencing. • Manage feral and native herbivore pressure where required.	
Minimise introduction or spread of weeds.	Black cockatoos • Weed invasion contributes to habitat degradation and loss Native vegetation • Degradation of vegetation condition	• Implement hygiene controls for personnel, vehicles and machinery. • Implement integrated weed control.	• During all site works;. • Weed control before revegetation and throughout establishment and maintenance.
Minimise introduction or spread of disease.	Black cockatoos • Phytophthora dieback contributes to habitat degradation and loss Native vegetation • Degradation of vegetation condition	• Implement hygiene controls for personnel, vehicles and machinery. • Restrict access during unsuitable conditions.	During all site works.

6.4 Management Actions

The management actions described in the following sections have been developed to achieve the objectives listed in **Section 3.1**. The effectiveness of these actions will be evaluated through implementation of the monitoring program in **Section 9.0** and assessment against the progressive performance indicators and completion criteria provided in **Section 7.0** of this OMP. Where necessary, management actions may be adapted to respond to monitoring outcomes, emerging threats or changing site conditions in accordance with the Adaptive Management Framework.

6.4.1 Land Use Control

The offset area will be secured through a conservation covenant, and agricultural activities will be discontinued. Further details are outlined in **Section 10.0**.

6.4.2 Access Control

Access to the offset area will be restricted to authorised personnel undertaking approved management, monitoring and maintenance activities. Fencing, lockable gates and signage will be installed and maintained to discourage unauthorised access and reduce the risk of vegetation disturbance, rubbish dumping, unauthorised vehicle use, fire ignition, grazing and the introduction of weeds and disease.

Vehicle access within the offset area will be limited to activities required for site establishment, revegetation, monitoring and ongoing management. Existing access tracks will be used wherever practicable to minimise disturbance to native vegetation and soils. Machinery and vehicles entering the offset area will be operated at low speeds and restricted to designated work areas. Firebreaks will be installed and maintained around the perimeter of the area proposed for revegetation.

All personnel and contractors accessing the offset area will be inducted on the environmental values of the site, access restrictions and hygiene requirements. Signage will be installed at key access points to identify the offset area and communicate site management requirements.

The effectiveness of access controls will be assessed through routine inspections of fences, gates, tracks and signage, and through monitoring for evidence of unauthorised access or disturbance. Any damage to access infrastructure, unauthorised entry, illegal dumping, off-road vehicle use, vegetation clearing, fire damage or other disturbance will be investigated and rectified as soon as practicable through repairs, remediation works and, where necessary, additional access control measures.

6.4.3 Hygiene Management

Hygiene management measures will be implemented to minimise the risk of introducing and spreading Phytophthora dieback disease and other soil-borne pathogens within the offset area. All personnel, vehicles and machinery entering the offset area will be required to comply with site hygiene requirements, including inspection and cleaning of footwear, vehicles and equipment prior to entry. Access will be restricted to designated entry points and, where practicable, activities involving soil disturbance will be avoided during wet conditions.

Hygiene requirements will be communicated through inductions, training and signage at key access points. The effectiveness of hygiene measures will be reviewed through routine site inspections and monitoring. Where a hygiene breach or evidence of disease introduction is identified, additional hygiene controls, monitoring and specialist advice will be implemented as required.

6.4.4 Weed Management

Weed management will be undertaken to reduce competition with native vegetation and support the establishment and long-term persistence of revegetation within the offset area. An integrated weed management approach will be implemented and will consider the use of mechanical and chemical control methods selected according to the target species, extent of infestation and site conditions.

Pre-revegetation weed control will commence in the year prior to revegetation and may comprise of:

- application of non-residual broadscale chemicals
- ripping and scarifying the surface with machinery to remove weeds prior to revegetation.

Weed control activities will continue throughout the maintenance period, with the frequency and extent of treatments informed by monitoring results. Monitoring will assess weed abundance, distribution and potential impacts on restoration outcomes. Where monitoring indicates increasing weed cover or adverse impacts on native vegetation establishment, additional weed control measures will be implemented through the adaptive management framework.

6.4.5 Grazing Management

Fauna exclusion fencing will be installed around revegetation areas prior to implementation to reduce grazing pressure from kangaroos and rabbits and improve establishment success. Herbivory is a key risk to revegetation success at the offset area, with evidence of both rabbits and kangaroos recorded during the site assessment.

The fencing design and any associated rabbit control measures will be finalised prior to implementation, taking into account the need for the fencing to transition to stock-exclusion fencing once the vegetation is sufficiently established (from approximately Year 9; 7 years from revegetation establishment), while maintaining fauna movement through the revegetation area.

The offset area will be regularly inspected for evidence of grazing, browsing, trampling or other animal-related disturbance. Where monitoring indicates that grazing pressure is affecting vegetation establishment, survival or recruitment, additional management measures may be implemented, including fence repairs, temporary exclusion measures or targeted animal control programs where appropriate and permitted. Management measures will remain in place until revegetation is sufficiently established and resilient to grazing impacts.

6.5 Revegetation

6.5.1 Overview

Revegetation is the principal mechanism through which the offset objectives for black cockatoo foraging habitat and native vegetation will be achieved. The revegetation program has been designed

to establish a self-sustaining native vegetation community representative of the local area and to create 22.71 ha of suitable black cockatoo foraging habitat in accordance with the offset objectives.

The revegetation design has been informed by assessment of soil type mapping, surrounding remnant vegetation, target habitat quality scores (Table 7.1) and practical restoration considerations. The offset area comprises predominantly cleared agricultural land in Completely Degraded condition and therefore provides substantial opportunity to improve both native vegetation condition and black cockatoo habitat values through restoration.

Based on assessment of soil-landscape mapping, reference vegetation and site conditions, revegetation will focus on two target vegetation communities:

- Marri Woodland (*Corymbia calophylla*)
- Banksia Woodland (*Banksia attenuata / Banksia menziesii*).

These vegetation communities represent the most appropriate restoration targets for the offset area and provide important foraging resources for Carnaby's Black-Cockatoo and Forest Red-tailed Black-Cockatoo.

6.5.2 Target Vegetation Communities

The revegetation area contains two primary soil groups based on regional soil mapping (Department of Primary Industries and Regional Development (DPIRD), 2022), comprising red deep sands and yellow deep sands. Based on observations during the site visit, these soils historically are likely to have supported Marri Woodland and *Banksia attenuata / Banksia menziesii* Woodland, respectively. These vegetation communities are considered representative of the local landscape and capable of supporting suitable black cockatoo foraging habitat.

Revegetation will therefore seek to establish a mosaic of Marri Woodland and Banksia Woodland aligned with soil conditions and adjacent remnant vegetation. Restoration of these communities is expected to improve habitat connectivity, increase habitat extent and provide a diverse range of food resources for black cockatoos.

The indicative species lists for the target vegetation communities are provided in **Appendix F**. Species lists will be refined following soil assessment, reference site surveys and seed availability assessments prior to implementation.



FIGURE 6.1

Proposed Offset Areas

Legend

- Mature trees to be retained
- Gate (3m wide)
- Indicative Access Tracks
- Proposed Offset Area
- Fauna Fence
- Cadastre
- Indicative Fire Breaks
- Remnant vegetation for retention
- Indicative revegetation areas

0 100 200
Meters

Scale 1:8,000 at A4
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6.5.3 Site Preparation

Site preparation will be undertaken prior to revegetation to maximise establishment success and minimise risks associated with soil compaction, weed competition and grazing pressure. Site preparation methods will be informed by the findings of the soil assessment described in **Section 6.2.1** and refined prior to implementation.

Site preparation is expected to include:

- pre-revegetation weed control commencing one year prior to revegetation
- shallow ripping to alleviate soil compaction associated with historic agricultural use
- surface scarification to prepare suitable seedbeds
- installation of exclusion fencing
- identification and protection of retained paddock trees
- establishment of access arrangements for implementation and maintenance activities.

The predominantly sandy soils of the offset area are unlikely to require contour banks or substantial erosion-control structures due to high infiltration rates and low erosion risk.

6.5.4 Seed Sourcing and Propagation

Seed and plant material will be sourced from local provenance populations wherever practicable to maximise genetic compatibility with surrounding vegetation communities and improve long-term resilience. Collection and procurement will commence sufficiently in advance of implementation to ensure adequate availability of seed and planting stock.

Not all species are suitable for establishment through direct seeding. Species that exhibit poor direct-seeding performance or have limited seed availability may be established using propagated tubestock. Tubestock will be sourced from specialist native plant nurseries using locally sourced seed where available.

6.5.5 Revegetation Establishment

Direct seeding will be the primary revegetation method due to its ability to establish a diverse suite of native species across large areas in a cost-effective manner. Direct seeding will be undertaken following completion of site preparation and pre-planting weed control.

Tubestock planting will be used to supplement direct seeding and may be targeted towards:

- key black cockatoo forage species
- species with limited seed availability
- species with low direct-seeding success rates
- areas requiring infill planting following establishment monitoring.

The final revegetation prescription, including planting densities, seeding rates and species allocations, will be prepared prior to implementation and documented in a revegetation plan.

6.5.6 Revegetation Maintenance

A revegetation maintenance program will be implemented following establishment to maximise survival and ensure achievement of the restoration and completion criteria. The maintenance will extend for at least 20 years, with the highest intensity management occurring during the first five years following revegetation.

Maintenance activities may include:

- weed control
- infill planting
- supplementary seeding
- repair of exclusion fencing
- fauna management
- erosion remediation, if required
- adaptive management actions identified through monitoring.

Monitoring outcomes will be used to determine the type, timing and extent of maintenance activities. As vegetation establishes and becomes increasingly self-sustaining, maintenance intensity is expected to reduce progressively

6.6 Artificial Hollow Installation

Artificial hollows will be installed in retained mature Marri trees in the offset area or in nearby remnant vegetation to provide an immediate benefit for black cockatoos by increasing local breeding habitat availability. Artificial hollows will be installed at a ratio of 3:1 to each suitable hollow identified in impacted Rank 3 trees in the Project Area. Design, location and installation of the artificial hollows will be in accordance with the *Artificial Hollows for Black Cockatoos* (DBCA, 2023).

An Artificial Hollow Management Plan will be prepared and implemented to guide the design, installation, maintenance, monitoring and adaptive management of artificial hollows for black cockatoos. The Artificial Hollow Management Plan will include:

- Management objectives and environmental outcomes for black cockatoo nesting habitat.
- The location, number and specifications of artificial hollows.
- Design, installation and maintenance requirements for artificial hollows.
- Measures to avoid, minimise and mitigate impacts during implementation.
- Monitoring protocols, performance indicators and trigger values to assess nest hollow condition and utilisation.
- Reporting requirements, including provision of nest hollow location data and monitoring results to relevant agencies.
- Risk assessment and contingency measures to address factors that may affect achievement of the desired outcomes.

- Adaptive management, review and compliance reporting processes to demonstrate the effectiveness of nest hollow management actions.

6.7 Implementation Schedule

Implementation of the offset will occur progressively following approval of this OMP and establishment of the required conservation mechanism over the offset area. The timing of individual activities may vary depending on seasonal conditions, seed availability, revegetation success, monitoring outcomes and adaptive management requirements. However, all activities will be undertaken in a sequence that supports the timely establishment of native vegetation and achievement of the approved offset outcomes.

The offset is anticipated to require approximately two years to complete planning, approvals, site preparation and revegetation establishment works, followed by a maintenance, monitoring and adaptive management period until completion criteria are achieved. Year 1 commences on the date the approved offset is implemented, as defined by the relevant approval conditions. Revegetation establishment is expected to occur during years 1 and 2. The ecological benefit assumed in the offset calculator is expected by year 17 and final completion criteria will be assessed by year 22. Legal protection will continue in perpetuity.

The implementation schedule is summarised in **Table 6.2**.

6.7.1 Relationship to Monitoring and Adaptive Management

The implementation schedule will be reviewed periodically in response to monitoring outcomes and adaptive management requirements. Where monitoring indicates that progressive performance indicators are not being achieved, management actions and implementation timing may be adjusted to improve offset performance and ensure achievement of the approved offset outcomes.

Table 6.2 Implementation Schedule and Activities

Activity	Year 1	Year 2	Years 3–5	Years 6–10	Years 11–22
Finalise offset arrangements and progress legal protection mechanism	●	●			
Complete soil, reference-site and habitat-tree assessments	●	●			
Finalise revegetation prescription and Nest Hollow Management Plan	●	●			
Cease cropping and implement access and fauna controls	●	●	●	●	●
Undertake pre-revegetation weed control and site preparation	●	●			
Procure local-provenance seed and planting stock	●	●			
Undertake direct seeding and tubestock planting		●			
Install artificial hollows and exclusion fencing	●	●			
Undertake intensive revegetation maintenance, including weed control, infill planting, supplementary seeding and fauna management	●	●	●		
Transition to stock-exclusion fencing from Year 9, informed by monitoring				●	
Undertake reduced-intensity maintenance informed by monitoring (refer **Table 9.1** for further details)				●	●
Formal revegetation monitoring: biannual in Winter/Autumn and Spring (refer **Table 9.1** for further details)	●	●	●		
Formal revegetation monitoring: annual in Spring (refer **Table 9.1** for further details)				●	
Formal revegetation monitoring: every 3 years in Spring (refer **Table 9.1** for further details)					●

Activity	Year 1	Year 2	Years 3–5	Years 6–10	Years 11–22
Monitor and maintain artificial hollows in accordance with the Nest Hollow Management Plan	●	●	●	●	●
Reporting, adaptive management and OMP review	●	●	●	●	●

7.0 Completion Criteria and Progressive Performance Indicators

Completion criteria define the environmental condition or management outcome that must be achieved for the offset objective to be considered satisfied. The completion criteria developed for the offset adhere to the SMART principles (Specific, Measurable, Achievable, Relevant and Timebound). They contain stated numerical targets, which reflect the ecological objectives and provide for quantitative assessment.

Progressive performance indicators are measurable targets used to track whether revegetation is developing as expected over time. These indicators help demonstrate progress, identify areas requiring corrective action, and ensure the offset site remains on track to achieve the nominated completion criteria.

The following sections provide further details on the nominated progressive performance indicators and completion criteria.

7.1 Completion Criteria Development

To achieve offset objectives (**Section 3.1**), foraging habitat for each MNES must demonstrate a measurable uplift in HQS, consistent with the final HQS prescribed within the Commonwealth OAG and WA Environmental Offsets calculators (**Section 4.5**). The target HQS for the offset area in **Table 7.1** reflect long-term gains across the key components of site condition, site context and species density (as per the Bamford foraging habitat scoring system in **Appendix A**).

The foliar cover values within the Bamford (2020) site condition scores (**Appendix A**) were used to inform the completion criteria identified in **Table 7.1**.

Additionally, to achieve the offset objectives for native vegetation (**Section 3.1**), revegetation must eventually and demonstrably become a self-sustaining community, which requires a minimum species diversity, density and vegetation structure. The target for non-foraging species diversity is set at 30% of the reference-site value, reflecting the reduced emphasis on replicating the floristic composition of the target vegetation type and the higher objective of providing a self-sustaining vegetation community that provides suitable black cockatoo foraging habitat.

7.2 Progressive Performance Indicator Development

Progressive performance indicators are appropriate interim ecological indicators monitored to evaluate offset trajectory and guide adaptive management. Progressive performance indicators apply throughout the offset period however by Year 22 these are superseded by the completion criteria presented for the purposes of offset compliance and sign-off.

The proposed progressive performance indicators (**Table 7.2**) were developed in consultation with an experienced revegetation specialist based on their knowledge of restoration performance in comparable Western Australian woodland revegetation projects. Performance indicator values align with the foliar cover for the expected HQS at each milestone. The targets are intended to represent

realistic and measurable interim milestones along the restoration trajectory rather than final completion criteria.

Revegetation completion criteria and progressive performance indicators are also supported by published studies from Western Australia. Multiple studies indicate that substantial vegetation cover can be established within the first decade following restoration, and that woodland structure, canopy development and ecological function continue to increase over subsequent years (Brundrett et al., 2017, 2020; Lee et al., 2013). Monitoring of the Banksia Woodland Restoration Project reported native vegetation cover of approximately 20% within five years of restoration and concluded that restored areas were trending toward recovery as Banksia woodland (Brundrett et al., 2020).

Long-term rehabilitation studies in Jarrah-Marri forests of south-west Western Australia have demonstrated ongoing vegetation development over at least the first 12-14 years following establishment, while black cockatoo feeding activity has been recorded in revegetated Marri systems within 7-8 years of establishment and continues in older rehabilitation sites (Koch, 2007; Norman et al., 2006). These findings support the appropriateness of the proposed foliage cover trajectories as performance indicator targets.

For foraging species diversity, the target value is higher in the Banksia woodland for both tree and lower storey species, reflecting the higher species richness of the banksia woodlands in general but also the wider range of forage species used by Carnaby's Black-Cockatoo that occur in this vegetation type.

Progress against the progressive performance criteria and completion criteria will be assessed using the monitoring methods described in **Section 9.0**.

