

EGLINTON ESTATES

CLEARING AND REVEGETATION MANAGEMENT PLAN

Prepared for: Eglinton Estates

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pgv
ENVIRONMENTAL

CONTENTS

Contents	i
List of Attachments	iv
1 INTRODUCTION	1
1.1 Background.....	1
1.2 Requirement for a Clearing and Revegetation Management Plan	1
1.3 Stakeholder Consultation	2
1.3.1 Community Participation	2
1.4 CRMP Revisions	3
1.4.1 2015 Topsoil Variation	3
1.4.2 2019 Variations Topsoil and Seed Collection	3
2 EPBC CONDITION OF APPROVAL	7
2.1 EPBC Conditions Relevant to Carnaby's Black Cockatoo.....	7
3 CARNABY'S BLACK COCKATOO	8
3.1 Background.....	8
3.1.1 Diet	8
3.1.2 Nesting Requirements	9
3.1.3 Breeding	9
3.2 Occurrence within Yellagonga Regional Park	9
4 CARNABY'S BLACK COCKATOO HABITAT RESTORATION RESEARCH	10
4.1 Background.....	10
4.2 Species Selection	10
4.3 Site Preparation.....	11
4.3.1 Ploughing, Deep Ripping and Scarifying.....	11
4.3.2 Weeds.....	11
4.3.3 Fertiliser.....	11
5 YELLAGONGA REGIONAL PARK.....	12
5.1 Background.....	12
5.2 Yellagonga Regional Park Site Description.....	12
5.2.1 Landform	12
5.2.2 Geology and Soils.....	12
5.2.3 Vegetation and Flora	13
6 SPECIES SELECTION.....	16

6.1	Objective	16
6.2	Methodology	17
6.2.1	Plant species at Eglinton East in Carnaby's Black Cockatoo Habitat:	17
6.2.2	Plant species at Yellagonga Regional Park once in Carnaby's Black Cockatoo Habitat	17
6.2.3	Selecting plant species suitable for revegetation at YRP	17
7	EGLINTON CLEARING AND REVEGETATION MANAGEMENT PLAN	19
7.1	Objectives	19
7.2	Vegetation Removal	19
7.3	Revegetation Onsite	19
7.3.1	Public Open Space	19
7.3.2	Fencing	20
7.3.3	Species List.....	20
7.3.4	Planting Methodology	20
7.3.5	Streetscapes	21
7.4	Weed Management.....	21
7.5	Transfer of Public Open Space to the City of Wanneroo	21
8	YELLAGONGA REVEGETATION MANAGEMENT PLAN	22
8.1	Objectives.....	22
8.2	Revegetation Sites	22
8.2.1	Tenure	23
8.2.2	Management	23
8.3	Site Preparation.....	23
8.3.1	Weed Control	23
8.3.1	Earthworks.....	24
8.3.2	Site Protection	24
8.4	Planting Design, Planting Schedule and Revegetation Timeframes	25
8.5	Methodology	25
8.5.1	Seedling Planting	25
8.5.2	Completion Criteria	25
8.6	Monitoring.....	27
8.7	Carnaby's Black Cockatoo Monitoring Program	27
9	IMPLEMENTATION TIMEFRAME AND RESPONSIBILITIES.....	28
9.1	Implementation Schedule	28
9.2	Responsibility	28
9.3	Timeframe	28

10	REFERENCES	33
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LIST OF ATTACHMENTS

Tables

Table 1:	CRMP Working Group
Table 2:	Changes to Condition 12(a) and 12(b)
Table 3:	Changes to Conditions 9, 11, 12 and 14
Table 4:	Yellagonga Regional Park Revegetation Site Descriptions
Table 5:	Key Yellagonga Regional Park CBC Foraging Species
Table 6:	Eglinton Indicative Species List for Public Open and Space and Streetscapes
Table 7:	Yellagonga Regional Park Revegetation Site Descriptions
Table 8:	Yellagonga Regional Park Revegetation Sites Completion Criteria
Table 9:	CRMP Actions and Timing
Table 10:	Indicative Timeframes

Figures

Figure 1:	Site Location
Figure 2:	Eglinton Local Structure Plan
Figure 3:	Yellagonga Regional Park Revegetation Sites
Figure 4:	Indicative Staging Plan Showing CBC habitat
Figure 5:	Location of Public Open Space areas to Contain 10% of CBC Foraging Species

Appendices

Appendix 1:	EPBC Approval
Appendix 2:	CRMP V6 Approval
Appendix 3:	Section 143 Variation Approval 20 October 2015
Appendix 4:	CRMP V8 Approval
Appendix 5:	Section 143 Variation Approval June 2019
Appendix 6:	DBCA List of known CBC Foraging Species

- Appendix 7: Yellagonga Regional Park Bush Forever Description
- Appendix 8: Yellagonga Regional Park Species List from DEP (1996), Gibson *et al.*, (1994), Griffin (1993), Keighery (1996) and Weston *et al.* (1992).
- Appendix 9: DBCA Approved Rehabilitation Species List
- Appendix 10: Completion Criteria Memo

1 INTRODUCTION

1.1 Background

The Eglinton Estates Pty Ltd (Eglinton) landholding is located 45km north west of the Perth Central Business District (Figure 1). The land will be developed in accordance with the approved Local Structure Plan (LSP) for residential and commercial purposes and includes Urban Development, the Eglinton District Centre, primary schools and playing fields, the Eglinton Marina and Coastal Village, Regional Open Space and Public Open Space (Figure 2).

