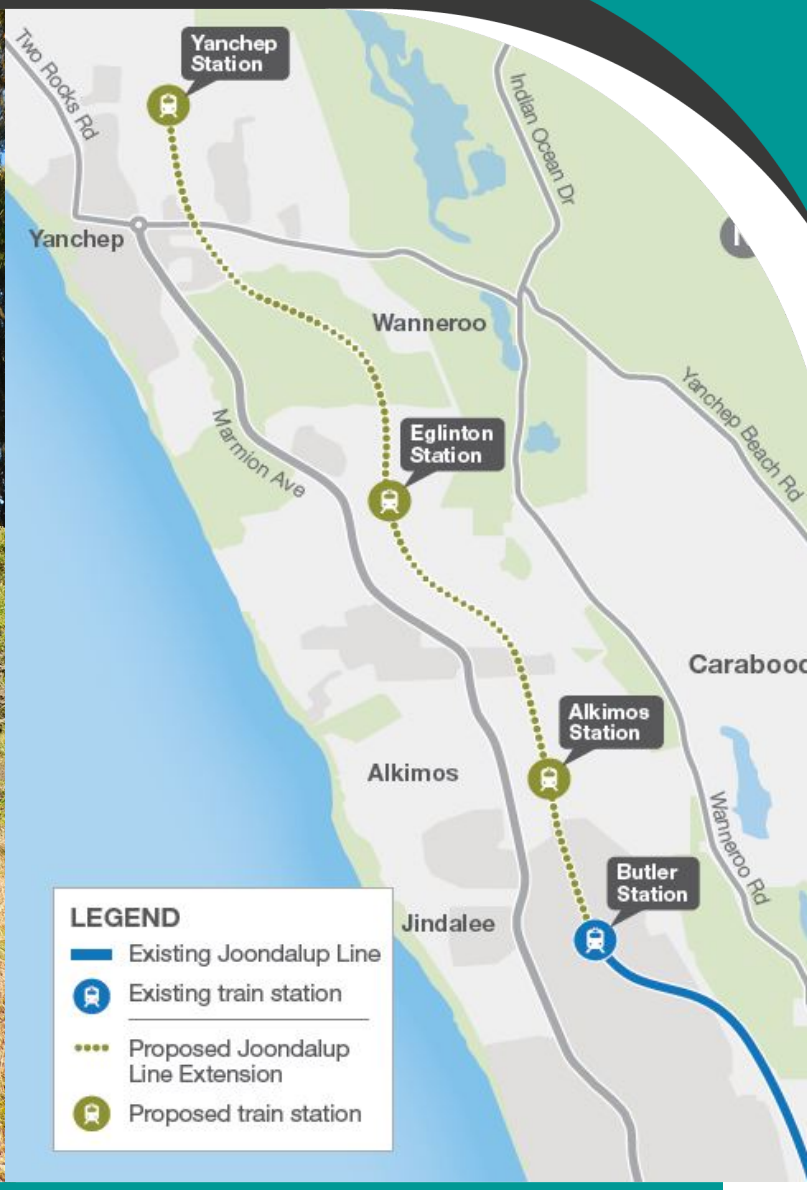
Public Transport Authority



Yanchep Rail Extension:Part 1 – Butler to Eglinton

Offsets Strategy

March 2019

For more information contact Public Transport Authority

Public Transport Centre, West Parade, Perth WA 6000
PO Box 8125, Perth Business Centre, Perth WA 6849

Telephone: (08) 9326 2000
Email: enquiries@pta.wa.gov.au
www.pta.wa.gov.au

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7	26 Feb. 19	Warren McGrath	Warren McGrath	FINAL 3
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Contents

Executive Summary

This Offsets Strategy outlines the proposed offsets for significant residual impacts of the Yanchep Rail Extension (YRE) Part 1 project. Offsets have been considered where it was determined that following avoidance and minimisation, a significant residual impact is still likely.

For flora and vegetation, the residual impact of the proposed clearing of 0.94 ha of Threatened Ecological Community (TEC) 26a is of such significance that it will require an offset. 0.94 ha is comprised of 0.53 ha of direct impacts and 0.41 ha of potential indirect impacts. Potential indirect impacts refer to the full extent of the TEC 26a patch that extends outside of the development envelope (i.e. incorporating potential indirect impacts to the ecological viability of the remainder of the patch following clearing the development envelope).

0.94 ha of TEC 26a will be directly offset through the proposed acquisition of a site identified by the Department of Biodiversity, Conservation and Attractions (DBCA) in the Nowergup/Neerabup locality. The desired offset site has no existing conservation tenure and is proposed to be transferred to the conservation estate, supported by funding of conservation works to maintain the condition (as a measure of quality) of the area of TEC.

In the event this proposed site cannot be acquired due to funding limitations, the PTA will, in consultation with DBCA:

- Rehabilitate degraded areas of TEC 26a in secured conservation land already under DBCA management.
- Acquire areas of TEC 26a in poorer quality, transfer to conservation estate and conduct rehabilitation works to improve its quality.

For terrestrial fauna, the significant residual impact to 48.21 ha of foraging habitat and 5 potential breeding trees for the Threatened Carnaby's Black Cockatoo *Calyptorhynchus latirostris* (Schedule 1 under the *Biodiversity Conservation Act 2016*) will be directly offset through land acquisition. The Nowergup/Neerabup site referenced above also contains suitable area(s) of Carnaby's Black Cockatoo foraging habitat and potential breeding trees. The site will be transferred into conservation estate and will therefore avert the risk of loss over time, addressing threatening processes and providing a secure management arrangement that will ensure its long term conservation.

The proposed clearing of foraging habitat for the six urban developments previously assessed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) that comprise the majority of the Part 1 development envelope have already been offset. The primary offsets provided under these approvals are the acquisition of large areas of Carnaby's Black Cockatoo foraging habitat north and north-east of the area of impact. The PTA, in consultation with the Department of Environment and Energy (DotEE) and the urban developers, intend to operate under these Commonwealth approvals and offsets. Consequently, the PTA's proposed offset strategy is to offset the shortfall of foraging habitat not previously offset by urban developers, namely 0.95 ha. This equates to the acquisition of approximately 4.4 ha of Black Cockatoo foraging habitat. 15 potential breeding trees will be offset to mitigate the impact of clearing the 5 potential breeding trees.

A property located in Carabooda has been identified as the proposed site for acquisition should acquisition of the Nowergup/Neerabup site not proceed.

1 Introduction

This Offsets Strategy has been prepared to support the assessment of Part 1 of the Yanchep Rail Extension (YRE) under the *Environmental Protection Act 1986* (EP Act) following the Environmental Protection Authority's (EPA) decision to assess the project. This strategy will be finalised following issue of conditions of approval for YRE Part 1.

1.1 Background

The Public Transport Authority (PTA) is proposing to implement the first stage of the Western Australian Government's METRONET program to transform Perth's transport network. The first stage of METRONET's priority projects includes the extension of the existing Joondalup railway line from Butler to Yanchep.

The YRE project is a 14.5 km extension of the Joondalup railway line, which includes new stations at three locations; Alkimos, Eglinton and Yanchep. It is located within the City of Wanneroo, which is situated approximately 26 km north of Perth's Central Business District (CBD).

The YRE project is being progressed in two parts:

- Part 1: Butler Station to Eglinton Station.
- Part 2: Eglinton Station to Yanchep Station.

This Offsets Strategy encompasses Part 1: Butler Station to Eglinton Station (YRE Part 1), 7.3 km of dual railway which extends to the north of Butler Station and generally follows the land reserved 'Railways' under the Metropolitan Region Scheme (MRS) before terminating north of the future Eglinton Station. The Part 1 development envelope includes the construction of two new stations at Alkimos and Eglinton and a contingency for a turnback facility to be constructed north of the proposed Eglinton Station, to allow for the turning of two six car trains (if required), should Part 2 of the YRE project not proceed.

The entire 63.33 ha YRE Part 1 development envelope is proposed to be cleared.

1.2 Assessment and approvals processes

YRE Part 1 was referred to the EPA under Section 38 of the EP Act. On 13 March 2018 the EPA set the level of assessment as 'Referral Information – Additional Information Required'. The EPA requested the PTA provide details of the proposed offset strategy for significant residual impacts to the identified environmental factors and values for the proposal. This strategy is consistent with the WA Environmental Offsets Guidelines (Government of Western Australia 2014) and the WA Environmental Offsets Template (**Appendix A**).

Since the referral was submitted, the PTA has made changes to the proposal to further avoid or minimise potential environmental impacts. The PTA is conscious of the high conservation value of the environmental aspects proposed to be impacted by the proposal and therefore conducted a detailed review of the project requirements to investigate opportunities to further avoid or minimise potential impacts where possible.

As a result of this process, a request to change the proposal under s43A of the EP Act was submitted to the EPA on 25 February 2019 (PTA, 2019). The major change is reducing the area of the development envelope from 70.19 ha to 63.33 ha. This eventuated due to the removal of five construction access roads and the addition of one construction access road to

Alkimos Station. This resulted in the following changes summarised in Table 1. All changes represent reductions in the potential impact to environmental aspects.

Table 1: Summary of changes to potential impacts

Environmental aspect	Referral area (ha)	New proposed area (ha)	Difference (ha)
Native vegetation	43.18	37.72	-5.46
Black cockatoo foraging habitat	52.43	48.21	-4.22
Black cockatoo potential breeding trees	21 trees	5 trees	-16 trees
Melaleuca huegelii – M. systena shrublands on limestone ridges (type 26a) TEC	1.12	Direct impact: 0.53 Direct and potential indirect impact[1]: 0.94	-0.59 -0.18
Banksia woodlands of the Swan Coastal Plain (SCP) TEC	12.12	10.69	-1.43
Banksia dominated woodlands of the SCP IBRA Region PEC	16.45	14.17	-2.28
Northern Spearwood shrublands and woodlands ('community type 24') PEC	17.18	16.05	-1.13
Tuart (*Eucalyptus gomphocephala*) woodlands of the SCP PEC	0.32	0.00	-0.32
Parabolic dunes	8.49	7.00	-1.49

[1] - Due to the limited natural extent of two occurrences of TEC type 26a, the area of impact has been adjusted to include the full extent of the patch that extends outside of the development envelope where the impact is approximately greater than 50% of the patch. This is to incorporate potential indirect impacts to the ecological viability of the remainder of the patch and is based on the outcomes of the targeted TEC type 26a patch survey (GHD 2019). The direct impact to TEC type 26a from the proposal is 0.53 ha, and inclusive of the potential indirect impacts to the two occurrences is 0.94 ha (refer to patches 2 and 5 in GHD (2019)). This does not include indirect impacts to patch 6 in GHD (2019).

1.3 Commonwealth approvals

The Part 1 YRE development envelope has been considered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) through the Commonwealth's formal assessment of six urban development vegetation clearing referrals under the EPBC Act, including that within the rail corridor (Table 2). **Figure 1** shows the extent of the EPBC Act referrals for urban development adjacent the YRE Part 1 development envelope, which were assessed to be Controlled Actions and subsequently approved by the DotEE.

Matters of National Environmental Significance (MNES) assessed under this process relevant to YRE Part 1 include Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) and the Banksia Woodlands of the Swan Coastal Plain TEC (for one development only).

The Commonwealth has approved and set conditions and required offsets for each of these developments. The PTA has committed to adhering to all relevant management plans and/or

conditions applied to the developments under the EPBC Act, when conducting the rail related works within the referred areas of the Part 1 development envelope. The PTA will operate under these approvals, through agreement with the approval holder.

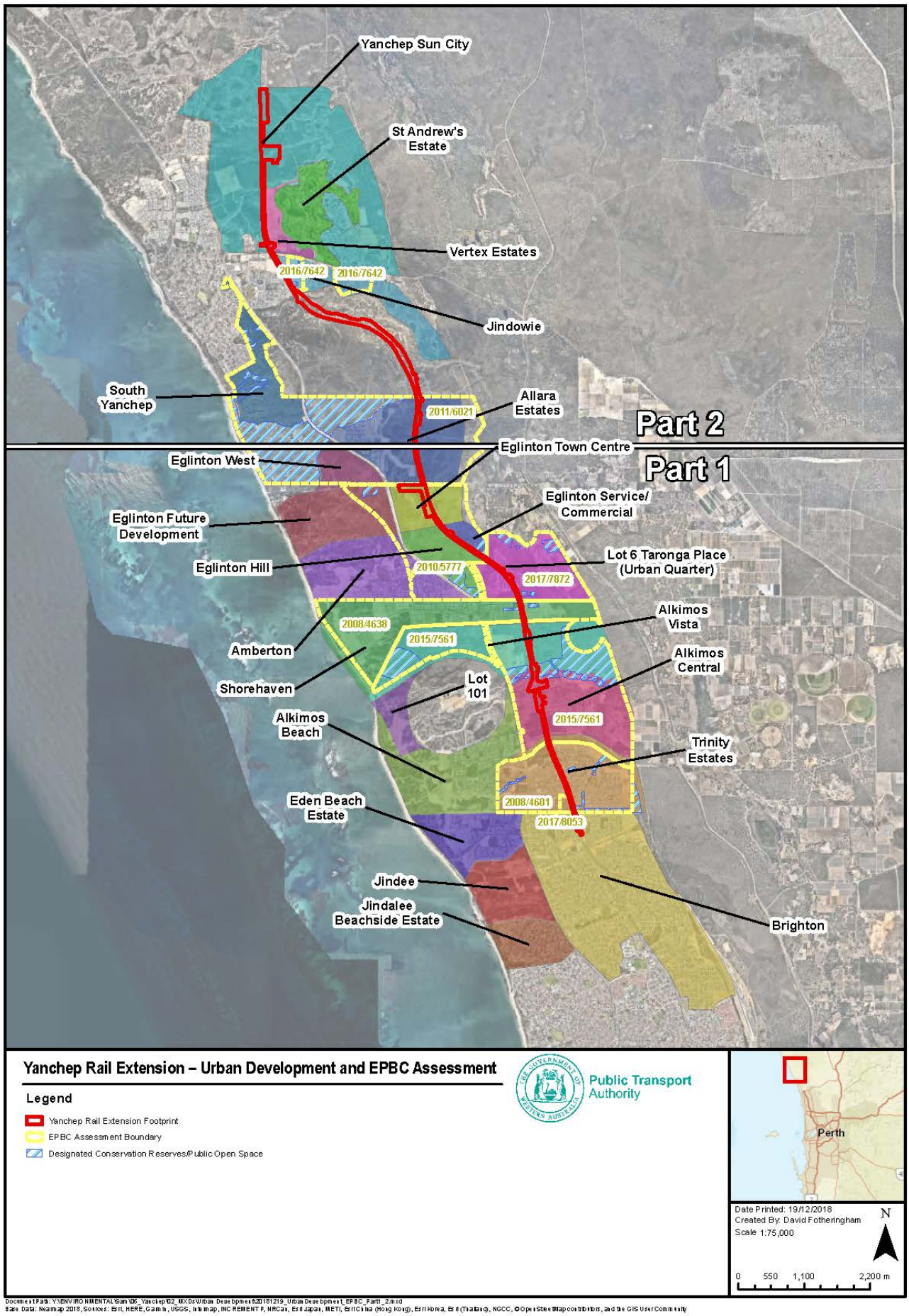
Carnaby's Black Cockatoo offsets such as land acquisition have been provided to compensate the residual impacts for each of these separate actions and the Commonwealth has signed off on each offset condition for all approvals.

The WA Environmental Offsets Guidelines (Government of Western Australia 2014) identifies where a proposal has already been assessed under the EPBC Act and offsets have been applied, the State will consider these offsets as contributing to the State requirements. The PTA considers that through agreement with the approval holder and Commonwealth endorsement, existing approvals and offsets issued under the EPBC Act address the majority of YRE Part 1 State offset requirements.

