MEMORANDUM

То:	Environmental Protection Authority and Department of the Environment										
From:	Main Roads Western Australia										
Date:	13 July 2015 Document No.: NLWA-03-EN-ME-0015										
Subject:	NorthLink WA: Perth-Darwin National Highway – Preliminary Black Cockatoo Offset Consideration										

1 INTRODUCTION

Main Roads Western Australia (MRWA) is proposing the construction of a new section of the Perth–Darwin National Highway (this proposal) between Malaga and Muchea, Western Australia. This proposal is 38 km of new dual carriageway highway to the west of the Swan Valley and will connect the intersection of Tonkin Highway and Reid Highway in the south with Great Northern Highway and Brand Highway in the north.

The proposal was referred to the Western Australian Environmental Protection Authority (EPA) under Section 38 (Part IV) of the *Environmental Protection Act 1986* (EP Act). The EPA determined that the proposal required assessment and set the level of assessment for the proposal as a Public Environmental Review.

The proposal was also referred to the Commonwealth Department of the Environment (DOTE) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The DOTE determined that the proposal was a controlled action and required assessment due to the likelihood of significant impacts to a number of listed threatened species.

As the proposal is unable to be assessed through the bilateral agreement under Section 47 of the EPBC Act, the DOTE and the EPA have agreed to undertake a coordinated approach to this assessment.

Following the implementation of avoidance, mitigation and management measures, the proposal is anticipated to have a significant effect on two listed threatened species, the Endangered Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) and the Vulnerable Forrest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*), associated with the clearing of suitable foraging, roosting and breeding habitat, including potential breeding trees (Figure 1). As this impact cannot be completely avoided or mitigated, an offset under both the EPBC Act and EP Act is required.

Additionally the EPA may require the proposal to offset other significant environmental values (i.e. impacts to Conservation Category Wetlands and loss of part of a Class A Nature Reserve) not recognised by the Commonwealth/DOTE.

MRWA has purchased an area of land (983 ha) in the Chittering area (the proposed offset site; Figure 2) for the purpose of offsetting impacts of the wider NorthLink WA Project (including this proposal and the Tonkin Grades Separations project). Agreement has been reached to cede this land with the Conservation

Commission, with the intention that the land will become a conservation reserve and be managed by Department of Parks and Wildlife in the long term.

This document serves to demonstrate the suitability of the proposed offset site for Carnaby's Black Cockatoo and the Forest Red-tailed Black Cockatoo (here in referred to as Black Cockatoos) using the DOTEs offsets assessment guide (the guide) for consideration by both departments.

2 OFFSET ASSESSMENT GUIDE INPUTS

The guide is a tool to assist in determining the suitability of offset proposals. The guide includes four parts:

- Matter of National Environmental Significance (MNES) assessment box.
- Impact calculator.
- Offset calculator.
- Summary box.

This guide has been populated for each Black Cockatoo species in consideration of the *How to Use the Offset Assessment Guide* (DSEWPAC, 2012) and with information from various supporting studies including; the proposals Level 2 Targeted Fauna Assessment and Level 1 Fauna Assessment of Local Roads and Additional Areas; and the Flora, Vegetation and Fauna Assessment of the Chittering offset site (Coffey, 2015a; 2015b; 2015c).

The following sections provide an outline of and justification for each of the inputs into the guide.

A copy of the guide developed for each species is provided as Appendix A and B.

2.1 Description and Area of Habitat

The proposal is likely to impact approximately **201.8** ha of Carnaby's Black Cockatoo foraging habitat (inclusive of 58.6 ha of roosting habitat and 120.1 ha of breeding habitat). Foraging habitat for this species within the proposal footprint is associated with the following broad habitat types as depicted in Figure 1; Eucalypt/Corymbia Woodland (containing Marri, Jarrah, *Banksia attenuata* and *Banksia menziesii*), Banksia Woodland (containing *Banksia menziesii*, *Banksia attenuata* and *Eucalyptus todtiana*), Modified Vegetation (only areas containing Marri and Jarrah) and Wetland habitats (containing *Eucalyptus rudis*) within the proposal footprint.

The proposal is also likely to impact approximately **120.1** ha of **Forest Red-tailed Black Cockatoo foraging habitat** (inclusive of 58.6 ha of roosting habitat and 120.1 ha of breeding habitat) within the proposal footprint. Unlike habitat requirements for the Carnaby's Black Cockatoo, foraging habitat for the Forest Red-tailed Black Cockatoo does not include Banksia Woodland and is associated with Eucalypt/Corymbia Woodland (containing Marri and Jarrah), Modified Vegetation (only areas containing Marri and Jarrah) and Wetland habitat (containing *Eucalyptus rudis*) as depicted in Figure 1.

In assessing the impact to foraging habitat and associated offset requirements, areas of Pine Plantation (51 ha) have been excluded, given they are currently proposed to be harvested by the Forest Products Commission and will not be replanted. As such the occurrence and impacts on this habitat are outside the scope and control of this proposal.

In regards to breeding habitat, the proposal is likely to impact 763 potential breeding trees (i.e. trees with a Diameter at Breast Height (DBH) of greater than 500 mm) as depicted in Figure 1. The majority of these trees are Marri (594), followed by Flooded Gum (94), Jarrah (69) and Tuarts (6).

2.2 Quality

In accordance with the *How to Use the Offset Assessment Guide* (DSEWPAC, 2012), the assessment of a threatened species' habitat must consider the site's condition, the site's context and the species' stocking rate. These factors are weighted according to the ecological requirements for the species being considered.

Coffey's weighting of these three factors has given precedence to site condition, with site context considered the second most important and species stocking rate the least important. Site condition has been weighted the highest as site/vegetation condition correlates directly with the sites carrying capacity for Black Cockatoos. Site context has been weighted as the second most important value as it recognises the location of the site to known foraging, roosting and breeding locations, and is less important than site condition given the nomadic nature and wide distribution of these species. Species stocking rate was given the lowest weighting, also in consideration of these species nomadic nature and wide distribution, and given the lack of location specific data for each species population.

Appendix C provides an assessment of habitat quality within the proposal area and the proposed offset site against each of the three factors, to determine their respective quality scores. In support of the guide, this assessment has considered both the current and future quality (both with and without offset) of habitat within the offset site. A summary of each of the quality scores used in the guide and key justifications for these scores is summarised in Table 1.

Table 1 Quality scores

Habitat being assessed	Quality ¹	Justification
Proposal footprint	6	 Vegetation condition ranges from pristine to completely degraded. Large sections are fragmented and contain non-endemic species. Contains 201.8 ha of Carnaby's Black Cockatoo habitat. Contains 120.1 ha of Forest Red-tailed Black Cockatoo habitat. East Wanneroo, Gnangara and Whiteman Park have been identified as important sites for Carnaby's Cockatoo on the Swan Coastal Plain. Presence of potential breeding habitat (763 trees).
Proposed offset site ²		
Current value	7	 Largely intact block of native vegetation, with only minor disturbance, the majority of vegetation being in good to excellent condition. Larger area of habitat, supporting breeding, roosting and foraging habitat, including a higher density of suitable breeding trees and greater number of known foraging resources (plant species). Situated in known breeding range of Carnaby's Cockatoo. Located close to and relatively well connected with, a number of vegetated lots and within 10 km of a number of nature reserves.

Habitat being assessed	Quality ¹	Justification								
Future value without offset	6	 Continued threat of clearing and degradation of habitat associated with third party access, development and neighbouring exploration and agricultural practices. 								
Future value with offset	7	Would result in an increase to the conservation estate in surrounding region and remove threats to the habitat including extinguishing exploration tenure rights.								
		Long-term management by DPAW (i.e. fencing) would reduce third party access, the introduction and spread of weeds and the spread of dieback, and would also remove any rubbish.								

^{1.} Quality scores have been rounded to the nearest whole number for input into the guide.

2.3 Time Horizon

2.3.1 Time Over Which Loss is Averted

The time over which loss is averted is the foreseeable timeframe (in years) over which changes in the level of risk to a proposed offset site can be considered and quantified. As the proposed offset site will be ceded with the Conservation Commission to become a conservation reserve, the time over which loss is averted should be set at the maximum value of 20 years, as the offset will be protected in perpetuity.

