

Environmental Offsets Strategy

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Northern Goldfields Interconnector Pipeline
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Environmental Offsets Strategy

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Acronyms and abbreviations

Acronym / abbreviation	Definition
BC Act	<i>Biodiversity and Conservation Act (2016)</i>
COGG	City of Greater Geraldton
EPBC Act	<i>Environmental Protection and Biodiversity Conservation Act (1999)</i>
EPA	Environmental Protection Authority
DWER	Department of Water, Environmental and Regulation
ha	hectares
m	metres
MS	Ministerial Statement
NGI	Northern Goldfields Interconnect Pipeline
Qty	Quantity
CEO	Chief Executive Officer
GGP	Goldfields Gas Pipeline
km	kilometre
m ²	metres squared
MS	Ministerial Statement
PO	Postal Office
SW	South-west
WA	Western Australia

1. Introduction

1.1 Background

APA Northern Goldfields Interconnect Pty Ltd, an entity of the APA Group (APA), has completed construction of the Northern Goldfields Interconnect (NGI) Pipeline; a buried pipeline approximately 580 km in length, commencing at Ambania (located approximately 50 km east of Geraldton), connecting into the existing Goldfields Gas Pipeline (GGP) at approximately 40 km south of Leinster (the Proposal). This project includes associated above ground facilities sparsely located along the route of the pipeline, including a new compressor station at Ambania and other stations such as valve stations and scraper stations.

The Proposal was referred to the Environmental Protection Authority (EPA) under section 45 of the *Environmental Protection Act 1986* in January 2021, and amended through a section 43a process that was approved in September 2021. EPA approval of the Proposal was granted through Ministerial Statement 1184 (MS 1184) on February 2, 2022.

Construction activities commenced in April 2022 for the pipeline, compressor station and other stations. Vegetation clearing associated with the proposal was predominately completed within this period, including clearing of 0.25 ha of Carnaby's Cockatoo foraging habitat.

This offset strategy has been prepared in accordance with conditions 6-1 and 6-3 of MS 1184, proposing on-ground revegetation actions to counterbalance the 0.25 ha of cleared foraging habitat for Carnaby's Cockatoo.

The purpose of this offset strategy is to detail the actions APA will undertake to ensure the revegetation of the nominated offset site achieves a satisfactory standard as an offset.

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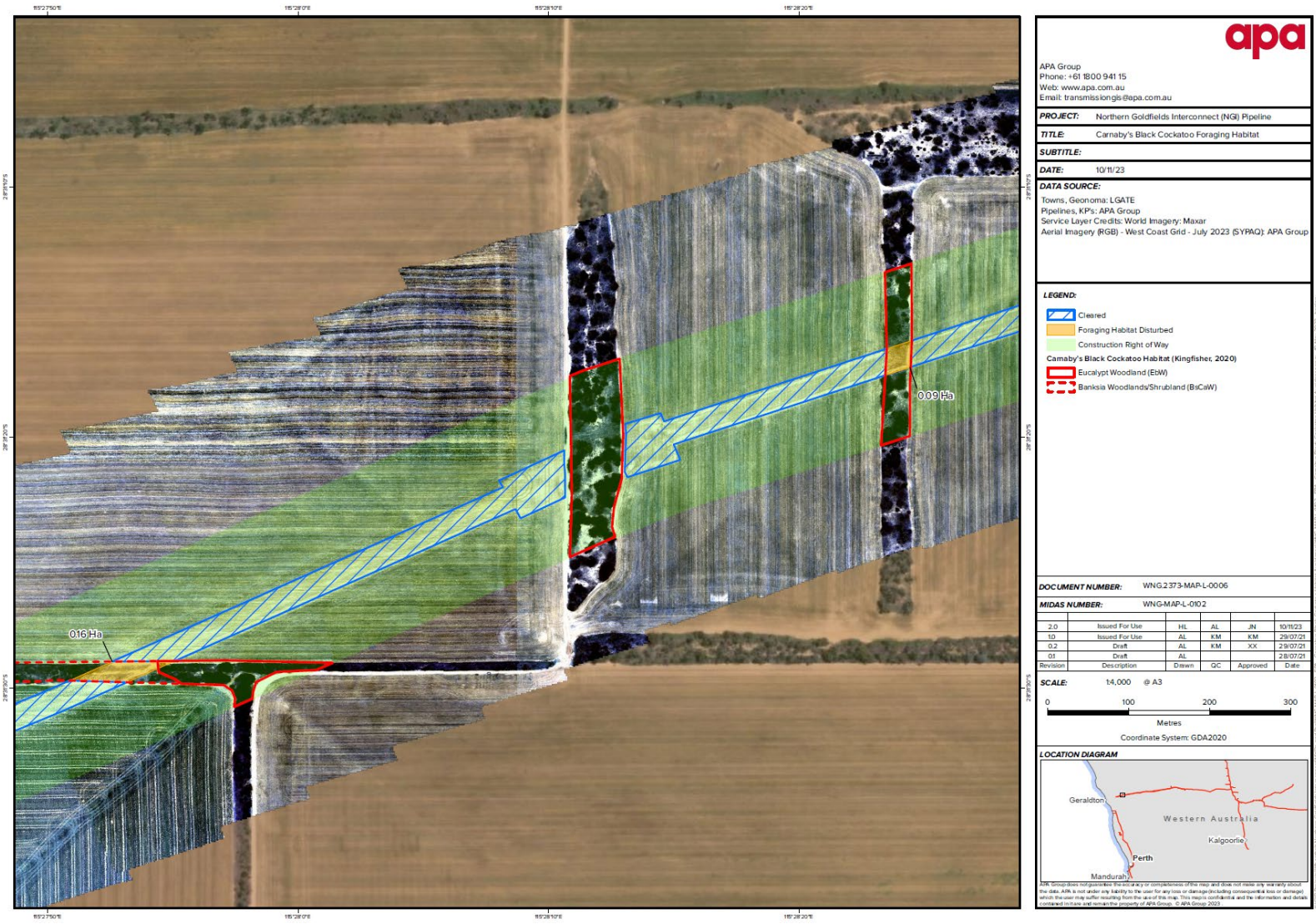


Figure 1-1. Impact Area

1.2 Significant Residual Environmental Impacts

Residual impacts associated with the Proposal have been determined through application of the residual impact significance model detailed in the *WA Environmental Offsets Metric Guideline* (Government of Western Australia, 2014). Significant residual impacts for which APA proposes environmental offsets are detailed in Table 1-1.