Table 2: Commonwealth assessments to relevant to YRE Part 1

EPBC Act Referral No.	Local Structure Plan / Development	Developer / Approval Holder
2008/4601	Lot 3 Romeo Road, Alkimos (approximate to Lot 1001 and 1002 Alkimos) Trinity Estate	LWP Property Group (formerly Northern Corridor Developments)
2008/4638	North Alkimos – Shorehaven Development Lots 1005 & 1006 Alkimos	Peet Limited (Peet)
2010/5777	Eglinton Estates Lot 1007 and Part Lot 1008 Pipidinny Road Eglinton	Eglinton Estates Pty Ltd (Eglinton)
2011/6021	Eglinton/South Yanchep Residential Development – 45 km Northwest of Perth “Allara”	Landcorp (Landcorp)
2015/7561	Alkimos City Centre and Central Alkimos	Lendlease Communities (Australia) Pty Ltd (Lend Lease)
2017/7872	Western Precinct, Lot 6 Taronga Place	Urban Quarter (Prime Eglinton Pty Ltd) (Urban Quarter)

Figure 1: Commonwealth Assessments under the EPBC Act relevant to YRE Part 1



2 Offset requirements

Environmental offsets will only be applied where the residual impacts of a project are determined to be significant, after avoidance, minimisation and rehabilitation have been pursued (Government of Western Australia 2014).

A summary of the application of the mitigation hierarchy is provided in Table 35 in Appendix A.

2.1 Significant residual impacts

Offsets are proposed for the mitigation of significant residual impacts to TEC 26a and Carnaby's Black Cockatoo foraging and potential breeding habitat (refer to Table 3).

Appendix A provides a summary of the evaluation of significant residual impacts in accordance with Government of Western Australia (2014) and Table 36 in Appendix A outlines the requirements to be offset. Detailed evaluation is contained in the Referral Information with Additional Information) (ELA 2018).

Table 3: Significant residual impact detail

Detail	TEC 26a	Carnaby's Black Cockatoo foraging habitat and potential breeding trees
Extent	0.94 ha direct and potential indirect impact[1] (0.53 ha direct impact)	48.21 ha of foraging habitat and 5 potential breeding trees.
Quality	Overall Quality score of 8 based on it primarily consisting of areas in Excellent condition (0.51 ha) and Very Good condition (0.03 ha).(considering direct impact mapping only)	Overall Quality score of 7 based on vegetation condition being largely good (5) to excellent (8) and habitat value is medium-high.
Conservation significance	High conservation significance as the vegetation comprises part of a TEC community listed as Endangered under the *Biodiversity Conservation Act 2016.*	High conservation significance as Carnaby's Black Cockatoo is listed as Endangered under the *Biodiversity Conservation and Environment Protection Act 2016* and EPBC Act.
Land tenure	State, Freehold or Unallocated Crown Land (UCL) (not currently managed for conservation)	
Timescale	Permanent	

1 - Due to the limited natural extent of two occurrences of TEC type 26a, the area of impact has been adjusted to include the full extent of the patch that extends outside of the development envelope where the impact is approximately greater than 50% of the patch. This is to incorporate potential indirect impacts to the ecological viability of the remainder of the patch and is based on the outcomes of the targeted TEC type 26a patch survey (GHD 2019). The direct impact to TEC type 26a from the proposal is 0.53 ha, and inclusive of the potential indirect impacts to the two occurrences is 0.94 ha (refer to patches 2 and 5 in GHD (2019)). This does not include indirect impacts to patch 6 in GHD (2019).

2.1.1 Flora and vegetation

For flora and vegetation, the residual impact (considering both direct and potential indirect impacts) of the proposed clearing of 0.94 ha of TEC 26a is of such significance that it will require an offset.

TEC 26a, or Floristic Community Type 26a, is subgroup of Type 26 as described by Gibson et al. (1994) found on shallow soils over limestone or massive limestone ridges of Tamala Limestone. It occurs on skeletal soil on ridge slopes and tops of ridges, and is dominated by *M. huegelii, M. systena* and *M. aff. systena* often over scattered limestone heath species such as *Dryandra sessilis* and *G. preissii* (Luu and English 2005).

TEC 26a is highly restricted and known from massive limestone ridges around Yanchep north of Perth, and south of Perth near Lake Clifton.

2.1.2 Terrestrial fauna

For fauna, the residual impact of the proposed clearing of 48.21 ha of foraging habitat and 5 potential breeding trees for Carnaby's Black Cockatoo is significant and requires an offset.

Carnaby's Black Cockatoo is a large cockatoo mostly brownish-black or greyish-black in colour with narrow off-white margins on the feathers and a large bill that is black or greyish-black in males and off-white to greyish white with a black tip in females. It occurs from the wheatbelt, in areas that receive between 300 and 750 mm of rainfall annually, across to wetter regions in the extreme south-west, including the Swan Coastal Plain and the southern coast (DEE 2018)

Its foraging habitat is that used by the species for feeding (during or outside of the breeding season). During the breeding season, Carnaby's Black Cockatoo forages in native vegetation that surrounds woodlands used for breeding. During the non-breeding season, Carnaby's Black Cockatoo forages extensively on banksia woodlands on the Swan Coastal Plain, including the Perth metropolitan area, as well as in banksia heath on the southern coast. Carnaby's Black Cockatoo also feeds on seeding marri and jarrah. The species also forages seasonally in pine plantations in areas that receive high rainfall, such as that on the Swan Coastal Plain and around the Perth metropolitan area on both native and non-native plants, such as liquid amber (DEE 2018). Black Cockatoo potential breeding trees are identified where the tree's diameter at breast height (DBH) is >500 mm which indicates they may be large enough to develop a hollow in future and be suitable for breeding.

2.2 Adjustment of significant residual impacts to Carnaby's Black Cockatoo habitat to account for clearing permit CPS 7843/1

To facilitate preliminary geotechnical investigations for the YRE Project, the PTA applied for a clearing permit under Part V of the EP Act. Clearing permit CPS 7843/1 was issued by the DWER on 31 August 2018 permitting 6.56 ha of native vegetation to be cleared for the purposes of geotechnical and unexploded ordnance investigations only. The clearing permit is valid until 2029, and clearing has already been undertaken and is complete. The clearing permit contained a condition requiring the PTA to provide an offset separate to this strategy.

The 6.56 ha of clearing authorised by the clearing permit applies to the whole YRE Project and has not been resolved into components YRE Parts 1 and/or 2. The significant residual impacts identified in Table 3 therefore do not include impacts under the CPS 7843/1. To avoid double counting of impacts already authorised under that permit and avoid providing duplicate offsets, this proposal's significant residual impacts to Carnaby's Black Cockatoo habitat will be adjusted to account for clearing conducted under the clearing permit. The adjustment will be undertaken as part of the Final Offsets Strategy based on actual clearing undertaken within the YRE Part 1 development envelope in accordance with the clearing permit.

3 Offsetting of significant residual impacts

3.1 Approach

Offsets for the significant residual impacts consider the extent to which offsets provided under previous environmental approvals apply to the proposal and new offsets are proposed only for impacts not adequately addressed. New offsets are presented as individual offset proposals in the subsequent sections.

3.2 Determining new offsets

Government of Western Australia (2014) requires that environmental offsets are cost-effective, as well as relevant and proportionate to the significance of the environmental value being impacted. The EPA indicated the Commonwealth Offsets Assessment Guide (Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) 2012) (the Commonwealth Guide) shall be utilised to determine the offsets appropriate and proportionate to the extent of impact. This has been done by using the Commonwealth Guide (2012) to estimate the area of offset required to mitigate the calculated quantum of impact using different types of offset based on assumptions of quality with and without offset, risk of loss with and without offset, and certainty in the outcome (**Appendix B**).

In accordance with Government of Western Australia (2014), in identifying candidate sites/proposals that would meet the offset requirements, the following values have and will be considered:

- It provides better condition/less-disturbance compared with the impacted environmental value.
- It contains habitat structure as similar as possible to undisturbed examples of the vegetation type to be impacted.
- It has a better area to perimeter ratio than the impacted site.
- It contains additional numbers of rare or otherwise significant species and threatened species or community compared with the impact site.
- It is contiguous with an existing conservation area.
- It enhances biological corridors or ecological linkages between conservation areas.
- It includes actions to address threatening processes; and/or
- It allows for secure management arrangements in place that will provide for long term conservation.

Environmental offsets are also to be based on sound environmental information and knowledge. In this case, the Commonwealth Guide (2012) has been used to demonstrate how the proposed offset will counterbalance the significant residual impact of its project. This will deliver long term environmental benefits.

3.3 Types of offsets considered

There are generally three types of environmental offsets under Government of Western Australia (2014):

- Land acquisition

- On ground management
- Research.

Land acquisition and on ground management are considered direct offsets in the Commonwealth Guide (2012) and must account for at least 90% of the offset provisions. Direct offsets are those actions that provide a measurable conservation gain for the value being offset. Research is considered as other compensatory measure and cannot account for more than 10% of the offset provision and represent at least 10% of the financial value of the direct offsets.

3.4 Summary of required offsets

A summary of the required offsets, options for offsets and offsets relevant to previous approvals is outlined in Table 4. Further detail on each of the offset options is provided in sections 4 – 8.

Table 4: Summary of required offsets and options

Aspect	TEC 26a	Carnaby's Black Cockatoo foraging habitat and potential breeding trees
Significant residual impact	0.94 ha (direct and potential indirect impact).	48.21 ha of foraging habitat of which 47.26 ha has previously been offset via offsets provided in historical EPBC Act approvals for urban developments directly adjacent and including the development envelope. The impact for which a new offset is required is 0.95 ha and 5 potential breeding trees.
Quantum of impact	0.75 ha adjusted for an existing quality of 8.	0.76 ha adjusted for an existing quality of 8.
Preferred direct offset and alternative options.	Acquisition and/or securing of land that has no existing conservation tenure and transfer to the conservation estate. This would be supported by funding of conservation works to maintain or enhance the quality (as a measure of quality) of the area of TEC. If it is not practicable to acquire sufficient area of a high habitat quality, then PTA will look at funding rehabilitation works in existing, more degraded, areas of TEC 26a within secured conservation land already under DBCA management to improve its quality. Alternatively, it will fund acquisition and transfer to conservation estate of poorer quality areas of TEC 26a in unsecured land and undertaking of rehabilitation works to improve its quality.	Acquisition and/or securing of land that has no existing conservation tenure and containing foraging habitat and transfer to the conservation estate.
Section	Section 4, 5 and 6.	Section 7, 8 and 9.

Aspect	TEC 26a	Carnaby's Black Cockatoo foraging habitat and potential breeding trees
Relevant previous approval offsets	Offsets for the clearing of TEC 26a have not been directly provided in any of the preceding environmental approvals for land development adjacent the development envelope. In addition, there are no known areas of TEC 26a located within the offsets provided for the mitigation of other values under these approvals including for Carnaby's Black Cockatoo.	The clearing of approximately 45.21 ha of Carnaby's Black Cockatoo foraging habitat has been approved for the six previous EPBC referrals which comprise the majority of the Part 1 development envelope. The Commonwealth Guide was used for each of these approvals to evaluate and finalise the offsets provided. The primary offsets provided under these approvals are the acquisition of large areas of Carnaby's Black Cockatoo habitat north and north-east of the area of impact (Table 31). The PTA will operate under these approvals, through agreement with the approval holder.

3.5 Consistency with Principles of WA offsets policy

The described approach to mitigation and proposed offsets is consistent with the six principles outlined in the WA Environmental Offset Policy (Government of Western Australia 2011). Table 5 summarises how these principles have been considered in the development of the offset approach for TEC 26a and Carnaby's Black Cockatoo.

Table 5: Consideration of WA Offsets policy and principles

Principle	TEC 26a	Carnaby's Black Cockatoo
Environmental offsets will only be considered after avoidance and mitigation options have been pursued.	Table 35, Appendix A demonstrates how avoidance and mitigation (minimisation and rehabilitation) have been considered before offsets were proposed for remaining significant residual impacts.	
Environmental offsets are not appropriate for all projects.	Environment offsets are appropriate for the significant residual environmental impacts of the proposal. They have not been applied to minor environmental impacts.	
Environmental offsets will be cost-effective, as well as relevant and proportionate to the significance of the environmental value being impacted.	The PTA has proposed three direct offset options for mitigation of impacts to TEC 26a. Assessment as to whether acquiring the identified site is cost effective is currently underway. The direct offsets prioritise the preservation and/or enhancement of vegetation representative of the identical TEC that is being impacted unless not practicable in which	Offsets for Carnaby's Black Cockatoo involving land acquisition and conservation have been demonstrated to be cost effective. The offsets involve the preservation and maintenance of habitat identical or similar in value to that being impacted. The area and quality of habitat involved in the offset is proportionate to the significance of the area of Carnaby's Black Cockatoo affected confirmed

Principle	TEC 26a	Carnaby's Black Cockatoo
	case an area of similar vegetation will be attained, which is consistent with this Principle. The area and condition of vegetation involved in the offset is proportionate to the significance of the area of TEC26a affected confirmed through application of the calculator using the areas and quality involved (in accordance with DSEWPC, 2012).	through application of the calculator using the areas and quality involved (in accordance with DSEWPAC, 2012b).
Environmental offsets will be based on sound environmental information and knowledge.	The quantum of impact to be offset has been calculated using reliable field survey data and the Commonwealth offsets calculator. The offset proposals for TEC 26a have been based on objectives and sites identified in the TEC recovery plan (Luu and English 2005).	The quantum of impact to be offset has been calculated using reliable field survey data and the Commonwealth offsets calculator. The offset proposals for Carnaby's Black Cockatoo have been based on objectives and actions to preserve important habitat as identified in the recovery plan for the species (Department of Parks and Wildlife 2013).
Environmental offsets will be applied within a framework of adaptive management.	Risks and contingency measures have been identified for offset options for TEC 26a.	Adaptive management approach applied using previous offsets that have already been implemented and only proposing new offsets for where a shortfall is identified following review of adequacy.
Environmental offsets will be focussed on longer term strategic outcomes.	TEC26a offsets are focussed on long-term preservation of areas of this community consistent with the TEC recovery plan (Luu and English 2005).	Carnaby's Black Cockatoo offsets area focussed on the long-term protection and avoidance of loss of important habitat, consistent with recovery plan for the species (DPaW 2013).

4 TEC 26a Offset Proposal 1 – Acquisition and maintenance

4.1 Overview of offset

The PTA is currently consulting with the DBCA to identify suitable potential offset options for TEC 26a. Through this process it has been identified that a large proportion of the occurrences of TEC 26a are already within DBCA managed estate. There are only a small number of occurrences outside DBCA managed estate considered suitable for acquisition and protection due to proposed or existing development approvals (basic raw material extraction and infrastructure) and the ability to retain the communities in perpetuity.

Therefore, identifying a suitable site as a proposed offset is challenging. Nevertheless, a suitable offset site has been identified by the DBCA in the Nowergup/Neerabup locality, which will be the target for acquisition. It is not identified specifically in this Strategy due to commercial sensitivity for reaching a sales agreement. The DBCA has undertaken site assessments of the vegetation within this site which have confirmed the presence of TEC 26a. It has advised this site contains very high conservation value and is a high priority for acquisition and protection through conservation reservation.

It is proposed that acquisition of the identified site in the Nowergup/Neerabup locality will sufficiently offset the residual impact to TEC 26a. The PTA proposes to provide funds to the DBCA for the acquisition of the property, and funds for management of the site for a period of seven years.

In the event that this identified site is not able to be acquired because purchase of the site does not represent value for money to WA (and therefore does not meet requirement of the WA Offsets Policy in providing a cost-effective solution) or the prospect of reaching a purchase agreement for the site cannot be conducted in a timely manner, other options will be considered in consultation with the DBCA. These options are described further in sections 5 and 6, and include:

- Funding rehabilitation of degraded areas of TEC 26a in existing conservation areas (TEC 26a Offset 2 – Section 5)
- Acquisition of areas in more degraded condition and funding rehabilitation (TEC 26a Offset 3 – Section 6)

It is considered that either of these options will offset the residual impact on TEC 26a. The PTA will notify EPA Services should acquisition of the identified site in Nowergup/Neerabup not be possible.

4.2 Preferred offset site description

The DBCA undertook a brief vegetation survey of the candidate offset site in Nowergup/Neerabup to assess the values and condition of the site. The site is zoned ‘Rural’ under the Metropolitan Region Scheme (MRS) and is owned by a private landholder.