However, it has been identified that the guide works counterintuitively and while a longer timeframe of loss aversion should be valued more highly (as documented in How to Use the Offset Assessment Guide (DSEWPAC, 2012)) and thus reduce the offset requirement, the higher the value input into the guide, the larger the offset requirement.

The DOTE has advised MRWA that it is aware of this operational error and would likely identify and address this issue during their assessment of this proposal and has requested that MRWA apply the maximum value of **20 years**, unless it can be demonstrated that the impacts are temporary and that benefits can be delivered in the shorter timeframe.

2.3.2 Time Until Ecological Benefit

Time until ecological benefit is the estimated time (in years) that it will take for the future quality with or without offset to be realised. The proposed offset site is currently at threat from mineral and petroleum exploration activities and is already impacted by weeds, dieback and third party access. The protection of this area as a conservation reserve will mitigate, and in some cases eliminate these impacts.

Once the site is entered into conservation estate, DPAW will manage the reserve to ensure the preservation of values and reduction of potential threats such as, dieback management, controlled access, and fire management.

The time until ecological benefit has been set at **10 years**, as DOTE does not consider the future value of the offset will be realised until this time.

2.4 Offset Start Area

In determining the necessary offset requirement for this proposal, the value in the start area was manipulated until a 100% of impact offset was achieved (in consideration of all other input values). A start value of **673.5** ha results in the offset of 100.02% of the impact **for Carnaby's Black Cockatoos**.

^{2.} Habitat values of the proposed offset site are described further in Appendix D.

A start value of **339 ha** results in the offset of 100.24% of the impact **for Forest Red-tailed Black Cockatoos**.

The proposed offset site is 673.5 ha in area and is recognised as containing the following habitat for Carnaby's Black Cockatoo:

- 673.5 ha of foraging habitat associated with Eucalypt Woodland and Banksia Woodland (containing 17 species of foraging resources and the following dominant species: Eucalyptus marginata, E. todtiana, Corymbia calophylla, Allocasuarina humilis, Banksia menziesii and B. attenuata).
- 279 ha of breeding and roosting habitat associated with the Eucalypt Woodland habitat (specifically in the stands of tall *Eucalyptus marginata*, *E. todtiana*, *Corymbia calophylla* present). An estimated 5,580 potential breeding trees are present within the Eucalypt Woodland habitat based on an average tree density of 20 trees per hectare. The tree age in the offset site is sufficient to produce large hollows with potential to yield more with subsequent fires. The offset site contains habitat that can be classified as having current breeding potential for Carnaby's Cockatoos in a region known to have breeding records (Johnstone and Kirkby, 2011).

The offset site is also considered to contain 279 ha of suitable foraging, breeding and roosting habitat (associated with the Eucalypt Woodland habitat) for the Forest Red-tailed Black Cockatoo. However, the offset site is possibly outside (approximately 10 km north) the known distribution for this species. Given recent expansion of this species distribution west from the edge of the Darling Scarp and onto the SCP (Johnstone et al., 2013), a review of current and historic information and a field survey is to be conducted to verify the suitability of this site as an offset for Forest Red-tailed Black Cockatoo. Consultation with the Office of the Environmental Protection Authority (OEPA) has confirmed the suitability of loppolo Road as an offset for both species of Black Cockatoo (Thompson, pers. comm., 2015).

2.5 Offset Start Quality

(Discussed under Section 2.1.2)

2.6 Risk of Loss (%)

The risk of loss is a percentage figure that describes the chance that the habitat on the proposed offset site will be completely lost over the foreseeable future. The risk of loss is entered into the guide both with and without offset. The difference in these values is the level of averted loss provided by the proposed offset.

The risk of loss without offset has been estimated at 30% given the area was privately owned (Aspen Holdings), had been proposed for residential housing subdivision, has existing and proposed exploration tenure over it, and has no current form of protection. The risk of loss with offset is 5% as it is proposed that the offset site will be ceded with the Conservation Commission and be managed by Department of Parks and Wildlife in the long term; however, there is the risk that dieback within the offset site may spread.

2.7 Future Quality With/Without Offset

(Discussed under Section 2.1.2.)

2.8 Confidence in the Result (%)

The confidence in result is a percentage figure that describes the level of certainty about the success of the proposed offset. Proposed offset actions that are designed to have a lower risk of failure should have a higher confidence in result score. Confidence in the results have been set at 90% as there is a very high level in the strength and effectiveness of protection of the proposed offset site once ceded to the Conservation Commission and managed by Department of Parks and Wildlife.

2.9 Summary of Inputs

A summary of the inputs into the guide for both Black Cockatoo species is provided in Table 2 and Table 3.

Table 2 Summary of inputs – Carnaby's Black Cockatoo

Guide attribute	Input value
Matter of National Environmental Significance	
Name	Carnaby's Black Cockatoo
Impact calculator	
Description	Foraging habitat
Area	201.8 ha
Quality	6
Offset calculator	
Proposed offset	670.05 ha
Time horizon	
Time over which loss is averted	20 year
Time until ecological benefit	10 years
Start area	670.05 ha
Start quality	7
Risk of loss with and without offset	
Risk of loss without offset	30%
Risk of loss with offset	5%
Future quality with and without offset	
Quality without offset	6
Quality with offset	7
Confidence in result	
Confidence in time until averted loss	90%
Confidence in time until ecological benefit	90%

Table 3 Summary of inputs – Forest Red-tailed Black Cockatoo

Guide attribute	Input value								
Matter of National Environmental Significance									
Name	Forest Red-tailed Black Cockatoo								
Impact calculator									
Description	Foraging habitat								
Area	120.1 ha								
Quality	6								
Offset calculator									
Proposed offset	339 ha								
Time horizon									
Time over which loss is averted	20 year								
Time until ecological benefit	10 years								
Start area	339 ha								
Start quality	7								
Risk of loss with and without offset									
Risk of loss without offset	30%								
Risk of loss with offset	5%								
Future quality with and without offset									
Quality without offset	6								
Quality with offset	7								
Confidence in result									
Confidence in time until averted loss	90%								
Confidence in time until ecological benefit	90%								

3 CONCLUSION

This proposal will impact 201.8 ha of suitable Carnaby's Cockatoo foraging habitat, inclusive of 58.6 ha of roosting habitat and 120.1 ha of breeding habitat (specifically 763 potential breeding trees). An assessment of this impact against the guide identified an offset requirement for Carnaby's Cockatoo of 670.05 ha of foraging habitat.

This proposal will impact 120.1 ha of Forest Red-tailed Black Cockatoo foraging habitat, inclusive of 58.6 ha of roosting habitat and 120.1 ha of breeding habitat (specifically 763 potential breeding trees). An

assessment of this impact against the guide identified an offset requirement for Forest Red-tailed Black Cockatoo of 339 ha of foraging habitat.

MRWA has purchased an area of land in the Chittering area for the purpose of offsetting impacts to Black Cockatoos from the wider NorthLink WA Project (including this proposal and the Tonkin Grades Separations project). Agreement has been reached to cede this land with the Conservation Commission, with the intention that the land will become a conservation reserve and be managed by Department of Parks and Wildlife in the long term.

The proposed offset site depicted in Figure 2 will:

- Adequately offset the proposals impacts to foraging, roosting and breeding habitat for the Carnaby's Cockatoo; providing 673 ha of foraging habitat, inclusive of 279 ha of Eucalyptus Woodland (which includes approximately 5,580 breeding/roosting trees, based on an average tree density within this habitat of 20 trees per hectare).
- Provide 279 ha of foraging, roosting and breeding habitat (approximately 82% of the offset requirement) for Forest Red-tailed Black Cockatoo. This is based on the assumption that the offset site can be confirmed to be within the current distribution of the Forest Red-tailed Black Cockatoo. MRWA is also committed to finding a secondary offset site to address the gap between the offset requirement and the offset provided in this proposal (i.e. additional 60 ha of foraging habitat).

Where the proposed offset site is not deemed to be a suitable offset for Forest Red-tailed Black Cockatoo (i.e. where evidence/records of this species within the Chittering area cannot be provided to the DOTE) MRWA is committed to finding an alternative offset site of comparable habitat value and area (as established through the application of the guide).

Consultation with the Office of the Environmental Protection Authority (OEPA) has confirmed the suitability of loppolo Road as an offset for both species of Black Cockatoo (Thompson, pers. comm., 2015).