Development of the LSP area will result in the clearing of Carnaby's Black Cockatoo (CBC) habitat which is listed as an Endangered species under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Subsequently, a Referral under the EPBC Act was submitted in December 2010 for the eastern LSP area. The Referral 2010/5777 was approved subject to environmental conditions by the Commonwealth Environment Minister on 30 April 2013 (Appendix 1).

To offset the clearing of the CBC habitat from the eastern LSP area, Eglinton will provide funds to the Department of Parks and Wildlife (DPAW, now DBCA) for the purchase of an offset site in the Gingin area that contains good quality CBC habitat, create 12.7ha of new CBC habitat in the Yellagonga Regional Park (YRP), plant 1.9ha of known CBC foraging species in Public Open Space (POS) in the Eglinton development and establish 50% of the streetscapes with known CBC foraging species.

1.2 Requirement for a Clearing and Revegetation Management Plan

In accordance with Condition 12 of the EPBC Approval 2010/5777, Eglinton were required to prepare and implement a Clearing and Revegetation Management Plan (CRMP) for the creation and maintenance of CBC habitat at Eglinton and YRP using where possible seed and topsoil from the CBC habitat to be cleared at Eglinton.

The specific intent of the CRMP is to:

- Identify a strategy for preparing a list of suitable CBC foraging species for use in revegetation at YRP, including source locations details of provenance and establishment requirements;
- Identify a strategy for topsoil collection from the Eglinton site and re-use on-site or off site;
- Provide best practice protocols for seed collection from the Eglinton site and YRP;
- Describe methods proposed to create 12.7ha of CBC habitat in YRP, including site preparation, planting methodology, completion criteria, timelines and staging of revegetation works and a monitoring program;
- Describe methods proposed to establish 50% of the streetscapes with CBC foraging species and 1.9ha of CBC foraging species within POS at Eglinton; and
- Outline management strategies for weeds and browsing/grazing pest animals at YRP.

Version 6 of the CRMP was approved by the Department of Environment, now known as the Department of the Environment and Energy (DoEE) on 8 November 2013 (Appendix 2).

1.3 Stakeholder Consultation

This CRMP has been prepared by PGV Environmental in consultation with officers from the Department of Parks and Wildlife now known as the Department of Biodiversity, Conservation and Attractions (DBCA) and Tranen Revegetation Systems (Tranen).

The core working group and other stakeholders are provided in Table 1.

Table 1: CRMP Working Group

Person	Company/Agency	Role
Core Group		
Paul van der Moezel	PGV Environmental	Eglinton Environmental Consultant
Belinda Heath	PGV Environmental	Eglinton Environmental Consultant
Catherine Prideaux	DBCA Regional Parks Unit	DBCA Lead Contact
Robert Campbell	DBCA Regional Parks Unit	A/Senior Project Officer
Mark Brundett	DBCA Swan Region	Restoration Ecologist
Karen Clarke	DBCA Swan Region	Ecologist
Vanda Longman	DBCA Swan Region	Conservation Officer (Flora)
Renee Evans	DBCA Regional Parks	Acting Manager
Damian Grose	Tranen	Independent Revegetation Expert
David Venning	Tranen	Independent Revegetation Expert
Tasio Cokis	Woodsome Management Pty Ltd	Eglinton Project Manager
Others		
	DBCA Regional Parks Unit	YRP Manager
	YRP Community Advisory Committee	
	Friends of YRP Inc.	
Tracey Scroop	WAPC Bush Forever Officer	
	City of Joondalup	
Sam Wagstaff	Department of Environment	Commonwealth Lead Contact
Chris Newton	Emerge	Eglinton Landscape Consultant
Luke Coyle	Cossill and Webley Civil Engineers	Eglinton Civil Engineering Consultant
Tom Barry	Stockland	Amberton Project Manager

1.3.1 Community Participation

Participation of the local community in implementing the revegetation component at YRP will encourage a sense of ownership of YRP by the community. A community planting day in the first five years of the revegetation will be organised by Eglinton in liaison with DBCA Regional Parks Unit, with opportunities for involvement of the YRP Community Advisory Committee.

Direct community enquiries about the revegetation project will be managed through the DBCA Regional Parks office as the first point of contact.

1.4 CRMP Revisions

1.4.1 2015 Topsoil Variation

Eglinton requested a variation to the approval conditions 12 and 13 in correspondence dated 25 May 2015. The variation was approved by the DoEE in accordance with the provisions of the EPBC Act on 20 October 2015 (Appendix 3). The original conditions 12 and 13 were replaced with new conditions.