The DBCA determined that the lot consists of approximately 18 ha of native vegetation, in Excellent to Very Good condition. The site is entirely covered by vegetation, with some access tracks through it.

The site has been found to support 7.3 ha of *Melaleuca huegelii – Melaleuca systena* shrublands of limestone ridges (Swan Coastal Plain Community type 26a (TEC 26a)). It also supports the following values:

- Banksia woodlands of the Swan Coastal Plain EPBC Act listed TEC (approx. 0.9 ha)
- Proposed EPBC Act TEC Tuart Woodlands of the Swan Coastal Plain (approx. 1.6 ha)
- Tuart-Banksia woodlands (approx. 3.6 ha)
- *Banksia sessilis* shrublands (approx. 4.6 ha)
- Carnaby's black cockatoo foraging habitat (approx.10.7 ha)
- Priority 4 *Jacksonia sericea* and Priority 3 *Sarcozona bicarinata.*

The site has been impacted, particularly along firebreaks, by soil disturbance, weed invasion and rubbish dumping. Some disturbance appears to be related to market gardening activities on the adjacent lands to the east and south east. Other disturbances include rabbits, frequent fire (evident during historical inspection in 2004 and from review of aerial photography) and minor tracks. The most common weeds noted at the site include: *Eragrostis curvula* (love grass), *Euphorbia terracina* (Geraldton carnation weed) and *Asparagus asparagoides* (asparagus). The site is partly fenced with intact fencing along the northern boundary and the majority of the western boundary. There are firebreaks established around the majority of the site, with some overgrown areas.

4.3 Justification of offset

Table 6 provides a justification of the offset site in accordance with the WA Offsets Template (EPA 2014).

Table 6: Justification of offset –Nowergup/Neerabup site

Offset calculation methodology		Assessment
Type		Land acquisition.
Risk		Low – land to be transferred to conservation estate.
Likely offset success	Can the values be defined and measured?	Yes – vegetation value can be measured.
	Operator experience/evidence?	The DBCA will manage the land and has previous experience managing conservation estate.
	What is the type of vegetation being revegetated?	No revegetation is proposed.
	Is there evidence the environmental values can be re-created (evidence of demonstrated success)?	Vegetation to be acquired is in Very Good to Excellent condition with only isolated areas of disturbance and weed invasion. With DBCA management vegetation condition should be maintained.
Time lag		Land secured upon agreement – no time delay.

Offset calculation methodology	Assessment
Offset quantification	7.3 ha of TEC 26a (see Table 8).

4.4 Desirable characteristics

Consideration of the values considered for offsets and the desired characteristics of a proposed offset site in accordance with EPA (2014) are presented for the Nowergup/Neerabup site in Table 7.

Table 7: Evaluation against desirable characteristics in accordance with EPA (2014) of Nowergup/Neerabup site

Value	Nowergup/Neerabup site
In proximity to the area of impact	The site is situated within the City of Wanneroo, and is approximately 5 km to the south-east of the southern extent of the proposal.
Similar or better vegetation condition than area impacted.	The site comprises vegetation in Very Good to Excellent condition, which is similar to or better than the condition of TEC 26a impacted by the proposal.
Supports additional rare or otherwise significant species and threatened species or community compared other than TEC 26a.	The site contains two other TECs - Banksia woodlands of the Swan Coastal Plain EPBC Act listed TEC and the proposed EPBC Act TEC Tuart Woodlands of the Swan Coastal Plain. The site also contains Carnaby's black cockatoo foraging habitat and two DBCA Priority flora species – *Jacksonia sericea* (Priority 4) and *Sarcozona bicarinata* (Priority 3).
Close to or contiguous with an existing conservation area (e.g. Bush Forever).	The site is located immediately north of a Bush Forever site and Class A Reserve.
Likely to enhance ecological linkages.	The site is adjoining and likely to enhance a regional ecological linkage that runs south-west of the site into Neerabup National Park from the north and east through the Nowergup/Neerabup area.

4.5 Environmental values

The environmental values of the site have been used to assess the total contribution to meeting the offset requirement for TEC 26a. Using the Commonwealth Offsets Assessment Guide ("offsets calculator") (DSEWPC 2012), the purchase of the Nowergup/Neerabup site meets substantially more than 100% of the total offset requirement of TEC 26a (Table 8, **Appendix C**).

Table 8: Environmental values of proposed Nowergup/Neerabup site

Criteria	Rating	Explanation
Clearing area		

Criteria	Rating	Explanation
Area (ha)	0.94	Vegetation surveys recorded a total of 0.53 ha of TEC 26a within the development envelope, with the difference, 0.41 ha, being the extent of TEC 26a outside of the development envelope potentially indirectly impacted by the proposal (i.e. 0.94 ha incorporates direct and potential indirect impacts to the ecological viability of the remainder of the patch).
Quality	8	Vegetation surveys recorded a total of 0.53 ha of TEC 26a within the development envelope comprised of 0.51 ha in Excellent condition and 0.03 ha in Very Good-Good condition.
Quantum of impact	0.75	
Offset Site		
Area (ha)	7.3	Brief survey undertaken by DBCA identified approximately 7.3 ha of TEC 26a within the site.
Start quality	8	A formal vegetation condition assessment has not been undertaken at the site; however, a brief survey by DBCA noted the areas of TEC 26a were in Very Good to Excellent condition.
Risk of loss (%) without offset	25%	No formal protection mechanisms are currently in place on the proposed offset site. The site is privately owned and is at risk of being developed due to changes in zoning as well as excavated as a potential source of raw limestone (designated as a basic raw material extraction activities area). The 25% acknowledges that that risk is moderated by the known high conservation value of the site limiting the potential for development.
Future quality without offset*	7	It is assumed that without active conservation management measures there will be a small reduction in quality due to weed incursion.
Risk of loss (%) with offset	5	Formal protection of the offset site will ensure that the risk of future loss is substantially reduced.
Future quality with offset*	8	Formal protection of the offset and provision of capped funds to the DBCA to engage in active management of the site will enhance the quality of the offset. Projected maintenance of quality due to active management measures not currently being implemented by the land owner such as ongoing weed control and fire management.
Confidence in result (averted loss) (%)	90	The formal protection mechanisms and proposed management provide a high level of certainty that the offset will be conserved, averting the level of loss that would likely occur should no formal protection measures be implemented.

Criteria	Rating	Explanation
Confidence in result (habitat quality) (%)	85	There is a high degree of confidence in this prediction based on DBCA involvement in conservation management.
Time over which loss is averted (years)	20	Provision of offset for protection in perpetuity.
Time until ecological benefit (years)	1	The protected effect of the acquisition is immediate on transfer of land.
Total offset %	**171.27%**	The impact will be over mitigated by the offset exceeding 100% threshold by 71.27%

4.6 Objectives, targets and completion criteria

The overarching objective of the offset is to conserve and enhance the TEC 26a within the Nowergup/Neerabup site. Objectives, targets and completion criteria to be achieved by the PTA are outlined in Table 9.

Table 9: Objectives, targets and completion criteria for Nowergup/Neerabup site

Objective	Target	Completion Criteria
To ensure the ongoing protection of 7.3 ha of TEC 26a	Purchase, Nowergup/Neerabup site and transfer of ownership to the Crown for the purpose of conservation.	Site ceded to the Crown for the purpose of conservation.
	Restrict access to Nowergup/Neerabup site to ensure ongoing protection.	Site fenced.
To successfully manage 7.3 ha of TEC 26a to avoid degradation from threatening processes.	Provide adequate funding to the DBCA to allow ongoing management of Nowergup/Neerabup site for seven years.	Provision of funding to the DBCA. Completion of management actions as outlined in Table 10.

The intended outcome is to increase the area of this community under conservation management and maintain the diversity and basic composition of native species and address threatening processes consistent with the TEC 26a Interim Recovery Plan (Luu and English 2005).

4.7 Management actions

The PTA will provide management funding to the DBCA to undertake management actions. Proposed management actions are outlined in Table 10. The associated costs will be determined in further consultation with the DBCA, and the details of the actions will be specified in an agreement to be established between the PTA and the DBCA within 12 months of approval of this Offsets Strategy.

The provision of management funding has been adjusted to account for the PTA providing over 100% of the TEC 26a offset requirement (Table 8).

Table 10: Proposed management actions for Nowergup/Neerabup site

Year	Action	Timing
Year 1	Install conservation style fencing around perimeter of site to restrict access.	Prior to any works being undertaken within the site.
	Install lockable vehicle access gate.	Prior to any works being undertaken within the site.
	Undertake targeted control programme for priority weeds.	Autumn and spring.
	Install firebreaks around perimeter of site as required in consultation with the DBCA.	Prior to onset of bushfire season if required.
Years 2 to 10	Undertake targeted control programme for priority weeds.	Autumn and spring.
	Undertake fire break maintenance if required.	Annually prior to onset of bushfire season.
	Monitor condition of fencing.	Autumn and spring.
	Fence maintenance.	Autumn and spring as required.
	Undertake periodic conservation measures for maintenance of TEC quality over seven years including weed control and vegetation condition inspections.	Spring.

4.8 Risks and contingency measures

There are several key risks associated with not achieving the success criteria for which contingency measures would be enacted should they be realised (**Table 11**).

Table 11: Key risks and contingency measures for proposed Nowergup/Neerabup site

Risk/Trigger	Potential contingency measures

Proposed site not able to be acquired due to funding limitations.	• Seek advice from the DBCA regarding potential:
	  • Funding for rehabilitation of degraded areas of TEC 26a in existing conservation areas (TEC 26a Offset 2 – Section 5)
	  • Acquisition of areas in more degraded condition and funding rehabilitation (TEC 26a Offset 3 – Section 6)

Condition/quality of area of TEC 26a degrades over time despite conservation measures to maintain	• Investigate cause. • Restrict access to affected areas. • Investigate cause and extent of vegetation decline (disturbance, pest, weed, pathogen, climate). • Review vegetation management measures. • Implement control and remedial measures in consultation with

Risk/Trigger	Potential contingency measures
	regulators, including weed spraying, pest control, access management as required. • Monitor success of control and remedial measures.

4.1 Funding and timelines

Funding for the establishment (year 1) and management of the proposed Nowergup/Neerabup site over seven years will be determined in consultation with the DBCA. A detailed funding arrangement will be determined when the formal agreement between the DBCA and the PTA is established, within 12 months of approval of this Offsets Strategy.

4.2 Roles and responsibilities

The primary roles and responsibilities of the PTA will include:

- Provide funding to the DBCA for purchase of the proposed site.
- Facilitate the establishment of an MOU establishing the formal funding agreement and program of works with the DBCA.
- Provide funding to the DBCA for the establishment and ongoing management of the Nowergup/Neerabup site for a period of seven years.

The primary roles and responsibilities of the DBCA will include:

- Facilitate purchase of the site.
- Participate in the establishment of a formal funding agreement and program of works with the PTA.
- Implement management, monitoring and reporting on site for a period of seven years.

5 TEC 26a Offset 2 – Rehabilitation

5.1 Overview of offset

In the event that Offset Proposal 1 cannot be implemented (as described in section 4.1), the next option to be considered in consultation with the DBCA is funding the rehabilitation of degraded TEC 26a in existing conservation areas.

Monetary contribution for rehabilitation of existing conservation land to improve condition (quality) will address threatening processes and increase the quality of an area currently managed by the DBCA or another responsible authority for the purpose of conservation. The area to be rehabilitated shall be appropriate and proportionate to the quantum of impact (0.9 ha) such that there is a net environmental gain for TEC 26a arising from the offset in the long term. Ideally it would also be in proximity to the area of impact (i.e. City of Wanneroo area).

5.2 Criteria for site selection

Table 12 indicates the key criteria that will be used for site selection for this offset proposal. An assessment against these criteria for suitability as an offset will be undertaken for each candidate site identified by desktop review. The criteria allow for a number of different scenarios based on the existing condition of the TEC (as a measure of quality), which do not affect the area required to be subject to the offset, which is 12.75 ha based on 100% of the TEC 26a offset being addressed by 'TEC 26a Offset 2 – Rehabilitation' (**Appendix B**). The areas involved with this offset would be decreased proportionally if other TEC 26a offsets are pursued (Sections 4 and 6).

The associated calculations of % loss and % change in quality in accordance with DSEWPC (2012) are indicated in Table 12 in italics. The time until ecological benefit has been set at 10 years based on a reasonable assumption of when the benefit of rehabilitation efforts will be realised. There is a high degree of confidence in the predictions for % loss given the known security of existing conservation tenure, which does not alter under this offset proposal. A 70% confidence level has been given for the % change in quality as a result of rehabilitation, which represents a reasonable high degree of confidence for a revegetation project, in this case, justified based on the DBCA or an equivalent responsible authority for conservation implementing the rehabilitation.

Table 12: Essential criteria for TEC 26a offset 2 (area, quality and % risk of loss values derived from DSEWPC 2012).

Criteria	Requirement		
Landform/soils	Very shallow soils on limestone ridge.		
Vegetation	*Melaleuca huegelii – Melaleuca systena* shrublands of limestone ridges inferred or confirmed as Floristic Community Type 26a.		
Ownership	Crown.		
Tenure	Managed by the DBCA or other responsible authority for purpose of conservation.		
Zoning	Parks and Recreation, Conservation.		
Max. area (ha) (assuming 100% offset for this offset option)	12.75	12.75	12.75

Criteria	Requirement		
Vegetation condition	Good – Very good	Good	Degraded - Good
*Current % risk of loss**	*5%*	*5%*	*5%*
*Future % risk of loss**	*5%*	*5%*	*5%*
*Current quality**	*6*	*5*	*4*
*Future quality without offset**	*6*	*5*	*4*
*Future quality with offset**	*7*	*6*	*5*

* These criteria have been derived using the Commonwealth Offset Assessment Guide (DSEWPC, 2012) with the 'time until ecological benefit' set at 10 years with confidence in predictions for change in quality and % risk of loss set at 70% and 90% respectively.

5.2.1 Desirable characteristics

The following are desired characteristics, in addition to the selection criteria, based on consideration of values considered for offsets in accordance with EPA (2014):

- In proximity to the area of impact (i.e. in proximity of the City of Wanneroo).
- Vegetation condition good to degraded.
- High perimeter to area ratio.
- Supports additional rare or otherwise significant species and threatened species or community other than TEC 26a.
- Within an existing conservation area (e.g. Regional Park, Nature Reserve, National Park, Bush Forever).
- Likely to enhance ecological linkages.

5.3 Objectives and intended outcomes

The objective of this offset proposal is to rehabilitate an area of TEC 26a in secure conservation tenure to improve its condition/quality.

The intended outcome is to increase the quality of an area of TEC 26a under conservation management and maintain the diversity and basic composition of native species and address threatening processes consistent with the Interim Recovery Plan (Luu and English 2005).

5.4 Actions to be undertaken

The following actions are to be undertaken for implementation of this offset:

1. Consult with the DBCA to determine the area of TEC 26a under existing conservation tenure and management to be subject to rehabilitation measures.
2. Update the Offset Strategy in consultation with the DBCA.
3. Prepare and execute a MOU between the PTA and the DBCA, or other responsible authority, to address offset funding and delivery.
4. Prepare a rehabilitation plan for site.
5. Undertake rehabilitation works to improve TEC quality including:
    a. targeted weed removal
    b. feral animal control (if required)

c. selective seedling planting to restore structure, cover, composition and species diversity characteristic of TEC 26a
d. annual monitoring for up to five years (extending further if desired quality not achieved).

5.5 Success criteria

Table 13 indicates the success criteria for this offset proposal.

Table 13: TEC 26a offset 2 success criteria

Objective	Success criteria
Rehabilitate TEC 26a to increase its condition/quality.	Rehabilitation regime implemented that will increase condition/quality of area of TEC 26a and maintain it at this level for seven years.

5.6 Risks and contingency measures

There are several key risks associated with not achieving the success criteria for which contingency measures would be enacted should they be realised (**Table 14**).