Carnaby's Cockatoo is listed as Endangered under the EPBC Act and the BC Act. The 0.25 ha of cleared foraging habitat for Carnaby's Cockatoo associated with the Proposal consists of two remnant strips of vegetation within otherwise cleared agricultural lands. This impact area near Mullewa is located on the northernmost modelled extent of the breeding and non-breeding distribution of Carnaby's Cockatoo (Department of Parks and Wildlife, 2013).

The 0.25 ha impact area consisted of two vegetation types, Banksia Woodlands (BsCaW) and Eucalyptus Woodlands (EbW). The area of vegetation cleared was predominately assessed as degraded (Focused Vision Consulting, 2020).

1.3 Ministerial Statement 1184 Conditions Related to Offsets

This Environmental Offset Strategy has been prepared to comply with the following conditions of MS 1184:

- *Condition 6-1: APA shall implement offset measures to achieve the objective of counterbalancing the significant residual impact to 0.25 ha of foraging habitat for Carnaby's Cockatoo.*
- *Condition 6-2: Within twelve (12) months from the date of this Statement APA shall prepare and submit an offset strategy to the requirements of the CEO.*
- *Condition 6-3: The offset strategy shall:*
 1. *demonstrate that the objective in condition 6-1 will be met;*
 2. *identify any area(s) to be acquired and/or for on-ground management (Proposed Offset Conservation Area), which contains the environmental values identified in condition 6-1, or similar values of equivalent conservation significance agreed by the CEO; and*
 3. *demonstrate how the proposed offset counterbalances the significant residual impact to the environmental value identified in condition 6-1 through application of the principles of the WA Environmental Offsets Policy (2011) and completion of the WA Offsets Template and the EPBC Act Offset assessment guide (the calculator) as described in the WA Environmental Offset Guidelines (2014), and the Environmental Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy Assessment Guide (2012), or any subsequent revisions of these documents.*
 4. *specify if land acquisition is proposed:*
 - a. *how the Proposed Offset Conservation Area will be acquired;*
 - b. *a timeframe and works associated with establishing the Proposed Offset Conservation Area, including plans for maintain the offset for at least twenty (20) years after completion of purchase; and*
 - c. *each relevant management body for the on-going management of the Proposed Offset Conservation Area, including its role, and confirmation in writing that the relevant management body accepts responsibility for its role.*
 5. *specify, if on-ground management is proposed:*
 - a. *state the targets to be achieved, including completion criteria, which result in a tangible improvement to the environmental value being offset;*

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- b. demonstrate the consistency of the objective(s) and target(s) with the objectives of the National Recovery Plans for Carnaby's Cockatoo, or any subsequent revision of this plan;*
 - c. detail the on-ground management actions with associated timeframes for implementation, to achieve the objective(s) and target(s) identified in condition 6-3(5); and*
 - d. detail monitoring, reporting and evaluation mechanisms for the objective(s), target(s) and actions identified under condition 6-3(5)(a) and 6-3(5)(c).*
- *Condition 6-5: APA shall implement the latest version of the offset strategy approved by the CEO.*
 - *Condition 6-6: APA shall continue to implement the offset strategy until the CEO has confirmed by notice in writing that APA has demonstrated that the objective in condition 6-1 has been met.*
 - *Condition 6-7: Should the actions, objectives or targets in the offset strategy be unable to be met, APA shall notify the CEO within thirty (30) days of it being identified and provide details and timing of contingency actions to be undertaken, to the satisfaction of the CEO.*
 - *Condition 6-8: APA shall report to the CEO on the outcomes of the contingency actions as required by the condition 6-7 within sixty (60) days of completion.*

Table 1-1. Environmental Offsets

Northern Goldfields Interconnector Pipeline									
Existing environment/ Impact	Mitigation			Significant Residual Impact	Offset Calculation Methodology				
	Avoid and minimise	Rehabilitation	Likely Rehab Success		Type	Risk	Likely offset success	Time Lag	Offset Quantification
0.25 ha clearing native vegetation/Carnaby's Cockatoo foraging habitat.	Avoid clearing Carnaby's Cockatoo foraging habitat where possible for the Proposal by utilising cleared areas.	Respread of cleared topsoil and revegetation to encourage natural regeneration. No rehabilitation credit has been allowed in calculating offset requirements.	No rehabilitation credit has been allowed in calculating offset requirements as such no further information in relation to success is included.	<p>Extent: 0.25 ha</p> <p>Quality:</p> <ul style="list-style-type: none"> Vegetation is in Degraded to Degraded-Good condition across the two impact areas (Focused Vision Consulting, 2020). Remnant vegetation in otherwise cleared landscape. Foraging value for Carnaby's Cockatoo <p>Conservation Significance: Endangered</p> <p>Land Tenure: Freehold (private) land</p> <p>Timescale: Permanent</p> <p>The residual impact is considered significant as land clearance is a recognised threatening process for Black Cockatoos.</p>	Revegetation / On ground management.	Proposed site is a crown reserve under a management order with City of Greater Geraldton (COGG). APA is currently developing agreement with COGG (low risk).	<p><u>Can the values be defined and measured?</u></p> <ul style="list-style-type: none"> Yes – area of offset that provides foraging habitat to Carnaby's Cockatoo can be measured. <p><u>Operator experience/Evidence?</u></p> <ul style="list-style-type: none"> Revegetation, maintenance and monitoring will be undertaken by a reputable, experienced local revegetation sub-contractor and managed by APA. <p><u>What is the type of vegetation being revegetated?</u></p> <ul style="list-style-type: none"> Habitat suitable for foraging by Carnaby's Cockatoo. 	8 – 10 years for Carnaby's Cockatoo foraging species to become productive for foraging (Calver, 2010); 1 - 5 years for other management actions.	Total offset of 1 ha of revegetation.