4 REFERENCES

360 Environmental. 2013. Black Cockatoo Assessment – Tonkin Highway. December. Report prepared for Main Roads Western Australia by 360 Environmental Pty Ltd.

360 Environmental. 2014. Tonkin Grade Separations: Flora, Vegetation and Fauna Survey. February. Report prepared for Main Roads Western Australia by 360 Environmental Pty Ltd.

Coffey. 2015a. Level 2 Targeted Fauna Assessment: NorthLink WA Perth–Darwin National Highway. January. Draft report prepared for NorthLink WA by Coffey Environments Australia Pty Ltd, Burswood, Western Australia.

Coffey. 2015b. Level 1 fauna assessment of local roads and additional areas – Memorandum Gaps Analysis, NorthLink WA Perth–Darwin National Highway. Memorandum. 11 March 2015.

Coffey. 2015c. Flora, Vegetation and Fauna Assessment. 570 loppolo Road, Chittering. NorthLink WA Perth–Darwin National Highway. February. Draft report prepared for NorthLink WA by Coffey Environments Australia Pty Ltd, Burswood, Western Australia.

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Johnstone, R. E. and Kirkby, T. 2011. Black Cockatoos on the Swan Coastal Plain. Carnaby's Cockatoo (*Calyptorhynchus latirostris*), Baudin's Cockatoo (*Calyptorhynchus baudinii*) and the Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) on the Swan Coastal Plain (Lancelin–Dunsborough), Western Australia. Studies on distribution, status, breeding, food, movements and historical changes. Report prepared for Department of Planning, Western Australia.

Johnstone, R. E., Kirkby, T and Sarti, K. 2013. The breeding biology of the Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso* Gould in south-western Australia. I. Characteristics of nest trees and nest hollows. Pacific Conservation Biology 19:121–142.

Personal Communications

Thompson. L. Environmental Protection Authority, Perth, Western Australia. Email. 12 March 2015.

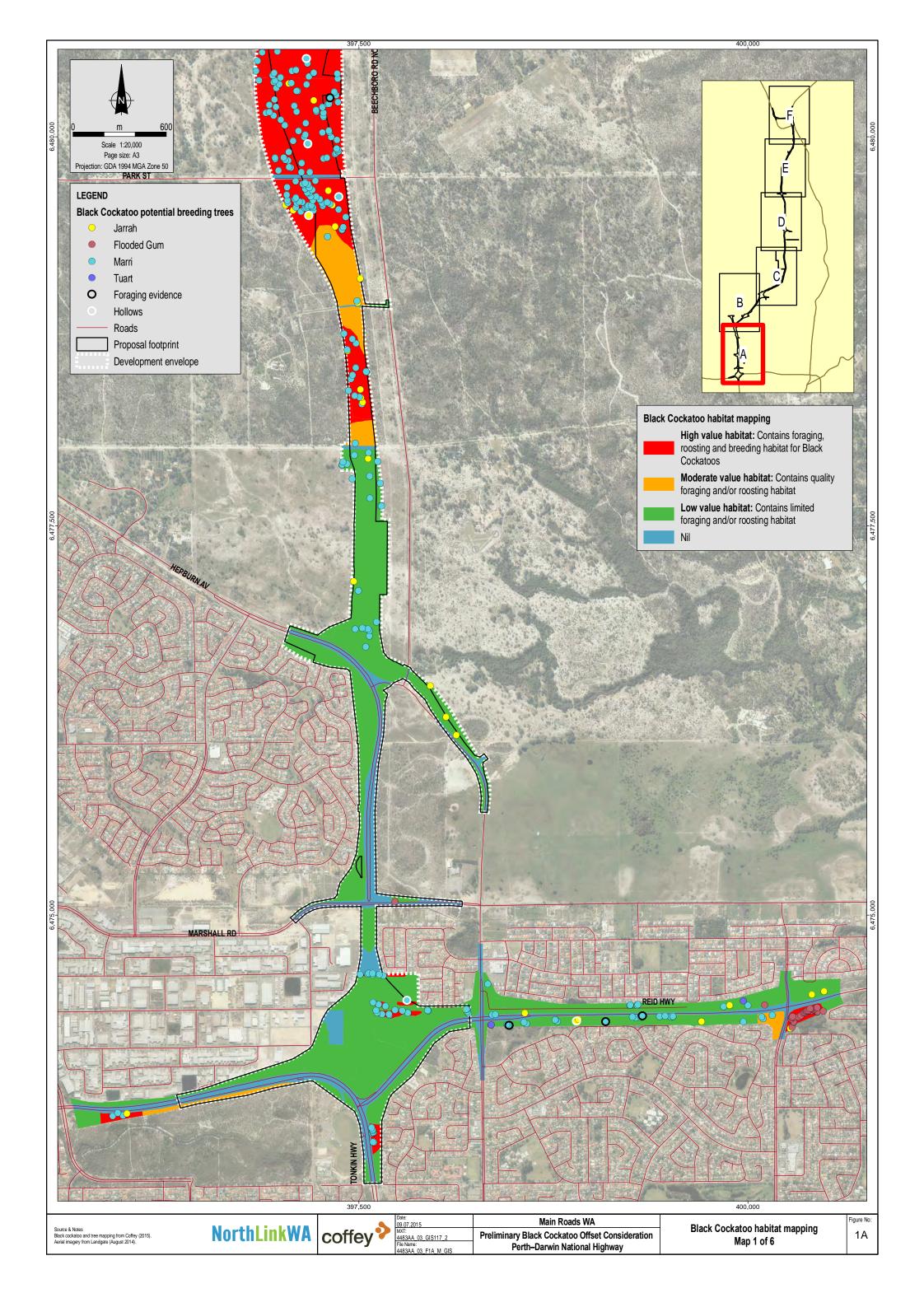
5 LIST OF FIGURES

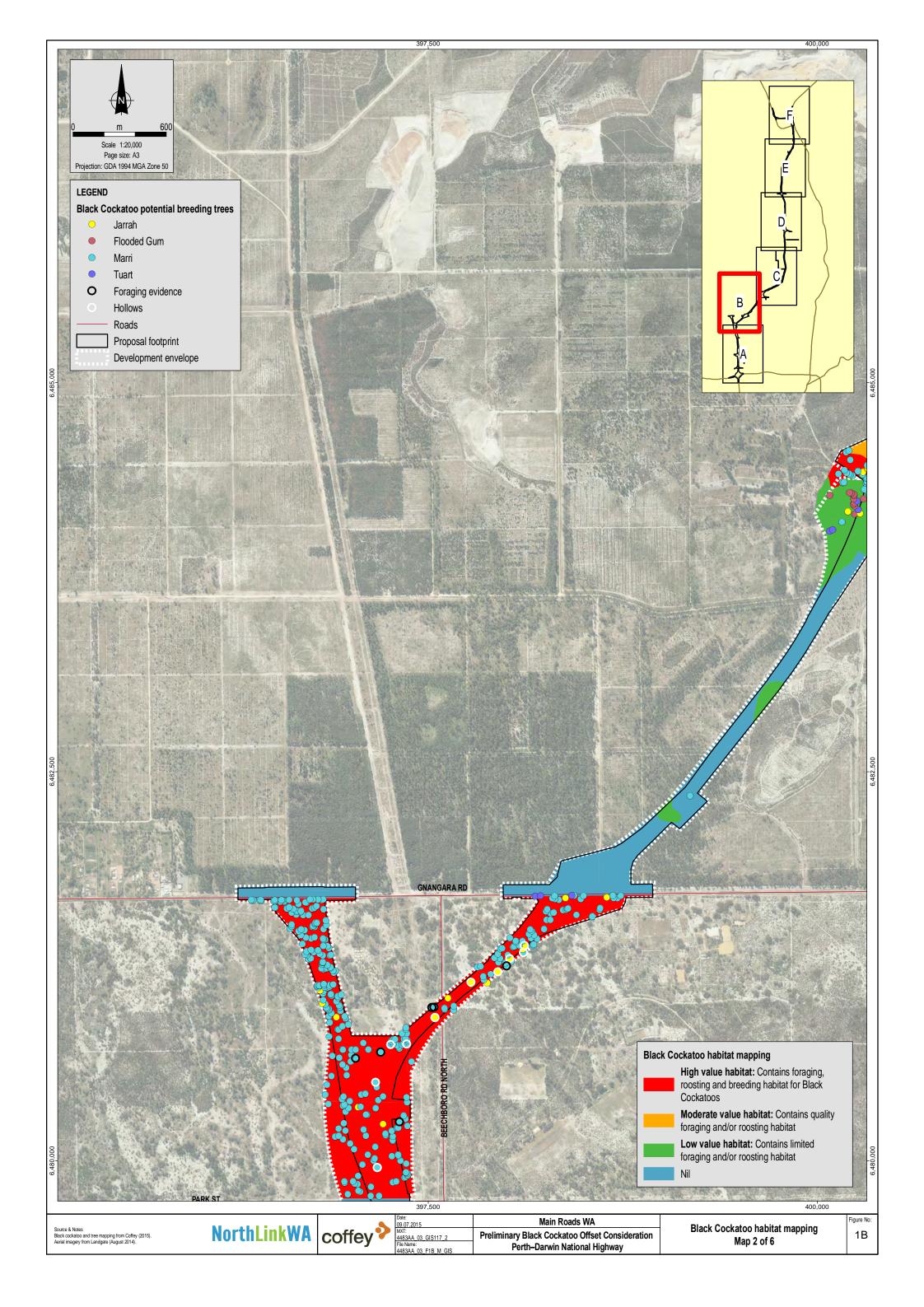
- 1A-F Black Cockatoo habitat mapping
- 2 Black Cockatoo habitat within the proposed offset site