Table 7.1 Completion Criteria for MNES

Receptor	Habitat Type	Habitat Quality (Bamford, 2020)				
		Year 0*	**Year 7 (5 years post seeding)**	**Year 12**	**Year 17**	**Year 22**
Carnaby's Black-Cockatoo and Forest Red-tailed Black-Cockatoo	Foraging – Marri woodland	Offset area baseline: HQS 2 (Condition 2; Context 0; Density 0)	21.38 ha, HQS 3 (Condition 3; Context 0; Density 0)	21.38 ha, HQS 5 (Condition 3; Context 1; Density 1)	21.38 ha, HQS 6 (Condition 4; Context 1; Density 1)	21.38 ha, HQS 6 (Condition 4; Context 1; Density 1)
	Foraging – Banksia woodland	Offset area baseline: HQS 2 (Condition 2; Context 0; Density 0)	1.33 ha, HQS 3 (Condition 3; Context 0; Density 0)	1.33 ha, HQS 6 (Condition 4; Context 1; Density 1)	1.33 ha, HQS 7 (Condition 5; Context 1; Density 1)	1.33 ha, HQS 7 (Condition 5; Context 1; Density 1)

*Commencement of offset

Table 7.2 Progressive Performance Indicators for Revegetation and Artificial hollows

Management Action	Criterion	Progressive Performance Indicators						
		Year 0*	**Year 2**	**Year 3**	**Year 7**	**Year 12**	**Year 17**	**Year 22**
Revegetation of 22.71 ha	Revegetation presence	NA	Revegetation established over 22.71 ha offset area	Revegetation monitored and maintained as outlined in this OMP.				
Fencing	Fence condition	Fencing installed with appropriate specifications to exclude access by rabbits and kangaroos.	Fencing inspected, maintained and repaired.		Fencing may be amended to allow native fauna access but exclude cattle and sheep from Year 9. To be inspected each monitoring event, and maintained and repaired as required.			
Weed management	Weed cover (%/ 100 m^2 nested quadrat within the plot)	Chemical weed control and mechanical surface scarification prior to revegetation.		20%	20%	10%	5%	5%
	Declared weeds and WONS	No Declared weeds and no WONS present.						
Marri Woodland Revegetation (HQS 6)	Projected foliage cover of suitable black cockatoo native foraging species (% /100 m^2 nested quadrat within the plot)	NA	NA	NA	10%	10-20%	20-40%	20-40%
	Species diversity of suitable black cockatoo overstorey	NA	NA	NA	1	2	2	2

Management Action	Criterion	Progressive Performance Indicators						
		Year 0*	Year 2	Year 3	Year 7	Year 12	Year 17	Year 22
	foraging species (count of species /100 m^2 nested quadrat within the plot)							
	Species diversity of suitable black cockatoo native lower storey foraging species (count of species /100 m^2 nested quadrat within the plot)	NA	NA	NA	1	2	2	2
	Tree stem density (stems/ ha)	NA	NA	200	200	200	200	200
Banksia Woodland Revegetation (HQS 7)	Projected foliage cover of suitable black cockatoo native foraging species (% /100 m^2 nested quadrat within the plot)	NA	NA	NA	10-20%	20-40%	40-60%	40-60%
	Species diversity of suitable black cockatoo overstorey foraging species (count of species /100 m^2 nested quadrat within the plot)	NA	NA	NA	2	3	3	3
	Species diversity of suitable black cockatoo native lower storey foraging species (count of species /100 m^2 nested quadrat within the plot)	NA	NA	NA	2	3	3	3
	Tree stem density (stems/ ha)	NA	NA	200	200	200	200	200
Native Vegetation	Species diversity – native non-tree species (% relative to reference site)	NA	NA	NA	20%	30%	30%	30%
Artificial hollow installation	Nest box condition	NA	Artificial hollows of a suitable design are installed at a ratio of 3:1 to each suitable hollow identified in	Artificial hollows are monitored, maintained and repaired to a standard that satisfies the requirements of the Artificial Hollows for Black Cockatoos (DBCA, 2023)				

Management Action	Criterion	Progressive Performance Indicators						
		Year 0*	Year 2	Year 3	Year 7	Year 12	Year 17	Year 22
			impacted Rank 3 trees in the Project Area, to a standard that satisfies the requirements of the Artificial Hollows for Black Cockatoos (DBCA, 2023)					

*Commencement of offset

8.0 Risk Assessment

A risk assessment has been undertaken utilising the risk framework presented in **Table 8.1, Table 8.2** and **Table 8.3** that is consistent with the likelihood and consequence criteria recommended by DCCEEW (2024).

The assessment identifies risks that may prevent achievement of the offset objectives. The risk assessment:

- Identified events and threats that will, may, or are likely to impact the achievement of the expected environmental outcomes.
- Assesses threat levels both before (initial risk rating) and after (residual risk rating) risk mitigation strategies are applied.
- Identifies appropriate risk mitigation strategies, with trigger criteria for corrective actions should risks eventuate.

Risk mitigation strategies including monitoring mechanisms, management triggers and corrective actions are prescribed within the Risk Management Plan(**Appendix E**).

Table 8.1 Risk Matrix Likelihood Ratings

Qualitative measure of likelihood	How likely is it that this event/issue will occur
Highly likely (5)	Is expected to occur in most circumstances
Likely (4)	Will probably occur during the life of the project
Possible (3)	Might occur during the life of the project
Unlikely (2)	Could occur but considered unlikely or doubtful
Rare (1)	May occur in exceptional circumstances

Table 8.2 Risk Matrix Consequence Ratings

Qualitative measure of consequences	What will be the consequence/result if this issue does occur
Critical (5)	Severe widespread loss of environmental amenity and irrecoverable environmental damage
Major (4)	Major loss of environmental amenity with real danger of continuing
High (3)	Substantial instances of environmental damage that could be reversed with intensive efforts
Moderate (2)	Isolated but substantial instances of environmental damage that could be reversed with intensive efforts

Qualitative measure of consequences	What will be the consequence/result if this issue does occur
Minor (1)	Minor incident of environmental damage that can be reversed

Table 8.3 Final Risk Rating Based on Likelihood and Consequence

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

9.0 Monitoring Program

Targeted, periodic monitoring surveys will be conducted by suitably qualified ecologists to assess the progress of the offset on a trajectory towards the management objectives and completion criteria, to evaluate the effectiveness of management actions and provide an evidence base for adaptive management. This will be informed by assessment of the offset against the progressive performance indicators. Monitoring methods will be repeatable and applied consistently to allow comparison over time and assessment of the ecological trajectory of the offset area.

Monitoring results will be documented and reviewed after each monitoring event. Where a trigger in **Section 9.3** is reached, the relevant response action will be implemented and its effectiveness evaluated through subsequent monitoring.

9.1 Monitoring Methods

Formal monitoring by collection of data within quadrats will be undertaken to assess the progress of revegetation against the progressive performance indicators identified in **Table 7.2** to achieve the completion criteria in **Table 7.1.**

Five permanent quadrats (400 m^2; 20 m x 20 m) will be established within the Marri Woodland and three permanent quadrats (400m^2; 20 m x 20m) will be established within the Banksia Woodland. Locations will be permanently marked with galvanised fence droppers and recorded on GPS. The placement of quadrats will be as per a stratified random sampling design, where plots are located randomly but differences in topography, soils and other edaphic factors taken into consideration to sample the variation across revegetation sites sufficiently and to ensure that the plots adequately represent the vegetation and weed cover within the revegetation area.

Observational monitoring will also be undertaken during regular monitoring events and maintenance activities by recording observations while personnel are moving throughout the site. These observations will assist with identifying site wide concerns / targets such as weed growth or fauna, before they have a chance to affect the revegetation. Observational monitoring will also identify indicators of success such as flowering of forage species or signs of foraging by black cockatoos.

9.2 Monitoring Schedule

The proposed monitoring activities and timings are presented in **Table 9.1**. These have been presented separately for the Establishment Phase (years 1-2), Management Phase (years 3-5) and Maintenance Phase (years 6-22).

9.3 Monitoring Triggers and Corrective Actions

Monitoring results will be assessed against the progressive performance indicators and completion criteria identified in this OMP. Where monitoring identifies that revegetation establishment, habitat development or management objectives are not progressing as expected, corrective actions will be implemented to address the issue and improve the likelihood of achieving the required offset outcomes.

Table 9.1 identifies the key monitoring aspects, performance indicators, trigger values and corrective actions that will be applied throughout implementation of the offset. The trigger values are intended to provide an early warning of issues that may affect achievement of the completion criteria, allowing management responses to be implemented before offset outcomes are compromised. Monitoring outcomes and any corrective actions undertaken will be documented in monitoring reports and considered as part of the adaptive management framework for the offset.

Table 9.1 Monitoring Program, Performance Indicators, Triggers and Corrective Actions

Parameter	Performance Indicator	Monitoring Method	Timing and Frequency	Trigger Value	Corrective Action	Reporting
Establishment Phase: Years 1 - 2						
Weed species presence	Weed species presence	• Visual inspection of weed cover • Quadrat assessment	2 visits/yr in Autumn/Winter & Spring.	• Weed cover above progressive performance indicators • WONS/ declared weeds present.	• Investigate cause • spot spray weeds • revise weed control program and review monitoring • monitor outcomes.	Annually as part of compliance reporting
Pest fauna presence	Evidence of kangaroo grazing	Visual inspection of herbivory on seedlings during quadrat monitoring and walking meander.	2 visits/yr in Autumn & Spring	• Visual evidence of kangaroos inside fence.	• Investigate cause • check fence, herd out kangaroos • monitor outcomes.	Annually as part of compliance reporting
	Evidence of rabbit or fox presence	Visual inspection during quadrat monitoring and walking meander.		• Visual evidence of rabbit or fox presence inside fence.	• Investigate cause • engage rabbit control contractor. • monitor outcomes.	Annually as part of compliance reporting
Fence condition	Presence and condition of fences and gates	Visual inspection.	During every monitoring event from fence installation	• Fence / gate damage • obvious weakness • fauna ingress.	• Investigate cause • repair / modify fencing • monitor outcomes.	Annually as part of compliance reporting
Firebreak condition	Condition of firebreaks	Visual inspection.	During every monitoring event	• Firebreaks not to required standard.	• Investigate cause • maintain/modify firebreaks • monitor outcomes.	Annually as part of compliance reporting
Management Phase: Years 3-5						
Plant establishment success	Flora cover, stem density and species richness	Quadrat monitoring	Annual in Spring	Flora cover, stem density and species richness below progressive performance indicators.	• Investigate cause • infill planting • weed control • fauna management.	Annually as part of compliance reporting

Parameter	Performance Indicator	Monitoring Method	Timing and Frequency	Trigger Value	Corrective Action	Reporting
Weed species presence	Weed species presence	• Visual inspection of weed cover • Quadrat assessment	2 visits/yr in Autumn/Winter and Spring.	• Weed cover above progressive performance indicators • WONS/ declared weeds present.	• Investigate cause • spot spray weeds • revise weed control program and review monitoring • monitor outcomes.	Annually as part of compliance reporting
Pest fauna presence	Evidence of kangaroo grazing	Visual inspection of herbivory on seedlings during quadrat monitoring and walking meander.	2 visits/yr in Autumn & Spring	Visual evidence of kangaroos inside fence.	• Investigate cause • check fence, herd out kangaroos • monitor outcomes.	Annually as part of compliance reporting
	Evidence of rabbit or fox presence	Visual inspection during quadrat monitoring and walking meander.		Visual evidence of rabbit or fox presence inside fence.	• Investigate cause • engage rabbit control contractor. • monitor outcomes.	
Fence condition	Presence and condition of fences and gates	Visual inspection.	During every monitoring event from fence installation	• Fence / gate damage • obvious weakness • fauna ingress	• Investigate cause • repair / modify fencing • monitor outcomes.	Annually as part of compliance reporting
Firebreak condition	Condition of firebreaks	Visual inspection.	During every monitoring event	Firebreaks not to required standard.	• Investigate cause • maintain/modify firebreaks • monitor outcomes.	Annually as part of compliance reporting
Black cockatoo artificial hollows	• Condition of artificial hollows including presence of cracks, security of attachment, stability of tree, drainage • Evidence of use	Visual inspection	Annually in April/May, commencing one year after installation.	Damage or loss of nest hollow.	• Investigate cause • repair, maintain or reinstall artificial hollows • monitor outcomes.	Annually as part of compliance reporting

Parameter	Performance Indicator	Monitoring Method	Timing and Frequency	Trigger Value	Corrective Action	Reporting
Maintenance Phase: Years 6-22						
Plant establishment success	Stem density	Quadrat monitoring	• Years 6-10: Annual in Spring • Years 11-22: every 3 yrs in Spring	Stem density below progressive performance indicator.	• Investigate cause • infill planting • weed control • fauna management.	Annually as part of compliance reporting
Canopy presence and vegetation cover / structure	Vegetation cover and structure	Quadrat monitoring	• Years 6-10: Annual in Spring • Years 11-22: every 3 yrs in Spring	Canopy presence and vegetation cover/structure below progressive performance indicators.	• Investigate cause • infill planting • weed control • fire management review • monitor outcomes.	Annually as part of compliance reporting
Species diversity for non-tree species	Species diversity	Quadrat monitoring	• Years 6-10: Annual in Spring • Years 11-22: every 3 yrs in Spring	Species diversity of non-tree species below progressive performance indicators.	• Investigate cause • infill planting • modify species selection. • review against reference site • monitor outcomes.	
Black cockatoo forage species presence and abundance	Presence and abundance of black cockatoo forage species	Quadrat monitoring	• Years 6-10: Annual in Spring • Years 11-22: every 3 yrs in Spring	Forage species presence and abundance below progressive performance indicators.	• Investigate cause • infill planting • modify species selection • monitor outcomes.	
Black cockatoo artificial hollows	• Condition of artificial hollows including presence of cracks, security of attachment, stability of tree, drainage • Evidence of use	Visual inspection	Annually in April/May, commencing one year after installation.	Damage or loss of nest hollow.	• Investigate cause • repair, maintain or reinstall artificial hollows • monitor outcomes.	Annually as part of compliance reporting
Weed species presence	Weed species presence	Visual inspection of weed cover Quadrat assessment	Annually in Spring.	• Weed cover above progressive	• Investigate cause • spot spray weeds	Annually as part of compliance reporting

Parameter	Performance Indicator	Monitoring Method	Timing and Frequency	Trigger Value	Corrective Action	Reporting
				• performance indicators • WONS/ declared weeds present. • following a bushfire.	• revise weed control program and review monitoring • monitor outcomes.	
Pest fauna presence	Evidence of kangaroo or rabbit grazing	Visual inspection of herbivory on seedlings during quadrat monitoring and walking meander.	• Years 6-10: Annually in Spring • Years 11-22: every 3 yrs in Spring	Visual evidence of kangaroos or rabbits inside fence.	• Investigate cause • check fence, herd out kangaroos • engage rabbit contractor • monitor outcomes.	Annually as part of compliance reporting
Fence condition	Presence and condition of fences and gates	Visual inspection.	During every monitoring event from fence installation	• Fence / gate damage • obvious weakness • fauna ingress	• Investigate cause • repair / modify fencing • monitor outcomes.	Annually as part of compliance reporting
Firebreak condition	Condition of firebreaks	Visual inspection.	During every monitoring event	Firebreaks not to required standard.	• Investigate cause • maintain/modify firebreaks • monitor outcomes.	Annually as part of compliance reporting

10.0 Commercial Arrangement

10.1 Conservation Covenant

Neoen has reached in-principle agreement with the landholder to secure the revegetation offset area for conservation purposes. The appropriate mechanism for securing the long-term protection of the offset area will be determined in consultation with the landholder and relevant authorities and may include the following options:

- Registering a private restrictive covenant on the certificate of title in favour of the State of Western Australia, preventing clearing and development in perpetuity, to the satisfaction of the CEO.
- Entering into a conservation covenant for the protection and management of vegetation in perpetuity under s.30 of the *Soil and Land Conservation Act 1945*.

For both of the above mechanisms:

- A surveyor will be engaged to delineate the boundaries of the offset area and prepare drawings to be registered against the certificate of title.
- The covenant will preclude the development of this land for any other purposes than its use as an environmental offset as outlined in the final Offset Management Plan.
- The land will be managed by Neoen until the completion criteria have been met, after which time the land will remain fenced and protected in-perpetuity.

Ad-hoc management activities may be undertaken by Neoen as required (e.g. repairing fencing) for the life of the Project (up to 30 years).

10.2 Legal Arrangements

The property owner of the proposed offset area has provided a letter of support for a suitable covenant to be placed on the area of land required to meet the offset requirements under the EPBC and EP Act. For privacy reasons a copy of this has not been attached, however can be provided directly to NEPA and/or DWER upon request.

Once the final offset area has been confirmed, Neoen will finalise legal arrangements with the property owner for a suitable covenant to be placed on the offset area as described above in **Section 10.1**. Roles and responsibilities for each party are outlined in **Table 10.1.**

10.3 Roles and Responsibilities

The Proponent is responsible for implementing this OMP and ensuring that sufficient resources are available to achieve the offset objectives and completion criteria. Responsibilities may be delegated to suitably qualified personnel and specialist contractors; however, the Proponent retains overall responsibility for compliance with approval conditions and the successful delivery of offset outcomes.

Key responsibilities associated with implementation of this OMP are outlined in **Table 10.1**.

Table 10.1 Roles and Responsibilities

Role	Responsibilities
Proponent / Approval Holder	• overall accountability for implementation of the OMP • placing a suitable covenant on the offset area so it is protected in perpetuity • ensuring adequate financial and personnel resources are available • ensuring compliance with EPBC Act and EP Act approval conditions • engaging suitably qualified specialists to undertake required monitoring • reviewing monitoring results • implementing adaptive management actions where required • submitting reports to NEPA, DWER and other relevant regulators • recording and maintaining copies of all data and reports per Neoen's document control procedures.
Environmental Manager or Offset Coordinator	• day-to-day coordination of offset management activities • management of contractors and consultants • maintenance of project records and data • oversight of monitoring programs • review of monitoring outcomes • coordination of reporting and adaptive management actions.
Suitably Qualified Ecologist	• undertaking ecological monitoring in accordance with approved methodologies • analysing monitoring results • assessing progress towards progressive performance indicators and completion criteria • providing management recommendations • contributing to periodic reporting.
Land Manager / Property Owner (where applicable)	• maintaining access arrangements • supporting implementation of management actions • notifying the Proponent of incidents or disturbances affecting the offset area • complying with any conservation agreements, management agreements or other offset-related obligations.
Contractors and Service Providers	Undertaking approved management actions, such as fencing, weed control, pest animal control, and revegetation works, in accordance with this OMP and relevant environmental requirements.
Regulatory Authorities	Reviewing reports and submissions where required under approval conditions and providing regulatory oversight of offset implementation and compliance.

10.4 Responsibility for Review and Continuous Improvement

All personnel involved in implementation of the OMP are responsible for identifying issues that may affect the achievement of offset outcomes and notifying the Environmental Manager or Offset Coordinator. Monitoring results and management records will be reviewed regularly to assess the effectiveness of management actions and determine whether corrective or adaptive management measures are required.

Where monitoring identifies that progressive performance indicators are not being achieved, the Proponent will ensure that appropriate investigations are undertaken and that corrective actions are implemented in accordance with **Section 7.0**.

10.5 Competency Requirements

Monitoring, reporting and ecological assessments required under this OMP will be undertaken by suitably qualified and experienced personnel with demonstrated expertise relevant to the environmental values being managed. Specialist advice may be sought where monitoring identifies emerging risks, knowledge gaps or technical matters requiring expert assessment.

11.0 Reporting, Audit and Review

11.1 Adaptive Management Framework

Adaptive management provides a structured process for responding to monitoring outcomes, unforeseen events and emerging risks. Monitoring results will be assessed against the progressive performance indicators, interim targets and completion criteria in this OMP. Where a trigger is reached, the cause will be investigated and the relevant response action implemented.

Corrective actions will be proportionate to the nature and extent of the issue and will be documented in monitoring and compliance records. The effectiveness of each response will be evaluated through follow-up monitoring. Where monitoring indicates that the approved offset outcomes may not be achieved, the OMP will be reviewed and revised, and NEPA/DWER will be notified or approval sought as required by the approval conditions.

11.2 Reporting

Reporting will be undertaken in accordance with the relevant EPBC Act and EP Act approval conditions and will be prepared by suitably qualified personnel. Reports will document management actions undertaken, monitoring completed during the reporting period, performance against the objectives, progressive performance indicators and completion criteria of the offset, and any corrective or adaptive management measures implemented. Results will be compared against previous monitoring events to identify trends and assess whether the trajectory of improvement is consistent with achieving the required offset outcomes.

Reports will also identify any incidents, non-compliances or unforeseen events that may affect achievement of offset outcomes and describe actions taken in response.

Monitoring and compliance reports will be submitted to NEPA and DWER at the frequency required by the approval conditions and retained as part of the project's environmental record system.