Under approval condition 5, if the person taking the action wants to act other than in accordance with the approved CRMP, the approval holder must submit a revised plan for approval. Until the Minister (or his delegate) has approved the revised plan, the person taking the action must continue to implement the original plan/s.

Condition 12 is relevant to this CRMP, thus the CRMP requires revision to reflect the variation in the approval conditions. The key changes to Condition 12 are shown below in Table 2.

Table 2: Changes to Approval Condition 12

Original Condition 12(a) and 12(b)	New condition 12(a) and 12(b)
a. A commitment to the staged collection of native seed prior to clearing, and collection of topsoil following clearing, from within Carnaby's Black Cockatoo foraging habitat as shown in Attachment B (checked in black, but excluding those areas shaded green in Attachment B), for use in revegetation;	a. A commitment to the staged collection of native seed prior to clearing from within Carnaby's Black Cockatoo foraging habitat as shown in Attachment B (checked in black, but excluding those areas shaded green in Attachment, E), and the collection of topsoil from 33 ha of the project site, from within 73 ha of good or better condition Carnaby's Black Cockatoo habitat as shown in Attachment B (checked in black), for use in revegetation.
b. A commitment to store native seed and topsoil, and transport it to a receiving site(s) where revegetation is being undertaken by the DEC or another receiving party (or parties), and at least 50% of the collected seed and topsoil must be used within 20 km of the proposal site;	b. A commitment to store native seed (excluding that which is required for revegetation on-site and within Yellongonga Regional Park) and transport it to a seed bank or receiving site(s) where revegetation is being undertaken by the DPaW or another receiving party (or parties).

Version 8 of the CRMP was approved by the DoEE (Appendix 4) and provided to the DBCA for information.

1.4.2 2019 Variations Topsoil and Seed Collection

To date, Eglinton has rehabilitated Site 1a and 1b (6.1ha) of bushland in Yellagonga Regional Park using the topsoil and seed collection protocols and methodology set out in the Clearing and Revegetation Management Plan V6 (CRMP) in accordance with conditions 11 and 12. The rehabilitation results have been conveyed to the DoEE in the annual Compliance Reports.

The use of topsoil relocated from the Referral Area to the rehabilitation sites 1a and 1b was unsuccessful. Similarly, the seed collection at Eglinton and seed broadcast at the rehabilitation sites 1a and 1b was unsuccessful, with germination rates being very low. One of the main reasons for the topsoil and seed broadcasting not being successful is that the soil type/landform at Eglinton is different to the rehabilitation sites. At the Yellagonga Regional Park Community Advisory Committee Meeting dated 9 June 2016, they requested that topsoil from Eglinton landholding is not used in the remaining rehabilitation sites 2 and 3 (6.6ha). The proposed revegetation methodology for the remaining two sites is weed control, ground preparation and tubestock plantings.

The Yanchep Rail Extension and Eglinton Station that is being constructed by the Perth Transit Authority (PTA) will not be able to use any seed or topsoil collected from Black Cockatoo foraging habitat in landscaping or rehabilitation of batters within 10m of the development envelope. The PTA have made this commitment which has been documented in the EPA Bulletin 1634. The reason for this is to minimise potential bird strikes.

Eglinton have minimal requirements for topsoil reuse on site as the EPBC conservation areas (AE, AG and AH) are largely in good condition.

For the reasons summarised above, Eglinton submitted a section 143 variation to change the EPBC 2010/5777 conditions 9, 11, 12 and 14(b) to the Department of Environment and Energy (DoEE) on the 17 April 2019. The original conditions and new conditions are detailed below in Table 3.

The DoEE approved the section 143 variation on the 17 June 2019 (Appendix 5).

Table 3: Changes to Approval Conditions 9, 11, 12 and 14

Original Condition	New Condition
9. To mitigate impacts to Carnaby's Black Cockatoo, the person taking the action must not clear any land that is proposed to be retained that is also habitat for Carnaby's Black Cockatoo (as shown in Attachment B)	No change to the wording of this condition but a change has been made to Attachment B to show the new configuration of Conservation Area AG
11. To mitigate impacts to Carnaby's Black Cockatoo, the person taking the action must fully implement the revegetation of at least 12.7ha of native vegetation (including primary feeding plants for Carnaby's Black Cockatoo) in the Yellagonga Regional Park (in consultation with DEC) using seed and topsoil collected in accordance with the Clearing and Revegetation Management Plan required under condition 12.	11. To mitigate impacts to Carnaby's Black Cockatoo, the person taking the action must fully implement the revegetation of at least 12.7 ha of native vegetation (including primary feeding plants for Carnaby's Black Cockatoo) in the Yellagonga Regional Park (in consultation with the DBCA) in accordance with the <i>Clearing and Revegetation Management Plan</i> required under condition 12.
12. To mitigate impacts to Carnaby's Black Cockatoo, the person taking the action must prepare and submit a Clearing and Revegetation Management Plan (the plan) for the Minister's approval . The plan must include: a) A commitment to the staged collection of native seed prior to clearing from within	12. To mitigate impacts to Carnaby's Black Cockatoo, the person taking the action must submit a <i>Clearing and Revegetation Management Plan</i> (the plan) for the Minister's approval. The plan must include:

<p>Carnaby's Black Cockatoo foraging habitat as shown in <u>Attachment B</u> (checked in black, but excluding those areas shaded green in Attachment B, and the collection of topsoil from 33 ha of the project site, from within 73 ha of good or better condition Carnaby's Black Cockatoo habitat as shown in <u>Attachment B</u> (checked in black), for use in revegetation.</p> <p>b) A commitment to store native seed (excluding that which is required for revegetation on-site and within Yellongonga Regional Park) and transport it to a seed bank or receiving site(s) where revegetation is being undertaken by the DeC or another receiving party (or parties).</p> <p>c) Detailed protocols for staged collection and use of native seed and topsoil required by conditions 12a, 12d and 12e to be developed in consultation with an independent revegetation expert (approved in writing by the Department) and the DeC or other receiving party (or parties) including:</p> <ul style="list-style-type: none"> i. The optimal methodology for native seed and topsoil collection from the proposal site ii. How clearing will be staged to best utilise the native seed and topsoil resource for revegetation iii. How native seed and topsoil will be stored and transported iv. Measures to manage any topsoil from the site that contains invasive weeds (at a level that makes that soil not suitable for use in revegetation) or soil infestation such as Phytophthora, and v. On-site supervision and implementation of monitoring mechanisms. <p>d) A commitment to revegetate at least 1.9 ha of native vegetation within Public Open Space on the proposal site.</p> <p>e) Methodology for revegetation, both on-site, and in Yellagonga Regional Park (as required under condition 11), using native seed and topsoil collected in accordance with the protocols require by condition 12c, along with:</p>	<p>(a) a commitment to revegetate at least 1.9 ha of native vegetation within Public Open Space on the proposal site;</p> <p>(b) methodology for revegetation, both on-site, and in Yellagonga Regional Park (as required under condition 11) along with:</p> <ul style="list-style-type: none"> i. survival targets proposed for plantings; ii. performance indicators and corrective measures; iii. roles and responsibilities; and iv. timeframes for the implementation and management of the above measures. <p>(c) a commitment for at least 50% of plantings for trees and shrubs in street-scaping to consist of plants known to be primary feeding plants for Carnaby's Black Cockatoo. Site selection for street-scaping must take account of any risk of vehicle strike to Carnaby's Black Cockatoos</p> <p>If the Minister approves the plan, then the approved plan must be implemented.</p>
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<p>i. Survival targets proposed for plantings</p> <p>ii. Performance indicators and corrective measures</p> <p>iii. Roles and responsibilities, and</p> <p>iv. Timeframes for the implementation and management of the above measures.</p> <p>f) A commitment for at least 50% of planting of trees and shrubs in street-scaping to consist of plants known to be primary feeding plants for Carnaby's Black Cockatoo. Site selection for street-scaping must take account of any risk of vehicle strike to Carnaby's Black Cockatoos.</p> <p>If the Minister approves the plan, then the approved plan must be implemented.</p>	
<p>14. The person taking the action must not undertake any clearing of habitat for Carnaby's Black Cockatoo (as shown in Attachment B hatched in black) apart from of the area outlined in yellow in Attachment D, unless:</p> <p>(a) the <i>Clearing and Revegetation Management Plan</i> required under condition 12 has been approved by the Minister; and</p> <p>(b) for each proposed clearing stage, the department has been provided written evidence that the DEC or other receiving party (or parties) agree(s) to utilise the seed and soil for the purposes of revegetation in accordance with the protocols developed under condition 12(c).</p>	<p>14. The person taking the action must not undertake any clearing of habitat for Carnaby's Black Cockatoo (such habitat being designated in <u>Attachment B</u> as the areas hatched in black), except for the area designated in <u>Attachment D</u> by yellow outline, unless the <i>Clearing and Revegetation Management Plan</i> required under condition 12 has been approved by the Minister.</p>

2 EPBC CONDITION OF APPROVAL

2.1 EPBC Conditions Relevant to Carnaby's Black Cockatoo

The Commonwealth Environment Minister approved the clearing of vegetation from the eastern Eglinton LSP area subject to a number of conditions of approval (Appendix 1). A variation on this approval was granted on the 20 October 2015 and the original conditions 11 and 12 were replaced with new conditions. A variation was submitted on 17 April 2019 to change conditions 9, 11, 12 and 14b and was subsequently approved by the Department on the 17 June 2019. Condition 11 and 12 below reflect the new conditions (Appendix 3).

The following conditions relate directly to the revegetation of CBC habitat at YRP and within POS and streetscapes in the future Eglinton development.