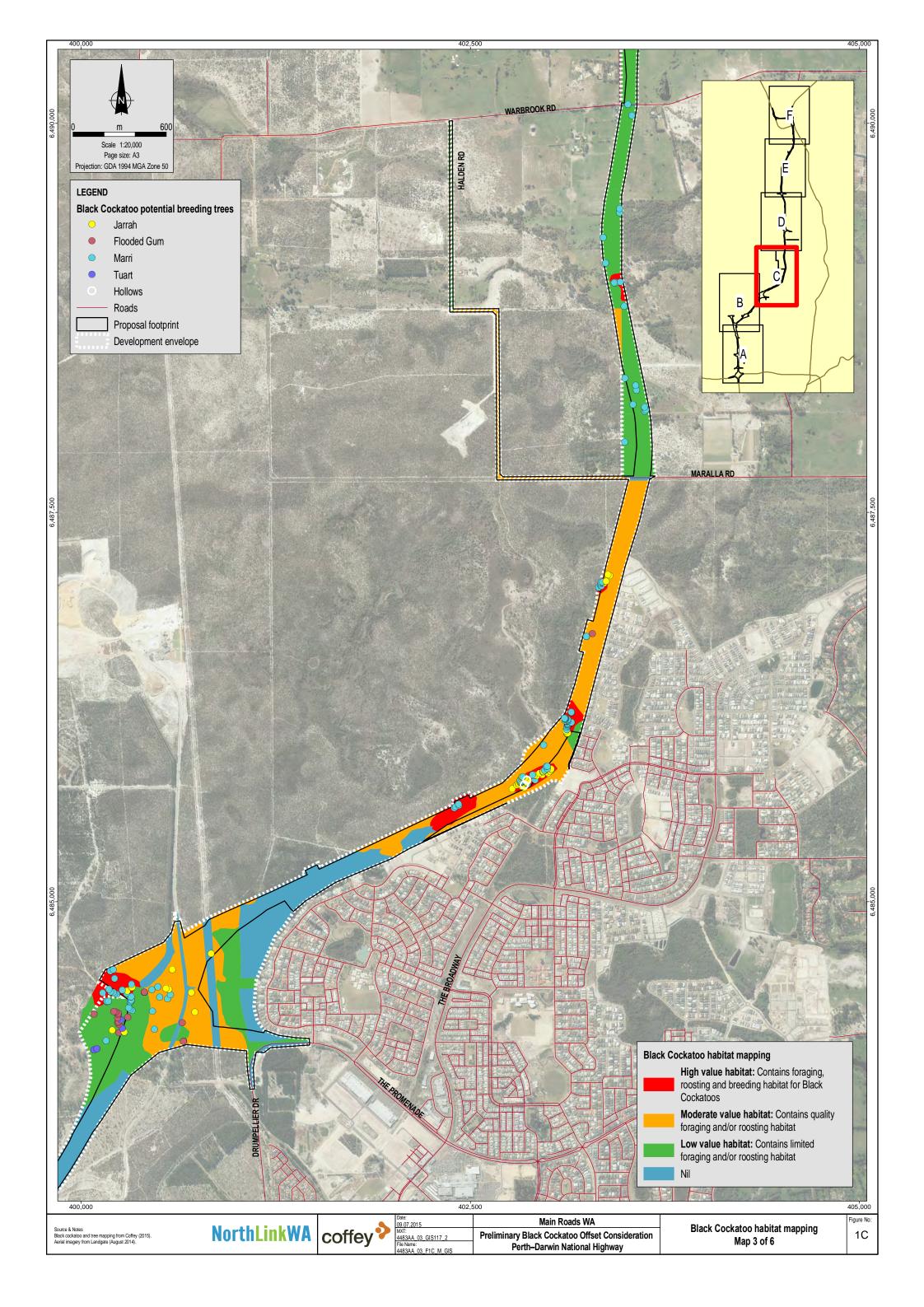
6 LIST OF APPENDICES

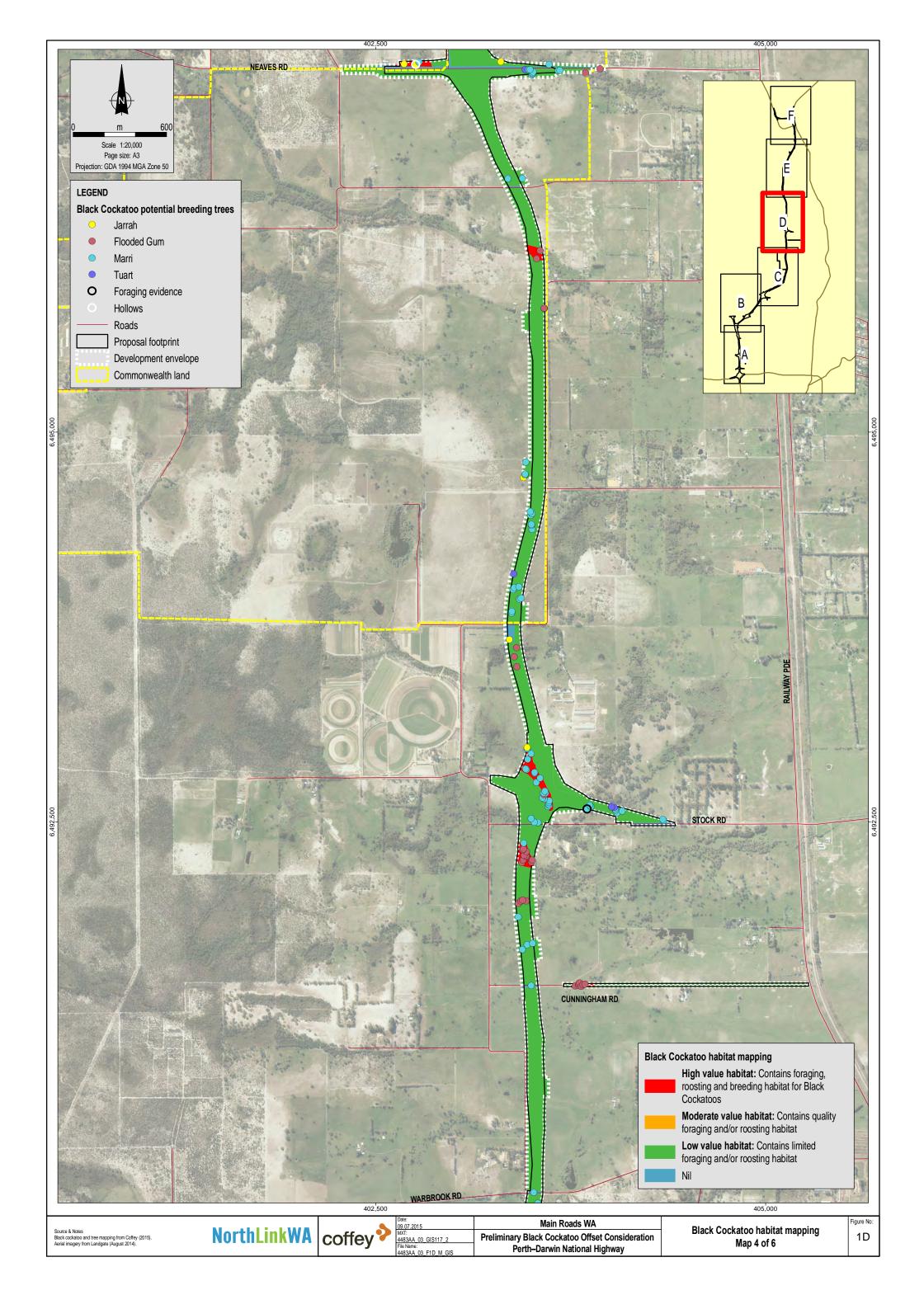
- A Offset assessment guide Carnaby's Black Cockatoo
- B Offset assessment guide Forest Red-tailed Black Cockatoo
- C Habitat quality assessment
- D Flora, vegetation and fauna assessment M291 Ioppolo Road, Chittering