Reporting may include, but not be limited to, those identified in **Table 11.1**.

Table 11.1 OMP Reporting Requirements

Report	Description	Timing	Provided to
Annual Compliance Report	Summarises implementation of the OMP during the reporting period, including management actions and maintenance completed, monitoring undertaken, performance against management objectives and progressive performance indicators, incidents or non-compliances, and corrective or adaptive management actions implemented.	Annually for the duration of OMP implementation, or at the frequency specified in the EPBC Act and EP Act approval conditions.	NEPA and DWER.
Formal Monitoring Report	Presents the results of formal and observational revegetation monitoring, including quadrat data, photographs and spatial information; comparison with baseline and previous monitoring results; assessment against progressive performance indicators and target habitat quality scores; identified trends; monitoring triggers reached; and recommended corrective actions.	Annually: Years 3 – 10 Every 3 years: Years 11 – 20	NEPA and DWER.

Report	Description	Timing	Provided to
Artificial Nest Hollow Monitoring Report	Documents the location and specifications of installed artificial hollows and monitoring results for hollow condition and use. Records maintenance, repair, replacement, relocation and other adaptive management actions undertaken in accordance with the Nest Hollow Management Plan.	Annually commencing one year after installation, or as otherwise specified in the approved Nest Hollow Management Plan.	Relevant results provided to NEPA, DWER and DBCA.
Incident or Non-compliance Notification	Describes any environmental incident, actual or potential non-compliance, unauthorised disturbance, significant unforeseen event or failure to implement an OMP commitment.	Notification as soon as practicable after the event is identified, and within any timeframe specified by the relevant approval condition.	NEPA and DWER where notification, approval is required.
Corrective Action and Adaptive Management Report	Documents investigation of a monitoring trigger or declining offset trajectory, the cause and significance of the issue, corrective or adaptive management measures selected, responsibilities and implementation timing, and the results of follow-up monitoring used to evaluate effectiveness.	Prepared when a trigger in **Section 9.3** is reached or when monitoring indicates that progressive performance indicators, completion criteria or approved offset outcomes may not be achieved.	NEPA and DWER where notification, approval or reporting is required.
Completion Criteria Verification Report	Provides the evidence required to demonstrate whether the final revegetation, habitat quality and artificial nest hollow completion criteria have been achieved.	Prepared when monitoring indicates that the completion criteria have been achieved, anticipated during Years 17-22.	NEPA and DWER in accordance with relevant approval conditions.

11.3 Data Management

Records relating to implementation of this OMP will be maintained for the duration of the offset and retained in accordance with relevant approval conditions. Data collected through monitoring, management activities and compliance inspections will be stored in the Proponent's environmental management system and may include monitoring results, site inspection records, management actions undertaken, spatial data, photographs and correspondence relevant to the offset.

Data will be maintained in a manner that provides a clear and auditable record of offset implementation and performance. Monitoring data will be reviewed following each monitoring event to assess performance against progressive performance indicators and progress towards achieving the completion criteria, and to inform any adaptive management measures required under this OMP.

11.4 OMP Review and Revision

This OMP will be implemented using an adaptive management approach and will be reviewed periodically to assess its effectiveness in meeting the progressive performance indicators and achieving the approved offset outcomes and completion criteria. Reviews will be undertaken every five years and may also be undertaken when:

- Monitoring indicates that progressive performance indicators are not being achieved.
- Monitoring identifies a decline in habitat condition or habitat function within the offset area.
- A significant disturbance event occurs, such as fire, storm damage, drought, disease outbreak or unauthorised clearing.

- Adaptive management measures are required to address unforeseen outcomes or risks.
- Monitoring methods, performance indicators or completion criteria are found to be ineffective or inappropriate.
- Approval conditions are amended, or regulatory requirements change.
- NEPA or DWER request a review or update of the OMP.

NEPA and DWER will be notified of any amendments to the OMP and the revised OMP will be submitted to NEPA and DWER for approval.

12.0 References

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Appendix A

Habitat Quality Scoring System



umwelt

A.1 Scoring system for the assessment of foraging value of vegetation for Black cockatoos.

Bamford Consulting Ecologists

Revised 4th April 2021

Introduction

Application of the Offset Assessment Guide (offsets guide) developed by the federal environment department for assessing Black-Cockatoo foraging habitat requires the calculation of a score out of 10. The following system has been developed by Bamford Consulting Ecologists (BCE) with assistance from Quessentia Consulting to provide an objective scoring system that is practical and can be used by trained field zoologists with experience in the environments frequented by the species.

The foraging value score provides a numerical value that reflects the significance of vegetation as foraging habitat for Black cockatoos, and this numerical value is designed to provide the information needed by the Federal Department of Agriculture, Water and the Environment (DAWE) to assess impact significance and offset requirements. The foraging value of the vegetation depends upon the type, density and condition of trees and shrubs in an area and can be influenced by the context such as the availability of foraging habitat nearby. The BCE scoring system for value of foraging habitat has three components as detailed above. These three components are drawn from the DAWE offsets guide but the scoring approach was developed by BCE and includes a fourth (moderation) component.

Note that the scoring system can only be applied within the range of the species or at least where the species could reasonably be expected to occur based upon existing information.

Calculating the total score (out of 10) requires the following steps:

A. Site condition. Determining a score out of six for the vegetation composition, condition and structure; plus

B. Site context. Determining a score out of three for the context of the site; plus

C. Species stocking rate. Determining a score out of one for species density.

D. Determining the total score out of 10, which may require moderation for context and species density with respect to the site condition (vegetation) score. Moderation also includes consideration of pine plantations as a special case for foraging value.

The BCE scoring system places the greatest weight on site condition (scale of 0 to 6) because this has the highest influence on the foraging values of a site, which in turn is the fundamental driver in meeting ecological requirements for continued survival.

Site context has a lower weight (scale of 0 to 3) in recognition of the mobility of the species, which means they can access good foraging habitat even in fragmented landscapes, but allowing for recognition of the extent of available habitat in a region and context in relation to activity (such as breeding and roosting). The application of scoring site context is further discussed below.

Species stocking rate is given a low weight (0 to 1) as it is a means only of recognising that a species may or may not be abundant at a site, but that abundance is dependent upon site condition and context and is thus not an independent variable. The abundance of a species is also sensitive to

sampling effort, and to seasonal and annual variation, and is therefore an unreliable indicator of actual importance of a site to a species.

Calculation of scores and the moderation process are described in detail below.

Appendix Table A.1 Site condition. Vegetation composition, condition and structure scoring.

Site Score	Description of Vegetation Values		
	Carnaby's Black-Cockatoo	**Baudin's Black-Cockatoo**	**Forest Red-tailed Black-Cockatoo**
0	No foraging value. No Proteaceae, eucalypts or other potential sources of food. Examples: Water bodies (e.g. salt lakes, dams, rivers); Bare ground; Developed sites devoid of vegetation (e.g. infrastructure, roads, gravel pits) or with vegetation of no food value, such as some suburban landscapes. Mown grass	No foraging value. No eucalypts or other potential sources of food. Examples: Water bodies (e.g. dams, rivers); Bare ground; Developed sites devoid of vegetation (e.g. infrastructure, roads, gravel pits).	No foraging value. No eucalypts or other potential sources of food. Examples: Water bodies (e.g. dams, rivers); Bare ground; Developed sites devoid of vegetation (e.g. infrastructure, roads, gravel pits).
1	Negligible to low foraging value. Examples: Scattered specimens of known food plants but projected foliage cover of these is < 2%. This could include urban areas with scattered foraging trees; Paddocks that are lightly vegetated with melons or other known food-source weeds (e.g. *Erodium* spp.) that represent a short-term and/or seasonal food source; Blue Gum plantations (foraging by Carnaby's Black cockatoos has been reported but appears to be unusual).	Negligible to low foraging value. Scattered specimens of known food plants but projected foliage cover of these < 1%. This could include urban areas with scattered foraging trees.	Negligible to low foraging value. Scattered specimens of known food plants but projected foliage cover of these < 1%. Could include urban areas with scattered foraging trees.

Site Score	Description of Vegetation Values		
	Carnaby's Black-Cockatoo	**Baudin's Black-Cockatoo**	**Forest Red-tailed Black-Cockatoo**
2	Low foraging value. Examples: Shrubland in which species of foraging value, such as shrubby banksias, have < 10% projected foliage cover; Woodland with tree banksias 2-5% projected foliage cover; Woodland with tree banksias (of key species *B. attenuata* and *B. menziesii*) with <10% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; Open eucalypt woodland/mallee of small-fruited species; Paddocks that are densely vegetated with melons or other known food-source weeds (e.g. *Erodium* spp.) that represent a short-term and/or seasonal food source.	Low foraging value. Examples: Woodland with scattered specimens of known food plants (e.g. Marri and Jarrah) 1-5% projected foliage cover; Marri-Jarrah Woodland with <10% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; Parkland-cleared Eucalypt Woodland/Forest with known food plants <10% projected foliage cover (poor long-term viability without management); Younger areas of (managed) revegetation with known food plants <10% projected foliage cover (establishing food sources with good long-term viability); Urban areas with scattered foraging trees.	Low foraging value. Examples: Woodland with scattered specimens of known food plants (e.g. Marri, Jarrah) 1-5% projected foliage cover; Marri-Jarrah Woodland with <10% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; Sheoak Woodland with <10% projected foliage cover; Parkland-cleared Eucalypt Woodland/Forest with known food plants <10% projected foliage cover (poor long-term viability without management); Younger areas of (managed) revegetation with known food plants <10% projected foliage cover (establishing food sources with good long-term viability); Urban areas with scattered food plants such as Cape Lilac, *Eucalyptus caesia* and *E. erythrocorys*.
3	Low to Moderate foraging value. Examples: Shrubland in which species of foraging value, such as shrubby banksias, have 10-20% projected foliage cover; Woodland with tree banksias 5-20% projected foliage cover; Woodland with tree banksias (of key species *B. attenuata* and *B. menziesii*) with 10-40% projected foliage cover but vegetation	Low to Moderate foraging value. Examples: Eucalypt Woodland with known food plants (especially Marri) 5-20% projected foliage cover; Marri-Jarrah Woodland with 10-40% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; Parkland-cleared Eucalypt Woodland/Forest with	Low to Moderate foraging value. Examples: Eucalypt Woodland with known food plants (especially Marri and Jarrah) 5-20% projected foliage cover; Marri-Jarrah Woodland with 10-40% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths;

Site Score	Description of Vegetation Values		
	Carnaby's Black-Cockatoo	**Baudin's Black-Cockatoo**	**Forest Red-tailed Black-Cockatoo**
	condition reduced due to weed invasion and/or some tree deaths; Eucalypt Woodland/Mallee of small-fruited species; Eucalypt Woodland with Marri < 10% projected foliage cover.	known food plants 10-40% projected foliage cover (poor long-term viability without management); Younger areas of (managed) revegetation with known food plants 10-40% projected foliage cover (establishing food sources with good long-term viability).	Sheoak Forest with 10-40% projected foliage cover; Parkland-cleared Eucalypt Woodland/Forest with known food plants 10-40% projected foliage cover (poor long-term viability without management); Younger areas of (managed) revegetation with known food plants 10-40% projected foliage cover (establishing food sources with good long-term viability).
4	Moderate foraging value. Examples: Woodland/low forest with tree banksias (of key species *B. attenuata* and *B. menziesii*) 20-40% projected foliage cover; Woodland/low forest with tree banksias (of key species *B. attenuata* and *B. menziesii*) with 40-60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; Kwongan/ Shrubland in which species of foraging value, such as shrubby banksias, have 20-40% projected foliage cover; Eucalypt Woodland/Forest with Marri 20-40% projected foliage cover.	Moderate foraging value. Examples: Marri-Jarrah Woodland/Forest with 20-40% projected foliage cover; Marri-Jarrah Forest with 40-60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; Parkland-cleared Eucalypt Woodland/Forest with known food plants 40-60% projected foliage cover (poor long-term viability without management); Younger areas of (managed) revegetation with known food plants 40-60% projected foliage cover (establishing food sources with good long-term viability); Orchards with highly desirable food sources (e.g. apples, pears, some stone fruits).	Moderate foraging value. Examples: Marri-Jarrah Woodland/Forest with 20-40% projected foliage cover; Marri-Jarrah Forest with 40-60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; Sheoak Forest with 40-60% projected foliage cover; Parkland-cleared Eucalypt Woodland/Forest with known food plants 40-60% projected foliage cover (poor long-term viability without management); Younger areas of (managed) revegetation with known food plants 40-60% projected foliage cover (establishing food sources with good long-term viability).

Site Score	Description of Vegetation Values		
	Carnaby's Black-Cockatoo	**Baudin's Black-Cockatoo**	**Forest Red-tailed Black-Cockatoo**
5	Moderate to High foraging value. Examples: Banksia Low Forest (of key species *B. attenuata* and *B. menziesii*) with 40-60% projected foliage cover; Banksia Low Forest (of key species *B. attenuata* and *B. menziesii*) with > 60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; Kwongan/ Shrubland in which species of foraging value, such as shrubby banksias, have 40-60% projected foliage cover; Marri-Jarrah Forest with 40-60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium term). Pine plantations with trees more than 10 years old (but see pine note below in moderation section).	Moderate to High foraging value. Examples: Marri-Jarrah Forest with 40-60% projected foliage cover; Marri-Jarrah Forest with > 60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; Parkland-cleared Eucalypt Woodland/Forest with known food plants >60% projected foliage cover (poor long-term viability without management); Younger areas of (managed) revegetation with known food plants >60% projected foliage cover (establishing food sources with good long-term viability).	Moderate to High foraging value. Examples: Marri-Jarrah Forest with 40-60% projected foliage cover; Marri-Jarrah Forest with > 60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; Sheoak Forest with > 60% projected foliage cover; Parkland-cleared Eucalypt Woodland/Forest with known food plants >60% projected foliage cover (poor long-term viability without management); Younger areas of (managed) revegetation with known food plants >60% projected foliage cover (establishing food sources with good long-term viability).
6	High foraging value. Example: Banksia Low Forest (of key species *B. attenuata* and *B. menziesii*) with > 60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium term).	High foraging value. Example: Marri-Jarrah Forest with > 60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium term).	High foraging value. Example: Marri-Jarrah Forest with > 60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium term).

Site Score	Description of Vegetation Values		
	Carnaby's Black-Cockatoo	**Baudin's Black-Cockatoo**	**Forest Red-tailed Black-Cockatoo**
	Kwongan/ Shrubland in which species of foraging value, such as shrubby banksias, have >60% projected foliage cover; Marri-Jarrah Forest with > 60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium term).		

Vegetation structural class terminology follows Keighery (1994).

Site context

Site Context is a function of site size, availability of nearby habitat and the availability of nearby breeding areas. Site context includes consideration of connectivity, although Black cockatoos are very mobile and will fly across paddocks to access foraging sites. Based on BCE observations, Black cockatoos are unlikely to regularly go over open ground for a distance of more than a few kilometres and prefer to follow tree-lines.

The maximum score for site context is 3, and because it is effectively a function of presence/absence of nearby breeding and the distribution of foraging habitat across the landscape, the following table, developed by Bamford Consulting in conjunction with the Department of the Environment and Energy (DEE), provides a *guide* to the assignation of site context scores. Note that 'local area' is defined as within a 15 km radius of the centre point of the study site. This is greater than the maximum distance of 12km known to be flown by Carnaby's Black-Cockatoo when feeding chicks in the nest.

Site Context Score	Percentage of the existing native vegetation within the 'local' area that the study site represents.	
	'Local' breeding known/likely	**'Local' breeding unlikely**
3	> 5%	> 10%
2	1 - 5%	5 - 10%
1	0.1 - 1%	1 - 5%
0	< 0.1%	< 1%

The table above provides weighting for where nearby breeding is known (or suspected) and for the proportion of foraging habitat within 15 km represented by the site being assessed. Some adjustments may be needed based on the judgement of the assessor and in relation to the likely function of the site. For example, a small area of foraging habitat (e.g. 0.5% of such habitat within 15 km) could be upgraded to a context of 2 if it formed part of a critical movement corridor. In

contrast, the same sized area of habitat, of the same local proportion, could be downgraded if it were so isolated that birds could never access it.

Species density (stocking rate)

Species stocking rate is described as "the usage and/or density of a species at a particular site" in the offsets guide. The description also implies that a site supports a discrete population, which is unlikely in the case of very mobile black cockatoos. Assignation of the species density score (0 or 1) is based upon the black cockatoo species being either abundant or not abundant. A score of 1 is used where the species is seen or reported regularly and/or there is abundant foraging evidence. Regularly is when the species is seen at intervals of every few days or weeks for at least several months of the year. A score of 0 is used when the species is recorded or reported very infrequently and there is little or no foraging evidence. Where information on actual presence of birds is lacking, a species density score can be assigned by interpreting the landscape and the site context. For example, a site with a moderate condition score that is part of a network of such habitat where a black cockatoo species is known would get a species density score of 1 even without clear presence data, while a species density score of 0 can be assigned to a site where the level of usage can confidently be predicted to be low.

Moderation of scores for the calculation of a value out of 10

The calculation out of 10 requires the vegetation characteristics (out of 6) to be combined with the scores given for context and species density. It is considered that the context and density scores are not independent of vegetation characteristics; otherwise habitat of absolutely no value for black cockatoo foraging (such as concrete or a wetland) could get a foraging score out of 10 as high as 4 if it occurred in an area where the species breed (context score of 3) and are abundant (species density score of 1). Similarly, vegetation of negligible or low characteristics which could not support black cockatoos could be assigned a score as high as 6 out of 10. In that case, the score of 6 would be more a reflection of nearby vegetation of high characteristics than of the foraging value of the negligible to low scoring vegetation. The Black cockatoos would only be present because of vegetation of high characteristics, so applying the context and species density scores to vegetation of low characteristics would not give a true reflection of their foraging value.

For this reason, the context and species density scores need to be moderated for the vegetation characteristic score to prevent vegetation of little or no foraging value receiving an excessive score out of 10. A simple approach is to assign a context and species density score of zero to sites with a Condition score of low (2), negligible (1) or none (0), on the basis that birds will not use such areas unless they are adjacent to at least low-moderate quality foraging habitat (≥3). The approach to calculating a score out of 10 can be summarised as follows:

Vegetation composition, condition and structure score	Context score	Species density score
3-6 (low/moderate to high value)	Assessed as per B above	Assessed as per C above
0-2 (no to low value)	0	0

Note that this moderation approach may require interpretation depending on the context. For example, vegetation with a condition score of 2 could be given a context score of 1 under special

circumstances. Such as when very close to a major breeding area or if strategically located along a movement corridor.