2. On-ground Management Offset

2.1 Offset Requirements

Environmental offsets for the Proposal have been considered in accordance with the WA Environmental Offsets Policy (Government of Western Australia, 2011) and the WA Environmental Offsets Metric Guideline (Department of Water and Environmental Regulation, 2021). Offset requirements have been calculated using the DWER Environmental Offset Calculator.

Offset calculations are provided in Appendix A. The inputs and justifications are provided in Table 2-1 below.

Table 2-1. Offset Calculator Input Values and Justifications – Carnaby’s Cockatoo

Offset Guide Item	Input Value	Justification
Conservation Status	Endangered	Current BC Act 2016 and EPBC 1999 listing.
Impact area (ha)	0.25	Total amount of clearing undertaken for the Proposal.
Quality of impact area	5.00	The quality of the impact area for Carnaby’s Cockatoo has been determined based on the value of the habitat as potential foraging and/or dispersal habitat. Despite the site being classified as ‘degraded to degraded-good condition’ the site provides habitat in a highly cleared landscape, increasing the value of the area.
Time until ecological benefit	15 years	It is considered that the revegetation will achieve a quality score of 5 as Carnaby’s foraging habitat within 15 years. It is known that foraging species reach an age/size capable of supporting Carnaby’s Cockatoo foraging at 8 - 10 years post planting in the SW regions of the State (Calver, 2010). Additional time has been added to account for the potential slower growth rate of seedlings due to the different climatic conditions of Mullewa.
Current quality of offset site	3.00	Area to be revegetated is degraded from previous water harvesting actions. Some vegetation has naturally revegetated and may provide some foraging value for Carnaby’s Cockatoos. The degraded portion to be revegetated (the offset area) is surrounded by vegetation in more intact condition, which forms part of the Mullewa Wildflower Walk Trail.
Future quality without offset	2.00	Without active management it is likely that vegetation will further degrade and any remaining value for Carnaby’s Cockatoos will be reduced and/or lost.
Future quality with offset	5.00	APA will organise an experienced and reputable sub-contractor company to undertake collection of local seed, propagation of seedlings, revegetation, maintenance and monitoring. It is therefore expected that the revegetation will achieve a reasonable quality as foraging habitat for Carnaby’s Cockatoo.
Time until offset site secured (years)	0	The revegetation will occur within an existing reserve R46355 (Water and Landscape Protection purpose) therefore no additional security is proposed.
Risk of loss (%) without offset	30	While the area is highly degraded, some values remain. Without active management it is likely that vegetation will further degrade and any remaining value for Carnaby’s Cockatoos will be reduced or lost. The COGG has not indicated any intention to revegetate the water harvesting area prior to APA proposing this revegetation project.
Risk of loss (%) with offset	5	Although the reserve is currently managed for a conservation and recreation purpose, there is a small risk of future loss, such as due to changes of tenure or infrastructure proposals.

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Confidence (%) in result (averted risk)	80	There is a high level of confidence that the revegetation will achieve a quality score of 5 within 15 years.
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2.2 Offset Location

The City of Greater Geraldton Reserve 46355 (the reserve) is controlled by the City of Greater Geraldton (COGG) and is located between Lovers Lane and Geraldton Mount Magnet Road in Mullewa, WA. APA is proposing to rehabilitate a 1 ha portion of this reserve that is currently in a degraded condition. This offset area is located approximately 4.5 km from the impact area. Two indicative locations for the offset are shown in Figure 2-1. The specific portion of the reserve to be revegetated will be determined based on assessment of suitability from the local revegetation sub-contractor.

The proposed offset area has historically been used for water harvesting. This involved removal of vegetation and shaping the land form. The area is currently degraded with a medium to high weed burden and minimal existing vegetation. Without rehabilitation, it is expected that weed coverage would increase and the area would become further degraded.

A 2,820 m circuit walk (the Mullewa Wildflower Walk) has been developed around the perimeter of the reserve with a portion passing through the degraded water harvesting area. This Wildflower Walk is a tourist attraction for the COGG. Revegetating the proposed offset area will not only provide foraging value to the Carnaby's Cockatoo but will add aesthetic value to the area and have a positive impact on tourism.

The crown reserve is under a management order with the COGG for the purposes of water and landscape protection. To ensure a third party (APA) can access the reserve to undertake ongoing revegetation, monitoring and maintenance activities, a formal lease agreement is intended to be established between APA and the COGG.

This process requires Council approval, and subsequent obtainment of ministerial consent to execute a lease agreement within Crown land. APA and the COGG have commenced this process, however it will likely take several months to complete.