Condition 11

*To mitigate impacts to Carnaby's Black Cockatoo, the person taking the action must fully implement the **revegetation** of at least 12.7 ha of native vegetation (including **primary feeding plants** for Carnaby's Black Cockatoo) in the Yellagonga Regional Park (in consultation with the **DBCA**) in accordance with the Clearing and Revegetation Management Plan required under condition 12.*

Condition 12

*To mitigate impacts to Carnaby's Black Cockatoo, the person taking the action must submit a Clearing and Revegetation Management Plan (the plan) for the **Minister's** approval. The plan must include:*

*(a) a commitment to **revegetate** at least 1.9 ha of native vegetation within Public Open Space on the **proposal site**;*

*(b) methodology for **revegetation**, both on-site, and in Yellagonga Regional Park (as required under condition 11) along with:*

i. survival targets proposed for plantings;

ii. performance indicators and corrective measures;

iii. roles and responsibilities; and

iv. timeframes for the implementation and management of the above measures.

*(c) a commitment for at least 50% of plantings for trees and shrubs in street-scaping to consist of plants known to be **primary feeding plants** for Carnaby's Black Cockatoo. Site selection for street-scaping must take account of any risk of vehicle strike to Carnaby's Black Cockatoos.*

If the Minister approves the plan, then the approved plan must be implemented.

Condition 14

The person taking the action must not undertake any **clearing** of habitat for Carnaby's Black Cockatoo (such habitat being designated in Attachment B as the areas hatched in black), except for the area designated in Attachment D by yellow outline, unless the *Clearing and Revegetation Management Plan* required under condition 12 has been approved by the **Minister**.

3 CARNABY'S BLACK COCKATOO

3.1 Background

Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) is endemic to the south-west of Western Australia. This species is listed as 'fauna that is rare or likely to become extinct' (generally referred to as threatened fauna) under the Western Australian *Wildlife Conservation Act 1950*, Wildlife Conservation (Specially Protected Fauna) Notice 2010(2). It has been given a ranking of Endangered by the Western Australian Threatened Species Scientific Committee. This species is listed as Endangered under the EPBC Act and listed as Threatened under the Western Australian *Wildlife Conservation Act 1950*.

This species is a postnuptial nomad, tending to move west after breeding. For example; most birds breeding in Badgingarra, Dandaragan, Moora and Bindoon regions tend to move west after breeding into higher rainfall areas especially the near coastal *Banksia* scrubs e.g. at Wanagarren Nature Reserve, Nilgen Nature Reserve, Yanchep area and Wanneroo area then many of these move further south onto the southern Swan Coastal Plain including the southern Perth metropolitan area Baldivis, Lake Clifton and Myalup areas (Johnstone and Kirkby, 2012).

Carnaby's Black Cockatoo usually travel in pairs or small flocks, although they are often seen in large flocks (up to 10,000) in non-breeding season (late spring to mid-winter), especially at *Banksia* scrubs and pine plantations on the Swan Coastal Plain. Because of the large-scale post-war clearing of semiarid sandplains, this species has declined in much of the wheatbelt (Johnstone and Kirkby, 2012).

3.1.1 Diet

Carnaby's Black-Cockatoo have been predominantly observed foraging on the seeds of 52 native species. The most common native plant species CBC have been observed foraging upon include the *Banksia* (including *Dryandra* species), *Hakea*, *Grevillea*, *Allocasuarina* and *Eucalyptus* (Carnaby 1948; Saunders 1974a, 1974b, 1980; Higgins 1999). The DBCA has prepared a ranked list of suitable foraging species for CBC (Appendix 6).

The species have been observed feeding on a number of introduced or crop species including Liquidamber (*Liquidamber styraciflua*), Umbrella Tree (*Schefflera actinophylla*), Sunflower (*Helianthus annuus*), Jacaranda (*Jacaranda mimosifolia*), Canola (*Brassica napus*), Wild Radish (*Raphanus raphanistrum*), Geranium species (*Erodium spp.*), Guildford Grass (*Romulea rosea*), *Hibiscus spp.*, White Cedar (*Melia azedarach*), Pinaster Pine (*Pinus pinaster*), Radiata Pine (*Pinus radiata*), Doublegee (*Emex australis*), Almond Tree (*Prunus amygdalus*) (Johnstone and Kirkby, 2012).

On the Swan Coastal Plain, identified important native food plants include *Banksia attenuata*, *B. menziesii*, *B. grandis*, *B. ilicifolia*, *B. sessilis*, *B. prionotes*, *Corymbia calophylla* and *Eucalyptus marginata* (Saunders 1980; Shah 2006; Weerheim 2008). On the Swan Coastal Plain, Carnaby's Black-Cockatoo are frequently observed feeding in pine plantations (Shah 2006). In addition, CBC have been observed feeding on invertebrates, braconid wasps and seed-eating weevils from cones and fruits of some *Acacia spp.* and *Xanthorrhoea preissii* (Shah, 2006).

3.1.2 Nesting Requirements

Carnaby's Black Cockatoo display strong pair bonds and mate for life. They nest in hollows of smooth-barked eucalypts especially Salmon Gum (*Eucalyptus salmonophloia*) and Wandoo (*Eucalyptus wandoo*) but nests have also been found in other eucalypts including York Gum (*Eucalyptus loxophleba*), Flooded Gum (*Eucalyptus rudis*), Tuart (*Eucalyptus gomphocephala*) and the rough-barked Marri (*Corymbia calophylla*) (Johnstone and Kirkby, 2012).