Table 14: Key risks and contingency measures for TEC 26a offset 2

Risk/Trigger	Potential contingency measures
Insufficient area of TEC 26a meeting essential criteria (as per Table 12) able to be practicably secured for rehabilitation within required timeframe.	If still shortfall, seek advice from the DBCA regarding potential to acquire areas in more degraded condition and fund rehabilitation (TEC 26a Offset 3 – Section 6).
Condition/quality of area of TEC 26a not improved or degrades over time despite rehabilitation and conservation measures.	• Investigate cause. • Restrict access to affected areas. • Investigate cause and extent of vegetation decline (fire disturbance, pest, weed, pathogen, climate). • Review vegetation management measures. • Implement control and remedial measures in consultation with regulators, including supplementary planting, weed spraying, pest control, access management as required. • Monitor success of control and remedial measures.

6 TEC 26a Offset 3 – Acquisition and rehabilitation

6.1 Overview of offset

In the event that TEC 26a Offset Proposal 1 and 2 cannot be implemented (as described above), the next option to be considered in consultation with the DBCA is •acquisition of areas in more degraded condition and funding of rehabilitation.

Acquisition of land containing TEC 26a for transfer to conservation estate with a corresponding monetary contribution for rehabilitation to improve condition (quality) and avert the risk of loss over time will address threatening processes and provide secure management arrangements for long-term conservation. The area to be acquired and rehabilitated shall be appropriate and proportionate to the quantum of impact (0.9 ha) such that there is a net environmental gain for TEC 26a arising from the offset in the long-term. Ideally it would also be in proximity to the area of impact (i.e. City of Wanneroo area).

6.2 Criteria for site selection

Table 15 indicates the key criteria that will be used for site selection for this offset proposal. An assessment against these criteria for suitability as an offset will be undertaken for each candidate site identified by desktop review. The criteria allow for a number of different scenarios in regards to the current tenure and the existing condition of the TEC (as a measure of quality), which influence the area subject to the offset. In this case, the maximum area to be subject to this offset is between 3.91 and 5.1 ha based on 100% of the TEC 26a offset being addressed by 'TEC 26a Offset 3 – Acquisition and rehabilitation' (**Appendix B**). The areas involved with this offset would be decreased proportionally if other TEC 26a offsets are pursued (Sections 4 and 5).

The associated calculations of % loss and % change in quality in accordance with DSEWPC (2012) are indicated in Table 15 in italics. There is a high degree of confidence in the predictions for % loss given the known security of conservation tenure being placed on currently developable land. A 70% confidence level has been given for the % change in quality as a result of acquisition and outcome of rehabilitation, which represents a reasonable high degree of confidence for a revegetation project, in this case, justified based on the DBCA implementing the rehabilitation.

Table 15: Essential criteria for TEC 26a offset 3 (area, quality and %risk of loss values derived from DSEWPC 2012).

Criteria	Requirement	
Landform/soils	Very shallow soils on limestone ridge.	
Vegetation	*Melaleuca huegelii – Melaleuca systena* shrublands of limestone ridges inferred or confirmed as Floristic Community Type 26a.	
Ownership	Private landholder	Crown
Tenure	State, Freehold or Unallocated Crown Land (UCL) (not currently managed for conservation).	State agency or UCL (not currently managed for conservation).
Zoning	Rural, industrial, or unzoned	Parks and Recreation, Special

Criteria	Requirement			
	(no conservation zoning).		Purpose.	
Max. area (ha) (assuming 100% offset for this offset option)	3.91	4.22	4.85	5.1
Vegetation condition	Good – Very good	Good	Good – Very good	Good
*Current % risk of loss**	*25%*	*25%*	*15%*	*15%*
*Future % risk of loss**	*5%*	*5%*	*5%*	*5%*
*Current quality**	*6*	*5*	*6*	*5*
*Future quality without offset**	*5*	*4*	*5*	*4*
*Future quality with offset**	*7*	*6*	*7*	*6*

* These criteria have been derived using the Commonwealth Offset Assessment Guide (DSEWPC 2012) with the 'time until ecological benefit' set at 10 years with confidence in predictions for % risk of loss and change in quality set at 90% and 70% respectively.

6.2.1 Desirable characteristics

The following are desired characteristics, in addition to the selection criteria, based on consideration of values to be considered for offsets in accordance with EPA (2014):

- In proximity to the area of impact (i.e. in proximity of City of Wanneroo).
- Vegetation condition good to degraded.
- High perimeter to area ratio.
- Supports additional rare or otherwise significant species and threatened species or community other than TEC 26a.
- Close to or contiguous with an existing conservation area (e.g. Bush Forever).
- Likely to enhance ecological linkages.

6.3 Objectives and intended outcomes

The objectives of this offset proposal are to:

- Acquire or secure area of TEC 26a appropriately proportionate to the area of impact and transfer to conservation tenure.
- Rehabilitate area of TEC 26a to improve its condition/quality.

The intended outcome is to increase the quality of an area of TEC 26a and increase the total area of the community under conservation management and maintain the diversity and basic composition of native species and address threatening processes consistent with the Interim Recovery Plan (Luu and English 2005).

6.4 Actions to be undertaken

The following actions are to be undertaken for implementation of this offset:

1. Desktop review of potential candidate sites meeting essential criteria.
2. Select candidate sites to undertake site assessment prioritising those that meet one or more of the desired characteristics.
3. Undertake site assessment to:
    a. confirm presence and map area of TEC 26a
    b. assess vegetation condition across site
    c. identify other environmental values that the site supports
    d. identify existing threatening processes including weed infestation (map weeds), feral animal damage, likely frequency of fires, and uncontrolled access.
4. Determine in consultation with the DBCA the final site to be used for offset.
5. Update Offset Strategy in consultation with the DBCA and DWER.
6. Prepare and execute a MOU between the PTA and the DBCA regarding funding and delivery of this offset.
7. Acquire or secure site.
8. Prepare rehabilitation plan for site.
9. Undertake upfront on ground conservation works, including:
    a. rubbish removal
    b. fencing
    c. weed control
    d. signage
    e. fire control measures.
10. Make arrangements for transfer to conservation estate.
11. Undertake rehabilitation works to improve TEC quality including:
    a. targeted weed removal
    b. feral animal control
    c. selective seedling planting to restore structure, cover, composition and species diversity characteristic of TEC 26a
    d. monitor annually up to five years (extending only if desired quality not achieved).
12. Beyond five years undertake conservation works to maintain quality at desired level by seven years including:
    a. weed control
    b. vegetation condition inspections.

6.5 Success criteria

Table 16 indicates the success criteria for this offset proposal.

Table 16: TEC 26a offset 2 success criteria

Objective	Success criteria
Acquire or secure area of TEC 26a appropriately proportionate to the area of impact and transfer to conservation tenure.	Site meeting essential criteria (as per Table 15) transferred to conservation estate.
Provide rehabilitation and conservation management of the area of TEC 26a to increase and then maintain its condition/quality.	Condition/quality of area of TEC 26a is increased and maintained at this level by seven years.

6.6 Risks and contingency measures

There are several key risks associated with not achieving the success criteria for which contingency measures would be enacted should they be realised (**Table 17**).

Table 17: Key risks and contingency measures for TEC 26a offset 3

Risk/Trigger	Potential contingency measures
Condition/quality of area of TEC 26a not improved or degrades over time despite rehabilitation and conservation measures	• Investigate cause. • Restrict access to affected areas. • Investigate cause and extent of vegetation decline (fire disturbance, pest, weed, pathogen, climate). • Review vegetation management measures. • Implement control and remedial measures in consultation with regulators, including supplementary planting, weed spraying, pest control, access management as required. • Monitor success of control and remedial measures.

7 Carnaby's Black Cockatoo Offset 1 – Acquisition of foraging habitat

7.1 Overview of offset

Impacts to Carnaby's Black Cockatoo foraging habitat will be offset through the acquisition of land. The Nowergup/Neerabup site, discussed in Section 4, contains suitable Carnaby's Black Cockatoo foraging habitat for transfer to conservation estate to avert the risk of loss over time. It is not identified specifically in this Strategy due to commercial sensitivity for reaching a sales agreement. The DBCA has undertaken site assessments of the vegetation within this site which have confirmed the presence of Black Cockatoo foraging habitat (approximately 10 ha). The DBCA has advised this site contains very high conservation value and is a high priority for acquisition and protection through conservation reservation.

This offset will address threatening processes and provide secure management arrangements that will provide long term conservation. The area to be acquired is appropriate and proportionate to the quantum of impact (38.57 ha in total, of which 0.76 ha is the total quantum of impact considering previous offsets) such that there is a net environmental gain for the cockatoo species arising from the offset in the long-term. The offset contains foraging habitat of adequate quality and correlates well with the nature of the area impacted as it is located in the northern Swan Coastal Plain region, directly adjacent Alkimos.

The PTA proposes to provide funds to the DBCA for the acquisition of the property, and funds for management of the site for a period of seven years.

In the event that this identified site is not able to be acquired because purchase of the site does not represent value for money to WA (and therefore does not meet requirement of the WA Offsets Policy in providing a cost-effective solution) or the prospect of reaching a purchase agreement for the site cannot be conducted in a timely manner, an alternative acquisition site may be available and will be considered in consultation with the DBCA and is described further in Section 8.

It is considered that either of these options will offset the residual impact on Black Cockatoo foraging habitat. The PTA will notify EPA Services should acquisition of the identified site in Nowergup/Neerabup not be possible.

7.1.1 Role of previous offsets

The clearing of native vegetation within the majority of the development envelope has been considered under the EPBC Act through formal assessment and approval of six developments referred to the Commonwealth, as described in Section 1.3.

Offsets, such as land acquisition (to a total of 5109 ha) have been provided to counterbalance the residual impacts for each of these separate actions on Carnaby's Black Cockatoo foraging habitat (**Table 31**). The Commonwealth has signed off on the offset conditions for all approvals and the offsets have all been delivered.

Each of the offset sites acquired were selected by the DBCA as they met internal requirements of providing adequate foraging habitat for Carnaby's Black Cockatoo. **Table 31** provides an indication of the vegetation/habitat types within each of the acquired sites based on desktop review. Detailed site surveys are not available for the acquired sites as it was not a

requirement of the offset condition at the time. The following datasets were referenced in the desktop review:

- Pre-European Vegetation Associations (DPIRD-006)
- Vegetation Complexes – Swan Coastal Plan (DBCA-045)
- DBCA Carnaby's Cockatoo feeding habitat areas as (DBCA-057)
- DBCA – Legislated Lands and Waters (DBCA-011).

Considering this, the PTA will subsequently proceed with a new land acquisition to offset the 0.95 ha of foraging habitat that was recorded by GHD (2018) within the Part 1 Development Envelope but outside the extent of previous EPBC Act approvals (**Figure 1**). This new offset is the shortfall of the YRE Part 1 Development Envelope that has not already been offset by private developers.

7.2 Preferred offset site description

The DBCA undertook a brief vegetation survey of the candidate offset site in Nowergup/Neerabup to assess the overall values and condition of the site, summarised in Section 4.

The site has been found to support approximately 10.7 ha of Carnaby's Black Cockatoo foraging habitat, comprised of:

- Banksia woodlands of the Swan Coastal Plain EPBC Act listed TEC (approx. 0.9 ha)
- Proposed EPBC Act TEC Tuart Woodlands of the Swan Coastal Plain (approx. 1.6 ha)
- Tuart-Banksia woodlands (approx. 3.6 ha)
- *Banksia sessilis* shrublands (approx. 4.6 ha).

7.3 Justification of offset

Table 18 provides a justification of the offset site in accordance with the WA Offsets Template (EPA 2014).

Table 18: Justification of offset –Nowergup/Neerabup site

Offset calculation methodology		Assessment
Type		Land acquisition.
Risk		Low – land to be transferred to conservation estate.
Likely offset success	Can the values be defined and measured?	Yes – vegetation value can be measured.
	Operator experience/evidence?	The DBCA will manage the land and has previous experience managing conservation estate.
	What is the type of vegetation being revegetated?	No revegetation is proposed.
	Is there evidence the environmental values can	Vegetation to be acquired is in Very Good to Excellent condition with only isolated areas of

	be re-created (evidence of demonstrated success)?	disturbance and weed invasion. With DBCA management vegetation condition should be maintained.
Time lag		Land secured upon agreement – no time delay.
Offset quantification		4.4 ha of Carnaby's Black Cockatoo foraging habitat (refer to Table 20).

7.4 Desirable characteristics

Consideration of the values considered for offsets and the desired characteristics of a proposed offset site in accordance with EPA (2014) are presented for the Nowergup/Neerabup site in Table 19.

Table 19: Evaluation against desirable characteristics in accordance with EPA (2014) of Nowergup/Neerabup site.

Value	Nowergup/Neerabup site
In proximity to the area of impact	The site is situated within the City of Wanneroo, and is approximately 5 km to the south-east of the southern extent of the proposal.
Similar or better vegetation condition than area impacted.	The site comprises vegetation in Very Good to Excellent condition, which is similar to or better than the condition of Black Cockatoo foraging habitat impacted by the proposal.
Supports additional rare or otherwise significant species and threatened species or community other than that proposed to be offset.	The site contains three TECs - Banksia woodlands of the Swan Coastal Plain EPBC Act listed TEC, *Melaleuca huegelii* TEC 26a and the proposed EPBC Act TEC Tuart Woodlands of the Swan Coastal Plain. The site also contains two DBCA Priority flora species –*Jacksonia sericea* (Priority 4) and *Sarcozona bicarinata* (Priority 3).
Close to or contiguous with an existing conservation area (e.g. Bush Forever).	The site is located immediately north of a Bush Forever site and Class A Reserve.
Likely to enhance ecological linkages.	The site is adjoining and likely to enhance a regional ecological linkage that runs south-west of the site into Neerabup National Park from the north and east through the Nowergup/Neerabup area.

7.5 Environmental values

The environmental values of the site have been used to assess the total contribution to meeting the offset requirement for Black Cockatoo foraging habitat. Using the Commonwealth Offsets Assessment Guide ("offsets calculator") (DSEWPC 2012), the purchase of the Nowergup/Neerabup site meets substantially more than 100% of the total offset requirement of Carnaby's Black Cockatoo foraging habitat, therefore, excess habitat is proposed to be banked for future METRONET offset requirements (Table 20, **Appendix C**).

Table 20: Environmental values of proposed Nowergup/Neerabup site

Criteria	Rating	Explanation
Clearing area		
Area (ha)	0.95	Vegetation surveys recorded a total of 48.21 ha of Black Cockatoo foraging habitat within the development envelope, with 0.95 ha the extent of Black Cockatoo foraging habitat within the development envelope that has not previously been offset by urban developers under the EPBC Act.
Quality	8	Vegetation surveys recorded a total of 48.21 ha of Black Cockatoo foraging habitat within the development envelope comprised of 30.39 ha of high value foraging habitat and 17.82 ha of medium value foraging habitat.
Quantum of impact	0.76	
Offset Site		
Area (ha)	4.4	4.4 ha of the approximately 10.7 ha of Black Cockatoo habitat surveyed by DBCA will be attributed to this offset.
Start quality	8	The survey by DBCA noted that most of the vegetation was in Excellent to Very Good-Excellent condition.
Risk of loss (%) without offset	25%	No formal protection mechanisms are currently in place on the proposed offset site. The site is privately owned and is at risk of being developed due to changes in zoning as well as excavated as a potential source of raw limestone (designated as a basic raw material extraction activities area). The 25% acknowledges that that risk is moderated by the known high conservation value of the site limiting the potential for development.
Future quality without offset*	7	It is assumed that without active conservation management measures there will be a small reduction in quality due to weed incursion.
Risk of loss (%) with offset	5	Formal protection of the offset site will ensure that the risk of future loss is substantially reduced.
Future quality with offset*	8	Formal protection of the offset and provision of capped funds to the DBCA to engage in active management of the site will enhance the quality of the offset. Projected maintenance of quality due to active management measures not currently being implemented by the land owner such as ongoing weed control and fire management.
Confidence in result (averted loss) (%)	90	The formal protection mechanisms and proposed management provide a high level of certainty that the offset will be conserved, averting the level of loss that would likely occur should no formal protection measures be

Criteria	Rating	Explanation
		implemented.
Confidence in result (habitat quality) (%)	85	There is a high degree of confidence in this prediction based on DBCA involvement in conservation management.
Time over which loss is averted (years)	20	Provision of offset for protection in perpetuity.
Time until ecological benefit (years)	1	The protected effect of the acquisition is immediate on transfer of land.
Total offset %	**102.50%**	The impact will be over mitigated by the offset exceeding 100% threshold by 2.5%.