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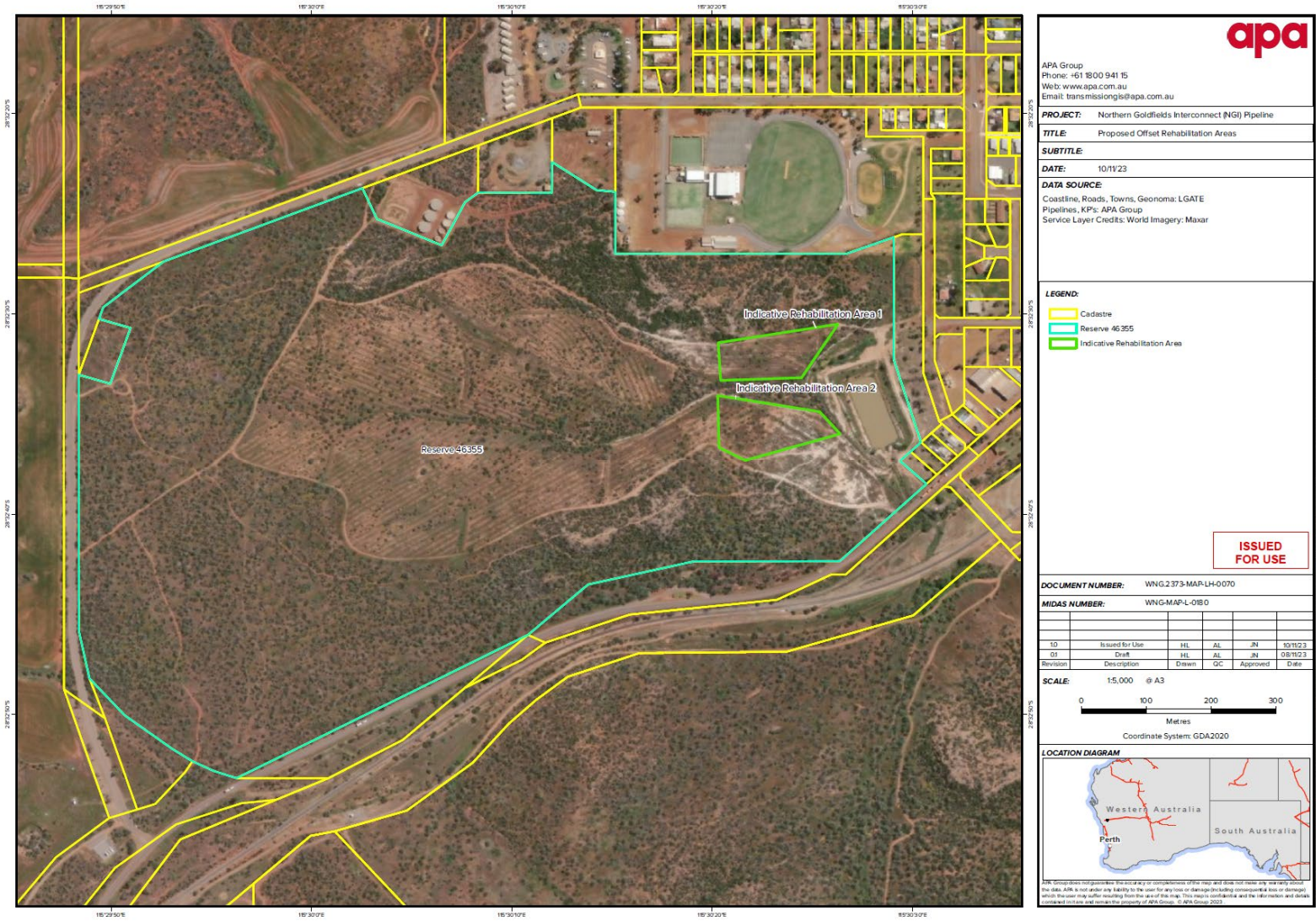


Figure 2-1. Indicative Offset Locations

2.3 Management Actions

The objectives for the proposed revegetation activities within the offset area are:

- increase Carnaby's Cockatoo foraging habitat within the offset area;
- increase connectivity of the offset area with surrounding bushland; and
- increase the aesthetic value of the offset area, contributing to the Wildflower Walk.

The following activities are proposed:

- site preparation (including an initial weed control event);
- initial revegetation via installation of native tubestock and direct seeding; and
- monitoring and maintenance for a 5-year period.

2.3.1 Site Preparation

As there is existing native vegetation within the offset area, ripping cannot be economically undertaken without risking damage to existing native species. Therefore, site preparation will be limited to an initial weed control event prior to revegetation activities.

Due to the previous disturbance history of the area, the offset area is likely to have a medium to heavy weed burden which could affect the survivability of the native revegetation. Some weed species found during a recent informal site inspection on 24 August 2023 included Wild Oats (*Avena fatua*), Paterson's Curse (*Echium plantagineum*) and a Fountain Grass (*Pennisetum* sp.). Weed control will be undertaken in favourable weather conditions, with care taken to avoid damage to existing native vegetation. Weed control will be undertaken by either mechanical intervention or experienced herbicide technicians spot spraying broad leaf weeds and introduced grasses with a selective herbicide (Glyphosate) and potentially a grass selective (Flusilade) application if required. The use of weed control will be specified by the local revegetation sub-contractor.

2.3.2 Revegetation Techniques

Revegetation is recommended to occur in May after the first significant rainfall event, with timing of revegetation to be flexible to weather conditions. Revegetation will be undertaken using tube stock planting and potentially direct seeding. The revegetation methodology will consider advice provided by the local revegetation sub-contractor. It is expected that tubestock plants will be planted in a layout reflecting the surrounding existing vegetation, using the following methodology:

- Handheld augers or pottiputkis will be used to dig holes throughout the offset area, with holes dug to a depth that ensures the entire root ball of the plant is covered.
- Native tubestock will be placed into the holes with a suitable native soil conditioner.
- Holes will be backfilled, ensuring no air pockets are present.

Mullewa presents a harsh climate for seedlings to survive. Limited rain has been recorded in 2023 compared to previous years (1986 to 2022) (Bureau of Meteorology, 2023). Therefore, the proposed initial planting density is proposed to be higher at up to two plants per square metre (m²) to account for the potentially lower success rate. This totals to up 20,000 native tubestock species within the 1 ha offset area.