Pine plantations

Pine plantations are an important foraging resource for Carnaby's Black-Cockatoo (only) but are not directly comparable with native vegetation. In comparing native vegetation with pine plantations for the purpose of calculating offsets, the following should be noted:

- Pine plantations are a commercial crop established with the intention of being harvested and thus have short-term availability (30-50 years), whereas native vegetation is available indefinitely if protected. Due to the temporary nature of pines as a food source, site condition and context differs between pines and native vegetation.
- Although pines provide a high abundance of food in the form of seeds, they are a limited food resource compared with native vegetation which provides seeds, insect larvae, flowers and nectar. The value of insect larvae in the diet of Carnaby's Black-Cockatoo has not been quantified, but in the vicinity of Perth, the birds forage very heavily on insect larvae in young cones of *Banksia attenuata* in winter, ignoring the seeds in these cones and seeds in older cones on the same trees (Scott and Black 1981; M. Bamford pers. obs.). This suggests that insect larvae are of high nutritional importance immediately prior to the breeding season.
- Pine plantations have very little biodiversity value other than their importance as a food source for Carnaby's Black cockatoos. They inhibit growth of other flora. While this is not a factor for direct consideration with respect to Carnaby's Black-Cockatoo, it is a factor in regional conservation planning of which offsets for the cockatoos are a part.

Taking the above points into consideration, it is possible to assign pine plantations a foraging value as follows:

- Site condition. The actual foraging value of pines is high. Stock *et al.* (2013) report that it takes nearly twice as many seeds of *Pinus pinaster* to meet the daily energy requirements for Carnaby's Black-Cockatoo compared with Marri, and three times as many *P. pinaster* seeds compared with Slender Banksia. However, pines are planted at a high density so the food supply per hectare can be high. Taking account of the lack of variety of food from pines, this suggests a site condition score of 4 or 5 out of 6 (5 is used in Section A above). As a source of food, pines are thus comparable to the best banksia woodland. This site condition score then needs to be adjusted to take account of the short-term nature of the food supply (for pine plantations to be harvested. Where pines are 'ornamental, such as in some urban contexts, they can be treated as with other trees in urban landscapes). The foraging value of a site after pines are harvested will effectively be 0, or possibly 1 if there is some retention. It is proposed that this should approximately halve the site condition score; young pine plantations could be redacted slightly less than old plantations on the basis that a young plantation provides a slightly longer-term food supply. If a maximum site condition score of 5 is given, then a young plantation (>10 but <30 years old) could be assigned a score of 3, and an old plantation (>30 years old) could be assigned a score of 2. Plantations <10 years old and thus not producing large quantities of cones could also get a score of 2, but recognising they may increase in value.

- Site context. Although a temporary food source, pines can be very important for Carnaby's Black-Cockatoo in some contexts; they could be said to carry populations in areas where there is little native vegetation. The system for assigning a context score as outlined above (Section B) also applies to pines. Thus, a context score of 3 can be given where pines are a significant proportion of foraging habitat (>5% if breeding occurs; >10% if no breeding), but where pines are a small part of the foraging landscape they will receive a context score of less than this. Species density. As outlined above (Section C), pines will receive a species density score of 1 where Carnaby's Black-Cockatoo are regular visitors. This is irrespective of an old plantation having a moderated condition score of 2.

Based on the above, pine plantations that represent a substantial part of the foraging landscape, such as in the region immediately north of Perth, would receive a total score (out of 10) of 6; young plantations in this area would receive a score of 7. In contrast, isolated and small plantations in rural landscapes could receive a score of just 2 if they are only a small proportion of foraging habitat and Carnaby's Black cockatoos are not regularly present.

Appendix B

Offset Calculator Inputs

B.1 Offset Attribute Assumptions

Table B.1 outlines the inputs applied in the Commonwealth Offset Assessment Guide and the rationale for each input. These values were derived with consideration of the Offset Assessment Guide (DCCEEW, 2022) and further informed by discussions with DCCEEW on 3 June 2026.

Appendix Table B.1 Commonwealth Offset Assessment Guide Assumptions for Black Cockatoo Foraging Habitat

Attribute	Input Value	Rationale
Time over which loss is averted (duration of offset)	20 years	Maximum calculator value.
Time until ecological benefit	17 years	• 2 years to commence revegetation. • Published studies from south-west Western Australia demonstrate that revegetation with Marri and Proteaceous species (Banksia, Hakea) can begin providing black cockatoo foraging resources within the first decade following establishment, with feeding by black cockatoos recorded within 7-8 years of revegetation (Doherty et al., 2016; Lee et al., 2013). The studies indicate that habitat values increase progressively as revegetation matures and support the use of a 15-year monitoring period as a precautionary and ecologically realistic timeframe for demonstrating progression toward a self-sustaining Marri woodland ecosystem.
Start quality (0-10)*	2	Bamford foraging scale applied during site assessment. Cleared cropping land with very isolated paddock trees (<2%).
Future quality without offset (0-10)*	1 – CBC 0 - FRTBC	• Review of aerial photography indicates that remnant trees in the offset area appear to have reduced by 50% in the past 10 years, and further loss of paddock trees in adjacent areas was observed whilst on site. Therefore, there is a high likelihood that in the next 20 years the remaining paddock trees in the offset area will also be removed. • Crops provide foraging value for Carnaby's Black-Cockatoo in the absence of paddock trees.
Future quality with offset (1-10)*	6 - 7	Revegetation and implementation of adaptive management and monitoring as per the OMP is expected to result in a foraging habitat quality of 6, which will offset impact areas with quality up to 6, comprising: • Quality score of 6 (20-40% Marri woodland); comprising site condition score of 4, site context score of 1, species density score of 1. A portion of the revegetation will aim to achieve a foraging HQS 7 to offset impact areas with value of 7, comprising: • Quality score of 5 (40-60% Banksia woodland); comprising site condition score of 5, site context score of 1, species density score of 1.

Attribute	Input Value	Rationale
Risk of loss without offset	0%	NEPA advised that they apply a 0% risk of loss without offset based on the assumption there would be no clearing of habitat without NEPA approval.
Risk of loss with offset	0%	NEPA advised that they apply a standard 0% risk of loss with offset.
Confidence in result (averted loss)	80%	There remains some potential failure due to unforeseen natural events (storm, fire).
Confidence in results (change in quality)	70%	Value assigned based on discussion with NEPA, indicating that the 70% confidence is the maximum value that is generally accepted. Strategies and management approaches to maximise confidence in the result comprise: • Selection of an appropriate site with indicative soil characteristics to support the proposed revegetation type • Management actions outlined in the OMP including: ○ offset protection through conservation covenant ○ revegetation by a specialist, with infill planting/seeding to be undertaken where indicated by monitoring results ○ access control, herbivore management, weed control, hygiene management • Monitoring and adaptive management. Low rainfall region and episodic weather conditions may affect results.
Percentage of impact offset target	100%	The proposed offset will counterbalance at least 100% of residual impacts

*Foraging habitat quality as per the Bamford (2020) scale

Table B.2 outlines the inputs applied in the WA Offset Calculator for black cockatoo foraging habitat and native vegetation and the rationale for each input. These values were derived with consideration of the Environmental Offsets Guidelines (Government of Western Australia, 2014b), Clearing of Native Vegetation Offsets Procedure (Government of Western Australia, 2014a) and informed by discussions with DWER on 8 June 2026.

Appendix Table B.2 WA Offset Calculator Assumptions for Black Cockatoo Foraging Habitat and Native Vegetation

Attribute	Input Value	Rationale
General Attributes		
Time over which loss is averted (duration of offset)	20 years	Maximum calculator value.
Time until ecological benefit	17 years	• 2 years to commence revegetation. • Published studies from south-west Western Australia demonstrate that revegetation with Marri and Proteaceous species (Banksia, Hakea) can begin providing black cockatoo foraging resources within the first decade following establishment, with feeding by black cockatoos recorded

Attribute	Input Value	Rationale
		within 7-8 years of revegetation (Doherty et al., 2016; Lee et al., 2013). The studies indicate that habitat values increase progressively as revegetation matures and support the use of a 15-year monitoring period as a precautionary and ecologically realistic timeframe for demonstrating progression toward a self-sustaining Marri woodland ecosystem.
Risk of loss without offset	80%	There is a likelihood that the site could be cleared in the next 20 years. Aerial photography shows that remnant trees in the offset area have reduced by 50% in the past 10 years.
Risk of loss with offset	5%	With the offset there is a low risk of future loss as the land will be placed under conservation covenant for perpetuity and managed under an Offset Management Plan.
Confidence in result	80%	The OMP includes measures to achieve offset success such as: • offset protection through conservation covenent • revegetation by a specialist, with infill planting/seeding • management actions (access control, grazing control, weed control, hygiene management) • monitoring and corrective actions. Residual potential for failure due to natural events (storm, fire). Confidence applies to the entire offset.
Percentage of impact offset target	100%	The proposed offset will counterbalance at least 100% of residual impacts
Black Cockatoo Foraging Habitat		
Start quality (0-10)*	2	Bamford foraging scale applied during site assessment. Cleared cropping land with very isolated paddock trees (<2%).
Future quality without offset (0-10)*	1 – CBC 0 - FRTBC	Site observations and historic aerial photos suggest that loss of the remaining paddock trees is likely in the next 20 years. Crops provide foraging value for Carnaby's Black-Cockatoo in the absence of paddock trees.
Future quality with offset (1-10)*	6	Revegetation and implementation of adaptive management and monitoring as per the OMP is expected to result in a foraging habitat quality of at least 6 (Bamford, 2020) within 15 years comprising: • Vegetation quality score of 6 (20-40% Marri woodland or 20-40% Banksia woodland); comprising site condition score of 4, site context score of 1, species density score of 1.
Native Vegetation		
Start quality (0-10)	2.5	The area is completely degraded with seven isolated paddock trees, but still retains foraging habitat value.
Future quality without offset (0-10)	2.5	Site observations and historic aerial photos suggest that loss of the remaining paddock trees is likely in the next 20 years.
Future quality with offset (1-10)	5	Revegetation and implementation of adaptive management and monitoring as per the OMP is expected to result in a vegetation quality of 5 (Good condition).

*Foraging habitat quality as per the Bamford (2020) scale

Appendix C

Commonwealth Offset Assessment Guides

umwelt

Offsets Assessment Guide

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

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Carnaby's Black-cockatoo
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	**1.2%**

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

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes	Native vegetation remnant, isolated trees and planted vegetation providing foraging habitat	**Area**	6.73	Hectares	Targeted fauna survey and habitat quality scoring using Bamford scale
			Quality	**1**	Scale 0-10	
			Total quantum of impact	0.67	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				**Risk-related time horizon (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**									
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0								
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**									
Threatened species habitat																				
Area of habitat	Yes	0.67	Adjusted hectares	Revegetation of cleared land	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	2.36	**Risk of loss (%) without offset**	0%	**Risk of loss (%) with offset**	0%	0.00	80%	0.00	0.00	0.67	100.21%	Yes	
									Future area without offset (adjusted hectares)	2.4	**Future area with offset (adjusted hectares)**	2.4								
					Time until ecological benefit	17	**Start quality (scale of 0-10)**	**2**	**Future quality without offset (scale of 0-10)**	**1**	**Future quality with offset (scale of 0-10)**	**6**	5.00	70%	3.50	2.86				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	0.673	0.67	100.21%	**Yes**	$0.00	N/A	$0.00
Area of community	0				$0.00		$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

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Carnaby's Black-cockatoo
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	**1.2%**

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

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes	Native vegetation remnant, isolated trees and planted vegetation providing foraging habitat	**Area**	4.33	Hectares	Targeted fauna survey and habitat quality scoring using Bamford scale
			Quality	**2**	Scale 0-10	
			Total quantum of impact	0.87	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				**Risk-related time horizon (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**									
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0								
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**									
Threatened species habitat																				
Area of habitat	Yes	0.87	Adjusted hectares	Revegetation of cleared land	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	3.04	**Risk of loss (%) without offset**	0%	**Risk of loss (%) with offset**	0%								
									Future area without offset (adjusted hectares)	3.0	**Future area with offset (adjusted hectares)**	3.0	0.00	80%	0.00	0.00	0.87	100.31%	Yes	
					Time until ecological benefit	17	**Start quality (scale of 0-10)**	**2**	**Future quality without offset (scale of 0-10)**	**1**	**Future quality with offset (scale of 0-10)**	**6**	5.00	70%	3.50	2.86				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	0.866	0.87	100.31%	**Yes**	$0.00	N/A	$0.00
Area of community	0				$0.00		$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

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Carnaby's Black-cockatoo
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	**1.2%**

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

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes	Native vegetation remnant, isolated trees and planted vegetation providing foraging habitat	**Area**	7.26	Hectares	Targeted fauna survey and habitat quality scoring using Bamford scale
			Quality	**5**	Scale 0-10	
			Total quantum of impact	3.63	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				**Risk-related time horizon (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**									
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0								
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**									
Threatened species habitat																				
Area of habitat	Yes	3.63	Adjusted hectares	Revegetation of cleared land	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	12.71	**Risk of loss (%) without offset**	0%	**Risk of loss (%) with offset**	0%	0.00	80%	0.00	0.00	3.63	100.05%	Yes	
									Future area without offset (adjusted hectares)	12.7	**Future area with offset (adjusted hectares)**	12.7								
					Time until ecological benefit	17	**Start quality (scale of 0-10)**	2	**Future quality without offset (scale of 0-10)**	1	**Future quality with offset (scale of 0-10)**	6	5.00	70%	3.50	2.86				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	3.63	3.63	100.05%	**Yes**	$0.00	N/A	$0.00
Area of community	0				$0.00		$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

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Carnaby's Black-cockatoo
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	**1.2%**

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

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes	Native vegetation remnant, isolated trees and planted vegetation providing foraging habitat	**Area**	2.68	Hectares	Targeted fauna survey and habitat quality scoring using Bamford scale
			Quality	**6**	Scale 0-10	
			Total quantum of impact	1.61	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				**Risk-related time horizon (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**									
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0								
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**									
Threatened species habitat																				
Area of habitat	Yes	1.61	Adjusted hectares	Revegetation of cleared land	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	5.63	**Risk of loss (%) without offset**	0%	**Risk of loss (%) with offset**	0%	0.00	80%	0.00	0.00	1.61	100.05%	Yes	
									Future area without offset (adjusted hectares)	5.6	**Future area with offset (adjusted hectares)**	5.6								
					Time until ecological benefit	17	**Start quality (scale of 0-10)**	**2**	**Future quality without offset (scale of 0-10)**	**1**	**Future quality with offset (scale of 0-10)**	**6**	5.00	70%	3.50	2.86				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	1.608	1.61	100.05%	**Yes**	$0.00	N/A	$0.00
Area of community	0				$0.00		$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

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Carnaby's Black-cockatoo
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	**1.2%**

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

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes	Native vegetation remnant, isolated trees and planted vegetation providing foraging habitat	**Area**	0.65	Hectares	Targeted fauna survey and habitat quality scoring using Bamford scale
			Quality	**7**	Scale 0-10	
			Total quantum of impact	0.46	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				**Risk-related time horizon (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**									
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0								
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**									
Threatened species habitat																				
Area of habitat	Yes	0.46	Adjusted hectares	Revegetation of cleared land	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	1.33	**Risk of loss (%) without offset**	0%	**Risk of loss (%) with offset**	0%								
									Future area without offset (adjusted hectares)	1.3	**Future area with offset (adjusted hectares)**	1.3	0.00	80%	0.00	0.00	0.46	100.24%	Yes	
					Time until ecological benefit	17	**Start quality (scale of 0-10)**	**2**	**Future quality without offset (scale of 0-10)**	**1**	**Future quality with offset (scale of 0-10)**	**7**	6.00	70%	4.20	3.43				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	0.455	0.46	100.24%	**Yes**	$0.00	N/A	$0.00
Area of community	0				$0.00		$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

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Forest Red-tailed Black-cockatoo
EPBC Act status	Vulnerable
Annual probability of extinction Based on IUCN category definitions	**0.2%**

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

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes	Native vegetation remnant, isolated trees and planted vegetation providing foraging habitat for Forest Red-tailed Black-cockatoo	**Area**	0.21	Hectares	Targeted fauna survey and habitat quality scoring using Bamford scale
			Quality	**1**	Scale 0-10	
			Total quantum of impact	0.02	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				**Risk-related time horizon (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**									
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0								
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**									
Threatened species habitat																				
Area of habitat	Yes	FALSE	Adjusted hectares	Revegetation of cleared land	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	0.06	**Risk of loss (%) without offset**	0%	**Risk of loss (%) with offset**	0%	0.00	80%	0.00	0.00	0.02	115.99%	Yes	
									Future area without offset (adjusted hectares)	0.1	**Future area with offset (adjusted hectares)**	0.1								
					Time until ecological benefit	17	**Start quality (scale of 0-10)**	**2**	**Future quality without offset (scale of 0-10)**	**0**	**Future quality with offset (scale of 0-10)**	**6**	6.00	70%	4.20	4.06				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	0.021	0.02	115.99%	**Yes**	$0.00	N/A	$0.00
Area of community	0				$0.00		$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

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Forest Red-tailed Black-cockatoo
EPBC Act status	Vulnerable
Annual probability of extinction Based on IUCN category definitions	**0.2%**

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

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes	Native vegetation remnant, isolated trees and planted vegetation providing foraging habitat for Forest Red-tailed Black-cockatoo	**Area**	2.76	Hectares	Targeted fauna survey and habitat quality scoring using Bamford scale
			Quality	**2**	Scale 0-10	
			Total quantum of impact	0.55	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				**Risk-related time horizon (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**									
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0								
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**									
Threatened species habitat																				
Area of habitat	Yes	0.55	Adjusted hectares	Revegetation of cleared land	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	1.36	**Risk of loss (%) without offset**	0%	**Risk of loss (%) with offset**	0%	0.00	80%	0.00	0.00	100.02%	Yes		
									Future area without offset (adjusted hectares)	1.4	**Future area with offset (adjusted hectares)**	1.4								
					Time until ecological benefit	17	**Start quality (scale of 0-10)**	**2**	**Future quality without offset (scale of 0-10)**	**0**	**Future quality with offset (scale of 0-10)**	**6**	6.00	70%	4.20	4.06				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	0.552	0.55	100.02%	**Yes**	$0.00	N/A	$0.00
Area of community	0				$0.00		$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

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Matter of National Environmental Significance	
Name	Forest Red-tailed Black-cockatoo
EPBC Act status	Vulnerable
Annual probability of extinction Based on IUCN category definitions	**0.2%**

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

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes	Native vegetation remnant, isolated trees and planted vegetation providing foraging habitat for Forest Red-tailed Black-cockatoo	**Area**	3.09	Hectares	Targeted fauna survey and habitat quality scoring using Bamford scale
			Quality	**5**	Scale 0-10	
			Total quantum of impact	1.55	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				**Risk-related time horizon (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**									
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0								
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**									
Threatened species habitat																				
Area of habitat	Yes	1.55	Adjusted hectares	Revegetation of cleared land	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	3.81	**Risk of loss (%) without offset**	0%	**Risk of loss (%) with offset**	0%	0.00	80%	0.00	0.00	1.55	100.11%	Yes	
									Future area without offset (adjusted hectares)	3.8	**Future area with offset (adjusted hectares)**	3.8								
					Time until ecological benefit	17	**Start quality (scale of 0-10)**	**2**	**Future quality without offset (scale of 0-10)**	**0**	**Future quality with offset (scale of 0-10)**	**6**	6.00	70%	4.20	4.06				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	1.545	1.55	100.11%	**Yes**	$0.00	N/A	$0.00
Area of community	0				$0.00		$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