7.6 Objectives, targets and completion criteria

The overarching objective of the offset is to conserve and enhance the Black Cockatoo foraging habitat within the Nowergup/Neerabup site. Objectives, targets and completion criteria to be achieved by the PTA are outlined in Table 21.

Table 21: Objectives, targets and completion criteria for Nowergup/Neerabup site

Objective	Target	Completion Criteria
Protect 4.4 ha of Black Cockatoo foraging habitat.	Purchase, Nowergup/Neerabup site and transfer of ownership to the Crown for the purpose of conservation.	Site ceded to the Crown for the purpose of conservation.
	Restrict access to Nowergup/Neerabup site to ensure ongoing protection.	Site fenced.
Manage 4.4 ha of Black Cockatoo foraging habitat to avoid degradation from threatening processes.	Provide adequate funding to the DBCA to allow ongoing management of Nowergup/Neerabup site for seven years.	Funding provided to the DBCA. Management actions outlined in Table 22 are complete.

The objective of the offset for impacts to foraging habitat is to prevent future loss of an area of high quality foraging habitat for Carnaby's Black Cockatoo. The intended outcome is to maintain or increase the quality of an area of habitat and increase the total area of the community under conservation management and address threatening processes consistent with the recovery plan (DPaW, 2013) for the species.

7.7 Management actions

The PTA will provide management funding to the DBCA to undertake management actions as outlined in Table 22. The associated costs will be determined in further consultation with the DBCA, and the details of the actions will be specified in an agreement to be established between the PTA and the DBCA within 12 months of approval of this Offsets Strategy.

The provision of management funding has been adjusted to account for the PTA providing over 100% of the offset requirement (Table 26).

Table 22: Proposed management actions for Nowergup/Neerabup site

Year	Action	Timing
Year 1	Install conservation style fencing around perimeter of site to restrict access.	Prior to any works being undertaken within the site.
	Install lockable vehicle access gate.	Prior to any works being undertaken within the site.
	Undertake targeted control programme for priority weeds.	Autumn and spring.
	Install firebreaks around perimeter of site as required in consultation with the DBCA.	Prior to onset of bushfire season if required.
Years 2 to 10	Undertake targeted control programme for priority weeds.	Autumn and spring.
	Undertake fire break maintenance if required.	Annually prior to onset of bushfire season.
	Monitor condition of fencing.	Autumn and spring.
	Fence maintenance.	Autumn and spring as required.
	Undertake periodic conservation measures for maintenance of Carnaby's Black Cockatoo foraging habitat quality over seven years including weed control and vegetation condition inspections.	Spring.

7.8 Risks and contingency measures

There are several key risks associated with not achieving the success criteria for which contingency measures would be enacted should they be realised (Table 23).

Table 23: Key risks and contingency measures for proposed Nowergup/Neerabup site

Risk/Trigger	Potential contingency measures
Proposed site not able to be acquired due to funding limitations.	• Consult with the DBCA regarding implementing Carnaby's Cockatoo Offset Strategy 2.
Condition/quality of area of Black Cockatoo foraging habitat degrades over time despite conservation measures to maintain habitat.	• Investigate cause. • Restrict access to affected areas. • Investigate cause and extent of vegetation decline (disturbance, pest, weed, pathogen, climate). • Review vegetation management measures. • Implement control and remedial measures in consultation with regulators, including weed spraying, pest control, access

Risk/Trigger	Potential contingency measures
	management as required. • Monitor success of control and remedial measures.

7.9 Funding and timelines

Funding for the establishment (year 1) and management of the proposed Nowergup/Neerabup site over seven years will be determined in consultation with the DBCA. A detailed funding arrangement will be determined when the formal agreement between the DBCA and the PTA is established, within 12 months of approval of this Offsets Strategy.

7.10 Roles and responsibilities

The primary roles and responsibilities of the PTA will include:

- Provide funding to the DBCA for purchase of the proposed site.
- Facilitate the establishment of an MOU establishing the formal funding agreement and program of works with the DBCA.
- Provide funding to the DBCA for the establishment and ongoing management of the Nowergup/Neerabup site for a period of seven years.

The primary roles and responsibilities of the DBCA will include:

- Facilitate purchase of the site.
- Participate in the establishment of a formal funding agreement and program of works with the PTA.
- Implement management, monitoring and reporting on site for a period of seven years.

8 Carnaby's Black Cockatoo Offset 2 – Acquisition of foraging habitat

8.1 Overview of offset

In the event that Offset Proposal 2 cannot be implemented (as described in Section 7), the alternative option to be considered in consultation with the DBCA is the acquisition of property in Carabooda. A site in Carabooda has been identified that contains suitable area(s) of Carnaby's Black Cockatoo foraging habitat for transfer to conservation estate to avert the risk of loss over time. The site is not identified specifically in this Strategy due to commercial sensitivity for reaching a sales agreement; however, at the time of writing, the site was being purchased by WAPC for the purpose of providing offsets.

This offset will address threatening processes and provide secure management arrangements that will provide long term conservation. The area to be acquired is appropriate and proportionate to the quantum of impact (38.57 ha in total, of which 0.76 ha is the total quantum of impact considering previous offsets) such that there is a net environmental gain for the cockatoo species arising from the offset in the long-term. The offset contains foraging habitat of adequate quality and correlates well with the nature of the area impacted as it is located in the northern Swan Coastal Plain region, directly adjacent Alkimos.

The PTA proposes to provide funds to the DBCA for the management of the site for a period of seven years.

Refer to Section 7.1.1 regarding the role of previous offsets when considering this offset option.

8.2 Preferred offset site description

PGV Environmental (2017) conducted a vegetation assessment of the Carabooda site. The site is zoned 'Rural' under the MRS and is currently under private ownership. The site is 53.39 ha in total and consists mostly of native vegetation in a range of condition and a cleared and partially cleared area in the south-east quarter. The vegetation on the site was found to be dominated by Tuart woodland and forest over a variety of mid-storey and understorey types. Two areas containing paperbark trees occur in the south-east portion of the site (PGV, 2017).

Table 24 summarises the site condition including vegetation and floristic community types. An additional survey will be undertaken onsite following site acquisition to confirm the extent of Carnaby's Cockatoo foraging habitat, potential breeding trees, vegetation condition and other notable vegetation types.

Table 24: Site Condition of Carabooda Offset Site

Aspect	Description
Size	53.39 ha in total, of which approximately 24-25 ha has been allocated to offset METRONET projects.
Landform/soils	Sandy soils on Northern Swan Coastal Plain.
Floristic community types	Three FCTs are suggested as possibly occurring on parts of the site - FCT 24, 26b and 28. The previously recorded FCT 26a suggested as occurring on the limestone ridge is considered not to occur on the site due abundant

Aspect	Description
	Tuart present in the vegetation unit on the ridge, the absence of a large amount of limestone and the small stature of the ridge.
Vegetation types	- EgSgBsMh – *Eucalyptus gomphocephala* (Tuart) Open Forest over *Spyridium globulosum/Banksia sessilis* (Parrot Bush)/*Melaleuca huegelii* Tall Open Scrub. - EgSgAsTr - *Eucalyptus gomphocephala* (Tuart) Open Forest over *Spyridium globulosum/Acacia saligna* Tall Shrubland over mixed Open Low Heath - EgSgAs - *Eucalyptus gomphocephala* (Tuart) Woodland to Open Forest over *Spyridium globulosum/Acacia saligna* Tall Open Scrub over *Xanthorrhoea preissii/Hibbertia hypericoides* Open Low Heath - EgBmAf - *Eucalyptus gomphocephala* (Tuart) Woodland to Open Forest over *Banksia menziesii/Allocasuarina fraseriana* Low Open Woodland over *Xanthorrhoea preissii/Hibbertia hypericoides* Open Low Heath - EgBmBa - *Eucalyptus gomphocephala* (Tuart) Open Forest over *Banksia menziesii/B. attenuata* Low Open Woodland over Jacksonia furcellata/Spyridium globulosum Tall Shrubland over *Xanthorrhoea preissii/Grevillea vestita/Hibbertia hypericoides* Open Low Heath - EgBsSg - *Eucalyptus gomphocephala* (Tuart) Woodland to Open Forest over *Banksia sessilis/Spyridium globulosum*/ Tall Shrubland over *Xanthorrhoea preissii/Hibbertia hypericiodes* Open Low Heath - EgBg - *Eucalyptus gomphocephala* (Tuart) Woodland to Open Forest over *Banksia grandis* Low Open Woodland over *Xanthorrhoea preissii/Hibbertia hypericoides* Open Low Heath - EgEmBaBm - *Eucalyptus gomphocephala* (Tuart) Woodland over *E. marginata (Jarrah)/Banksia attenuata/B. menziesii* Low Open Woodland over *Hakea prostrata/Xanthorrhoea preissii/Hibbertia hypericoides* Open Low Heath - EgBaBmCq - *Eucalyptus gomphocephala* (Tuart) Woodland over *Banksia attenuata/B. menziesii* Low Open Woodland over Calothamnus *quadrifidus/Xanthorrhoea preissii/Hibbertia hypericoides* Open Low Heath - Eg Mixed Heath - *Eucalyptus gomphocephala* (Tuart) Open Woodland over mixed Heath - EgXp - *Eucalyptus gomphocephala* (Tuart) Open Forest over *Xanthorrhoea preissii* Shrubland - Eg - *Eucalyptus gomphocephala* (Tuart) Open Forest over weeds - EgMr - *Eucalyptus gomphocephala* (Tuart) Open Forest over *Melaleuca rhaphiophylla* (Paperbark) - Low Open Woodland over *Spyridium globulosum/Xanthorrhoea*

Aspect	Description
	preissii Shrubland over weeds - Mr - *Melaleuca rhaphiophylla* (Paperbark) Low Open Forest.
Vegetation condition	The condition of the vegetation on the site ranged from areas that are Completely Degraded (6 ha) to large areas that are in Very Good to Excellent condition. The extent of vegetation condition will be confirmed in an additional survey following acquisition.
Ownership	Private landholder.
Tenure	State, Freehold or Unallocated Crown Land (UCL) (not currently managed for conservation).
Zoning	Rural, industrial, or unzoned (no conservation zoning).

8.1 Justification of offset

Table 25 provides a justification of the offset site in accordance with the WA Offsets Template (EPA 2014).

Table 25: Justification of offset –Carabooda site

Offset calculation methodology		Assessment
Type		Land acquisition.
Risk		Low – land to be transferred to conservation estate.
Likely offset success	Can the values be defined and measured?	Yes – vegetation value can be measured.
	Operator experience/evidence?	The DBCA will manage the land and has previous experience managing conservation estate.
	What is the type of vegetation being revegetated?	No revegetation is proposed.
	Is there evidence the environmental values can be re-created (evidence of demonstrated success)?	Vegetation to be acquired is in Very Good to Excellent condition with only isolated areas of disturbance and weed invasion. With DBCA management vegetation condition should be maintained.
Time lag		Land secured upon agreement – no time delay.
Offset quantification		4.4 ha of Carnaby's Black Cockatoo foraging habitat (see Table 27).

8.1 Desirable characteristics

Consideration of the values considered for offsets and the desired characteristics of a proposed offset site in accordance with EPA (2014) for the Carabooda site are presented in Table 26.

Table 26: Evaluation against desirable characteristics in accordance with EPA (2014) of Carabooda site

Value	Carabooda site
In proximity to the area of impact	The site is situated within the City of Wanneroo, and is approximately 2.5 km north-east of Eglinton.
Similar or better vegetation condition than area impacted.	The site comprises vegetation in Very Good to Excellent condition, which is similar to or better than the condition of Black Cockatoo foraging habitat impacted by the proposal.
Supports additional rare or otherwise significant species and threatened species or community.	The site may contain "Aquatic Root Mat" Community in Caves of the Swan Coastal Plain TEC.
Close to or contiguous with an existing conservation area (e.g. Bush Forever).	The site is located adjacent to Yanchep National Park.
Likely to enhance ecological linkages.	The site is adjoining and likely to enhance a regional ecological linkage associated with Yanchep National Park.

8.1 Environmental values

The environmental values of the site have been used to assess the total contribution to meeting the offset requirement for Black Cockatoo foraging habitat. Using the Commonwealth Offsets Assessment Guide ("offsets calculator") (DSEWPC 2012), the Carabooda site meets substantially more than 100% of the total offset requirement.

Table 27: Environmental values of proposed Carabooda site

Criteria	Rating	Explanation
Clearing area		
Area (ha)	0.95	Vegetation surveys recorded a total of 48.21 ha of Black Cockatoo foraging habitat within the development envelope, with 0.95 ha the extent of Black Cockatoo foraging habitat within the development envelope that has not previously been offset by urban developers under the EPBC Act.
Quality	8	Vegetation surveys recorded a total of 48.21 ha of Black Cockatoo foraging habitat within the development envelope comprised of 30.39 ha of high value foraging habitat and 17.82 ha of medium value foraging habitat.
Quantum of impact	0.76	
Offset Site		

Criteria	Rating	Explanation
Area (ha)	4.4 ha	Additional surveys required to identify extent of Black Cockatoo foraging habitat onsite.
Start quality	8	A formal vegetation condition assessment has not been undertaken at the site; however, a brief survey (PGV, 2017) noted areas were in Very Good to Excellent condition.
Risk of loss (%) without offset	25%	No formal protection mechanisms are currently in place on the proposed offset site. The site is privately owned and is at risk of being developed due to changes in zoning. The 25% acknowledges that that risk is moderated by the known high conservation value of the site limiting the potential for development.
Future quality without offset*	7	It is assumed that without active conservation management measures there will be a small reduction in quality due to weed incursion.
Risk of loss (%) with offset	5	Formal protection of the offset site will ensure that the risk of future loss is substantially reduced.
Future quality with offset*	8	Formal protection of the offset and provision of capped funds to the DBCA to engage in active management of the site will enhance the quality of the offset. Projected maintenance of quality due to active management measures not currently being implemented by the land owner such as ongoing weed control and fire management.
Confidence in result (averted loss) (%)	90	The formal protection mechanisms and proposed management provide a high level of certainty that the offset will be conserved, averting the level of loss that would likely occur should no formal protection measures be implemented.
Confidence in result (habitat quality) (%)	85	There is a high degree of confidence in this prediction based on DBCA involvement in conservation management.
Time over which loss is averted (years)	20	Provision of offset for protection in perpetuity.
Time until ecological benefit (years)	1	The protected effect of the acquisition is immediate on transfer of land.
Total offset %	**102.50%**	The impact will be over mitigated by the offset exceeding 100% threshold by 2.5%.

8.1 Objectives, targets and completion criteria

The overarching objective of the offset is to conserve and enhance the Black Cockatoo foraging habitat within the Carabooda site. Objectives, targets and completion criteria to be achieved by the PTA are outlined in Table 28.

Table 28: Objectives, targets and completion criteria for Carabooda site

Objective	Target	Completion Criteria
Protect 4.4 ha of Black Cockatoo foraging habitat.	Purchase Carabooda site and transfer ownership to the Crown for the purpose of conservation.	Site ceded to the Crown for the purpose of conservation.
	Restrict access to Carabooda site to ensure ongoing protection.	Site fenced.
Manage 4.4 ha of Black Cockatoo foraging habitat to avoid degradation from threatening processes.	Provide adequate funding to the DBCA to fund the management of the Carabooda site for seven years.	Funding provided to the DBCA. Management actions outlined in Table 29 are complete.

The objective of the offset for impacts to foraging habitat is to prevent future loss of an area of high quality foraging habitat for Carnaby's Black Cockatoo. The intended outcome is to maintain or increase the quality of an area of habitat and increase the total area of the community under conservation management and address threatening processes consistent with the recovery plan (DPaW, 2013) for the species.

8.1 Management actions

The PTA will provide management funding to the DBCA to undertake management actions as outlined in Table 29. The associated costs will be determined in further consultation with the DBCA, and the details of the actions will be specified in an agreement to be established between the PTA and the DBCA within 12 months of approval of this Offsets Strategy.