Based on expectations for lower success rates, infill planting of up to 30% (of the initial number planted) will be undertaken in May annually for the next two-year period (two events), with up to 6,000 tubestock species expected to be required. However, the actual number of seedlings required will be decided after the spring monitoring events and recommendations from the experienced local revegetation sub-contractor.

2.3.3 Species List

The proposed species list comprises of native species from the locality of the offset area and is outlined below in Table 2-2. The list is predominately made up of species that will provide foraging value for

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Carnaby's Cockatoo (Department of Environment and Conservation, 2011). The species list comprises of approximately 25% overstorey, 25% understorey and 50% middle storey species; reflecting the surrounding vegetation of the offset area. Majority of the understorey species comprise of native wild flower species that are local to the area, resulting in this offset strategy not only providing foraging value but aesthetic value to the area.

Table 2-2. Proposed Species List

Species	Common Name	Qty	Type
<i>Borya sphaerocephala</i>	Pincushions	250	Tubestock
<i>Brachyscome iberidifolia</i>	Swan River Daisy	250	Tubestock
<i>Cephalopterum drummondii</i>	Pompom Head	250	Tubestock
<i>Lawrencella rosea</i>	-	150	Tubestock
<i>Laxmannia sessiliflora</i>	Nodding Lily	150	Tubestock
<i>Ptilotus chamaecladus</i>	-	150	Tubestock
<i>Ptilotus gaudichaudii</i>	-	150	Tubestock
<i>Schoenia cassiniana</i>	Schoenia	250	Tubestock
<i>Trachymene ornata</i>	Spongefruit	150	Tubestock
<i>Waitzia acuminata</i>	Orange Immortelle	150	Tubestock
<i>Waitzia nitida</i>	-	250	Tubestock
<i>Hemigenia botryphylla</i>	-	100	Tubestock
<i>Banksia fraseri</i>	Dryandra	300	Tubestock
<i>Grevillea paradoxa</i>	Bottlebrush Grevillea	300	Tubestock
<i>Hakea circumalata</i>	Coastal Hakea	300	Tubestock
<i>Hakea incrassata</i>	Marble Hakea	300	Tubestock
<i>Allocasuarina campestris</i>	-	150	Tubestock
<i>Eremophila clarkei</i>	Turpentine Bush	150	Tubestock
<i>Grevillea didymobotrya</i> subsp <i>didymobotrya</i>	-	50	Tubestock
<i>Grevillea dielsiana</i>	Diels Grevillea	50	Tubestock
<i>Hakea bucculenta</i>	Red Pokers	50	Tubestock
<i>Hakea recurva</i> subsp <i>arida</i>	-	50	Tubestock
<i>Hibbertia glomerosa</i>	Guinea-flower	50	Tubestock
<i>Hibbertia stenophylla</i>	-	50	Tubestock

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Species	Common Name	Qty	Type
<i>Malleostemon tuberculatus</i>	-	50	Tubestock
<i>Melaleuca radula</i>	Graceful Honeymyrtle	100	Tubestock
<i>Philotheca brucei</i>	-	50	Tubestock
<i>Philotheca sericea</i>	-	50	Tubestock
<i>Pileanthus peduncularis</i>	Coppercups	50	Tubestock
<i>Prostanthera magnifica</i>	Magnificent Prostanthera	150	Tubestock
<i>Ptilotus obovatus</i>	Cotton Bush	150	Tubestock
<i>Ricinocarpos velutinus</i>	-	50	Tubestock
<i>Ricinocarpos velutinus</i>	-	200	Tubestock
<i>Senna artemisioides</i>	-	150	Tubestock
<i>Seringia hermannifolia</i>	Crinkle-leaved firebush	200	Tubestock
<i>Thryptomene denticulata</i>	-	50	Tubestock
<i>Verticordia spicata</i>	Spiked Featherflower	50	Tubestock
<i>Solanum lasiophyllum</i>	Flannel Bush	150	Tubestock
<i>Allocasuarina acutivalvis subsp. prinsepiana</i>	-	100	Tubestock
<i>Dodonaea inaequifolia</i>	-	100	Tubestock
<i>Eremophila oldfieldii</i>	Pixie Bush	50	Tubestock
<i>Acacia acuminata</i>	Jam	600	Tubestock
<i>Acacia tetragonophylla</i>	Kurara	250	Tubestock
<i>Grevillea obliquistigma</i>	-	50	Tubestock
<i>Eremophila glabra</i>	Tarbush	200	Tubestock
<i>Grevillea paniculata</i>	Kerosene Bush	200	Tubestock
<i>Grevillea petrophiloides</i>	Pink Poker	200	Tubestock
<i>Hakea preissii</i>	Needle Tree	200	Tubestock
<i>Hakea scoparia</i>	Kangaroo Bush	200	Tubestock
<i>Acacia aneura</i>	-	200	Tubestock
<i>Acacia saligna</i>	Orange Wattle	300	Tubestock

Species	Common Name	Qty	Type
<i>Banksia ashbyi</i>	Ashby's Banksia	300	Tubestock
<i>Eucalyptus beardiana</i>	Beard's Mallee	250	Tubestock
<i>Eucalyptus cometae-vallis</i>	Comet Vale Mallee	200	Tubestock
<i>Eucalyptus eudesmioides</i>	Malallie	300	Tubestock
<i>Eucalyptus ewartiana</i>	Ewart's Mallee	50	Tubestock
<i>Eucalyptus horistes</i>	Pointed-Bud Mallee	50	Tubestock
<i>Eucalyptus jucunda</i>	Yuna Mallee	50	Tubestock
<i>Eucalyptus kochii</i>	Oil Mallee	50	Tubestock
<i>Eucalyptus leptopoda</i>	Tammin Mallee	50	Tubestock
<i>Eucalyptus loxophleba</i>	York Gum	300	Tubestock
<i>Eucalyptus obtusiflora</i>	Dongara Mallee	50	Tubestock
<i>Eucalyptus oldfieldii</i>	Oldfield's Mallee	50	Tubestock
<i>Eucalyptus petraea</i>	Granite Rock Box	50	Tubestock
<i>Eucalyptus subangusta</i>	-	50	Tubestock
<i>Eucalyptus subangusta</i> subsp. <i>Pusilla</i>	Ember Mallee	50	Tubestock

*Note the proposed species and quantities is subject to change depending on availability during seed collection events.