On the Swan Coastal Plain most nests are in Tuart. Eggs are laid on a mat of wood chips at the bottom of a large hollow (mostly top entry hollows) ranging from a few centimetres to 5 m deep; clutch 1–2 (mostly 2 but only one young reared). Incubation lasts 29 days and only the female incubates and broods. The nestling is brooded by the female during which time both rely on the male for food. The female then leaves the nest each day at dawn, sometimes returning mid-morning (with the male) to feed the chick. After about 2–3 weeks she ceases to brood and the chick is fed by one or both parents in the morning and at late evening (DoP, 2012).

3.1.3 Breeding

Breeding occurs mainly from early July to mid-December in the semiarid and subhumid interior from the Three Springs district south to the Stirling Range, west to Cockleshell Gully, Cataby, Regans Ford, Gingin, near mouth of Moore River, Yanchep, Serpentine, Mandurah, Lake Clifton, Bunbury, Nannup and Tone River and east to Manmanning, Kellerberrin, Woolundra, Lake Cronin, Hatters Hill and near Ravensthorpe (Storr-Johnstone Bird Data Bank).

There are limited records of CBC breeding in Tuart on the Swan Coastal Plain. Known locations include Gingin, Boonanarring, Mooliabeenee, near mouth of Moore River, Yanchep, Baldivis, near Mandurah, Lake Clifton and near Bunbury (Storr-Johnstone Bird Data Bank).

Breeding success is largely dependent on suitable feeding habitat adjacent to the nest site to provide the necessary food for the survival of the chick (Johnstone and Kirkby, 2012).

3.2 Occurrence within Yellagonga Regional Park

Carnaby's Black Cockatoo has been recorded in YRP and adjacent areas within the City of Joondalup and City of Wanneroo. YRP currently provides roosting and foraging opportunities and potential nesting trees within close proximity to water sources in Lakes Goollelal and Joondalup. The DBCA have indicated that there is a roosting site approximately 4km to the south of the proposed revegetation areas.

4 CARNABY'S BLACK COCKATOO HABITAT RESTORATION RESEARCH

4.1 Background

The DBCA and others have recently become involved in *Banksia* woodland revegetation projects that have a primary focus of providing CBC foraging habitat. The following projects are related to EPBC offset sites:

- Fiona Stanley Hospital – revegetation of a number of sites within the Beeliar Regional Park;
- Jandakot Airport Holdings Pty Ltd – Regeneration of *Banksia* woodland at Forrestdale Lake and Jandakot Regional Park (18ha); and
- Malaga Wetland Offset Project – Regeneration of 60ha in Melaleuca Park.

Prior to the EPBC offset projects, *Banksia* Woodland restoration projects on the Swan Coastal Plain have largely been focused on revegetation of sand mines and in more recent times cleared pine plantations. Native plant regeneration of abandoned farmland in the Western Australian wheatbelt region is also slow to non-existent, even 45 years after abandonment (Yates & Hobbs 1997; Standish *et al.* 2006; 2008). Natural regeneration after these types of land use is not realistic as the native seed bank within the topsoil has been removed and other factors that limit the regeneration of native species may also encourage the germination of weed species.

Techniques for restoring *Banksia* woodland communities on the sandy soils of the Swan Coastal Plain in the Perth region have been investigated at post-pine harvested sites in the Gnamptara Sustainability Strategy (GSS) area (Reid *et al.* 2004; Maher *et al.* 2008) and at post-sand mined sites operated by Rocla Quarry Products (Rokich *et al.* 2000, 2002; Turner *et al.* 2006; Rokich & Dixon 2007).

DBCA has established restoration trials in the GSS area annually since 2002 using direct seeding across cleared plantation compartments. The aims of these trials are to determine the most successful and cost-effective techniques for revegetating clear felled pine sites with abundant and diverse native vegetation cover over a broad-scale area. The success of these trials was assessed in 2004 (Reid *et al.* 2004) and 2008 (Maher *et al.* 2008).

4.2 Species Selection

Species selection is now widely recognised as a fundamental and important step in revegetation. The species chosen not only determine the landscape that future generations of people will inherit, but directly influence the success of the revegetation project, the wildlife that will utilise the site, the natural regeneration dynamics, human access and other potential uses and services (including ecosystem services). The vast majority landcare-type projects use local native species. Seed is generally sourced from nearby remnants, although fluctuations in availability and other issues such as remnant condition continue to present ongoing practical and ethical challenges (e.g. genetic mixing and a shortage of seed suppliers).

Species selection is critical for plant survival as well as for maximising the ecological value of the project. Part of the value of each bushland area is in its unique character, and this should be maintained by using plants that occur there naturally and are of local provenance (i.e. are found in the local area). A range of understorey and ground cover species, not just trees, should be planted.

4.3 Site Preparation

There are a number of site preparation techniques that can be utilised prior to planting.

4.3.1 Ploughing, Deep Ripping and Scarifying

The structure of the soil at revegetation sites should be assessed to determine the level of compaction which will give an indication of the level of treatment prior to the planting of tubestock.