The provision of management funding has been adjusted to account for the PTA providing over 100% of the offset requirement (Table 27).

Table 29: Proposed management actions for Carabooda site

Year	Action	Timing
Year 1	Install conservation style fencing around perimeter of site to restrict access.	Prior to any works being undertaken within the site.
	Install lockable vehicle access gate.	Prior to any works being undertaken within the site.
	Undertake targeted control programme for priority weeds.	Autumn and spring.
	Install firebreaks around perimeter of site as required in consultation with the DBCA.	Prior to onset of bushfire season if required.
Years 2 to 10	Undertake targeted control programme for priority weeds.	Autumn and spring.
	Undertake fire break maintenance if required.	Annually prior to onset of bushfire season.
	Monitor condition of fencing.	Autumn and spring.

Year	Action	Timing
	Fence maintenance.	Autumn and spring as required.
	Undertake periodic conservation measures for maintenance of Carnaby's Black Cockatoo foraging habitat quality over seven years including weed control and vegetation condition inspections.	Spring.

8.2 Risks and contingency measures

Table 30 summarises the risks is not achieving the success criteria and the contingency measures proposed should they be realised.

Table 30: Key risks and contingency measures for proposed Carabooda site

Risk/Trigger	Potential contingency measures
Condition/quality of area of Black Cockatoo foraging habitat degrades over time despite conservation measures to maintain habitat.	• Investigate cause. • Restrict access to affected areas. • Investigate cause and extent of vegetation decline (disturbance, pest, weed, pathogen, climate). • Review vegetation management measures. • Implement control and remedial measures in consultation with regulators, including weed spraying, pest control, access management as required. • Monitor success of control and remedial measures.

8.3 Funding and timelines

Funding for the establishment (year 1) and management of the proposed Carabooda site over seven years will be determined in consultation with the DBCA. A detailed funding arrangement will be determined when the formal agreement between the DBCA and the PTA is established, within 12 months of approval of this Offsets Strategy.

8.4 Roles and responsibilities

The primary roles and responsibilities of the PTA will include:

- Provide funding to the DBCA for purchase of the proposed site.
- Facilitate the establishment of an MOU establishing the formal funding agreement and program of works with the DBCA.
- Conduct site assessment of the Carabooda site to:
    - Confirm presence and map the extent of Carnaby's Cockatoo foraging habitat, potential breeding trees, vegetation condition and other notable vegetation types.
    - Identify existing threatening processes relevant to Carnaby's Cockatoo foraging and breeding habitat.

- Update Offset Strategy in consultation with the DBCA and DWER as required.
- Provide funding to the DBCA for the establishment and ongoing management of the Nowergup/Neerabup site for a period of seven years.

The primary roles and responsibilities of the DBCA will include:

- Facilitate purchase of the site.
- Participate in the establishment of a formal funding agreement and program of works with the PTA.
- Implement management, monitoring and reporting on site for a period of seven years.

Table 31: Carnaby's Black Cockatoo offsets provided under previous EPBC Act approvals that incorporated parts of YRE Part 1 development envelope

Proponent (from Table 1) & parcel (Figure 1)	Impact requiring offset	Direct offset provided	Offset site(s) acquired and values
LWP Trinity Estate (Lot 1001 & 1002 Marmion Avenue)	157 ha of potential Carnaby's Black Cockatoo foraging habitat	$614,111 to acquire 936 ha of Carnaby's Black Cockatoo foraging habitat 5.52 ha Black Cockatoo habitat retained in Public Open Space	1. Lot 106 Mogumber Road West, Mindarra (459 ha) Values: • Vegetation association 1015 – Mosaic: Mixed scrub-heath / Shrublands; Banksia thicket • Mogumber Complex-North – Open to closed heath of Banksia species - *Allocasuarina humilis* • DBCA Carnaby's Cockatoo feeding habitat area (DBCA-057)
			2. Site east of Badgingarra (477 ha) There is limited information available on the environmental values of this site, however the DBCA identified the site as suitable to address the requirement for foraging (feeding) habitat acquisition
Peet Shorehaven (North Alkimos)	83.6 ha of potential Carnaby's Black Cockatoo foraging habitat	$350,000 provided to DBCA to acquire a 648 ha offset property 1.41 ha Black Cockatoo habitat retained in Public Open Space 0.63 ha of Public Open Space to be rehabilitated to provide Black Cockatoo habitat	1. Lot 101 Cowalla Road, Neergabby (948 ha) Values: • Vegetation association 1014 – Mosaic: Low woodland; banksia / Shrublands; tea tree thicket • Caladenia Complex – Mosaic of vegetation from adjacent vegetation complexes of Karrakatta, Yanga and Bassendean • DBCA Carnaby's Cockatoo feeding habitat area (DBCA-057) • South of Moore River Nature Reserve (R 41830)
Eglinton Estates Eglinton Town Centre and Eglinton Hill (Eglinton)	115 ha of potential Carnaby's Black Cockatoo foraging habitat	850 ha of good quality foraging habitat for Carnaby's Black Cockatoo or another approved parcel of land 7.92 ha Black Cockatoo habitat retained in Public Open Space Revegetation of at least 12.7 ha of native vegetation (including primary feeding plants for Carnaby's Black	1. Lot 23 Gillingarra Road, Regans Ford Values: • Vegetation association 1030 – Low woodland; *Banksia attenuata* & *B. menziesii* • Vegetation association 1035 – Mosaic: Medium open woodland; marri / Shrublands; Banksia heath • DBCA Carnaby's Cockatoo feeding habitat area (DBCA-057)

Proponent (from Table 1) & parcel (Figure 1)	Impact requiring offset	Direct offset provided	Offset site(s) acquired and values
		Cockatoo) in the Yellagonga Regional Park	
LandCorp Allara (Eglinton/South Yanchep Residential Development)	176.7 ha of potential Carnaby's Black Cockatoo foraging habitat	1,157 ha of good quality foraging habitat for Carnaby's Black Cockatoo habitat or another approved parcel of land (Condition #13 2011/6021))	1. Lot 111 Cullalla Road, Cullalla (1,205ha in total) <u>Values:</u> • Vegetation association 949 – Low woodland; Banksia • Vegetation association 1027 – Mosaic: Medium open woodland; jarrah & marri, with low woodland; banksia / Medium sparse woodland; jarrah & marri • Vegetation association 1017 – Medium open woodland; jarrah & marri, with low woodland; banksia • Cullula Complex – Mixture of low oopen forest of Banksia species – *Eucalyptus todtiana* and open woodland of *Corymbia calophylla* with second storey of *Eucalyptus todtiana - B.attenuata – Banksia menziesii – Banksia ilicifolia* • DBCA Carnaby's Cockatoo feeding habitat area (DBCA-057) • West of Boonanarring Nature Reserve (R 41805)
Lend Lease Alkimos City Centre Activity Centre & Central Alkimos	257 ha of potential Carnaby's Black Cockatoo foraging habitat 87 potential breeding trees	1,138 ha of Carnaby's Black Cockatoo habitat (Condition #4 of 2015/7561) Preparation and implementation of a Parks and Recreation Reserve Management Plan (PRRMP) provides for retention of 66.64 ha of Carnaby's Black Cockatoo in Alkimos Parks and Recreation Reserve, conservation management measures for maintenance and revegetation habitat. It also provides for 12 artificial nest boxes or nesting hollows to be installed	Lot 403 Red Gully Rd, Mindarra (1,267.1 ha in total) <u>Values:</u> • Vegetation association 949 – Low woodland; Banksia • Vegetation association 1015 – Mosaic: Mixed scrub-heath / Shrublands; dryandra thicket • Mogumber Complex-North – Open to closed heath of Banksia species – *Allocasuarina 42umillis* • DBCA Carnaby's Cockatoo feeding habitat area (DBCA-057).

Proponent (from Table 1) & parcel (Figure 1)	Impact requiring offset	Direct offset provided	Offset site(s) acquired and values
Urban Quarter (Draft Western Precinct)	92.25 ha of potential Carnaby's Black Cockatoo foraging habitat	Acquire and manage 380 ha of Black Cockatoo habitat in Boonarring and 117 ha in Cataby. A minimum of 8 ha of Black Cockatoo habitat retained in Public Open Space Prepare, submit and implement a Vegetation and Conservation Area Management Plan for approval prior to commencement of the Action	1. Lot 5450 Wannamal Road West, Boonarring (1002.5 ha) <u>Values:</u> • Vegetation association 949 – Low woodland; Banksia • Vegetation association 1027 – Mosaic: Medium open woodland; jarrah & marri, with low woodland; banksia / Medium sparse woodland; jarrah & marri • Karamal Complex-South – Open forest of *Eucalyptus 43umillis43* – *Corymbia calophylla* with second storey of *Banksia grandis* • Moondah Complex – Low closed to low open forest of *Banksia attenuata* – *Banksia menziesii* – *Eucalyptus todtiana* - *Banksia prionotes* on slopes, open woodland of *Corymbia calophylla* – Banksia species in valley. • Mogumber Complex-North – Open to closed heath of Banksia species – *Allocasuarina 43umillis* • DBCA Carnaby's Cockatoo feeding habitat area (DBCA-057) • North of Boonanarring Nature Reserve (R 41805)
			• Lot 3333 Mimegarra Road, Cataby <u>Values:</u> • Vegetation association 1030 – Low woodland; *Banksia attenuata* & *B. menziesii* • DBCA Carnaby's Cockatoo feeding habitat area (DBCA-057) • North of Eneminga Nature Reserve (R 27394)
TOTAL	**881.55 ha of potential Carnaby's Black Cockatoo foraging habitat** **87 potential breeding trees**	**5109 ha of Carnaby's Black Cockatoo habitat acquired.** **Retention of 66.64 ha of Carnaby's Black Cockatoo in Alkimos Parks and Recreation Reserve and installation of 12 artificial nest boxes or nesting hollows.**	

9 Carnaby's Black Cockatoo Offset 3 – Potential breeding trees

9.1 Overview of offset

The PTA will offset the loss of 5 potential breeding trees deemed a significant residual impact. The objective for the offset of potential breeding trees is to prevent future loss of existing potential breeding trees with the intended outcome to maintain the extent of breeding habitat in the long-term.

To offset the impact on 5 potential breeding trees, a sufficient number of potential breeding trees will be provided as part of the land acquisition offset associated with the Carnaby's Black Cockatoo offset proposals (Offset 1 and Offset 2), described above, as there is a high potential for the Nowergup/Neerabup or Carabooda sites to also support potential breeding habitat for Carnaby's Cockatoo.

Refer to Sections 4 and 8 for a description of the proposed acquisition sites.

It is anticipated that a ratio of 3:1 will be applied, and therefore 15 potential breeding trees will be provided. However, if 15 potential breeding trees are unable to be identified within the Carnaby's Black Cockatoo acquisition site, the difference will be offset through the installation of artificial nest boxes. This is measured on a 6:1 ratio; therefore, up to 35 artificial nest boxes will be installed at the selected acquisition site in consultation with DBCA.

9.2 Preferred offset site

This offset proposal is intended to be implemented within the offset site acquired to offset Carnaby's Black Cockatoo habitat. Refer to Sections 4 and 8 for a description of the proposed acquisition sites. Both the Nowergup/Neerabup and Carabooda proposed acquisition sites are likely to contain Carnaby's Black Cockatoo breeding habitat. Table 32 presents the essential criteria for the preferred offset site.

The associated calculations of % loss and % change in quality in accordance with DSEWPC (2012) are indicated in Table 32 in italics. There is a high degree of confidence in the predictions for % loss and change in quality given the known security of conservation tenure being placed on currently developable land and current threats likely to unmanaged rural land.

Table 32: Essential criteria for Carnaby's Black Cockatoo offset 3 (area, quality and %risk of loss values derived from DSEWPC 2012).

Criteria	Requirement
Landform/soils	Sandy soils on Northern Swan Coastal Plain
Vegetation/habitat	Woodland or heathland dominated by flora species used by Carnaby's Black Cockatoo for food (i.e. *Banksia*, Jarrah, Marri)
Vegetation condition	Majority of vegetation in Very Good or better condition
Ownership	Private landholder
Tenure	State, Freehold or Unallocated Crown Land (UCL) (not currently managed for conservation)
Zoning	Rural, industrial, or unzoned (no conservation zoning)

Criteria	Requirement
Time horizon	*5 years*
Start value	*0 potential breeding trees*
Future value without offset	*0 potential breeding trees (represents a 15% risk of loss)*
Future value with offset	*15 potential breeding trees (represents a 5% risk of loss)*
Confidence in result	*90%*
% of impact offset	*254.37*

* These criteria have been derived using the Commonwealth Offset Assessment Guide (DSEWPC 2012) with the 'time until ecological benefit' set at 10 years with confidence in predictions for change in quality and % risk of loss both set at 90% and 90%

9.1 Justification of offset

Table 33 provides a justification of the offset site in accordance with the WA Offsets Template (EPA 2014).

Table 33: Justification of offset –potential breeding trees

Offset calculation methodology		Assessment
Type		Provision of breeding trees through land acquisition.
Risk		Low – land and breeding trees to be transferred to conservation estate.
Likely offset success	Can the values be defined and measured?	Yes – number of potential breeding trees on the acquired site can be measured.
	Operator experience/evidence?	The DBCA will manage the land and has previous experience managing conservation estate.
	What is the type of vegetation being revegetated?	No revegetation is proposed.
	Is there evidence the environmental values can be re-created (evidence of demonstrated success)?	Vegetation to be acquired is in Very Good to Excellent condition with only isolated areas of disturbance and weed invasion. With DBCA management vegetation condition should be maintained.
Time lag		Land secured upon agreement – five years.
Offset quantification		Provision of 15 breeding trees.

9.2 Objectives and intended outcome

The objective of the offset for impacts to potential breeding trees is to prevent future loss of potential breeding trees for Carnaby's Black Cockatoo. The intended outcome is to maintain or

increase the quality of an area of habitat and increase the total area of the community under conservation management and address threatening processes consistent with the recovery plan (DPaW, 2013) for the species.

9.3 Management Actions

Refer to Sections 7.7 and 8.1 for management actions applicable to the acquired site(s).

Additional management actions applicable to this offset proposal will be identifying potential breeding trees through a physical marker and observing and reordering their growth and hollow development per annum.

9.4 Risks and contingency measures

Table 34 summarises the risks is not achieving the success criteria and the contingency measures proposed should they be realised.

Table 34: Key risks and contingency measures for Carnaby's Black Cockatoo breeding habitat

Risk/Trigger	Potential contingency measures
Condition/quality of area of Black Cockatoo breeding habitat degrades over time despite conservation measures to maintain habitat.	• Investigate cause. • Restrict access to affected areas. • Investigate cause and extent of vegetation decline (disturbance, pest, weed, pathogen, climate). • Review vegetation management measures. • Implement control and remedial measures in consultation with regulators, including weed spraying, pest control, access management as required. • Monitor success of control and remedial measures.

9.5 Funding and timelines

Funding for the establishment (year 1) and management of the proposed acquisition site over seven years will be determined in consultation with the DBCA. A detailed funding arrangement will be determined when the formal agreement between the DBCA and the PTA is established, within 12 months of approval of this Offsets Strategy.

9.6 Roles and responsibilities

The primary roles and responsibilities of the PTA will include:

- Provide funding to the DBCA for purchase of the proposed acquisition site.
- Facilitate the establishment of an MOU establishing the formal funding agreement and program of works with the DBCA.
- Conduct site assessment of the Carnaby's Black Cockatoo site acquired to offset Black Cockatoo foraging habitat to:
    - Confirm presence and map the extent of Carnaby's Cockatoo foraging habitat, potential breeding trees, vegetation condition and other notable vegetation types.

    - Identify existing threatening processes relevant to Carnaby's Cockatoo foraging and breeding habitat.

- Determine final offset site in consultation with DWER.
- Should an insufficient number of potential breeding trees be located on the acquired site, supplement the number of potential breeding trees with the installation of nest boxes at a 6:1 ratio.
- Update Offset Strategy in consultation with the DBCA and DWER as required.
- Provide funding to the DBCA for the establishment and ongoing management of the site for a period of seven years.