2.3.3.1 Species Source

Species are proposed to be sourced from Greenoil Tree Nursery, a reputable local revegetation company that is able to collect seed from species within or surrounding the offset area, increasing the likelihood of propagated species survival. Greenoil Tree Nursery maintain a collection of seed from local species to be used in regional revegetation projects. Further, the local supplier will determine if any of the collected species will be suited for direct seeding. Additional native seed mix may be broadcasted throughout the offset area if appropriate.

2.3.4 Maintenance

Maintenance events will be undertaken within the offset area following initial revegetation to increase the likelihood of success and that the completion criteria (Section 2.4) are being met. Bi-annual maintenance events in spring and autumn are recommended for a 5-year period following the initial revegetation event based on assessments during monitoring events.

Maintenance events should be adaptable to site conditions observed during monitoring events and may include the following activities:

- weed control;
- pest control (e.g. rabbit control);
- waste management; and
- infill planting (if required).

The frequency of maintenance events and activities required at each event will be determined based on the outcomes of revegetation monitoring.

2.4 Targets and Completion Criteria

The targets and completion criteria defined in Table 2-3 were developed in order to achieve a successful self-sustaining revegetation area that provides foraging value for Carnaby’s Cockatoo.

Table 2-3. Targets and Completion Criteria for the Offset Strategy

Criterion	Completion targets	Completion criteria
A	Establish Carnaby’s Cockatoo foraging value to the offset area.	A minimum of 5 Carnaby’s Cockatoo foraging species present within offset area.
B	Weed cover is no greater than in the reference sites.	Weed coverage is to be +/- 5% of the reference site.
C	Revegetation is successful.	The establishment of 1 plant per m ² or 70% native vegetation foliage cover.
D	Species richness is established within offset area.	A minimum of species richness of 15 native species present from the species list.

2.5 Monitoring, Reporting and Evaluation

APA will sub-contract a suitable and experienced specialist to undertake bi-annual monitoring events in spring and autumn of the offset area against the completion criteria. Monitoring will also include the establishment of an appropriate reference site (informal assessment) to establish if the area has any other issues that need to be addressed, such as evidence of pest species.

Monitoring of rehabilitation outcomes will be undertaken through the establishment of 5 x 5 m quadrats to assess:

- number of native and non-native species;
- species diversity; and
- weed coverage.

A report will be provided on monitoring results for each monitoring event for the 5-year period.

2.5.1 Contingency Measures

The contingency measures outlined in Table 2-4 will be implemented should monitoring indicate the completion criteria defined in Section 2.4 may not be met. Table 2-4 outlines potential risks of the offset and the contingency measures that can be implemented to mitigate each risk.

Table 2-4. Risks and contingency measures

Risk	Contingency measure
Low survival rate of revegetation	<ul style="list-style-type: none"> ▪ If revegetation is not meeting the survival rate several options can be considered including: <ul style="list-style-type: none"> - watering revegetation throughout summer months; and - infill planting (utilising species with a high success rate).

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Grazing on revegetation by pest species (e.g. rabbits)	<ul style="list-style-type: none">▪ If revegetation is being grazed on by pest species, the following actions could be implemented to mitigate the risk:<ul style="list-style-type: none">- installation of tree guards or a rabbit proof fence; and- infill planting.
Weed burden is higher than in reference site	<ul style="list-style-type: none">▪ If the weed burden is higher than in reference site and isn't being controlled by bi-annual events, additional weed control events can be undertaken.

3. Consistency with Policies and Recovery Plans

3.1 WA Environmental Offsets Policy

The WA Environmental Offsets Policy (Government of Western Australia, 2011) requires the following Principles are considered when developing an offset proposal:

1. Environmental offsets will only be considered after avoidance and mitigation options have been pursued.
2. Environmental offsets are not appropriate for all projects.
3. Environmental offsets will be cost-effective, as well as relevant and proportionate to the significance of the environmental value being impacted.
4. Environmental offsets will be based on sound environmental information and knowledge.
5. Environmental offsets will be applied within a framework of adaptive management.
6. Environmental offsets will be focussed on longer term strategic outcomes.

Details of how this Offset Strategy meets each of the above principles is outlined below in Table 3-1 below.