Ploughing was an effective and cost-efficient method of soil preparation prior to planting of tubestock. Although deep ripping generated similar results to ploughing, it was the most expensive treatment. Scarifying the soil was the cheapest treatment but resulted in lower establishment rates for seedlings (Maher, 2009; Reid *et al.*, 2004).

4.3.2 Weeds

Seedling establishment of many native woody species is significantly reduced in the presence of annual weed species (Hobbs 2001). Weeds commonly establish after disturbance (Hussey *et al.*, 1997) and often use the disturbance caused by fire as the opportunity to invade an area (Brown & Brooks 2002).

Maher *et al.* (2008) found that weed cover negatively affected species establishment and density at restored trial sites. Higher levels of weed cover reduced the percentage of species that established and density of some species, in particular *Banksia attenuata* and *Eucalyptus tottiana*. However, weed cover did not reduce the density of all species. Some species therefore appear to be more sensitive to competition from weeds.

4.3.3 Fertiliser

Rokich and Dixon (2007) suggest that fertiliser application benefits plant survival and overall plant development within *Banksia* woodland restoration. However, this treatment requires some caution particularly for proteaceous species that are sensitive to phosphorus (Grose, 2013; Lambers *et al.*, 2007).

5 YELLAGONGA REGIONAL PARK

5.1 Background

Yellagonga Regional Park is located approximately 20km north of Perth City and 20km to the south of the Eglinton (Figure 1). The YRP is approximately 13km long from north to south and varies in width from 1 to 1.5km. The YRP comprises 1400 hectares and is primarily focussed on a wetland system that includes Lake Joondalup, Beenyup and Walluburnup Swamps, Lake Goollelal and the surrounding lands reserved in the MRS for “Parks and Recreation”. YRP was recognised in Bush Forever (Site No. 299) due to its regional importance because of its natural, cultural and recreational resources in a rapidly growing suburban area. The Bush Forever description is provided at Appendix 7.

Yellagonga Regional Park provides an important (north/south) link with Neerabup National Park and Yanchep National Park. The YRP contains a wide variety of ecosystems from upland forest, fringing wetland and aquatic vegetation to open water bodies. This rich diversity and complexity of ecosystems has very high conservation value.

The vegetation communities found within the YRP are significant as they are representative of communities once widespread on the Swan Coastal Plain but now significantly cleared. The vegetation on the upland areas surrounding the wetlands was once Jarrah - Marri - Banksia (*Eucalyptus marginata* - *Corymbia calophylla* – *Banksia attenuata*) Open Forest, and Tuart-Jarrah – Marri (*Eucalyptus gomphocephala* - *Eucalyptus marginata* - *Corymbia calophylla*) Open Forest.

Management of YRP is guided by the Yellagonga Regional Park Management Plan 2003-2013 (DEC 2003). The purpose of the Management Plan is to provide broad direction for the protection and enhancement of the conservation, recreation and landscape values of YRP.

The DBCA manages YRP in consultation with the local governments which control the land within the park, namely the Cities of Joondalup and Wanneroo. Areas of responsibility are identified in the Management Zones section of the YRP Management Plan.

5.2 Yellagonga Regional Park Site Description

5.2.1 Landform

The lakes and wetlands of the YRP lie in an interdunal swale of the Spearwood Dune System. The landform within the YRP is representative of similar geological features found elsewhere on the Swan Coastal Plain, having been formed from large sand dunes that over time have become consolidated and stabilised with vegetation. The landform is characterised by relatively high elevation sloping dunes on the western side of the YRP with generally more gentle slopes on the eastern side.

The eastern and southern portions of the YRP are relatively flat with very gentle slopes leading down to Lake Goollelal and Walluburnup Swamp (DEC, 2003).

5.2.2 Geology and Soils

The Spearwood Sands predominate through the western and southern portions of the YRP. The soil consists of a dark brown sandy surface grading into yellow brown or brown sand. Limestone usually occurs within a metre of the surface although depth tends to be variable. Limestone outcrops at the

surface form interesting features on the western edge of Lake Joondalup where subterranean water flows have formed channels and caves through the limestone. The soil varies in fertility, from relatively fertile and moist on the western edges of Lake Joondalup, to freely draining sands which have low fertility on elevated slopes northwest of Lake Goollelal (McArthur and Bartle, 1980).

The general lack of fertile soils in the YRP is an important consideration in the methods and species used in rehabilitation programmes.