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Matter of National Environmental Significance	
Name	Forest Red-tailed Black-cockatoo
EPBC Act status	Vulnerable
Annual probability of extinction Based on IUCN category definitions	**0.2%**

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

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes	Native vegetation remnant, isolated trees and planted vegetation providing foraging habitat for Forest Red-tailed Black-cockatoo	**Area**	3.27	Hectares	Targeted fauna survey and habitat quality scoring using Bamford scale
			Quality	**6**	Scale 0-10	
			Total quantum of impact	1.96	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				**Risk-related time horizon (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**									
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0								
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**									
Threatened species habitat																				
Area of habitat	Yes	1.96	Adjusted hectares	Revegetation of cleared land	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	4.84	**Risk of loss (%) without offset**	0%	**Risk of loss (%) with offset**	0%								
									Future area without offset (adjusted hectares)	4.8	**Future area with offset (adjusted hectares)**	4.8	0.00	80%	0.00	0.00	1.96	100.15%	Yes	
					Time until ecological benefit	17	**Start quality (scale of 0-10)**	**2**	**Future quality without offset (scale of 0-10)**	**0**	**Future quality with offset (scale of 0-10)**	**6**	6.00	70%	4.20	4.06				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	1.962	1.96	100.15%	**Yes**	$0.00	N/A	$0.00
Area of community	0				$0.00		$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

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Matter of National Environmental Significance	
Name	Forest Red-tailed Black-cockatoo
EPBC Act status	Vulnerable
Annual probability of extinction Based on IUCN category definitions	**0.2%**

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

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes	Native vegetation remnant, isolated trees and planted vegetation providing foraging habitat for Forest Red-tailed Black-cockatoo	**Area**	0.03	Hectares	Targeted fauna survey and habitat quality scoring using Bamford scale
			Quality	**7**	Scale 0-10	
			Total quantum of impact	0.02	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				**Risk-related time horizon (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**									
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0								
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**									
Threatened species habitat																				
Area of habitat	Yes	FALSE	Adjusted hectares	Revegetation of cleared land	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	0.05	**Risk of loss (%) without offset**	0%	**Risk of loss (%) with offset**	0%	0.00	80%	0.00	0.00	0.02	112.77%	Yes	
									Future area without offset (adjusted hectares)	0.1	**Future area with offset (adjusted hectares)**	0.1								
					Time until ecological benefit	17	**Start quality (scale of 0-10)**	**2**	**Future quality without offset (scale of 0-10)**	**0**	**Future quality with offset (scale of 0-10)**	**7**	7.00	70%	4.90	4.74				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	0.021	0.02	112.77%	**Yes**	$0.00	N/A	$0.00
Area of community	0				$0.00		$0.00
					$0.00	**$0.00**	**$0.00**

Appendix D

WA Offset Calculator Outputs

WA Environmental Offsets Calculator

Step 3: Calculating offsets

Key:	
	Data to be entered
	Drop-down selection
	Automatically-generated scores

Environmental value (step 1)	Carnaby's black cockatoo foraging habitat	Significant impact (step 2, part A)	2.99
		Rehabilitation credit (step 2, part B)	0.00
		Significant residual impact (step 2, part C)	0.30

***Area* (offset site)**

Offset calculation *Area*							
Offsets calculation	**Description**	**Proposed offset (area in hectares)**	2.99	**Duration of offset implementation (maximum 20 years)**	20.00	**Offset value**	**1.51**
	Revegetation	**Current quality of offset site (scale)**	2.00	**Time until offset site secured (years)**	2.00		**504.7%**
		Future quality WITHOUT offset (scale)	1.00	**Risk of future loss WITHOUT offset (%)**	80.0%		
		Future quality WITH offset (scale)	6.00	**Risk of future loss WITH offset (%)**	5.0%		
		Time until ecological benefit (years)	17.00				
		Confidence in offset result (%)	80.0%			**OFFSET ADEQUATE?**	**YES**

WA Environmental Offsets Calculator

Rationale for scores used in the offsets calculator

Environmental value to be offset			
Calculation	***Score (Area)***		***Rationale***
Conservation significance			
Description	Carnaby's black cockatoo foraging habitat		Carnaby's Black-cockatoo foraging habitat
Type of environmental value	Vegetation/habitat		Fauna species
Conservation significance of environmental value	Rare/threatened species - endangered		Endangered under the Biodiversity Conservation Act
Landscape-level value impacted	yes/no		Yes
Significant impact			
Description	Carnaby's black cockatoo foraging habitat		The impact area includes native vegetation that is suitable as foraging habitat for Carnaby's Black-cockatoo
Significant impact (hectares) / Type of feature	2.99		Extent of Carnaby's Cockatoo foraging habitat (HQS 1) within the application area.
Quality (scale) / Number	1.00		The clearing area includes a mixture of primary and secondary species for Carnaby's cockatoo in the form of Marri, Flooded Gum, Banksia, Blackbutt, York Gum, within a 12 km radius of known Carnaby's Cockatoo roosting sites
Rehabilitation credit			
Description	n/a		n/a
Proposed rehabilitation (area in hectares)	0.00		n/a
Current quality of rehabilitation site / Start number (of type of feature)	0.00		n/a
Future quality WITHOUT rehabilitation (scale) / Future number WITHOUT rehabilitation	0.00		n/a
Future quality WITH rehabilitation (scale) / Future number WITH rehabilitation	0.00		n/a
Time until ecological benefit (years)	0.00		n/a
Confidence in rehabilitation result (%)	0		n/a
Offset			
Description	Revegetation		Revegetation and conservation of completely degraded areas.
Proposed offset (area in hectares)	2.99		The calculated offset will counterbalance 100% of the significant residual impacts of the proposed clearing.
Current quality of offset site / Start number (of type of feature)	2.00		The area is completely degraded, with isolated paddock trees.
Future quality WITHOUT offset (scale) / Future number WITHOUT offset	1.00		Site observations and historic aerial photos suggest that loss of the remaining paddock trees is likely in the next 20 years. Crops provide foraging value for Carnaby's Black-Cockatoo in the absence of paddock trees.
Future quality WITH offset (scale) / Future number WITH offset	6.00		Proposed offset site anticipated to achieve minimum HQS of 6 for Carnaby's Black-cockatoo foraging habitat (Bamford 2020). This score was selected as a score of 5 is typically applied to foraging habitat with low density of primary foraging species. A score of 7 is not considered justified as the proposed offset area is more than 12 km from known roosting/breeding sites and is outside the area considered most significant for black cockatoo survival. Future quality will be achieved through appropriate soil preparation, extensive direct planting/seeding, and management including fencing, weed control, and follow up planting if required.
Time until ecological benefit (years)	17.00		Revegetation activities are planned to commence in two years, with environmental benefits for the impacted species expected to be realised over a 15-year timeframe.
Confidence in offset result (%)	0.8		There is a high level of confidence that on-ground actions guided by a DWER-approved revegetation management plan will improve fauna habitat quality at the site. A reputable revegetation contractor will use well known restoration methods to restore vegetation suitable as foraging habitat for Carnaby's Black-cockatoo. Ongoing management and protection of the offset through covenant will contribute to the success of the offset.
Duration of offset implementation (maximum 20 years)	20.00		The offset will be placed under covenant for perpetuity. 20 years is the maximum value that can be input.
Time until offset site secured (years)	2.00		Time required until the protection of the offset area in perpetuity is finalised through the conservation covenant under the Soil and Land Conservation Act 1945.
Risk of future loss WITHOUT offset (%)	80.0%		The offset site is situated in a rural area.
Risk of future loss WITH offset (%)	5.0%		The level of protection afforded by the offset reduces the risk of vegetation loss at the offset site to 5%.
Offset ratio (Conservation area only)	N/A		NA

WA Environmental Offsets Calculator

Step 3: Calculating offsets

Key:	
	Data to be entered
	Drop-down selection
	Automatically-generated scores

Environmental value (step 1)	Carnaby's black cockatoo foraging habitat	Significant impact (step 2, part A)	3.55
		Rehabilitation credit (step 2, part B)	0.00
		Significant residual impact (step 2, part C)	0.71

Area **(offset site)**

Offset calculation *Area*							
Offsets calculation	**Description**	**Proposed offset (area in hectares)**	3.55	**Duration of offset implementation (maximum 20 years)**	20.00	**Offset value**	**1.79**
	Revegetation	**Current quality of offset site (scale)**	2.00	**Time until offset site secured (years)**	2.00		**252.4%**
		Future quality WITHOUT offset (scale)	1.00	**Risk of future loss WITHOUT offset (%)**	80.0%		
		Future quality WITH offset (scale)	6.00	**Risk of future loss WITH offset (%)**	5.0%		
		Time until ecological benefit (years)	17.00				
		Confidence in offset result (%)	80.0%			**OFFSET ADEQUATE?**	**YES**

WA Environmental Offsets Calculator

Rationale for scores used in the offsets calculator

Environmental value to be offset			
Calculation	***Score (Area)***		***Rationale***
Conservation significance			
Description	Carnaby's black cockatoo foraging habitat		Carnaby's Black-cockatoo foraging habitat
Type of environmental value	Vegetation/habitat		Fauna species
Conservation significance of environmental value	Rare/threatened species - endangered		Endangered under the Biodiversity Conservation Act
Landscape-level value impacted	yes/no		Yes
Significant impact			
Description	Carnaby's black cockatoo foraging habitat		The impact area includes native vegetation that is suitable as foraging habitat for Carnaby's Black-cockatoo
Significant impact (hectares) / Type of feature	3.55		Extent of Carnaby's Cockatoo foraging habitat (HQS 2) within the application area.
Quality (scale) / Number	2.00		The clearing area includes a mixture of primary and secondary species for Carnaby's cockatoo in the form of Marri, Flooded Gum, Banksia, Blackbutt, York Gum, within a 12 km radius of known Carnaby's Cockatoo roosting sites
Rehabilitation credit			
Description	n/a		n/a
Proposed rehabilitation (area in hectares)	0.00		n/a
Current quality of rehabilitation site / Start number (of type of feature)	0.00		n/a
Future quality WITHOUT rehabilitation (scale) / Future number WITHOUT rehabilitation	0.00		n/a
Future quality WITH rehabilitation (scale) / Future number WITH rehabilitation	0.00		n/a
Time until ecological benefit (years)	0.00		n/a
Confidence in rehabilitation result (%)	0		n/a
Offset			
Description	Revegetation		Revegetation and conservation of completely degraded areas.
Proposed offset (area in hectares)	3.55		The calculated offset will counterbalance 100% of the significant residual impacts of the proposed clearing.
Current quality of offset site / Start number (of type of feature)	2.00		The area is completely degraded, with isolated paddock trees.
Future quality WITHOUT offset (scale) / Future number WITHOUT offset	1.00		Site observations and historic aerial photos suggest that loss of the remaining paddock trees is likely in the next 20 years. Crops provide foraging value for Carnaby's Black-Cockatoo in the absence of paddock trees.
Future quality WITH offset (scale) / Future number WITH offset	6.00		Proposed offset site anticipated to achieve minimum HQS of 6 for Carnaby's Black-cockatoo foraging habitat (Bamford 2020). This score was selected as a score of 5 is typically applied to foraging habitat with low density of primary foraging species. A score of 7 is not considered justified as the proposed offset area is more than 12 km from known roosting/breeding sites and is outside the area considered most significant for black cockatoo survival. Future quality will be achieved through appropriate soil preparation, extensive direct planting/seeding, and management including fencing, weed control, and follow up planting if required.
Time until ecological benefit (years)	17.00		Revegetation activities are planned to commence in two years, with environmental benefits for the impacted species expected to be realised over a 15-year timeframe.
Confidence in offset result (%)	0.8		There is a high level of confidence that on-ground actions guided by a DWER-approved revegetation management plan will improve fauna habitat quality at the site. A reputable revegetation contractor will use well known restoration methods to restore vegetation suitable as foraging habitat for Carnaby's Black-cockatoo. Ongoing management and protection of the offset through covenant will contribute to the success of the offset.
Duration of offset implementation (maximum 20 years)	20.00		The offset will be placed under covenant for perpetuity. 20 years is the maximum value that can be input.
Time until offset site secured (years)	2.00		Time required until the protection of the offset area in perpetuity is finalised through the conservation covenant under the Soil and Land Conservation Act 1945.
Risk of future loss WITHOUT offset (%)	80.0%		The offset site is situated in a rural area.
Risk of future loss WITH offset (%)	5.0%		The level of protection afforded by the offset reduces the risk of vegetation loss at the offset site to 5%.
Offset ratio (Conservation area only)	N/A		NA

WA Environmental Offsets Calculator

Step 3: Calculating offsets

Key:	
	Data to be entered
	Drop-down selection
	Automatically-generated scores

Environmental value (step 1)	Carnaby's black cockatoo foraging habitat - quality score 5	Significant impact (step 2, part A)	5.67
		Rehabilitation credit (step 2, part B)	0.00
		Significant residual impact (step 2, part C)	2.84

Area **(offset site)**

Offset calculation *Area*							
Offsets calculation	**Description**	**Proposed offset (area in hectares)**	5.67	**Duration of offset implementation (maximum 20 years)**	20.00	**Offset value**	**2.86**
	Revegetation	**Current quality of offset site (scale)**	2.00	**Time until offset site secured (years)**	2.00		**101.0%**
		Future quality WITHOUT offset (scale)	1.00	**Risk of future loss WITHOUT offset (%)**	80.0%		
		Future quality WITH offset (scale)	6.00	**Risk of future loss WITH offset (%)**	5.0%		
		Time until ecological benefit (years)	17.00				
		Confidence in offset result (%)	80.0%			**OFFSET ADEQUATE?**	**YES**

WA Environmental Offsets Calculator

Rationale for scores used in the offsets calculator

Environmental value to be offset			
Calculation	***Score (Area)***		***Rationale***
Conservation significance			
Description	Carnaby's black cockatoo foraging habitat - quality score 5		Carnaby's Black-cockatoo foraging habitat
Type of environmental value	Vegetation/habitat		Fauna species
Conservation significance of environmental value	Rare/threatened species - endangered		Endangered under the Biodiversity Conservation Act
Landscape-level value impacted	yes/no		Yes
Significant impact			
Description	Carnaby's black cockatoo foraging habitat		The impact area includes native vegetation that is suitable as foraging habitat (HQS 5) for Carnaby's Black-cockatoo
Significant impact (hectares) / Type of feature	5.67		Extent of Carnaby's Cockatoo foraging habitat (HQS 5) within the application area.
Quality (scale) / Number	5.00		The clearing area includes a mixture of primary and secondary species for Carnaby's cockatoo in the form of Marri, Flooded Gum, Banksia, Blackbutt, York Gum, within a 12 km radius of known Carnaby's Cockatoo roosting sites
Rehabilitation credit			
Description	n/a		n/a
Proposed rehabilitation (area in hectares)	0.00		n/a
Current quality of rehabilitation site / Start number (of type of feature)	0.00		n/a
Future quality WITHOUT rehabilitation (scale) / Future number WITHOUT rehabilitation	0.00		n/a
Future quality WITH rehabilitation (scale) / Future number WITH rehabilitation	0.00		n/a
Time until ecological benefit (years)	0.00		n/a
Confidence in rehabilitation result (%)	0		n/a
Offset			
Description	Revegetation		Revegetation and conservation of completely degraded areas.
Proposed offset (area in hectares)	5.67		The calculated offset will counterbalance 100% of the significant residual impacts of the proposed clearing.
Current quality of offset site / Start number (of type of feature)	2.00		The area is completely degraded, with isolated paddock trees.
Future quality WITHOUT offset (scale) / Future number WITHOUT offset	1.00		Site observations and historic aerial photos suggest that loss of the remaining paddock trees is likely in the next 20 years. Crops provide foraging value for Carnaby's Black-Cockatoo in the absence of paddock trees.
Future quality WITH offset (scale) / Future number WITH offset	6.00		Proposed offset site anticipated to achieve minimum HQS of 6 for Carnaby's Black-cockatoo foraging habitat (Bamford 2020). This score was selected as a score of 5 is typically applied to foraging habitat with low density of primary foraging species. A score of 7 is not considered justified as the proposed offset area is more than 12 km from known roosting/breeding sites and is outside the area considered most significant for black cockatoo survival. Future quality will be achieved through appropriate soil preparation, extensive direct planting/seeding, and management including fencing, weed control, and follow up planting if required.
Time until ecological benefit (years)	17.00		Revegetation activities are planned to commence in two years, with environmental benefits for the impacted species expected to be realised over a 15-year timeframe.
Confidence in offset result (%)	0.8		There is a high level of confidence that on-ground actions guided by a DWER-approved revegetation management plan will improve fauna habitat quality at the site. A reputable revegetation contractor will use well known restoration methods to restore vegetation suitable as foraging habitat for Carnaby's Black-cockatoo. Ongoing management and protection of the offset through covenant will contribute to the success of the offset.
Duration of offset implementation (maximum 20 years)	20.00		The offset will be placed under covenant for perpetuity. 20 years is the maximum value that can be input.
Time until offset site secured (years)	2.00		Time required until the protection of the offset area in perpetuity is finalised through the conservation covenant under the Soil and Land Conservation Act 1945.
Risk of future loss WITHOUT offset (%)	80.0%		The offset site is situated in a rural area.
Risk of future loss WITH offset (%)	5.0%		The level of protection afforded by the offset reduces the risk of vegetation loss at the offset site to 5%.
Offset ratio (Conservation area only)	N/A		NA

WA Environmental Offsets Calculator

Step 3: Calculating offsets

Key:	
	Data to be entered
	Drop-down selection
	Automatically-generated scores

Environmental value (step 1)	Carnaby's black cockatoo foraging habitat - quality score 6	Significant impact (step 2, part A)	2.45
		Rehabilitation credit (step 2, part B)	0.00
		Significant residual impact (step 2, part C)	1.47

Area **(offset site)**

Offset calculation *Area*							
Offsets calculation	**Description**	**Proposed offset (area in hectares)**	2.91	**Duration of offset implementation (maximum 20 years)**	20.00	**Offset value**	**1.47**
	Revegetation	**Current quality of offset site (scale)**	2.00	**Time until offset site secured (years)**	2.00		**100.0%**
		Future quality WITHOUT offset (scale)	1.00	**Risk of future loss WITHOUT offset (%)**	80.0%		
		Future quality WITH offset (scale)	6.00	**Risk of future loss WITH offset (%)**	5.0%		
		Time until ecological benefit (years)	17.00				
		Confidence in offset result (%)	80.0%			**OFFSET ADEQUATE?**	**YES**