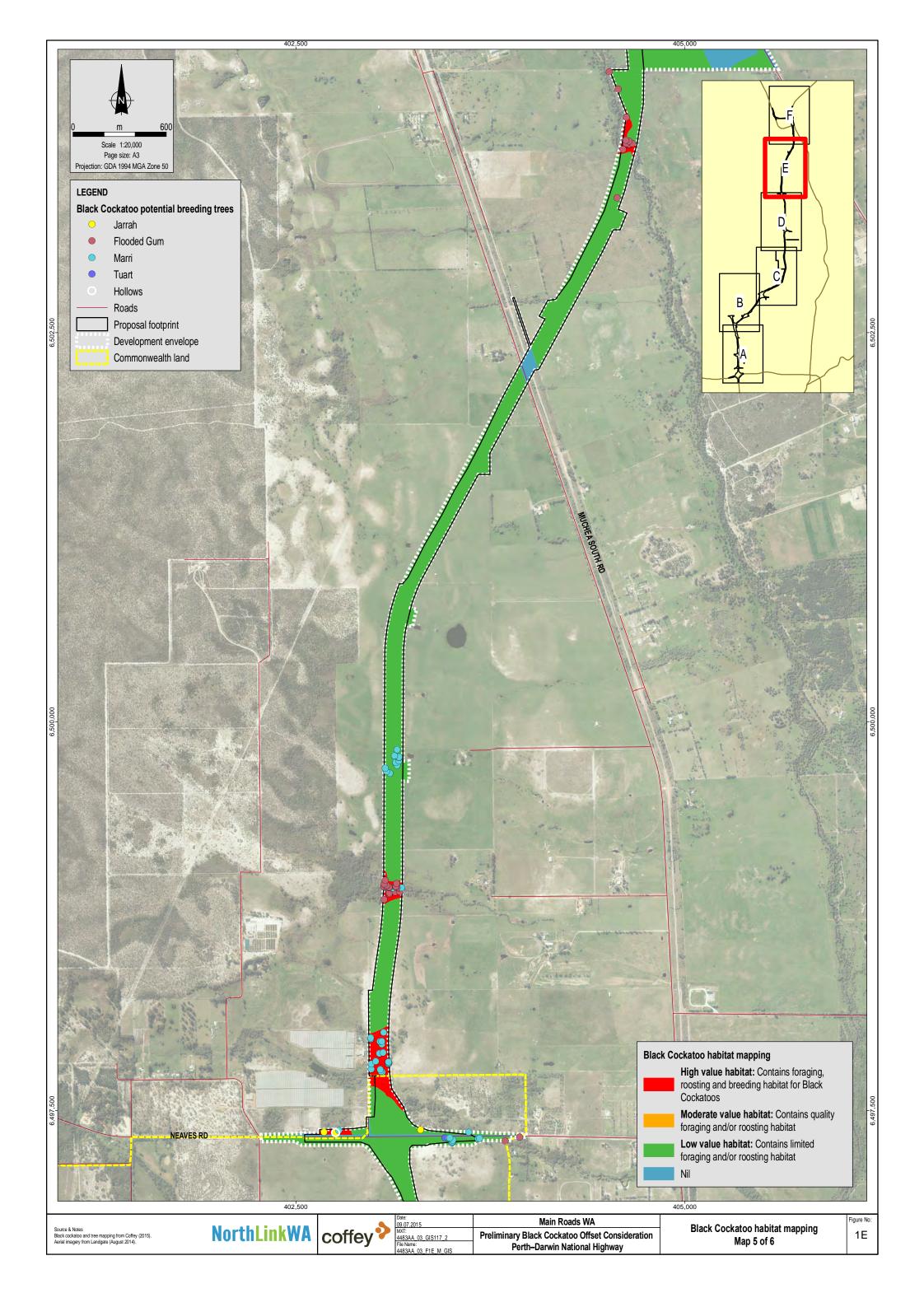


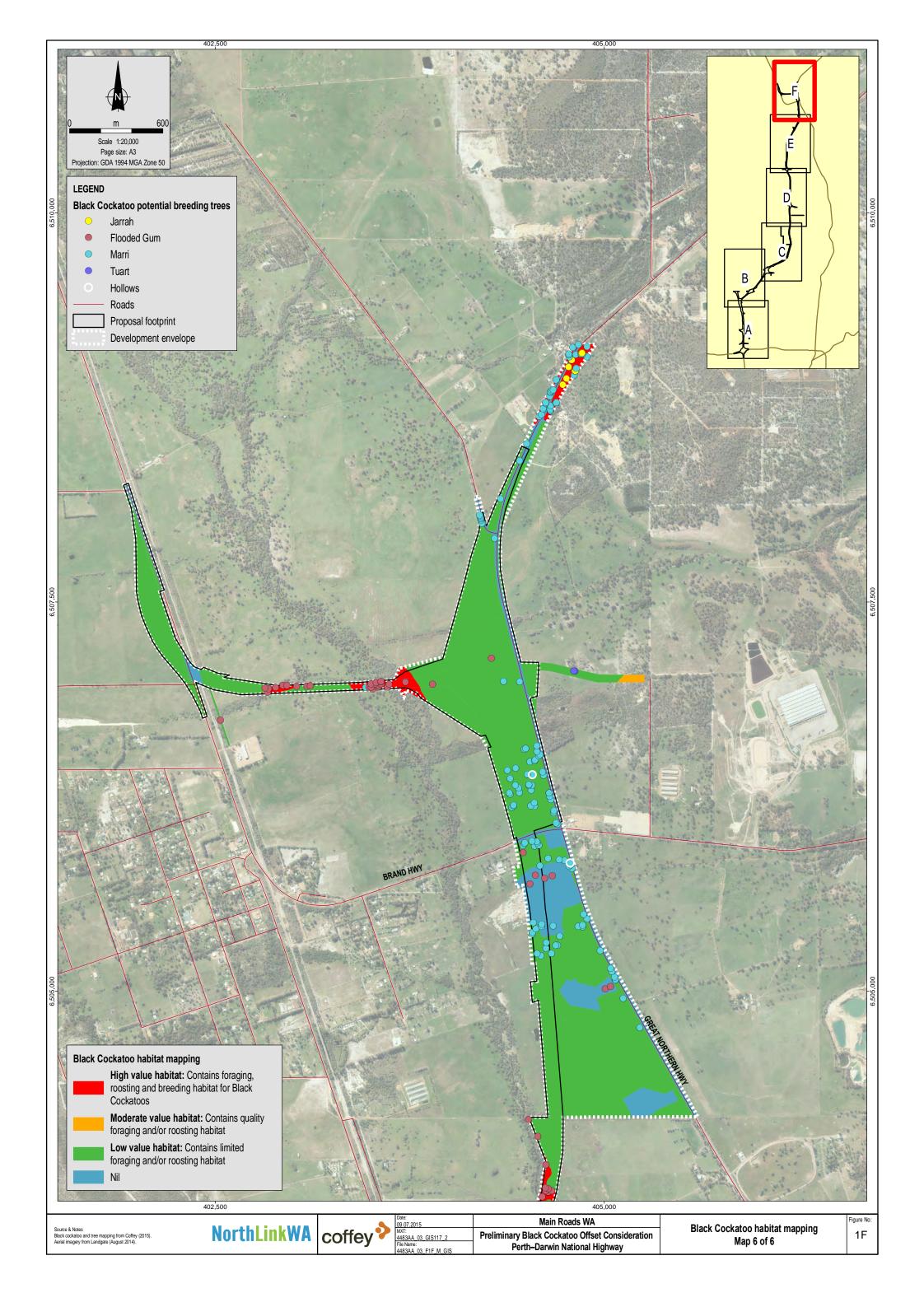


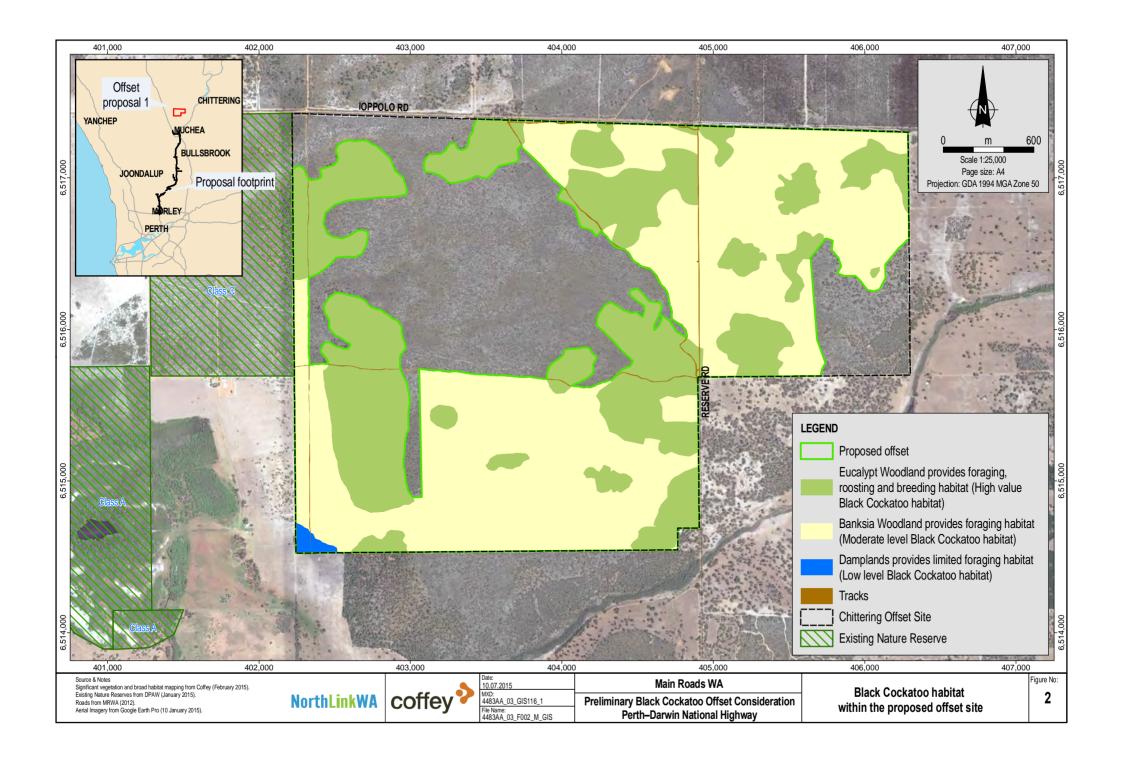














APPENDIX A

Offset assessment guide

Carnaby's Black Cockatoo



Offsets Assessment Guide

For use in determining offsets under the Environment Protection and Biodiversity Conservation Act 199

October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance										
Name	Forest Red-tailed Black Cockatoo									
EPBC Act status	Vulnerable									
Annual probability of extinction	0.2%									

			Impact calcul	ator											
	Protected matter attributes	Attribute relevant to case?	Description	Quantum of imp	act	Units	Information source								
			Ecological c	ommunities											
				Area											
	Area of community	No		Quality											
				Total quantum of impact	0.00										
	Threatened species habitat														
				Area	120.1	Hectares									
itor	Area of habitat	Yes		Quality	6	Scale 0-10	Impact site for EPBC 2013-7042								
Impact calculator				Total quantum of impact	72.06	Adjusted hectares									
dwj	Protected matter attributes	Attribute relevant to case?	Description	Quantum of imp	act	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													
			Threatene	ed 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													

Key to Cell Colours

User input required

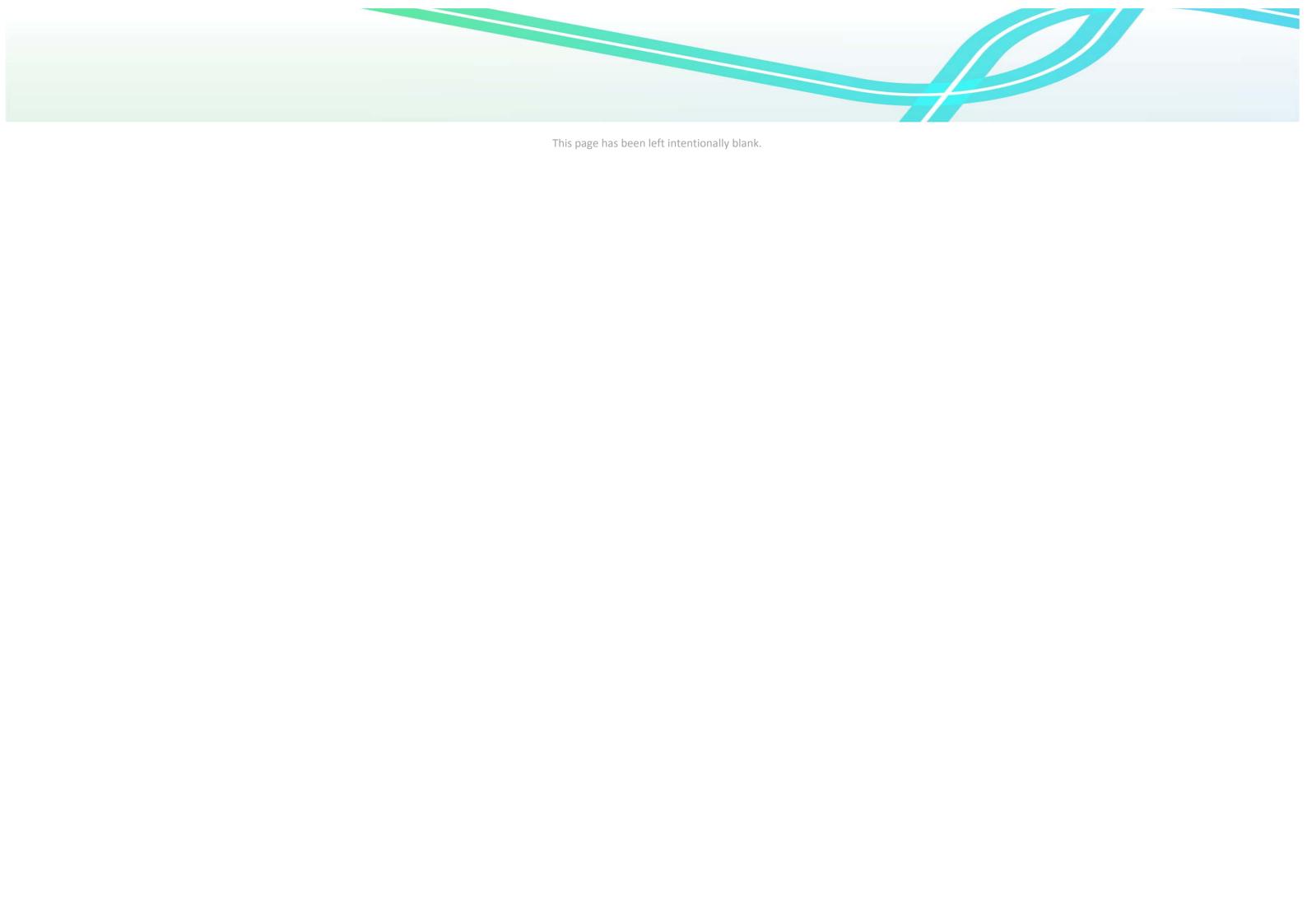
Drop-down list

Calculated output

Not applicable to attribute

										Offset o	alculato	r												
	Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon	orizon (years) Start :		art area and anality		Future area and quality without offset		Future area and quality with offset		Confidence in result (%)	Adjusted gain	•	Net present value (adjusted hectares)		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 Future area without offset (adjusted hectares)	0.0	Risk of loss (%) with offset 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)						 						
										Threat	ened spec	ies habitat												
						Time over which	20	Start area	220	Risk of loss (%) without offset	30%	Risk of loss (%) with offset	5%	04.75	0004	76.28	73.29							
ator	Area of habitat	Yes	72.06	Adjusted hectares		loss is averted (max. 20 years)	20	(hectares)	339	Future area without offset (adjusted hectares)	237.3	Future area with offset (adjusted hectares)	322.1	84.75	90%	70.28	, , , , ,	72.24	100.24%	Yes				
Offset calculator						Time until ecological benefit	10	Start quality (scale of 0-10)	7	Future quality without offset (scale of 0-10)	6	Future quality with offset (scale of 0-10)	7	1.00	90%	0.90	0.88	 - 						
	Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon	(years)	Start va	Start value		Future value without offset					Raw gain	Confidence in result (%)	Adjusted gain	Net prese	ent 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 .g. Change in nest success	No																						
	Mortality rate e.g Change in number of road kills per year	No																						
	Number of individuals e.g. Individual plants/animals	No																						