The primary roles and responsibilities of the DBCA will include:

- Agree on the final offset strategy based on site conditions and presence of potential breeding habitat.
- Participate in the establishment of a formal funding agreement and program of works with the PTA.
- Implement management, monitoring and reporting on site for a period of seven years.

10 Arrangements for each offset proposal

10.1 Timelines and milestones

Key milestones and timing for implementation of this offset will be agreed with the DBCA or other responsible authority as part of the development of the MOU in regards to the funding and delivery of each offset.

10.2 Monitoring to assess offset implementation

The PTA will monitor the progress of the implementation of the management actions through its liaison with the DBCA and reporting through each MOU (to be developed). This would include reporting on the condition of:

- TEC 26a vegetation in offset land.
- Carnaby's Cockatoo foraging habitat and breeding tree quality.

At least five years of monitoring of the rehabilitation would be provided under the MOU with ability to extend this should monitoring indicate that success criteria have not or will not be met.

10.3 Reporting details and timing

The PTA will provide an annual compliance assessment report to the DWER regarding:

- The activities undertaken in the previous 12 months for each offset.
- The activities proposed in the next 12 months for each offset.
- A summary of compliance with the Final Offsets Strategy in regards to each offset.
- An evaluation of the results of site assessments and monitoring to identify progress on meeting the success criteria.

The MOU between the DBCA and the PTA will indicate the form and timing of corresponding reporting from the DBCA on site works and monitoring. Monitoring would be supported for the first five years and only extended if monitoring indicates that success criteria have not or are unlikely to be met at 10 years.

10.4 Financial arrangements

The PTA will fully fund the actions proposed under this Offset Strategy including the rehabilitation and conservation management measures to increase the condition of the vegetation and the acquisition and/or securing of offset property.

10.5 Governance arrangements

Governance arrangements will be determined during preparation of each MOU. Stakeholder consultation regarding all offsets will be undertaken.

11 Stakeholder consultation

The PTA has commenced consultation with the DBCA and existing EPBC Act approval holders for the developments that includes the Part 1 YRE development envelope. This includes discussing the outcomes of previous offsets provided, delivery of new offsets potentially required and confirmation that the DBCA has identified preferred sites for

acquisition to conserve TEC26a. These TEC26a sites are to be subject to updated inspections to confirm area and condition. Consultation with the DBCA has also focussed on financial arrangements for acquisition and funding of conservation works. The DBCA has been and will continue to undertake consultation with landowners.

12 Implementation, review and revision

This Strategy will be finalised following the issue of condition of approval for YRE Part 1. The Strategy, once approved by the DWER will continue to be implemented until directed otherwise by the CEO of the Department. The PTA will review and revise this Strategy as and when directed, which may be specified by conditions.

13 References

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Appendix A – Summary of application of Mitigation Hierarchy and Residual Impact Significance model

Table 35: Summary of the mitigation strategy for relevant environmental factors

Factor	Avoid	Minimise	Rehabilitate

Flora and vegetation	• Realigned rail reservation to reduce impact to vegetation within Alkimos PRR by an estimated 70%.
	• Construction and access areas have been selected to coincide with proposed future urban development cells or roads either reserved by the MRS, or as detailed within approved and draft LSPs, to intentionally avoid direct impacts to vegetation which may have otherwise been able to be retained within future POS reservations.
	• Reductions in the size of the development envelope, including the removal of five construction access roads and the addition of one construction access road to Alkimos Station, resulting in a 6.86 ha reduction in the area of the proposal's development envelope, from 70.19 ha to 63.33 ha, and an associated 5.45 ha reduction in the extent of native vegetation clearing from 43.18 ha to 37.73 ha.
		• Construction and access areas selected to coincide with proposed future urban development cells or roads, the impacts for clearing of which have already been considered by the EPA.
		• Modification of development envelope within Alkimos PRR.
		• Modification of the development envelope to avoid the clearing of native vegetation and direct impacts to Bush Forever Site No. 130.
		• A CEMP will be developed and implemented to include the following as a minimum:
		  ○ Demarcate the development envelope to avoid clearing outside approved areas.
		  ○ Restrict clearing to the development envelope to as low as reasonably practicable.
		  ○ Prevent the distribution of declared Pests and other weed species offsite.
		  ○ Prevent introduction of Phytophthora dieback to the surrounding vegetation.
		  ○ Manage indirect impacts to surrounding vegetation.
		  ○ Should batters be of a suitable gradient and material and not required for operational infrastructure purposes, they will be stabilised with planting of locally endemic species where possible and/or bioengineering controls.
			N/A

Terrestrial fauna		• Construction and access areas selected to coincide with proposed future urban development cells or roads, the impacts for clearing of which have already been considered by the EPA. • Modification of development envelope within Alkimos PRR. • A CEMP will be developed and implemented to include the	

		following as a minimum: ○ Demarcate the development envelope to avoid clearing outside approved areas. ○ Restrict clearing to the development envelope to as low as reasonably practicable. ○ Prevent the distribution of declared Pests and other weed species offsite. ○ Prevent introduction of Phytophthora dieback to the surrounding vegetation. ○ Should batters be of a suitable gradient and material and not required for operational infrastructure purposes, they will be stabilised with planting of locally endemic species where possible and/or bioengineering controls. ○ Manage indirect impacts to surrounding vegetation. ○ Provide a fauna underpass within Alkimos PRR. ○ Undertake progressive clearing to allow fauna to move away from clearing activities ○ Pre-clearing survey for potential black-cockatoos prior to construction works.	

Table 36: Summary of application of Residual Impact Significance model (from Government of Western Australia 2014)

Environmental factor	Outcome (ELA 2018)	Unacceptable impacts	Significant impacts	Potential significant impacts	Insignificant impacts
Flora and vegetation	The proposal has the potential to cause the following impacts to flora and vegetation: • Permanent loss of 37.72 ha of native vegetation in Pristine to Degraded condition;	None	0.94 ha of TEC 26a as cumulative impacts to this TEC as considered to already be at a	None	The remaining residual impacts are considered insignificant due to associated values affected are not protected by statute and cumulative impacts have not been

Environmental factor	Outcome (ELA 2018)	Unacceptable impacts	Significant impacts	Potential significant impacts	Insignificant impacts

	• Permanent removal of vegetation located near the edge of the north-south regional ecological linkage (1.81 ha);
	• Disruption of the local east-west ecological linkage by the permanent removal of 2.50 ha of vegetation;
	• Permanent loss of Threatened and Priority Ecological Communities, including a total of:
	  o 0.94 ha of *Melaleuca huegelii – M. systena* shrublands on limestone ridges (Gibson et al. 1994 type 26a) TEC;
	  o 14.17 ha of Banksia dominated woodlands of the Swan Coastal Plain IBRA Region PEC;
	  o 16.05 ha of Northern Spearwood shrublands and woodlands ('community type 24') PEC.
	• Introduction and/or spread of weeds within the development envelope and/or into vegetation adjacent to the development envelope; and
	• Introduction and spread of *Phytophthora* dieback into vegetation adjacent to the development envelope.
	Through the implementation of the EPA's mitigation hierarchy, the residual impacts of the proposal to flora and vegetation are as low as reasonably practicable and not significant, with the exception of the impacts to the M. huegelii – M. systena shrublands on limestone ridges (Gibson et al. 1994 type 26a) TEC.
			critical level		increased to a critical level as a result of development.

Environmental factor	Outcome (ELA 2018)	Unacceptable impacts	Significant impacts	Potential significant impacts	Insignificant impacts

Terrestrial fauna	The proposal has the potential to cause the following impacts to terrestrial fauna:
	• Loss of fauna habitat:
	  ○ A total of 54.97 ha of terrestrial fauna habitat, consisting of 48.1 ha of high value and 6.87 ha of medium value habitat;
	  ○ A total of 61.51 ha of potential Short Range Endemic (SRE) fauna habitat, consisting of 35.79 ha of medium suitability and 25.72 ha of low suitability habitat;
	  ○ A total of 52.43 ha of Carnaby's Black Cockatoo habitat, including 48.21 ha of potential foraging habitat.
	• Fragmentation of fauna habitat, including:
	  ○ Partial removal of the edge of the north-south regional linkage, resulting in the loss of 1.80 ha of this linkage; and
	  ○ Disruption of the local east-west ecological linkage, resulting in the loss of 2.50 ha of this linkage.
	• Injury and/or mortality during clearing activities and construction and operation of the railway;
	• Disturbance of local fauna populations adjacent to the development envelope during construction (clearing activities and noise) and operation of the railway (noise and vibration); and
	• Habitat degradation through hydrocarbon spills, the alteration of surface hydrology, increased
		None	Loss of 48.21 ha of foraging habitat considered critical habitat for Carnaby's Black Cockatoo.	None	The remaining residual impacts are considered insignificant due to associated values affected are not protected by statute and cumulative impacts have not been increased to a critical level as a result of development.

Environmental factor	Outcome (ELA 2018)	Unacceptable impacts	Significant impacts	Potential significant impacts	Insignificant impacts
	sedimentation and weed incursions in habitat adjacent to the development envelope. Through the implementation of the EPA's mitigation hierarchy, the residual impacts of the proposal to terrestrial fauna and their habitats are as low as reasonably practicable and not significant, with the exception of the impacts to Carnaby's Black Cockatoo.				

Appendix B – WA Environmental Offsets Template

Yanchep Rail Extension: Part 1 – Butler to Eglinton Preliminary Offset Strategy

Existing environment/ Impact	*Mitigation*			*Significant Residual Impact*	*Offset Calculation Methodology*				
	Avoid and minimise	*Rehabilitation Type*	*Likely Rehab Success*		*Type*	*Risk*	*Likely offset success*	*Time Lag*	*Offset Quantification*
Clearing of 0.94 ha of Threatened Ecological Community 26a (*Melaleuca huegelii – M. systena* shrublands on limestone ridges) in Good to Excellent Condition.	Realigned rail reservation to reduce impact to vegetation within Alkimos PRR by an estimated 70%. Construction and access areas have been selected to coincide with proposed future urban development cells or roads either reserved by the MRS, or as detailed within approved and draft LSPs, to intentionally avoid direct impacts to vegetation which may have otherwise been able to be retained within future POS reservations. Reductions in the size of the development envelope, including the removal of five construction access roads and the addition of one construction access road to Alkimos Station, resulting in a 6.86 ha reduction in the area of the proposal's development envelope, from 70.19 ha to 63.33 ha, and an associated 5.45 ha reduction in the extent of native vegetation clearing from 43.18 ha to 37.73 ha. The Development Envelope avoids fragmentation where possible to the north-south regional ecological linkage. A Construction Environmental Management Plan (CEMP) will be developed and implemented to include the following as a minimum: o Demarcate the development envelope to avoid clearing outside approved areas. o Restrict clearing to the development envelope to as low as reasonably practicable. o Prevent the distribution of declared Pests and other weed species offsite. o Prevent introduction of Phytophthora dieback to the surrounding vegetation. o Manage indirect impacts to surrounding vegetation. o Should batters be of a suitable gradient and material and not required for operational infrastructure purposes, they will be stabilised with planting of locally endemic species where possible and/or bioengineering controls.	Not applicable.	Not applicable.	Extent 0.94 ha of TEC 26a Quality Excellent condition (0.51 ha) Very Good condition (0.03 ha) Conservation Significance High conservation significance as the vegetation comprises part of a TEC community listed as Endangered under the *Biodiversity Conservation Act.* Land Tenure State, Freehold or Unallocated Crown Land (UCL) (not currently managed for conservation) Time Scale Permanent According to the agreed significance framework, residual impact is considered significant as cumulative impacts to this TEC is already at a critical level.	**Option 1: land acquisition** Acquisition of land in Nowergup/Neerabup that has no existing conservation tenure to transfer to the conservation estate	Land acquisition: Low – land to be ceded to DBCA or other responsible authority.	This is not applicable for land acquisition, see risk comments.	No time lag	Land acquisition and protection of selected Nowergup/Neerabup site containing 7.3 ha of TEC 26a. Vegetation condition: Very Good to Excellent. Tenure: Freehold, currently privately owned. The total offset % using the DoEE offset calculator: 171.27%
					Option 2: on-ground management Revegatation of degraded areas of TEC 26a in secured conservation land already under DBCA management.	Low - DBCA managed land	Can the values be defined and measured? Yes - revegetation values can be measured through vegetation condition inspections from on ground works during: • weed management • dieback management • rubbish removal, fencing, signage, fire control works. A site assessment will be undertaken to obtain baseline information including: a. presence and mapped extent of TEC 26a b. vegetation condition across site c. identification of other environmental values that the site supports d. identification of existing threatening processes including weed infestation (map weeds), feral animal damage, likely frequency of fires, and uncontrolled access. Operator experience/Evidence? • DBCA will manage the land within their ownership What is the type of vegetation being revegetated? Vegetation types/species associated with TEC 26a. Is there evidence the environmental values can be re-created (evidence of demonstrated success)? DBCA is responsible for biodiversity conservation in Western Australia and routinely carries out management and restoration activities.	Within 10 years to achieve no net loss.	Total offset is revegeation of **12.75 ha,** calculated using the DoEE offset calculator.
					Option 3: acquisition and on-ground management Acquisition of poorer quality areas of TEC 26a for transfer to conservation estate, and conducting revegetation works to improve its quality.	Land acquisition: Low – land to be ceded to DBCA. Revegetation/ongroun d management: Possible sites on DBCA managed land (low risk) and others on freehold land (higher risk).	Can the values be defined and measured? Yes - vegetation values can be measured through vegetation condition inspections from on ground works during: • weed management • dieback management • rubbish removal, fencing, signage, fire control works. A site assessment will be undertaken for baseline information including: a. presence and mapped extent of TEC 26a b. vegetation condition across site c. identification of other environmental values that the site supports d. identification of existing threatening processes including weed infestation (map weeds), feral animal damage, likely frequency of fires, and uncontrolled access. Operator experience/Evidence? • Varied - DBCA may undertake some of the offset, local land care groups may also be engaged under DBCA stewardship • PTA will also consider funding of research or monitoring that will go towards informing the conservation threatened communities, particularly if a sufficient area of TEC 26a is not able to be acquired. • DBCA will manage the land within their ownership What is the type of vegetation being revegetated? Vegetation types/species associated with TEC 26a. Is there evidence the environmental values can be re-created (evidence of demonstrated success)? PTA has demonstrated experience from their infrastructure projects that shows contributions towards conservation and mitigating project impacts. DBCA is responsible for biodiversity conservation in Western Australia and routinely carries out management and restoration activities.	Acquisition of land: No time lag - secures land upon agreement. Revegetation of land: Within 10 years to achieve no net loss.	Total offset estimated to be between **3.91 and 5.1 ha** of land acquisition and protection, dependent on vegetation condition and tenure. The area of land acquisition/revegetation was determined using the DoEE offset calculator.
Clearing of 48.21 ha of Carnaby Cockatoo (*Calyptorhynchus latirostri*) forgaing habitat and 5 potential breeding trees.	Realigned rail reservation to reduce impact to vegetation within Alkimos PRR by an estimated 70%. Construction and access areas have been selected to coincide with proposed future urban development cells or roads either reserved by the MRS, or as detailed within approved and draft LSPs, to intentionally avoid direct impacts to vegetation which may have otherwise been able to be retained within future POS reservations. Reductions in the size of the development envelope, including the removal of five construction access roads and the addition of one construction access road to Alkimos Station, resulting in a 6.86 ha reduction in the area of the proposal's development envelope, from 70.19 ha to 63.33 ha, and an associated 5.45 ha reduction in the extent of native vegetation clearing from 43.18 ha to 37.73 ha. The Development Envelope avoids fragmentation where possible to the north-south regional ecological linkage. A CEMP will be developed and implemented to include the following as a minimum: o Demarcate the development envelope to avoid clearing outside approved areas. o Restrict clearing to the development envelope to as low as reasonably practicable. o Prevent the distribution of declared Pests and other weed species offsite. o Prevent introduction of Phytophthora dieback to the surrounding vegetation. o Should batters be of a suitable gradient and material and not required for operational infrastructure purposes, they will be stabilised with planting of locally endemic species where possible and/or bioengineering controls. o Manage indirect impacts to surrounding vegetation. o Provide a fauna underpass within Alkimos PRR. o Undertake progressive clearing to allow fauna to move away from clearing activities o Pre-clearing survey for potential black-cockatoos prior to construction works.	Not applicable.	Not applicable.	Extent 48.21 ha of foraing habitat, of which 0.98 ha has not previously been offset under existing EPBC Act approvals. 5 potential breeding trees Quality Foraging habitat: - High value: 30.39 ha - Medium value: 17.82 ha Conservation Significance High conservation significance as Carnaby's Black Cockatoo is listed as Endangered under the *Biodiversity Conservation Act 2016.* Land Tenure State, Freehold or Unallocated Crown Land (UCL) (not currently managed for conservation) Time Scale Permenant According to the agreed significance framework, residual impact is considered significant when considering cumulative impacts (in this instance, proposed adjacent industrial and urban development).	**Option 1: Land acquisition** Acquisition of Canbay's Black Cockatoo foraging habitat. Acquisition of land containing potential breeding trees.	Land acquisition: Low – land to be ceded to DBCA or other responsible authority.	Can the values be defined and measured? Yes - values can be measured. Operator experience/Evidence? DBCA will manage the land. What is the type of vegetation being revegetated? None proposed. Is there evidence the environemntal values can be re-created (evidence of demonstrated success)? PTA has demonstrated experience from their infrastructure projects that shows contributions towards conservation and mitigating project impacts. DBCA is responsible for biodiversity conservation in Western Australia and routinely carries out management and restoration activities.	Acquisition of land: No time lag - secures land upon agreement.	Total offset is **4.4 ha** of land acquisition and protection, determined using the DoEE offset calculator. Aquistion and conservation of **15 potential breeding trees.**
					Option 2: Installation of artifical nesting hollows	Low – hollows to be installed in land to be ceded to DBCA or other responsible authority/DBCA owned land.	Can the values be defined and measured? Yes - values can be measured. Operator experience/Evidence? DBCA will manage the land. What is the type of vegetation being revegetated? Installation of artifical nest boxes. Is there evidence the environemntal values can be re-created (evidence of demonstrated success)? PTA has demonstrated experience from their infrastructure projects that shows contributions towards conservation and mitigating project impacts. DBCA is responsible for biodiversity conservation in Western Australia and routinely carries out management and restoration activities.	No time lag - hollws can be used immediately after installation.	Installation of 35 **aritfical nestling hollows,** calculated at a 6:1 ratio.