WA Environmental Offsets Calculator

Rationale for scores used in the offsets calculator

Environmental value to be offset			
Calculation	***Score (Area)***		***Rationale***
Conservation significance			
Description	Carnaby's black cockatoo foraging habitat - quality score 6		Carnaby's Black-cockatoo foraging habitat
Type of environmental value	Vegetation/habitat		Fauna species
Conservation significance of environmental value	Rare/threatened species - endangered		Endangered under the Biodiversity Conservation Act
Landscape-level value impacted	yes/no		Yes
Significant impact			
Description	Carnaby's black cockatoo foraging habitat		The impact area includes native vegetation that is suitable as foraging habitat (HQS 6) for Carnaby's Black-cockatoo
Significant impact (hectares) / Type of feature	2.45		Extent of Carnaby's Cockatoo foraging habitat with HQS 6 within the application area.
Quality (scale) / Number	6.00		The clearing area includes a mixture of primary and secondary species for Carnaby's cockatoo in the form of Marri, Flooded Gum, Banksia, Blackbutt, York Gum, within a 12 km radius of known Carnaby's Cockatoo roosting sites
Rehabilitation credit			
Description	n/a		n/a
Proposed rehabilitation (area in hectares)	0.00		n/a
Current quality of rehabilitation site / Start number (of type of feature)	0.00		n/a
Future quality WITHOUT rehabilitation (scale) / Future number WITHOUT rehabilitation	0.00		n/a
Future quality WITH rehabilitation (scale) / Future number WITH rehabilitation	0.00		n/a
Time until ecological benefit (years)	0.00		n/a
Confidence in rehabilitation result (%)	0		n/a
Offset			
Description	Revegetation		Revegetation and conservation of completely degraded areas.
Proposed offset (area in hectares)	2.91		The calculated offset will counterbalance 100% of the significant residual impacts of the proposed clearing.
Current quality of offset site / Start number (of type of feature)	2.00		The area is completely degraded, with isolated paddock trees.
Future quality WITHOUT offset (scale) / Future number WITHOUT offset	1.00		Site observations and historic aerial photos suggest that loss of the remaining paddock trees is likely in the next 20 years. Crops provide foraging value for Carnaby's Black-Cockatoo in the absence of paddock trees.
Future quality WITH offset (scale) / Future number WITH offset	6.00		Proposed offset site anticipated to achieve minimum HQS of 6 for Carnaby's Black-cockatoo foraging habitat (Bamford 2020). This score was selected as a score of 5 is typically applied to foraging habitat with low density of primary foraging species. A score of 7 is not considered justified as the proposed offset area is more than 12 km from known roosting/breeding sites and is outside the area considered most significant for black cockatoo survival. Future quality will be achieved through appropriate soil preparation, extensive direct planting/seeding, and management including fencing, weed control, and follow up planting if required.
Time until ecological benefit (years)	17.00		Revegetation activities are planned to commence in two years, with environmental benefits for the impacted species expected to be realised over a 15-year timeframe.
Confidence in offset result (%)	0.8		There is a high level of confidence that on-ground actions guided by a DWER-approved revegetation management plan will improve fauna habitat quality at the site. A reputable revegetation contractor will use well known restoration methods to restore vegetation suitable as foraging habitat for Carnaby's Black-cockatoo. Ongoing management and protection of the offset through covenant will contribute to the success of the offset.
Duration of offset implementation (maximum 20 years)	20.00		The offset will be placed under covenant for perpetuity. 20 years is the maximum value that can be input.
Time until offset site secured (years)	2.00		Time required until the protection of the offset area in perpetuity is finalised through the conservation covenant under the Soil and Land Conservation Act 1945.
Risk of future loss WITHOUT offset (%)	80.0%		The offset site is situated in a rural area.
Risk of future loss WITH offset (%)	5.0%		The level of protection afforded by the offset reduces the risk of vegetation loss at the offset site to 5%.
Offset ratio (Conservation area only)	N/A		NA

WA Environmental Offsets Calculator

Step 3: Calculating offsets

Key:	
	Data to be entered
	Drop-down selection
	Automatically-generated scores

Environmental value (step 1)	Carnaby's black cockatoo foraging habitat - quality score 7	Significant impact (step 2, part A)	0.65
		Rehabilitation credit (step 2, part B)	0.00
		Significant residual impact (step 2, part C)	0.46

Area **(offset site)**

Offset calculation *Area*							
Offsets calculation	**Description**	**Proposed offset (area in hectares)**	0.77	**Duration of offset implementation (maximum 20 years)**	20.00	**Offset value**	**0.46**
	Revegetation	**Current quality of offset site (scale)**	2.00	**Time until offset site secured (years)**	2.00		**100.0%**
		Future quality WITHOUT offset (scale)	1.00	**Risk of future loss WITHOUT offset (%)**	80.0%		
		Future quality WITH offset (scale)	7.00	**Risk of future loss WITH offset (%)**	5.0%		
		Time until ecological benefit (years)	17.00				
		Confidence in offset result (%)	80.0%			**OFFSET ADEQUATE?**	**YES**

WA Environmental Offsets Calculator

Rationale for scores used in the offsets calculator

Environmental value to be offset			
Calculation	***Score (Area)***		***Rationale***
Conservation significance			
Description	Carnaby's black cockatoo foraging habitat - quality score 7		Carnaby's Black-cockatoo foraging habitat
Type of environmental value	Vegetation/habitat		Fauna species
Conservation significance of environmental value	Rare/threatened species - endangered		Endangered under the Biodiversity Conservation Act
Landscape-level value impacted	yes/no		Yes
Significant impact			
Description	Carnaby's black cockatoo foraging habitat		The impact area includes native vegetation that is suitable as foraging habitat (HQS 7) for Carnaby's Black-cockatoo
Significant impact (hectares) / Type of feature	0.65		Extent of Carnaby's Cockatoo foraging habitat with HQS 7 within the application area.
Quality (scale) / Number	7.00		The clearing area includes a mixture of primary and secondary species for Carnaby's cockatoo in the form of Marri, Flooded Gum, Banksia, Blackbutt, York Gum, within a 12 km radius of known Carnaby's Cockatoo roosting sites
Rehabilitation credit			
Description	n/a		n/a
Proposed rehabilitation (area in hectares)	0.00		n/a
Current quality of rehabilitation site / Start number (of type of feature)	0.00		n/a
Future quality WITHOUT rehabilitation (scale) / Future number WITHOUT rehabilitation	0.00		n/a
Future quality WITH rehabilitation (scale) / Future number WITH rehabilitation	0.00		n/a
Time until ecological benefit (years)	0.00		n/a
Confidence in rehabilitation result (%)	0		n/a
Offset			
Description	Revegetation		Revegetation and conservation of completely degraded areas.
Proposed offset (area in hectares)	0.77		The calculated offset will counterbalance 100% of the significant residual impacts of the proposed clearing.
Current quality of offset site / Start number (of type of feature)	2.00		The area is completely degraded, with isolated paddock trees.
Future quality WITHOUT offset (scale) / Future number WITHOUT offset	1.00		Site observations and historic aerial photos suggest that loss of the remaining paddock trees is likely in the next 20 years. Crops provide foraging value for Carnaby's Black-Cockatoo in the absence of paddock trees.
Future quality WITH offset (scale) / Future number WITH offset	7.00		Proposed offset site anticipated to achieve minimum HQS of 6 for Carnaby's Black-cockatoo foraging habitat (Bamford 2020). This score was selected as a score of 5 is typically applied to foraging habitat with low density of primary foraging species. A score of 7 is not considered justified as the proposed offset area is more than 12 km from known roosting/breeding sites and is outside the area considered most significant for black cockatoo survival. Future quality will be achieved through appropriate soil preparation, extensive direct planting/seeding, and management including fencing, weed control, and follow up planting if required.
Time until ecological benefit (years)	17.00		Revegetation activities are planned to commence in two years, with environmental benefits for the impacted species expected to be realised over a 15-year timeframe.
Confidence in offset result (%)	0.8		There is a high level of confidence that on-ground actions guided by a DWER-approved revegetation management plan will improve fauna habitat quality at the site. A reputable revegetation contractor will use well known restoration methods to restore vegetation suitable as foraging habitat for Carnaby's Black-cockatoo. Ongoing management and protection of the offset through covenant will contribute to the success of the offset.
Duration of offset implementation (maximum 20 years)	20.00		The offset will be placed under covenant for perpetuity. 20 years is the maximum value that can be input.
Time until offset site secured (years)	2.00		Time required until the protection of the offset area in perpetuity is finalised through the conservation covenant under the Soil and Land Conservation Act 1945.
Risk of future loss WITHOUT offset (%)	80.0%		The offset site is situated in a rural area.
Risk of future loss WITH offset (%)	5.0%		The level of protection afforded by the offset reduces the risk of vegetation loss at the offset site to 5%.
Offset ratio (Conservation area only)	N/A		NA

WA Environmental Offsets Calculator

Step 3: Calculating offsets

Key:

	Data to be entered
	Drop-down selection
	Automatically-generated scores

Environmental value (step 1)	Forest Red-tailed Black-cockatoo foraging habitat - HQS1	Significant impact (step 2, part A)	0.19
		Rehabilitation credit (step 2, part B)	0.00
		Significant residual impact (step 2, part C)	0.02

***Area* (offset site)**

Offset calculation *Area*							
Offsets calculation	**Description**	**Proposed offset (area in hectares)**	0.19	**Duration of offset implementation (maximum 20 years)**	20.00	**Offset value**	**0.10**
	Revegetation	**Current quality of offset site (scale)**	2.00	**Time until offset site secured (years)**	2.00		**541.0%**
		Future quality WITHOUT offset (scale)	0.00	**Risk of future loss WITHOUT offset (%)**	80.0%		
		Future quality WITH offset (scale)	6.00	**Risk of future loss WITH offset (%)**	5.0%		
		Time until ecological benefit (years)	17.00				
		Confidence in offset result (%)	80.0%			**OFFSET ADEQUATE?**	**YES**

WA Environmental Offsets Calculator

Rationale for scores used in the offsets calculator

Environmental value to be offset			
Calculation	***Score (Area)***		***Rationale***
Conservation significance			
Description	Forest Red-tailed Black-cockatoo foraging habitat - HQS1		Forest Red-tailed Black-cockatoo foraging habitat.
Type of environmental value	Vegetation/habitat		Fauna habitat
Conservation significance of environmental value	Rare/threatened Species - vulnerable		Vulnerable under the Biodiversity Conservation Act
Landscape-level value impacted	yes/no		Yes
Significant impact			
Description	Forest Red-tailed black cockatoo foraging habitat		The impact area includes native vegetation that is suitable as foraging habitat for Forest Red-tailed Black-cockatoo
Significant impact (hectares) / Type of feature	0.19		Extent of Forest Red-tailed Black-cockatoo foraging habitat (HQS 1) within the application area.
Quality (scale) / Number	1.00		The clearing area includes a mixture of primary and secondary species for Forest Red-tailed Black-cockatoo.
Rehabilitation credit			
Description	n/a		n/a
Proposed rehabilitation (area in hectares)	0.00		n/a
Current quality of rehabilitation site / Start number (of type of feature)	0.00		n/a
Future quality WITHOUT rehabilitation (scale) / Future number WITHOUT rehabilitation	0.00		n/a
Future quality WITH rehabilitation (scale) / Future number WITH rehabilitation	0.00		n/a
Time until ecological benefit (years)	0.00		n/a
Confidence in rehabilitation result (%)	0		n/a
Offset			
Description	Revegetation		Revegetation and conservation of completely degraded areas.
Proposed offset (area in hectares)	0.19		The calculated offset will counterbalance 100% of the significant residual impacts of the proposed clearing.
Current quality of offset site / Start number (of type of feature)	2.00		The area is completely degraded, with only isolated remnant paddock trees present.
Future quality WITHOUT offset (scale) / Future number WITHOUT offset	0.00		Site observations and historic aerial photos suggest that loss of the remaining paddock trees is likely in the next 20 years. Crops provide foraging value for Carnaby's Black-Cockatoo in the absence of paddock trees.
Future quality WITH offset (scale) / Future number WITH offset	6.00		Proposed offset site anticipated to achieve minimum HQS of 6 for Forest Red-tailed Black-cockatoo foraging habitat (Bamford 2020). This score was selected as a score of 5 is typically applied to foraging habitat with low density of primary foraging species. A score of 7 is not considered justified as the proposed offset area is more than 12 km from known roosting/breeding sites and is outside the area considered most significant for black cockatoo survival. Future quality will be achieved through appropriate soil preparation, extensive direct planting/seeding, and management including fencing, weed control, and follow up planting if required.
Time until ecological benefit (years)	17.00		Revegetation activities are planned to commence in two years, with environmental benefits for the impacted species expected to be realised over a 15-year timeframe.
Confidence in offset result (%)	0.8		There is a high level of confidence that on-ground actions guided by a DWER-approved revegetation management plan will improve fauna habitat quality at the site. A reputable revegetation contractor will use well known restoration methods to restore vegetation suitable as foraging habitat for Forest Red-tailed Black-cockatoo. Ongoing management and protection of the offset through covenant will contribute to the success of the offset.
Duration of offset implementation (maximum 20 years)	20.00		The offset will be placed under covenant for perpetuity. 20 years is the maximum value that can be input.
Time until offset site secured (years)	2.00		Time required until the protection of the offset area in perpetuity is finalised through the conservation covenant under the Soil and Land Conservation Act 1945.
Risk of future loss WITHOUT offset (%)	80.0%		The offset site is situated in a rural area.
Risk of future loss WITH offset (%)	5.0%		The level of protection afforded by the offset reduces the risk of vegetation loss at the offset site to 5%.
Offset ratio (Conservation area only)	N/A		NA

WA Environmental Offsets Calculator

Step 3: Calculating offsets

Key:

	Data to be entered
	Drop-down selection
	Automatically-generated scores

Environmental value (step 1)	Forest Red-tailed Black-cockatoo foraging habitat - HQS2	Significant impact (step 2, part A)	2.39
		Rehabilitation credit (step 2, part B)	0.00
		Significant residual impact (step 2, part C)	0.48

Area **(offset site)**

Offset calculation *Area*							
Offsets calculation	**Description**	**Proposed offset (area in hectares)**	2.39	**Duration of offset implementation (maximum 20 years)**	20.00	**Offset value**	**1.29**
	Revegetation	**Current quality of offset site (scale)**	2.00	**Time until offset site secured (years)**	2.00		**270.5%**
		Future quality WITHOUT offset (scale)	0.00	**Risk of future loss WITHOUT offset (%)**	80.0%		
		Future quality WITH offset (scale)	6.00	**Risk of future loss WITH offset (%)**	5.0%		
		Time until ecological benefit (years)	17.00				
		Confidence in offset result (%)	80.0%			**OFFSET ADEQUATE?**	**YES**

WA Environmental Offsets Calculator

Rationale for scores used in the offsets calculator

Environmental value to be offset			
Calculation	***Score (Area)***		***Rationale***
Conservation significance			
Description	Forest Red-tailed Black-cockatoo foraging habitat - HQS2		Forest Red-tailed Black-cockatoo foraging habitat.
Type of environmental value	Vegetation/habitat		fauna habitat
Conservation significance of environmental value	Rare/threatened Species - vulnerable		Vulnerable under the Biodiversity Conservation Act
Landscape-level value impacted	yes/no		Yes
Significant impact			
Description	Carnaby's black cockatoo foraging habitat		The impact area includes native vegetation that is suitable as foraging habitat for Forest Red-tailed Black-cockatoo
Significant impact (hectares) / Type of feature	2.39		Extent of Forest Red-tailed Black-cockatoo foraging habitat (HQS 2) within the application area.
Quality (scale) / Number	2.00		The clearing area includes a mixture of primary and secondary species for Forest Red-tailed Black-cockatoo.
Rehabilitation credit			
Description	n/a		n/a
Proposed rehabilitation (area in hectares)	0.00		n/a
Current quality of rehabilitation site / Start number (of type of feature)	0.00		n/a
Future quality WITHOUT rehabilitation (scale) / Future number WITHOUT rehabilitation	0.00		n/a
Future quality WITH rehabilitation (scale) / Future number WITH rehabilitation	0.00		n/a
Time until ecological benefit (years)	0.00		n/a
Confidence in rehabilitation result (%)	0		n/a
Offset			
Description	Revegetation		Revegetation and conservation of completely degraded areas.
Proposed offset (area in hectares)	2.39		The calculated offset will counterbalance 100% of the significant residual impacts of the proposed clearing.
Current quality of offset site / Start number (of type of feature)	2.00		The area is completely degraded, with only isolated remnant paddock trees present.
Future quality WITHOUT offset (scale) / Future number WITHOUT offset	0.00		Site observations and historic aerial photos suggest that loss of the remaining paddock trees is likely in the next 20 years. Crops provide foraging value for Carnaby's Black-Cockatoo in the absence of paddock trees.
Future quality WITH offset (scale) / Future number WITH offset	6.00		Proposed offset site anticipated to achieve minimum HQS of 6 for Forest Red-tailed Black-cockatoo foraging habitat (Bamford 2020). This score was selected as a score of 5 is typically applied to foraging habitat with low density of primary foraging species. A score of 7 is not considered justified as the proposed offset area is more than 12 km from known roosting/breeding sites and is outside the area considered most significant for black cockatoo survival. Future quality will be achieved through appropriate soil preparation, extensive direct planting/seeding, and management including fencing, weed control, and follow up planting if required.
Time until ecological benefit (years)	17.00		Revegetation activities are planned to commence in two years, with environmental benefits for the impacted species expected to be realised over a 15-year timeframe.
Confidence in offset result (%)	0.8		There is a high level of confidence that on-ground actions guided by a DWER-approved revegetation management plan will improve fauna habitat quality at the site. A reputable revegetation contractor will use well known restoration methods to restore vegetation suitable as foraging habitat for Forest Red-tailed Black-cockatoo. Ongoing management and protection of the offset through covenant will contribute to the success of the offset.
Duration of offset implementation (maximum 20 years)	20.00		The offset will be placed under covenant for perpetuity. 20 years is the maximum value that can be input.
Time until offset site secured (years)	2.00		Time required until the protection of the offset area in perpetuity is finalised through the conservation covenant under the Soil and Land Conservation Act 1945.
Risk of future loss WITHOUT offset (%)	80.0%		The offset site is situated in a rural area.
Risk of future loss WITH offset (%)	5.0%		The level of protection afforded by the offset reduces the risk of vegetation loss at the offset site to 5%.
Offset ratio (Conservation area only)	N/A		NA

WA Environmental Offsets Calculator

Step 3: Calculating offsets

Key:	
	Data to be entered
	Drop-down selection
	Automatically-generated scores

Environmental value (step 1)	Forest Red-tailed Black-cockatoo foraging habitat - HQS5	Significant impact (step 2, part A)	3.00
		Rehabilitation credit (step 2, part B)	0.00
		Significant residual impact (step 2, part C)	1.50