	Summary														
			N				Cost (\$)								
	Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Direct offset (\$)	Other compensatory measures (\$)	Total (\$)							
	Birth rate	0				\$0.00		\$0.00							
nary	Mortality rate	0				\$0.00		\$0.00							
Summary	Number of individuals	0				\$0.00		\$0.00							
	Number of features	0				\$0.00		\$0.00							
	Condition of habitat	0				\$0.00		\$0.00							
	Area of habitat	72.06	72.24	100.24%	Yes	\$0.00	N/A	\$0.00							
	Area of community	0				\$0.00		\$0.00							
						\$0.00	\$0.00	\$0.00							



APPENDIX B

Offset assessment guide

Forest Red-tailed Black Cockatoo



Offsets Assessment Guide

For use in determining offsets under the Environment Protection and Biodiversity Conservation Act 19

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	1.2%									

			Impact calcul	ator											
	Protected matter attributes	Attribute relevant to case?	Description	Quantum of imp	act	Information source									
			Ecological c	ommunities											
				Area											
	Area of community	No		Quality											
				Total quantum of impact	0.00										
	Threatened species habitat														
				Area	202	Hectares									
itor	Area of habitat	Yes		Quality	6	Scale 0-10	Impact site for EPBC 2013-7042								
Impact calculator				Total quantum of impact	121.20	Adjusted hectares									
dwj	Protected matter attributes	Attribute relevant to case?	Description	Quantum of imp	act	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													
			Threatene	ed 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													

Key to Cell Colours

User input required

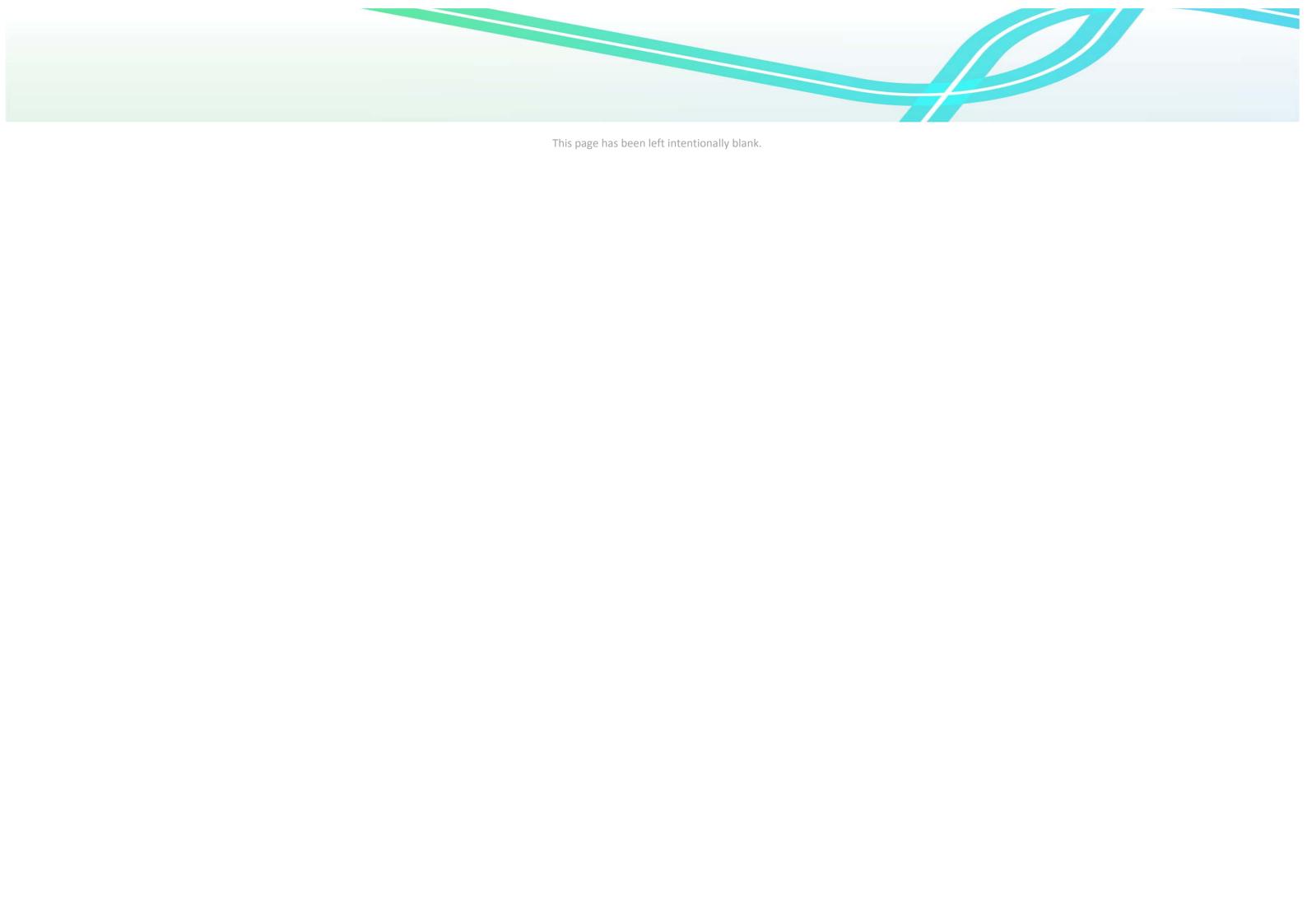
Drop-down list

Calculated output

Not applicable to attribute

										Offset c	alculato	or											
	Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon	(years)	Start area an			Future area and quality without offset				Raw gain	Confidence in result (%)	Adjusted gain	Net prese (adjusted		% of impact offset	Minimum (90%) direct offset requirement met?	Cost (\$ total)	Information source
							Ecolog	gical Com	munities														
	Area of community	No				Risk-related time horizon (max. 20 years)		Start area (hectares)		Risk of loss (%) without offset Future area without offset (adjusted hectares)	0.0	Risk of loss (%) with offset 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																						
ır	Area of habitat	Yes	121.20	Adjusted hectares	Long term protection and management of habitat at Ioppolo Road, Chittering,	Time over which loss is averted (max. 20 years)	20	Start area (hectares)	673.5	Risk of loss (%) without offset Future area without offset (adjusted hectares)	30% 471.5	Risk of loss (%) with offset Future area with offset (adjusted hectares)	639.8	168.38	90%	151.54	119.37	121.22	100.02%	Yes			
Offset calculator					WA WA	Time until ecological benefit	10	Start quality (scale of 0-10)	7	Future quality without offset (scale of 0-10)	6	Future quality with offset (scale of 0-10)	7	1.00	90%	0.90	0.80						
	Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon	(years)	Start va	alue	Future value without offset				Raw gain	Confidence in result (%)	Adjusted gain	Net prese	ent 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																					
	N. d.									Thi	reatened s	pecies											
	Birth rate e.g. Change in nest success	No																					
	Mortality rate e.g Change in number of road kills per year	No																					
	Number of individuals e.g. Individual plants/animals	No																					