Table 3-1. WA Environmental Offset Policy Principles

Principle	How this offset strategy satisfies each principle
1. Environmental offsets will only be considered after avoidance and mitigation options have been pursued	APA have implemented several avoidance and mitigations measures when constructing the Northern Goldfields Interconnect Pipeline. One of the measures undertaken included utilising horizontal directional drilling to avoid damaging additional areas of the Eucalyptus Woodlands (EbW). Additionally, APA avoiding clearing native species such as the threatened <i>Eucalyptus beardiana</i> where possible. Lastly, APA ensured the completion of rehabilitation within short time frames to maximise the benefit of topsoil and stripped vegetation respreading.
2. Environmental offsets are not appropriate for all projects	Carnaby’s Cockatoo is listed as threatened species under the BC Act, with one of the key threats to the survival of the species within the recovery plan listed as the loss of habitat, including foraging habitat (Department of Parks and Wildlife, 2013). Environmental offsets are considered appropriate for offsetting impacts to biodiversity and ecological values. Additionally, an environmental offset that includes on-ground management actions that focuses on habitat creation will be more beneficial for the species than indirect offsets. Revegetation will increase the species connectivity and their distribution within the area and can provide foraging habitat for the species.
3. Environmental offsets will be cost-effective, as well as relevant and proportionate to the	Rehabilitating the offset area with Carnaby’s Cockatoo foraging species will directly replace habitat lost. The offset strategy has been prepared

significance of the environmental value being impacted	in order to maximise the success of the revegetation, meaning the offset area will have a greater chance of becoming self-sustaining and provide long-term benefits to the species. This will result in cost-effectiveness overall.
4. Environmental offsets will be based on sound environmental information and knowledge	This proposed environmental offset strategy aligns with the Carnaby's Cockatoo Recovery Plan (Department of Parks and Wildlife, 2013). Section 3.2 below outlines how this offset strategy meets the recommended recovery actions outlined within the Recovery Plan. The offsets strategy is based on research and knowledge of plant species used by Carnaby's Cockatoo for foraging in the Mullewa area.
5. Environmental offsets will be applied within a framework of adaptive management	This offset strategy is adaptive to site conditions and will ensure the best management practices are utilised based on the findings during the monitoring events. Adaptive management in the form of contingency measures has been included in this offset strategy.
6. Environmental offsets will be focused on longer term strategic outcomes	The monitoring and maintenance of the proposed offset site for a 5-year period sets the offset area up for long term success, with the aim of the area to provide foraging value to Carnaby's Cockatoo within an 8–10 year period.

3.2 Recovery Plan for Carnaby's Cockatoo

This Offset Strategy aligns with the Carnaby's Cockatoo Recovery Plan (Department of Parks and Wildlife, 2013) objective to stop further decline in the distribution and abundance of Carnaby's Cockatoo by the creation of habitat including habitat connectivity for the species. Table 3-2 below outlines how this offset strategy meets each of the recovery actions outlined within the Recovery Plan.

Table 3-2. Recovery Plan Actions

Recovery Action	How this offset strategy satisfies each action
Action 1: Protect and Manage Important Habitat	The protection and management of the full extent of the Carnaby's Cockatoo habitat is not possible. Therefore, it is important to minimise the impacts of habitat loss where possible. This offset strategy meets this recovery action by working with the existing vegetation found within the proposed offset area, such that revegetation of further Carnaby's Cockatoo habitat doesn't impact any existing habitat. This offset strategy will protect and improve the existing habitat through the management of weeds and feral animals as required, and the prevention of further degradation of habitat. Further this offset strategy will revegetate the bare or weed burdened areas within the proposed offset area, an area in close proximity to Carnaby's Cockatoo foraging habitat.

Environmental Offsets Strategy

<p>Action 2: Undertake Regular Monitoring</p>	<p>This offset strategy will involve bi-annual monitoring of the offset area for a 5-year period and will include recording the vegetation condition of the foraging species. Monitoring of Carnaby's Cockatoo numbers in the Mullewa region is not relevant to this offset proposal.</p>
<p>Action 3: Conduct Research to Inform Management</p>	<p>This offset strategy does not include a research component and this action is therefore not relevant to the offset strategy.</p>
<p>Action 4: Manage Other Impacts</p>	<p>This offset strategy does not manage other impacts such as vehicle collisions or illegal activities and is therefore not relevant to the offset strategy.</p>
<p>Action 5: Engage with the Broader Community</p>	<p>This offset strategy has the potential to engage with the broader community via its proximity to the town of Mullewa's Wild Flower Walk. This walk brings in tourism to the area, and revegetating the proposed offset area adjacent to it may foster discussions about the species. Further, this offset strategy will manage land owned by the COGG within the town of Mullewa and help revegetate the Carnaby's Cockatoo habitat.</p>
<p>Action 6: Undertake Information and Communication Activities</p>	<p>This offset strategy proposes to establish a management agreement with the COGG on land that is potentially used by Carnaby's Cockatoos. With the COGG providing the land to be revegetated and APA managing the revegetation, maintenance and monitoring for a 5-year period. The offset strategy presents an opportunity for additional interpretive signage along the Wildflower Walk to inform and educate walkers on Carnaby's Cockatoo and the value of foraging habitat protection.</p>

4. References

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Appendix A. Offset Calculations

Step 1: Determining conservation significance

Key:

- Data to be entered
- Drop-down selection
- Automatically-generated scores
(Or, if appropriate, manual data entry permitted)

Area / feature (Impact site)

Conservation significance determination for the environmental value impacted									
Conservation significance	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; padding: 5px;">Description</td> <td style="padding: 5px; background-color: yellow;">Carnaby's Foraging Habitat</td> </tr> <tr> <td style="padding: 5px;">Type of environmental value</td> <td style="padding: 5px; background-color: #f4a460;">Species (flora/fauna)</td> </tr> <tr> <td style="padding: 5px;">Conservation significance of environmental value</td> <td style="padding: 5px; background-color: #f4a460;">Rare/threatened species - endangered</td> </tr> <tr> <td style="padding: 5px;">Conservation significance score</td> <td style="padding: 5px; background-color: #cccccc;">1.2%</td> </tr> </table>	Description	Carnaby's Foraging Habitat	Type of environmental value	Species (flora/fauna)	Conservation significance of environmental value	Rare/threatened species - endangered	Conservation significance score	1.2%
Description	Carnaby's Foraging Habitat								
Type of environmental value	Species (flora/fauna)								
Conservation significance of environmental value	Rare/threatened species - endangered								
Conservation significance score	1.2%								