***Area* (offset site)**

Offset calculation *Area*							
Offsets calculation	**Description**	**Proposed offset (area in hectares)**	3.00	**Duration of offset implementation (maximum 20 years)**	20.00	**Offset value**	**1.62**
	Revegetation	**Current quality of offset site (scale)**	2.00	**Time until offset site secured (years)**	2.00		**108.2%**
		Future quality WITHOUT offset (scale)	0.00	**Risk of future loss WITHOUT offset (%)**	80.0%		
		Future quality WITH offset (scale)	6.00	**Risk of future loss WITH offset (%)**	5.0%		
		Time until ecological benefit (years)	17.00				
		Confidence in offset result (%)	80.0%			**OFFSET ADEQUATE?**	**YES**

WA Environmental Offsets Calculator

Rationale for scores used in the offsets calculator

Environmental value to be offset			
Calculation	***Score (Area)***		***Rationale***
Conservation significance			
Description	Forest Red-tailed Black-cockatoo foraging habitat - HQS5		Forest Red-tailed Black-cockatoo foraging habitat.
Type of environmental value	Vegetation/habitat		Fauna habitat
Conservation significance of environmental value	Rare/threatened Species - vulnerable		Vulnerable under the Biodiversity Conservation Act
Landscape-level value impacted	yes/no		Yes
Significant impact			
Description	Forest Red-tailed black cockatoo foraging habitat		The impact area includes native vegetation that is suitable as foraging habitat for Forest Red-tailed Black-cockatoo
Significant impact (hectares) / Type of feature	3.00		Extent of Forest Red-tailed Black-cockatoo foraging habitat (HQS 5) within the application area.
Quality (scale) / Number	5.00		The clearing area includes a mixture of primary and secondary species for Forest Red-tailed Black-cockatoo.
Rehabilitation credit			
Description	n/a		n/a
Proposed rehabilitation (area in hectares)	0.00		n/a
Current quality of rehabilitation site / Start number (of type of feature)	0.00		n/a
Future quality WITHOUT rehabilitation (scale) / Future number WITHOUT rehabilitation	0.00		n/a
Future quality WITH rehabilitation (scale) / Future number WITH rehabilitation	0.00		n/a
Time until ecological benefit (years)	0.00		n/a
Confidence in rehabilitation result (%)	0		n/a
Offset			
Description	Revegetation		Revegetation and conservation of completely degraded areas.
Proposed offset (area in hectares)	3.00		The calculated offset will counterbalance 100% of the significant residual impacts of the proposed clearing.
Current quality of offset site / Start number (of type of feature)	2.00		The area is completely degraded, with only isolated remnant paddock trees present.
Future quality WITHOUT offset (scale) / Future number WITHOUT offset	0.00		Site observations and historic aerial photos suggest that loss of the remaining paddock trees is likely in the next 20 years. Crops provide foraging value for Carnaby's Black-Cockatoo in the absence of paddock trees.
Future quality WITH offset (scale) / Future number WITH offset	6.00		Proposed offset site anticipated to achieve minimum HQS of 6 for Forest Red-tailed Black-cockatoo foraging habitat (Bamford 2020). This score was selected as a score of 5 is typically applied to foraging habitat with low density of primary foraging species. A score of 7 is not considered justified as the proposed offset area is more than 12 km from known roosting/breeding sites and is outside the area considered most significant for black cockatoo survival. Future quality will be achieved through appropriate soil preparation, extensive direct planting/seeding, and management including fencing, weed control, and follow up planting if required.
Time until ecological benefit (years)	17.00		Revegetation activities are planned to commence in two years, with environmental benefits for the impacted species expected to be realised over a 15-year timeframe.
Confidence in offset result (%)	0.8		There is a high level of confidence that on-ground actions guided by a DWER-approved revegetation management plan will improve fauna habitat quality at the site. A reputable revegetation contractor will use well known restoration methods to restore vegetation suitable as foraging habitat for Forest Red-tailed Black-cockatoo. Ongoing management and protection of the offset through covenant will contribute to the success of the offset.
Duration of offset implementation (maximum 20 years)	20.00		The offset will be placed under covenant for perpetuity. 20 years is the maximum value that can be input.
Time until offset site secured (years)	2.00		Time required until the protection of the offset area in perpetuity is finalised through the conservation covenant under the Soil and Land Conservation Act 1945.
Risk of future loss WITHOUT offset (%)	80.0%		The offset site is situated in a rural area.
Risk of future loss WITH offset (%)	5.0%		The level of protection afforded by the offset reduces the risk of vegetation loss at the offset site to 5%.
Offset ratio (Conservation area only)	N/A		NA

WA Environmental Offsets Calculator

Step 3: Calculating offsets

Key:	
	Data to be entered
	Drop-down selection
	Automatically-generated scores

Environmental value (step 1)	Forest Red-tailed Black-cockatoo foraging habitat - HQS6	Significant impact (step 2, part A)	3.04
		Rehabilitation credit (step 2, part B)	0.00
		Significant residual impact (step 2, part C)	1.82

Area **(offset site)**

Offset calculation *Area*							
Offsets calculation	**Description**	**Proposed offset (area in hectares)**	3.37	**Duration of offset implementation (maximum 20 years)**	20.00	**Offset value**	**1.82**
	Revegetation	**Current quality of offset site (scale)**	2.00	**Time until offset site secured (years)**	2.00		**100.0%**
		Future quality WITHOUT offset (scale)	0.00	**Risk of future loss WITHOUT offset (%)**	80.0%		
		Future quality WITH offset (scale)	6.00	**Risk of future loss WITH offset (%)**	5.0%		
		Time until ecological benefit (years)	17.00				
		Confidence in offset result (%)	80.0%			**OFFSET ADEQUATE?**	**YES**

WA Environmental Offsets Calculator

Rationale for scores used in the offsets calculator

Environmental value to be offset			
Calculation	***Score (Area)***		***Rationale***
Conservation significance			
Description	Forest Red-tailed Black-cockatoo foraging habitat - HQS6		Forest Red-tailed Black-cockatoo foraging habitat.
Type of environmental value	Vegetation/habitat		Habitat for fauna
Conservation significance of environmental value	Rare/threatened Species - vulnerable		Vulnerable under the Biodiversity Conservation Act
Landscape-level value impacted	yes/no		Yes
Significant impact			
Description	Forest Red-tailed black cockatoo foraging habitat		The impact area includes native vegetation that is suitable as foraging habitat for Forest Red-tailed Black-cockatoo
Significant impact (hectares) / Type of feature	3.04		Extent of Forest Red-tailed Black-cockatoo foraging habitat (HQS 6) within the application area.
Quality (scale) / Number	6.00		The clearing area includes a mixture of primary and secondary species for Forest Red-tailed Black-cockatoo.
Rehabilitation credit			
Description	n/a		n/a
Proposed rehabilitation (area in hectares)	0.00		n/a
Current quality of rehabilitation site / Start number (of type of feature)	0.00		n/a
Future quality WITHOUT rehabilitation (scale) / Future number WITHOUT rehabilitation	0.00		n/a
Future quality WITH rehabilitation (scale) / Future number WITH rehabilitation	0.00		n/a
Time until ecological benefit (years)	0.00		n/a
Confidence in rehabilitation result (%)	0		n/a
Offset			
Description	Revegetation		Revegetation and conservation of completely degraded areas.
Proposed offset (area in hectares)	3.37		The calculated offset will counterbalance 100% of the significant residual impacts of the proposed clearing.
Current quality of offset site / Start number (of type of feature)	2.00		The area is completely degraded, with only isolated remnant paddock trees present.
Future quality WITHOUT offset (scale) / Future number WITHOUT offset	0.00		Site observations and historic aerial photos suggest that loss of the remaining paddock trees is likely in the next 20 years. Crops provide foraging value for Carnaby's Black-Cockatoo in the absence of paddock trees.
Future quality WITH offset (scale) / Future number WITH offset	6.00		Proposed offset site anticipated to achieve minimum HQS of 6 for Forest Red-tailed Black-cockatoo foraging habitat (Bamford 2020). This score was selected as a score of 5 is typically applied to foraging habitat with low density of primary foraging species. A score of 7 is not considered justified as the proposed offset area is more than 12 km from known roosting/breeding sites and is outside the area considered most significant for black cockatoo survival. Future quality will be achieved through appropriate soil preparation, extensive direct planting/seeding, and management including fencing, weed control, and follow up planting if required.
Time until ecological benefit (years)	17.00		Revegetation activities are planned to commence in two years, with environmental benefits for the impacted species expected to be realised over a 15-year timeframe.
Confidence in offset result (%)	0.8		There is a high level of confidence that on-ground actions guided by a DWER-approved revegetation management plan will improve fauna habitat quality at the site. A reputable revegetation contractor will use well known restoration methods to restore vegetation suitable as foraging habitat for Forest Red-tailed Black-cockatoo. Ongoing management and protection of the offset through covenant will contribute to the success of the offset.
Duration of offset implementation (maximum 20 years)	20.00		The offset will be placed under covenant for perpetuity. 20 years is the maximum value that can be input.
Time until offset site secured (years)	2.00		Time required until the protection of the offset area in perpetuity is finalised through the conservation covenant under the Soil and Land Conservation Act 1945.
Risk of future loss WITHOUT offset (%)	80.0%		The offset site is situated in a rural area.
Risk of future loss WITH offset (%)	5.0%		The level of protection afforded by the offset reduces the risk of vegetation loss at the offset site to 5%.
Offset ratio (Conservation area only)	N/A		NA

WA Environmental Offsets Calculator

Step 3: Calculating offsets

Key:

	Data to be entered
	Drop-down selection
	Automatically-generated scores

Environmental value (step 1)	Forest Red-tailed Black-cockatoo foraging habitat - HQS7	Significant impact (step 2, part A)	0.03
		Rehabilitation credit (step 2, part B)	0.00
		Significant residual impact (step 2, part C)	0.02

Area **(offset site)**

Offset calculation *Area*							
Offsets calculation	**Description**	**Proposed offset (area in hectares)**	0.04	**Duration of offset implementation (maximum 20 years)**	20.00	**Offset value**	**0.02**
	Revegetation	**Current quality of offset site (scale)**	2.00	**Time until offset site secured (years)**	2.00		**100.0%**
		Future quality WITHOUT offset (scale)	0.00	**Risk of future loss WITHOUT offset (%)**	80.0%		
		Future quality WITH offset (scale)	6.00	**Risk of future loss WITH offset (%)**	5.0%		
		Time until ecological benefit (years)	17.00				
		Confidence in offset result (%)	80.0%			**OFFSET ADEQUATE?**	**YES**

WA Environmental Offsets Calculator

Rationale for scores used in the offsets calculator

Environmental value to be offset			
Calculation	***Score (Area)***		***Rationale***
Conservation significance			
Description	Forest Red-tailed Black-cockatoo foraging habitat - HQS7		Forest Red-tailed Black-cockatoo foraging habitat.
Type of environmental value	Vegetation/habitat		Habitat for fauna
Conservation significance of environmental value	Rare/threatened Species - vulnerable		Vulnerable under the Biodiversity Conservation Act
Landscape-level value impacted	yes/no		Yes
Significant impact			
Description	Forest Red-tailed black cockatoo foraging habitat		The impact area includes native vegetation that is suitable as foraging habitat for Forest Red-tailed Black-cockatoo
Significant impact (hectares) / Type of feature	0.03		Extent of Forest Red-tailed Black-cockatoo foraging habitat (HQS 7) within the application area.
Quality (scale) / Number	7.00		The clearing area includes a mixture of primary and secondary species for Forest Red-tailed Black-cockatoo.
Rehabilitation credit			
Description	n/a		n/a
Proposed rehabilitation (area in hectares)	0.00		n/a
Current quality of rehabilitation site / Start number (of type of feature)	0.00		n/a
Future quality WITHOUT rehabilitation (scale) / Future number WITHOUT rehabilitation	0.00		n/a
Future quality WITH rehabilitation (scale) / Future number WITH rehabilitation	0.00		n/a
Time until ecological benefit (years)	0.00		n/a
Confidence in rehabilitation result (%)	0		n/a
Offset			
Description	Revegetation		Revegetation and conservation of completely degraded areas.
Proposed offset (area in hectares)	0.04		The calculated offset will counterbalance 100% of the significant residual impacts of the proposed clearing.
Current quality of offset site / Start number (of type of feature)	2.00		The area is completely degraded, with only isolated remnant paddock trees present.
Future quality WITHOUT offset (scale) / Future number WITHOUT offset	0.00		Site observations and historic aerial photos suggest that loss of the remaining paddock trees is likely in the next 20 years. Crops provide foraging value for Carnaby's Black-Cockatoo in the absence of paddock trees.
Future quality WITH offset (scale) / Future number WITH offset	6.00		Proposed offset site anticipated to achieve minimum HQS of 6 for Forest Red-tailed Black-cockatoo foraging habitat (Bamford 2020). This score was selected as a score of 5 is typically applied to foraging habitat with low density of primary foraging species. A score of 7 is not considered justified as the proposed offset area is more than 12 km from known roosting/breeding sites and is outside the area considered most significant for black cockatoo survival. Future quality will be achieved through appropriate soil preparation, extensive direct planting/seeding, and management including fencing, weed control, and follow up planting if required.
Time until ecological benefit (years)	17.00		Revegetation activities are planned to commence in two years, with environmental benefits for the impacted species expected to be realised over a 15-year timeframe.
Confidence in offset result (%)	0.8		There is a high level of confidence that on-ground actions guided by a DWER-approved revegetation management plan will improve fauna habitat quality at the site. A reputable revegetation contractor will use well known restoration methods to restore vegetation suitable as foraging habitat for Forest Red-tailed Black-cockatoo. Ongoing management and protection of the offset through covenant will contribute to the success of the offset.
Duration of offset implementation (maximum 20 years)	20.00		The offset will be placed under covenant for perpetuity. 20 years is the maximum value that can be input.
Time until offset site secured (years)	2.00		Time required until the protection of the offset area in perpetuity is finalised through the conservation covenant under the Soil and Land Conservation Act 1945.
Risk of future loss WITHOUT offset (%)	80.0%		The offset site is situated in a rural area.
Risk of future loss WITH offset (%)	5.0%		The level of protection afforded by the offset reduces the risk of vegetation loss at the offset site to 5%.
Offset ratio (Conservation area only)	N/A		NA

WA Environmental Offsets Calculator

Step 3: Calculating offsets

Key:

	Data to be entered
	Drop-down selection
	Automatically-generated scores

Environmental value (step 1)	Native vegetation in Good condition	Significant impact (step 2, part A)	2.23
		Rehabilitation credit (step 2, part B)	0.00
		Significant residual impact (step 2, part C)	1.12

Area **(offset site)**

Offset calculation *Area*							
Offsets calculation	**Description**	**Proposed offset (area in hectares)**	2.55	**Duration of offset implementation (maximum 20 years)**	20.00	**Offset value**	**1.12**
	Revegetation	**Current quality of offset site (scale)**	1.00	**Time until offset site secured (years)**	2.00		**100.0%**
		Future quality WITHOUT offset (scale)	1.00	**Risk of future loss WITHOUT offset (%)**	80.0%		
		Future quality WITH offset (scale)	5.00	**Risk of future loss WITH offset (%)**	5.0%		
		Time until ecological benefit (years)	17.00				
		Confidence in offset result (%)	80.0%			**OFFSET ADEQUATE?**	**YES**

WA Environmental Offsets Calculator

Rationale for scores used in the offsets calculator

Environmental value to be offset			
Calculation	***Score (Area)***		***Rationale***
Conservation significance			
Description	Native vegetation in Good condition		
Type of environmental value	Vegetation/habitat		Native vegetation
Conservation significance of environmental value	Terrestrial native vegetation complex - <30% extent remaining in the bioregion		Vegetation is in an extensively cleared area
Landscape-level value impacted	yes/no		Yes
Significant impact			
Description	Native vegetation		Good condition native vegetation proposed for clearing after applying mitigation.
Significant impact (hectares) / Type of feature	2.23		2.23 ha of vegetation in Good condition is proposed for clearing
Quality (scale) / Number	5.00		The vegetation proposed for clearing is located within an extensively cleared landscape and provide significant habitat for conservation significant fauna.
Rehabilitation credit			
Description	n/a		n/a
Proposed rehabilitation (area in hectares)	0.00		n/a
Current quality of rehabilitation site / Start number (of type of feature)	0.00		n/a
Future quality WITHOUT rehabilitation (scale) / Future number WITHOUT rehabilitation	0.00		n/a
Future quality WITH rehabilitation (scale) / Future number WITH rehabilitation	0.00		n/a
Time until ecological benefit (years)	0.00		n/a
Confidence in rehabilitation result (%)	0		n/a
Offset			
Description	Revegetation		Revegetation and conservation of completely degraded areas.
Proposed offset (area in hectares)	2.55		The calculated offset will counterbalance 100% of the significant residual impacts of the proposed clearing.
Current quality of offset site / Start number (of type of feature)	1.00		The area is completely degraded, with only seven isolated paddock trees present.
Future quality WITHOUT offset (scale) / Future number WITHOUT offset	1.00		Without the offset, the vegetation quality is expected to remain unchanged.
Future quality WITH offset (scale) / Future number WITH offset	5.00		Revegetation actions at the offset site, guided by a revegetation plan approved by DWER, will restore good quality vegetation at the offset site.
Time until ecological benefit (years)	17.00		Rehabilitation activities are planned to commence in two years. The proposed rehabilitation actions will likely result in a sustainable and resilient patch of vegetation in 15 years.
Confidence in offset result (%)	0.8		There is a high level of confidence that on-ground actions guided by a DWER-approved revegetation management plan will acehieve good quality vegetation at the site. A reputable revegetation contractor will use well known restoration methods to restore vegetation. Ongoing management and protection of the offset through covenant will contribute to the success of the offset.
Duration of offset implementation (maximum 20 years)	20.00		The offset will be placed under covenant for perpetuity. 20 years is the maximum value that can be input.
Time until offset site secured (years)	2.00		Time required until the protection of the offset area in perpetuity is finalised through the conservation covenant under the Soil and Land Conservation Act 1945.
Risk of future loss WITHOUT offset (%)	80.0%		The offset site is situated in a rural area.
Risk of future loss WITH offset (%)	5.0%		The level of protection afforded by the offset reduces the risk of vegetation loss at the offset site to 5%.
Offset ratio (Conservation area only)	N/A		NA

WA Environmental Offsets Calculator

Step 3: Calculating offsets

Key:

	Data to be entered
	Drop-down selection
	Automatically-generated scores

Environmental value (step 1)	Native vegetation in Degraded condition	Significant impact (step 2, part A)	8.05
		Rehabilitation credit (step 2, part B)	0.00
		Significant residual impact (step 2, part C)	1.61

Area **(offset site)**

Offset calculation *Area*							
Offsets calculation	**Description**	**Proposed offset (area in hectares)**	8.05	**Duration of offset implementation (maximum 20 years)**	20.00	**Offset value**	**3.52**
	Revegetation	**Current quality of offset site (scale)**	1.00	**Time until offset site secured (years)**	2.00		**218.6%**
		Future quality WITHOUT offset (scale)	1.00	**Risk of future loss WITHOUT offset (%)**	80.0%		
		Future quality WITH offset (scale)	5.00	**Risk of future loss WITH offset (%)**	5.0%		
		Time until ecological benefit (years)	17.00				
		Confidence in offset result (%)	80.0%			**OFFSET ADEQUATE?**	**YES**