Appendix C – EPBC Act Offsets Assessment Guide

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	TEC 26a
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	Yes	Clearing of 0.94 ha of TEC 26a within the Development Envelope	**Area**	0.94	Hectares	Biological survey reports. Total clearing of 0.94 ha of TEC 26a comprises of 0.60ha in Excellent condition, 0.47ha in Very Good-Good condition, 0.02 ha in Good condition and 0.04ha in Degraded condition.
			Quality	**8**	Scale 0-10	
			Total quantum of impact	0.75	Adjusted hectares	
Threatened species habitat						
Area of habitat	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
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	Yes	0.75	Adjusted hectares	Land acquisition (transfer to conservation) and ongoing maintenance	**Risk-related time horizon (max. 20 years)**	20	**Start area (hectares)**	7.3	**Risk of loss (%) without offset**	25%	**Risk of loss (%) with offset**	5%	1.46	90%	1.31	1.04	1.29	171.27%	Yes	
									Future area without offset (adjusted hectares)	5.5	**Future area with offset (adjusted hectares)**	6.9								
					Time until ecological benefit	1	**Start quality (scale of 0-10)**	**8**	**Future quality without offset (scale of 0-10)**	**7**	**Future quality with offset (scale of 0-10)**	**8**	1.00	85%	0.85	0.84				
Threatened species habitat																				
Area of habitat	No				**Time over which loss is averted (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)**									
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																			

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	TEC 26a
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	Yes	Clearing of 0.94 ha of TEC 26a within the Development Envelope	**Area**	0.94	Hectares	Biological survey reports. Total clearing of 0.94 ha of TEC 26a comprises of 0.60ha in Excellent condition, 0.47ha in Very Good-Good condition, 0.02 ha in Good condition and 0.04ha in Degraded condition.
			Quality	**8**	Scale 0-10	
			Total quantum of impact	0.75	Adjusted hectares	
Threatened species habitat						
Area of habitat	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
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	Yes	0.75	Adjusted hectares	Monetary contribution for revegetation measures to be implemented in existing conservation land for purpose of improving condition (quality).	**Risk-related time horizon (max. 20 years)**	20	**Start area (hectares)**	12.75	**Risk of loss (%) without offset**	5%	**Risk of loss (%) with offset**	5%	0.00	90%	0.00	0.00	0.75	100.07%	Yes	
									Future area without offset (adjusted hectares)	12.1	**Future area with offset (adjusted hectares)**	12.1								
					Time until ecological benefit	10	**Start quality (scale of 0-10)**	**6**	**Future quality without offset (scale of 0-10)**	**6**	**Future quality with offset (scale of 0-10)**	**7**	1.00	70%	0.70	0.62				
Threatened species habitat																				
Area of habitat	No				**Time over which loss is averted (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)**									
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																			

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	TEC 26a
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	Yes	Clearing of 0.94 ha of TEC 26a within the Development Envelope	**Area**	0.94	Hectares	Biological survey reports. Total clearing of 0.94 ha of TEC 26a comprises of 0.60ha in Excellent condition, 0.47ha in Very Good-Good condition, 0.02 ha in Good condition and 0.04ha in Degraded condition.
			Quality	**8**	Scale 0-10	
			Total quantum of impact	0.75	Adjusted hectares	
Threatened species habitat						
Area of habitat	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
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	Yes	0.75	Adjusted hectares	Monetary contribution for revegetation measures to be implemented in existing conservation land for purpose of improving condition (quality).	**Risk-related time horizon (max. 20 years)**	20	**Start area (hectares)**	12.75	**Risk of loss (%) without offset**	5%	**Risk of loss (%) with offset**	5%	0.00	90%	0.00	0.00	0.75	100.07%	Yes	
									Future area without offset (adjusted hectares)	12.1	**Future area with offset (adjusted hectares)**	12.1								
					Time until ecological benefit	10	**Start quality (scale of 0-10)**	**5**	**Future quality without offset (scale of 0-10)**	**5**	**Future quality with offset (scale of 0-10)**	**6**	1.00	70%	0.70	0.62				
Threatened species habitat																				
Area of habitat	No				**Time over which loss is averted (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)**									
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																			

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	TEC 26a
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	Yes	Clearing of 0.94 ha of TEC 26a within the Development Envelope	**Area**	0.94	Hectares	Biological survey reports. Total clearing of 0.94 ha of TEC 26a comprises of 0.60ha in Excellent condition, 0.47ha in Very Good-Good condition, 0.02 ha in Good condition and 0.04ha in Degraded condition.
			Quality	**8**	Scale 0-10	
			Total quantum of impact	0.75	Adjusted hectares	
Threatened species habitat						
Area of habitat	No		**Area**			
			Quality			
			Total quantum of impact	0.00		

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Units	Information source
Number of features e.g. Nest hollows, habitat trees	Yes			Count	
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	Yes	0.75	Adjusted hectares	Monetary contribution for revegetation measures to be implemented in existing conservation land for purpose of improving condition (quality).	**Risk-related time horizon (max. 20 years)**	20	**Start area (hectares)**	12.75	**Risk of loss (%) without offset**	5%	**Risk of loss (%) with offset**	5%	0.00	90%	0.00	0.00	0.75	100.07%	Yes		
									Future area without offset (adjusted hectares)	12.1	**Future area with offset (adjusted hectares)**	12.1									
					Time until ecological benefit	10	**Start quality (scale 0-10)**	**4**	**Future quality without offset (scale of 0-10)**	**4**	**Future quality with offset (scale of 0-10)**	**5**	1.00	70%	0.70	0.62					
Threatened species habitat																					
Area of habitat	Yes		Adjusted hectares		**Time over which loss is averted (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**		0.00		0.00	0.00	0.00	#DIV/0!	#DIV/0!		
									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)**		0.00		0.00	0.00					

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	Yes		Count						0		0.00	0.00	#DIV/0!	#DIV/0!		
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															

Offsets Assessment Guide

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Matter of National Environmental Significance	
Name	TEC 26a
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	Yes	Clearing of 0.94 ha of TEC 26a within the Development Envelope	**Area**	0.94	Hectares	Quality is unknown as land offset has not been decided
			Quality	**8**	Scale 0-10	
			Total quantum of impact	0.75	Adjusted hectares	
Threatened species habitat						
Area of habitat	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
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	Yes	0.75	Adjusted hectares	Acquisition of land containing area of TEC for transfer to conservation estate with corresponding monetary contribution for revegetation measures to be implemented	**Risk-related time horizon (max. 20 years)**	20	**Start area (hectares)**	3.91	**Risk of loss (%) without offset**	25%	**Risk of loss (%) with offset**	5%	0.78	90%	0.70	0.55	0.75	100.06%	Yes		
									Future area without offset (adjusted hectares)	2.9	**Future area with offset (adjusted hectares)**	3.7								
					Time until ecological benefit	10	**Start quality (scale of 0-10)**	**6**	**Future quality without offset (scale of 0-10)**	**5**	**Future quality with offset (scale of 0-10)**	**7**	2.00	70%	1.40	1.24				
Threatened species habitat																				
Area of habitat	No				**Time over which loss is averted (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)**									
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																			

Offsets Assessment Guide

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2 October 2012

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Matter of National Environmental Significance	
Name	TEC 26a
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	Yes	Clearing of 0.94 ha of TEC 26a within the Development Envelope	**Area**	0.94	Hectares	Quality is unknown as land offset has not been decided
			Quality	**8**	Scale 0-10	
			Total quantum of impact	0.75	Adjusted hectares	
Threatened species habitat						
Area of habitat	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
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	Yes	0.75	Adjusted hectares	Acquisition of land containing area of TEC for transfer to conservation estate with corresponding monetary contribution for revegetation measures to be implemented	**Risk-related time horizon (max. 20 years)**	20	**Start area (hectares)**	4.22	**Risk of loss (%) without offset**	25%	**Risk of loss (%) with offset**	5%	0.84	90%	0.76	0.60	0.75	100.04%	Yes		
									Future area without offset (adjusted hectares)	3.2	**Future area with offset (adjusted hectares)**	4.0								
					Time until ecological benefit	10	**Start quality (scale of 0-10)**	**5**	**Future quality without offset (scale of 0-10)**	**4**	**Future quality with offset (scale of 0-10)**	**6**	2.00	70%	1.40	1.24				
Threatened species habitat																				
Area of habitat	No				**Time over which loss is averted (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)**									
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																			

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	TEC 26a
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	Yes	Clearing of 0.94 ha of TEC 26a within the Development Envelope	**Area**	0.94	Hectares	Quality is unknown as land offset has not been decided
			Quality	**8**	Scale 0-10	
			Total quantum of impact	0.75	Adjusted hectares	
Threatened species habitat						
Area of habitat	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	Yes				Count	
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	Yes	0.75	Adjusted hectares	Acquisition of land containing area of TEC for transfer to conservation estate with corresponding monetary contribution for revegetation measures to be implemented	**Risk-related time horizon (max. 20 years)**	20	**Start area (hectares)**	4.85	**Risk of loss (%) without offset**	15%	**Risk of loss (%) with offset**	5%	0.48	90%	0.44	0.34	0.75	100.13%	Yes		
									Future area without offset (adjusted hectares)	4.1	**Future area with offset (adjusted hectares)**	4.6									
					Time until ecological benefit	10	**Start quality (scale 0-10)**	**6**	**Future quality without offset (scale of 0-10)**	**5**	**Future quality with offset (scale of 0-10)**	**7**	2.00	70%	1.40	1.24					
Threatened species habitat																					
Area of habitat	Yes		Adjusted hectares		**Time over which loss is averted (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**		0.00		0.00	0.00	0.00	#DIV/0!	#DIV/0!		
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0									
					Time until ecological benefit		**Start quality (scale 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**		0.00		0.00	0.00					
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	Yes		Count										0		0.00	0.00		#DIV/0!	#DIV/0!		
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																				

Offsets Assessment Guide

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2 October 2012

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Matter of National Environmental Significance	
Name	TEC 26a
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	Yes	Clearing of 0.94 ha of TEC 26a within the Development Envelope	**Area**	0.94	Hectares	Quality is unknown as land offset has not been decided
			Quality	**8**	Scale 0-10	
			Total quantum of impact	0.75	Adjusted hectares	
Threatened species habitat						
Area of habitat	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	Yes				Count	
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	Yes	0.75	Adjusted hectares	Acquisition of land containing area of TEC for transfer to conservation estate with corresponding monetary contribution for revegetation measures to be implemented	**Risk-related time horizon (max. 20 years)**	20	**Start area (hectares)**	5.1	**Risk of loss (%) without offset**	15%	**Risk of loss (%) with offset**	5%	0.51	90%	0.46	0.36	0.76	100.48%	Yes		
									Future area without offset (adjusted hectares)	4.3	**Future area with offset (adjusted hectares)**	4.8									
					Time until ecological benefit	10	**Start quality (scale 0-10)**	**5**	**Future quality without offset (scale of 0-10)**	**4**	**Future quality with offset (scale of 0-10)**	**6**	2.00	70%	1.40	1.24					
Threatened species habitat																					
Area of habitat	Yes		Adjusted hectares		**Time over which loss is averted (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**		0.00		0.00	0.00	0.00	#DIV/0!	#DIV/0!		
									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)**		0.00		0.00	0.00					
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	Yes		Count										0		0.00	0.00		#DIV/0!	#DIV/0!		
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																				

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	48.21 ha of impact to foraging habitat already accounted for EPBC Act referrals, including 0.95 ha of new foraging habitat impacts	**Area**	0.95	Hectares	Various EPBC Act referrals and approvals. Quality is assumed from veg condition largely good (5) to excellent (8).
			Quality	**8**	Scale 0-10	
			Total quantum of impact	0.76	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	Yes	5 potential breeding trees	5		Count	GHD (2019)
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	0.76	Adjusted hectares	4.4 ha of foraging habitat in Good to Very-Good to Very-Good to Excellent. Land acquisition (transfer to conservation) and ongoing maintenance	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	4.4	**Risk of loss (%) without offset**	25%	**Risk of loss (%) with offset**	5%	0.88	90%	0.79	0.62	0.78	102.14%	Yes	
									Future area without offset (adjusted hectares)	3.3	**Future area with offset (adjusted hectares)**	4.2								
					Time until ecological benefit	1	**Start quality (scale of 0-10)**	**8**	**Future quality without offset (scale of 0-10)**	**7**	**Future quality with offset (scale of 0-10)**	**8**	1.00	85%	0.85	0.84				
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	Yes	5	Count	15	5		0		0		15		15	90%	13.50	12.72	254.37%	Yes		
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																			

Offsets Assessment Guide

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2 October 2012

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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	48.21 ha of impact to foraging habitat already accounted for EPBC Act referrals, including 0.95 ha of new foraging habitat impacts	**Area**	0.95	Hectares	Various EPBC Act referrals and approvals. Quality is assumed from veg condition largely good (5) to excellent (8).
			Quality	**8**	Scale 0-10	
			Total quantum of impact	0.76	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	Yes	5 potential breeding trees	5		Count	GHD (2019)
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	0.76	Adjusted hectares	4.4 ha of foraging habitat in Good to Very-Good to Excellent.	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	4.4	**Risk of loss (%) without offset**	25%	**Risk of loss (%) with offset**	5%	0.88	90%	0.79	0.62	0.78	102.14%	Yes	
									Future area without offset (adjusted hectares)	3.3	**Future area with offset (adjusted hectares)**	4.2								
					Time until ecological benefit	1	**Start quality (scale of 0-10)**	**8**	**Future quality without offset (scale of 0-10)**	**7**	**Future quality with offset (scale of 0-10)**	**8**	1.00	85%	0.85	0.84				
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	Yes	5	Count	35	0		0		0		35		35	70%	24.50	24.50	490.00%	Yes		
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																			