Please select <i>area</i> or <i>feature</i> for the calculations	Area
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Step 2: Calculating significant residual impact

Key:

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

Environmental value (step 1)	Carnaby's Foraging Habitat
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Area (impact site)

Part A: Significant impact calculation Area				
Significant impact	Description	Quantum of impact		
	Clearing of foraging habitat for Carnaby's Cockatoo	Significant impact (hectares)	0.25	
		Quality (scale)	5.00	
		Total quantum of impact		0.13

Part B: Rehabilitation credit calculation Area (onsite)					
Rehabilitation Credit	Description	Proposed rehabilitation (area in hectares)	Time until ecological benefit (years)		
	No rehabilitation credit has been applied	Current quality of rehabilitation site (scale)		Confidence in rehabilitation result (%)	
		Future quality WITHOUT rehabilitation (scale)		Rehabilitation credit	0.00
		Future quality WITH rehabilitation (scale)			

Part C: Significant residual impact calculation Area		
Significant residual impact	Total quantum of impact	0.13
	Rehabilitation credit	0.00
	Significant residual impact	0.13

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 Foraging Habitat	Significant impact (step 2, part A)	0.25
		Rehabilitation credit (step 2, part B)	0.00
		Significant residual impact (step 2, part C)	0.13

Area (offset site)

Offset calculation Area							
Offsets calculation	Description	Proposed offset (area in hectares)	1.00	Duration of offset implementation (maximum 20 years)	20.00	Offset value	0.27
	Rehabilitation of degraded land at Mullewa, previously used for water harvesting and adjacent to the Wildflower Walk.	Current quality of offset site (scale)	3.00	Time until offset site secured (years)	0.00		212.4%
		Future quality WITHOUT offset (scale)	2.00	Risk of future loss WITHOUT offset (%)	30.0%		
		Future quality WITH offset (scale)	5.00	Risk of future loss WITH offset (%)	5.0%		
		Time until ecological benefit (years)	15.00				
	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 Foraging Habitat	Impact to 0.25 ha of foraging habitat for Carnaby's Cockatoo
Type of environmental value	Species (flora/fauna)	Drop down list
Conservation significance of environmental value	Rare/threatened species - endangered	Drop down list
Landscape-level value impacted	yes/no	
Significant impact		
Description	Clearing of foraging habitat for Carnaby's Cockatoo	Clearing of 0.25 ha of native vegetation that provides foraging habitat for Carnaby's Cockatoo
Significant impact (hectares) / Type of feature	0.25	The area of foraging habitat that will be impacted by the proposal
Quality (scale) / Number	5.00	Although the vegetation is in Degraded condition, it potentially provides foraging habitat for Carnaby's Cockatoo in a highly cleared landscape.
Rehabilitation credit		
Description	No rehabilitation credit has been applied	No rehabilitation credit is proposed.
Proposed rehabilitation (area in hectares)	0.00	
Current quality of rehabilitation site / Start number (of type of feature)	0.00	
Future quality WITHOUT rehabilitation (scale) / Future number WITHOUT rehabilitation	0.00	
Future quality WITH rehabilitation (scale) / Future number WITH rehabilitation	0.00	
Time until ecological benefit (years)	0.00	
Confidence in rehabilitation result (%)	0	
Offset		
Description	Rehabilitation of degraded land at Mullewa, previously used for water harvesting and adjacent to the Wildflower Walk.	
Proposed offset (area in hectares)	1.00	Revegetation of 1 ha using foraging species suitable for Carnaby's Cockatoo
Current quality of offset site / Start number (of type of feature)	3.00	Area to be revegetated is degraded from previous use to harvest water for Mullewa town water supply. Some vegetation remains and is assumed to provide some foraging value for Carnaby's Cockatoos. The degraded portion to be revegetated (the offset area) is surrounded by vegetation in more intact condition, which is part of the Mullewa Wildflower Walk Trail.
Future quality WITHOUT offset (scale) / Future number WITHOUT offset	2.00	Without active management it is likely that vegetation will further degrade and any remaining value for Carnaby's Cockatoos will be reduced and/or lost.
Future quality WITH offset (scale) / Future number WITH offset	5.00	APA will organise an experienced and reputable sub-contractor company to undertake collection of local seed, propagation of seedlings, revegetation, maintenance and monitoring. It is therefore expected that the revegetation will achieve a reasonable quality as foraging habitat for Carnaby's Cockatoo.
Time until ecological benefit (years)	15.00	It is considered that the revegetation will achieve a quality score of 5 as Carnaby's Cockatoo foraging habitat within 15 years. It is known that foraging species reach an age/size capable of supporting Carnaby's Cockatoo foraging at 8 - 10 years post planting in the SW regions of the State (Calver, 2010). Additional time has been added to account for the potential slower growth rate of seedlings due to the different climatic conditions of Mullewa.
Confidence in offset result (%)	0.8	There is a high level of confidence that the revegetation will achieve a quality score of 5 within 15 years.
Duration of offset implementation (maximum 20 years)	20.00	The revegetation will be established and monitored for a period of 5 years by APA and then managed for a period of 20 years by the local government authority.
Time until offset site secured (years)	0.00	The revegetation will occur within an existing reserve R46355 (Water and Landscape Protection purpose) therefore no additional security is proposed.
Risk of future loss WITHOUT offset (%)	30.0%	While there area is highly degraded, some values remain. Without active management it is likely that vegetation will further degrade and any remaining value for Black Cockatoos will be reduced or lost. The COGG has not indicated any intention to revegetate the water harvesting area.
Risk of future loss WITH offset (%)	5.0%	Although the reserve is currently managed for a conservation and recreation purpose, there is a small risk of future loss, such as due to changes of tenure or infrastructure proposals.
Offset ratio (Conservation area only)	N/A	N/A