WA Environmental Offsets Calculator

Rationale for scores used in the offsets calculator

Environmental value to be offset			
Calculation	***Score (Area)***		***Rationale***
Conservation significance			
Description	Native vegetation in Degraded condition		
Type of environmental value	Vegetation/habitat		Native vegetation
Conservation significance of environmental value	Terrestrial native vegetation complex - <30% extent remaining in the bioregion		Vegetation is in an extensively cleared area
Landscape-level value impacted	yes/no		Yes
Significant impact			
Description	Native vegetation		Degraded condition native vegetation proposed for clearing after applying mitigation.
Significant impact (hectares) / Type of feature	8.05		8.05 ha of vegetation in Degraded condition is proposed for clearing
Quality (scale) / Number	2.00		The vegetation proposed for clearing is located within an extensively cleared landscape and provides significant habitat for conservation significant fauna.
Rehabilitation credit			
Description	n/a		n/a
Proposed rehabilitation (area in hectares)	0.00		n/a
Current quality of rehabilitation site / Start number (of type of feature)	0.00		n/a
Future quality WITHOUT rehabilitation (scale) / Future number WITHOUT rehabilitation	0.00		n/a
Future quality WITH rehabilitation (scale) / Future number WITH rehabilitation	0.00		n/a
Time until ecological benefit (years)	0.00		n/a
Confidence in rehabilitation result (%)	0		n/a
Offset			
Description	Revegetation		Revegetation and conservation of completely degraded areas.
Proposed offset (area in hectares)	8.05		The calculated offset will counterbalance 100% of the significant residual impacts of the proposed clearing.
Current quality of offset site / Start number (of type of feature)	1.00		The area is completely degraded, with only seven isolated paddock trees present.
Future quality WITHOUT offset (scale) / Future number WITHOUT offset	1.00		Without the offset, the vegetation quality is expected to remain unchanged.
Future quality WITH offset (scale) / Future number WITH offset	5.00		Revegetation actions at the offset site, guided by a revegetation plan approved by DWER, will restore good quality vegetation at the offset site.
Time until ecological benefit (years)	17.00		Rehabilitation activities are planned to commence in two years. The proposed rehabilitation actions will likely result in a sustainable and resilient patch of vegetation in 15 years.
Confidence in offset result (%)	0.8		There is a high level of confidence that on-ground actions guided by a DWER-approved revegetation management plan will acehieve good quality vegetation at the site. A reputable revegetation contractor will use well known restoration methods to restore vegetation. Ongoing management and protection of the offset through covenant will contribute to the success of the offset.
Duration of offset implementation (maximum 20 years)	20.00		The offset will be placed under covenant for perpetuity. 20 years is the maximum value that can be input.
Time until offset site secured (years)	2.00		Time required until the protection of the offset area in perpetuity is finalised through the conservation covenant under the Soil and Land Conservation Act 1945.
Risk of future loss WITHOUT offset (%)	80.0%		The offset site is situated in a rural area.
Risk of future loss WITH offset (%)	5.0%		The level of protection afforded by the offset reduces the risk of vegetation loss at the offset site to 5%.
Offset ratio (Conservation area only)	N/A		NA

WA Environmental Offsets Calculator

Step 3: Calculating offsets

Key:

	Data to be entered
	Drop-down selection
	Automatically-generated scores

Environmental value (step 1)	Native vegetation in Completely Degraded condition	Significant impact (step 2, part A)	5.45
		Rehabilitation credit (step 2, part B)	0.00
		Significant residual impact (step 2, part C)	0.55

Area **(offset site)**

Offset calculation *Area*							
Offsets calculation	**Description**	**Proposed offset (area in hectares)**	5.45	**Duration of offset implementation (maximum 20 years)**	20.00	**Offset value**	**2.38**
	Revegetation	**Current quality of offset site (scale)**	1.00	**Time until offset site secured (years)**	2.00		**437.2%**
		Future quality WITHOUT offset (scale)	1.00	**Risk of future loss WITHOUT offset (%)**	80.0%		
		Future quality WITH offset (scale)	5.00	**Risk of future loss WITH offset (%)**	5.0%		
		Time until ecological benefit (years)	17.00				
		Confidence in offset result (%)	80.0%			**OFFSET ADEQUATE?**	**YES**

WA Environmental Offsets Calculator

Rationale for scores used in the offsets calculator

Environmental value to be offset			
Calculation	***Score (Area)***		***Rationale***
Conservation significance			
Description	Native vegetation in Completely Degraded condition		
Type of environmental value	Vegetation/habitat		Native vegetation
Conservation significance of environmental value	Terrestrial native vegetation complex - <30% extent remaining in the bioregion		Vegetation is in an extensively cleared area
Landscape-level value impacted	yes/no		Yes
Significant impact			
Description	Native vegetation		Completely degraded condition native vegetation proposed for clearing after applying mitigation.
Significant impact (hectares) / Type of feature	5.45		5.45 ha of vegetation in Completely Degraded condition is proposed for clearing
Quality (scale) / Number	1.00		The vegetation proposed for clearing is located within an extensively cleared landscape and provides significant habitat for conservation significant fauna.
Rehabilitation credit			
Description	n/a		n/a
Proposed rehabilitation (area in hectares)	0.00		n/a
Current quality of rehabilitation site / Start number (of type of feature)	0.00		n/a
Future quality WITHOUT rehabilitation (scale) / Future number WITHOUT rehabilitation	0.00		n/a
Future quality WITH rehabilitation (scale) / Future number WITH rehabilitation	0.00		n/a
Time until ecological benefit (years)	0.00		n/a
Confidence in rehabilitation result (%)	0		n/a
Offset			
Description	Revegetation		Revegetation and conservation of completely degraded areas.
Proposed offset (area in hectares)	5.45		The calculated offset will counterbalance 100% of the significant residual impacts of the proposed clearing.
Current quality of offset site / Start number (of type of feature)	1.00		The area is completely degraded, with only seven isolated paddock trees present.
Future quality WITHOUT offset (scale) / Future number WITHOUT offset	1.00		Without the offset, the vegetation quality is expected to remain unchanged.
Future quality WITH offset (scale) / Future number WITH offset	5.00		Revegetation actions at the offset site, guided by a revegetation plan approved by DWER, will restore good quality vegetation at the offset site.
Time until ecological benefit (years)	17.00		Rehabilitation activities are planned to commence in two years. The proposed rehabilitation actions will likely result in a sustainable and resilient patch of vegetation in 15 years.
Confidence in offset result (%)	0.8		There is a high level of confidence that on-ground actions guided by a DWER-approved revegetation management plan will acehieve good quality vegetation at the site. A reputable revegetation contractor will use well known restoration methods to restore vegetation. Ongoing management and protection of the offset through covenant will contribute to the success of the offset.
Duration of offset implementation (maximum 20 years)	20.00		The offset will be placed under covenant for perpetuity. 20 years is the maximum value that can be input.
Time until offset site secured (years)	2.00		Time required until the protection of the offset area in perpetuity is finalised through the conservation covenant under the Soil and Land Conservation Act 1945.
Risk of future loss WITHOUT offset (%)	80.0%		The offset site is situated in a rural area.
Risk of future loss WITH offset (%)	5.0%		The level of protection afforded by the offset reduces the risk of vegetation loss at the offset site to 5%.
Offset ratio (Conservation area only)	N/A		NA

Appendix E

Risk Management Plan



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Table E.1 consolidates the offset risk assessment against the primary offset management objectives, including offset protection, restoration delivery, habitat outcomes, long-term security and adaptive implementation. Initial and residual risk scores are calculated as likelihood (L) x consequence (C), interpreted using the risk matrix and likelihood/consequence criteria defined in **Table 8.1** and **Table 8.2** of this OMP.

Appendix Table E.1 Risk Management Plan

			Initial Risk						Residual Risk		
Management Objective	**Risk Event**	**Potential Consequence**	**L**	**C**	**R**	**Management and Mitigation Measures**	**Monitoring Trigger**	**Corrective Action**	**L**	**C**	**R**
O1. Secure the offset area in perpetuity and ensure management actions remain effective through conservation mechanisms, monitoring and adaptive management.	Conservation covenant or legal protection mechanism not established within required timeframes.	Offset area not secured in perpetuity and potential non-compliance with approval conditions.	3	4	H	Early engagement with landholder, legal advisors and surveyors; implementation schedule and governance oversight.	Covenant not achieved within nominated timeframe.	Escalate through project governance; prioritise covenant registration; notify regulators where required	1	3	L
	Insufficient monitoring, maintenance or resourcing of offset implementation.	Issues not identified early, increasing risk of offset failure.	3	4	H	Defined responsibilities; allocated budget; monitoring and reporting schedule; regular review of outcomes.	Monitoring events missed or maintenance actions not completed.	Undertake supplementary monitoring and maintenance; allocate additional resources.	2	2	L
	Adaptive management measures are not implemented when performance targets are not achieved.	Persistent decline in offset performance and reduced likelihood of achieving completion criteria.	3	4	H	Adaptive management framework; periodic review of monitoring outcomes; reporting to regulators.	Monitoring identifies progressive performance indicators are not being achieved.	Investigate causes and implement corrective actions consistent with Section 7.0.	2	4	M
O2. Establish a self-sustaining vegetation community representative of native vegetation in the local area.	Poor germination, recruitment or establishment due to drought, below-average rainfall, unsuitable seasonal conditions or inadequate site preparation.	Restoration performance indicators not achieved and delayed habitat development.	4	3	H	Soil assessment and preparation; ripping and contouring where required; use of local provenance seed; direct seeding and planting at densities accounting for expected mortality; maintenance program.	Seedling density, survival or vegetation cover below restoration performance indicators.	Supplementary seeding and planting; review species selection and establishment techniques; amend maintenance program.	3	3	M
	Local provenance seed or planting stock unavailable in sufficient quantities.	Reduced species diversity or delay to implementation of revegetation works.	3	3	M	Early seed collection and procurement; use of accredited suppliers; staged revegetation where necessary.	Required species unavailable prior to implementation.	Undertake additional seed collection; revise implementation schedule; prioritise key habitat-forming species.	2	2	L
	Revegetation trajectory insufficient to meet progressive performance indicators or achieve completion criteria within the required timeframe.	Offset obligations not achieved.	3	4	H	Progressive restoration performance indicators; monitoring against progressive performance indicators; adaptive management framework; ongoing maintenance and infill planting.	Monitoring demonstrates declining trajectory or performance indicator targets are not met.	Increase maintenance effort; undertake supplementary planting and seeding; review revegetation methodology.	2	4	M
O3. Increase available foraging habitat for local populations of Carnaby's Black-Cockatoo and Forest Red-tailed Black-Cockatoo through revegetation with suitable native vegetation communities.	Revegetation does not achieve sufficient density, diversity or abundance of preferred black cockatoo forage species.	Habitat quality score lower than predicted and reduced offset value for black cockatoos.	3	4	H	Revegetation designed around local reference communities and known forage species; monitoring of species composition and habitat quality.	Preferred forage species richness, density or cover below restoration targets.	Targeted infill planting of forage species; modify species mix and revegetation prescriptions.	2	2	L
O4. Increase available breeding habitat for local populations of Carnaby's Black-Cockatoo and Forest Red-tailed Black-Cockatoo through installation and maintenance of artificial hollows.	Artificial hollows fail, deteriorate, become unsafe or are unsuitable for occupancy.	Breeding habitat objectives not achieved.	3	4	H	Installation by suitably qualified personnel; use of proven designs; periodic inspection and maintenance; replacement where required.	Structural defects, excessive wear or low occupancy rates recorded during inspections.	Repair, replace or relocate hollows; install additional hollows if required.	2	2	L
	Predation or disturbance of artificial hollows by feral animals.	Reduced breeding success and habitat utilisation.	3	3	M	Monitoring of artificial hollows; feral animal management where required.	Evidence of predator activity or nest disturbance.	Implement targeted predator control measures and modify hollow protection measures.	2	2	L
O5. Minimise the introduction and spread of weeds and disease within the offset area.	Weed invasion suppresses establishment and growth of native vegetation.	Reduced vegetation condition, diversity and habitat quality.	4	3	H	Pre-revegetation weed control; ongoing weed management program; hygiene procedures; routine monitoring.	Weed cover exceeds progressive performance indicators or increasing trend observed.	Additional weed mapping and targeted treatment program.	3	3	M
	Introduction or spread of pathogens or disease.	Decline in vegetation health and habitat quality.	3	3	M	Hygiene management procedures; clean machinery, footwear and equipment requirements; restrict access in wet conditions.	Evidence of disease symptoms or confirmed disease occurrence.	Implement disease containment measures; restrict access; obtain specialist advice.	2	2	L
O6. Protect the offset area from activities or disturbances that could result in the loss, degradation or fragmentation of native vegetation and black cockatoo habitat.	Unauthorised access, vegetation clearing, vehicle damage or incompatible land use within the offset area.	Loss or degradation of offset values and failure to achieve offset outcomes.	3	4	H	Conservation covenant registered over the offset area; fencing; signage; restricted vehicle access; personnel training.	Evidence of unauthorised access, clearing or disturbance during inspections.	Repair affected areas; reinforce access controls; investigate incident; implement additional barriers or signage.	2	2	L
	Bushfire impacts revegetation or adjacent remnant habitat.	Direct loss of vegetation, habitat values and offset gains.	3	4	H	Firebreak maintenance; access controls; compliance with local fire management requirements; routine inspections.	Fire occurrence within, or adjacent to, the offset area.	Undertake post-fire assessment; implement rehabilitation and supplementary planting where required; review fire management measures.	2	4	M
	Soil erosion following establishment works or extreme rainfall events.	Loss of soil productivity and revegetation failure in affected areas.	3	3	M	Appropriate site preparation; erosion controls; progressive stabilisation through revegetation; routine inspections.	Visible erosion scars, sediment movement or vegetation loss.	Repair erosion areas; install additional controls; revegetate disturbed areas.	2	2	L
	Grazing by livestock, rabbits, kangaroos or other herbivores damages establishing vegetation.	Reduced survival rates and delayed habitat development.	4	3	H	Fencing; stock exclusion; monitoring of grazing impacts; pest animal management where required.	Browsing, trampling or seedling damage observed.	Repair fencing; reinforce fencing; undertake supplementary planting.	3	3	M

Appendix F

Indicative Revegetation Species List

Species	CBC Forage Value	FRTBC Forage Value	Marri	BaBm
Groundcover/ Climber				
Banksia dallanneyi subsp. pollosta			X	
Gompholobium knightianum				X
Hardenbergia comptoniana			X	
Kennedia prostrata			X	
Thysanotus manglesianus			X	
Conostylis aculeata subsp. aculeata				X
Conostylis aculeata subsp. preissii			X	
Conostylis juncea				X
Conostylis setigera				X
Lepidosperma pubisquameum			X	
Lobelia rhytidosperma			X	
Lobelia tenuior			X	
Lomandra caespitosa			X	
Mesomelaena pseudostygia			X	X
Philotheca spicata				X
Phlebocarya ciliata				X
Phlebocarya filifolia				X
Xanthorrhoea brunonis				X
Xanthorrhoea preissii	M		X	X
Xanthosia huegelii				X
Herbs				
Anigozanthos humilis subsp. humilis			X	X
Asteridea pulverulenta				X
Astroloma pallidum				X
Astroloma stomarrhena				X
Brachyscome iberidifolia			X	
Burchardia congesta				X
Patersonia occidentalis var. occidentalis			X	X
Podotheca gnaphalioides			X	
Thysanotus arenarius			X	
Thysanotus patersonii				X
Trachymene pilosa			X	X
Tripterococcus brunonis			X	
Low Shrubs				
Acacia applanata				X
Acacia huegelii				X
Acacia pulchella var. pulchella			X	
Acacia sessilis			X	
Aotus procumbens				X
Blancoa canescens				X
Boronia ramosa subsp. anethifolia				X
Bossiaea eriocarpa			X	X
Calothamnus sanguineus				X
Calytrix angulata				X
Calytrix flavescens				X
Calytrix fraseri				X
Calytrix leschenaultii				X
Calytrix strigosa			X	
Conospermum crassinervium				X
Conospermum stoechadis				X
Conostephium minus				X
Conostephium pendulum			X	X
Dampiera linearis				X
Gompholobium tomentosum			X	X
Hybanthus calycinus			X	
Laxmannia squarrosa				X
Lechenaultia floribunda			X	X
Persoonia saccata			X	X

Species	CBC Forage Value	FRTBC Forage Value	Marri	BaBm
Phyllanthus calycinus			X	X
Pimelea floribunda			X	
Scaevola phlebopetala				X
Scholtzia involucrata				X
Siloxerus humifusus				X
Stirlingia latifolia				X
Styphelia propinqua			X	
Styphelia xerophylla			X	X
Synaphea spinulosa subsp. spinulosa				X
Medium Shrub				
Allocasuarina humilis				X
Banksia sessilis var. sessilis			X	
Beaufortia elegans				X
Calothamnus quadrifidus subsp. quadrifidus				X
Caesia micrantha			X	X
Calectasia narragara				X
Dasypogon bromeliifolius				X
Daviesia decurrens			X	
Daviesia divaricata subsp. divaricata				X
Daviesia physodes				X
Daviesia triflora				X
Eremaea asterocarpa subsp. asterocarpa				X
Eremaea fimbriata				X
Eremaea pauciflora var. pauciflora				X
Hakea costata	M		X	
Hakea prostrata	M		X	X
Hakea ruscifolia	M			X
Hakea trifurcata	M		X	
Hibbertia acerosa				X
Hibbertia crassifolia				X
Hibbertia hemignosta			X	
Hibbertia huegelii				X
Hibbertia hypericoides			X	X
Hibbertia racemosa				X
Hibbertia subvaginata			X	X
Hovea trisperma var. grandiflora				X
Hovea trisperma var. trisperma				X
Jacksonia floribunda	M			X
Jacksonia sternbergiana	M		X	
Johnsonia pubescens				X
Leptospermum spinescens				X
Leucopogon conostephioides				X
Melaleuca trichophylla				X
Pericalymma ellipticum var. floridum				X
Petrophile linearis			X	X
Petrophile macrostachya			X	
Petrophile striata				X
Tall Shrub				
Acacia saligna	L		X	
Tree				
Allocasuarina fraseriana		M		X
Banksia attenuata	H		X	X
Banksia grandis	H			X
Banksia ilicifolia	M			X
Banksia menziesii	H		X	X
Corymbia calophylla	H	H	X	X
Eucalyptus marginata	M	H	X	X
Eucalyptus todtiana	M			X
Total:			**48**	**84**

Data compiled from the literature (Davies 1966; Saunders 1974, 1979a, b, 1980; Saunders *et al.* 1982; Saunders 1986;

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