	Summary												
			N			Cost (\$)							
	Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Direct offset (\$)	Other compensatory measures (\$)	Total (\$)					
	Birth rate	0				\$0.00		\$0.00					
Summary	Mortality rate	0				\$0.00		\$0.00					
	Number of individuals	0				\$0.00		\$0.00					
	Number of features	0				\$0.00		\$0.00					
	Condition of habitat	0				\$0.00		\$0.00					
	Area of habitat	121.2	121.22	100.02%	Yes	\$0.00	N/A	\$0.00					
	Area of community	0				\$0.00		\$0.00					
			\$0.00	\$0.00	\$0.00								



APPENDIX C

Habitat quality assessment



Appendix C: Habitat quality assessment

Factor	Considerations	Assessment of proposal area	Initial Score	Weight	Adj. Score	Assessment of offset site (current value)	Initial Score	Weight	Adj. Score	Assessment of offset site (future value with offset)	Initial Score	Weight	Adj. Score
Site condition	Structure and condition of vegetation on the site.	Vegetation condition within the proposal footprint ranged from pristine to completely degraded. Large sections of the proposal footprint are fragmented and contain nonendemic species, rubbish/litter, recent fire damage and dieback. Areas of pristine to very good habitat include habitat at Maralla Road, State Forest 65 and Cullacabardee bushland.	5	15	0.8	Largely intact block of native vegetation, some minor disturbance associated with offroad vehicle use. The majority of the site is of very good to excellent condition. Limited weed infestation (in comparison to proposal footprint). Small area of dieback at the periphery of the site (Coffey, 2015b).	8	15	1.2	Once ceded with the Conservation Commission the intent is the land will be entered into conservation estate and will be managed by Department of Parks and Wildlife in the long-term. Any rubbish would be removed and third party access prevented, improving habitat quality. Risk of the introduction or spread of dieback and weeds will be reduced. Existing weeds and dieback would be actively managed. (Not likely to be a significant change.)	8	15	1.2
	Diversity of relevant habitat species present.	The study area contains 21 species of plant that are known as foraging resources for the Black Cockatoos (Valentine and Stock, 2008, Chapman, 2007 and DSEWPAC, 2012).	6	13	0.8	The offset site contains 17 species of plant that are known foraging resources for Black Cockatoos (Coffey, 2015b).	6	13	0.8	(No change.)	6	13	0.8
	Relevant habitat features on the site.	The proposal footprint contains 201 ha of foraging habitat (excluding pine plantation), 56 ha of roosting habitat and 119 ha of breeding habitat, including 756 potential breeding trees.	6	15	0.9	Largely intact block of native vegetation that contain suitable foraging (788.4 ha), roosting (234.24 ha) and breeding (234.4 ha) habitat (Coffey, 2015b). The mature age of the foraging species (predominantly Jarrah, Marri and Banksia species) allows a greater yield of fruiting bodies/seed pods as compared to immature habitats. Given the large area of foraging habitat and the excellent condition of the vegetation, the offset site provides a quality foraging resource for Black Cockatoos (Coffey, 2015b). The tree density survey results show that the offset site has a high tree density, with more than 20 trees with a DBH over 500 mm per hectare. An estimated 4,669 trees with a DBH over 500 mm occur in the offset site. As such, the offset site contains large areas of potential breeding habitat for Black Cockatoos (Coffey, 2015b).	8	15	1.2	(No change.)	8	15	1.2

Factor	Considerations	Assessment of proposal area	Initial Score	Weight	Adj. Score	Assessment of offset site (current value)	Initial Score	Weight	Adj. Score	Assessment of offset site (future value with offset)	Initial Score	Weight	Adj. Score
Site context	Connectivity with other suitable/known habitat or remnants.	The only areas of ecological connectivity include Maralla Road Bushland, State Forest 65 and Cullacabardee Bushland, which have been previously identified as an "existing or potential bushland/wetland linkage." (Government of Western Australia, 2000b)[R182].	5	11	0.6	Located close to and relatively well connected with a number of vegetated lots (likely to be of similar habitat and quality) in a north to south direction (approximately 15km in length) between Brand Highway and Great Northern Highway, including known breeding sites (Coffey, 2015b).	6	11	0.7	(No change.)	6	11	0.7
						A number of reserves; Chandala Nature Reserve, Barracca Nature Reserve, Breera Road Nature Reserve and Yeal Nature Reserve are all located within 10 km of the offset site (Coffey, 2015b).							
	Importance of the site in relation to the overall species population or occurrence of the community.	East Wanneroo, Gnangara and Whiteman Park have been identified as important foraging sites for Carnaby's Cockatoo on the Swan Coastal Plain (Johnstone and Kirkby, 2011) [R227]. The proposal footprint is outside the known breeding range of both species, but provides important foraging and roosting resources during their migration.	6	11	0.7	Carnaby's Cockatoos that have been breeding in the Dandaragan, Moora and Bindoon regions potentially move through the vicinity of the offset site prior to their movement south through the Swan Coastal Plain. Bindoon and the areas around it have been identified as an appropriate location to be recommended as offset site and Chittering has been identified as an area under pressure (Johnstone and Kirkby, 2011). This site is within the known breeding range of the Carnaby's Cockatoo (DSEWPAC, 2012). This site is approximately 10km north of the current mapped extent for the Forest Redtailed Cockatoo (DSEWPAC, 2012). Given recent expansion of this species distribution west from the edge of the Darling Scarp and onto the SCP (Johnstone et al., 2013), a review of current and historic information and a field survey is to be conducted to verify the suitability of this site as an offset for Forest Red-tailed Black Cockatoo.	8	11	0.9	Adding to conservation estate in surrounding region. (+1)	9	11	1.0
	Threats occurring on or near the site.	Major threats include clearing and degradation of habitat due to the introduction and/or spread of dieback and weeds and arson/altered fire regimes associated with urban development, mining and agricultural practices.	4	11	0.4	Major threats include clearing and degradation of habitat associated with the introduction and/or spread of dieback and weeds, third party access and potential edge effects associated with neighbouring exploration and agricultural activities.	6	11	0.7	Threat of clearing and degradation of habitat (including introduction of dieback and or weeds) managed, through removal of exploration tenure and management of third party access. (+2)	8	11	0.9

Factor	Considerations	Assessment of proposal area	Initial Score	Weight	Adj. Score	Assessment of offset site (current value)	Initial Score	Weight	Adj. Score	Assessment of offset site (future value with offset)	Initial Score	Weight	Adj. Score
Species stocking rate Total Quality	Presence of species on site.	The proposal footprint is within the known range of both species. Both Black Cockatoo species have been observed within the proposal footprint.	7	6	0.4	No record of the species or any evidence of foraging was recorded within the site. However, the offset site provides suitable foraging, roosting and breeding habitat for the Carnaby's Cockatoo and to a lesser extent the Forest Red-tailed Cockatoo (due to the offset site occurring approximately 10km north of the current mapped extent for this species) (DSEWPAC, 2012).	6	6	0.7	(No change.)	6	6	0.9
	Density of species known to use the site.	No density investigations have been undertaken; however both Black Cockatoo species are known to have a large range and low density. Both species have been recorded foraging within the proposal footprint.	5	9	0.4	No density investigations have been undertaken; however both Black Cockatoo species are known to have a large range and low density.	5	9	0.4	Improvements in quality and management of third party access may attract more individuals. (Not likely to be a significant change.)	5	9	0.4
	Role of the site population in regards to overall species population.	There are approximately 474,000 ha of suitable Carnaby's Cockatoo habitat on the Swan Coastal Plain (Johnston, 2013) [R408]. The clearing of 202 ha of foraging habitat through the project represents 0.04% of the available habitat in a regional context. The proposal footprint is outside the known breeding range of both species, but provides	3	9	0.5	The Chittering area has been identified as a location where Black Cockatoo habitat is under pressure and is a strategic location as it supports Carnaby's Cockatoos during their migration to and from breeding sites in the Wheatbelt (Johnstone and Kirkby, 2011).	5	9	0.5	Adding to conservation estate in surrounding region (+1).	6	9	0.5
	Score for Habitat ¹ :	important foraging and roosting resources during their migration.			5.5				7.1				7.6

^{1.} Quality scores have been rounded to the nearest hectare for use in the guide.

References:

DSEWPAC. 2012. EPBC Act referral guidelines for three threatened black cockatoo species. Department of Sustainability, Environment, Water, Population and Communities.

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