5.2.3 Vegetation and Flora

Disturbance and subsequent weed invasion have modified large areas of local vegetation in the YRP. The wetland vegetation is recognised as having high conservation value but, in many areas, is modified by weed invasion and altered water regimes. Woodlands of Flooded Gum (*Eucalyptus rudis*) and Freshwater Paperbark (*Melaleuca raphiophylla*) would once have encircled the wetland but are now fragmented with few intact areas. The emergent aquatic vegetation of local and introduced rushes covers much of the shallow waters with open water beyond. The YRP Management Plan (DEC, 2003) describes the following vegetation as occurring within the park:

Upland Vegetation

The upland vegetation is adapted to the landforms of the Spearwood System with its low fertility and low water holding capacity and the wet winter, dry summer Mediterranean climate. There are few areas of intact upland vegetation remaining. Significant areas of upland vegetation still retain a tree canopy, but local understorey and ground layers are in poor condition with many areas mown and with a parkland appearance. There are three major upland vegetation communities in YRP:

- Jarrah-Marri-Banksia Open Forest

The Jarrah-Marri-Banksia (*Eucalyptus marginata* – *Corymbia calophylla* – *Banksia* spp.) Open Forest mainly occurs on the south west and north east areas surrounding Lake Joondalup and in the south in remnant pockets mainly in the south east portions of the wetlands of Lake Joondalup. The mid-storey species usually comprise Banksias with *Banksia attenuata*, *Banksia menziesii* and *Banksia grandis* with the Sheoak (*Allocasuarina fraseriana*) sometimes present.

- Tuart-Jarrah-Marri Open Forest

The Tuart-Jarrah-Marri (*Eucalyptus gomphocephala* – *Eucalyptus marginata* – *Corymbia calophylla*) Open Forest occurs mainly on the north east side of Lake Joondalup with remnant patches amongst previously cleared areas to the west of the wetlands north of Whitfords Avenue.

- Scattered Tuarts

Scattered Tuarts occur with an understorey of exotic grasses to the east of Walluburnup and Beenyp Swamps and to the north east of Lake Goollelal (Department of Planning and Urban Development, 1992a).

Fringing Wetland Vegetation

The local wetland vegetation on permanently moist soils consists of Flooded Gum (*Eucalyptus rudis*) and freshwater paperbark woodland (*Melaleuca raphiophylla*). Substorey species include *Acacia cyclops* and *Acacia saligna* with rushes extending beneath the overstorey in relatively undisturbed areas. Aggressive grass weeds such as Kikuyu (*Pennisetum clandestinum*), Buffalo (*Stenotaphrum secundatum*) and Couch (*Cynodon dactylon*) are vigorously invading wetland fringes in many areas.

Emergent Aquatic Vegetation

The emergent aquatic vegetation comprises local rushes often invaded by the non-local Bulrush (*Typha orientalis*) which appears to be increasingly impacting on local rush communities. The main emergent aquatic communities comprise:

- *Baumea articulata* occurs in monospecific stands 1-2 metres tall, usually dense when in the open and occurs mainly on inlets within Lake Goollelal and in the north of Lake Joondalup.
- *Baumea articulata* is mixed with the nonlocal Bulrush in various proportions in Beenypup Swamp and on the north east fringes of Lake Goollelal.
- *Typha orientalis* is mixed with the local rush *Schoenoplectus validus*, in dense stands 1.5 to 3 metres tall, to the south and south east of Lake Joondalup and for much of Walluburnup Swamp and the wetlands south to Whitfords Avenue. Stands of mixed *Baumea articulata* and *Schoenoplectus validus* occur to the south of Lake Goollelal.

Flora

Total flora within the YRP has been recorded at 217 taxa including 114 native and 103 weed taxa (DEP 1996, Tauss 1996).

A species list based on plot records from Department of Environment (1996), Gibson *et al.* (1993), Keighery (1996) and Weston *et al.* (1992) is provided at Appendix 6.

No species of Declared Rare Flora have been recorded in the YRP, however several taxa are considered to have significance.

Significant flora within the YRP includes *Jacksonia sericea* (P3) *Conostylis bracteata* (P3), *Hibbertia cuneiformis* (not known to occur naturally north of Port Kennedy), *Amyema miquelii* (uncommon on the Swan Coastal Plain), *Lechenaultia linarioides* and *Ricinocarpus glaucus* (Government of Western Australia, 2000).

Environmental Weeds

The presence of weeds is a major problem within the YRP. The area occupied by weeds continues to grow and unless controlled will lead to the eventual demise of the local vegetation. A survey of weeds found in Yellagonga Regional Park has been carried out (Sage 1997).

Weeds appear to be spreading and are impacting on most native ecosystems in the YRP. In particular Veldt Grass (*Ehrharta calycina*) is impacting on many of the upland areas within the YRP where some sections of the understorey have been largely replaced by the weed. Other major weeds in upland areas include Wild Oat (*Avena fatua*), Two Leafed Cape Tulip (*Moraea miniata*), Bridal Creeper

(*Asparagus asparagoides*), Caltrop (*Tribulus terrestris*), Giant Reed (*Arundo donax var. donax*), Geraldton Carnation Weed (*Euphorbia terracina*), Mossman River Grass (*Cenchrus echinatus*) and Fennel (*Foeniculum vulgare*) (DEC,2003).

Aggressive grass weeds such as Kikuyu, Buffalo and Couch are vigorously invading wetland fringes in many areas. Additionally, Arum Lily (*Zantedeschia aethiopica*), Blackberry (*Rubus fruticosus*) Castor Oil (*Ricinus communis*), Pampas Grass (*Cortaderia selloana*) and Cape Tulip (*Moraea flaccida*) have the potential to significantly impact on the wetland areas of the YRP.

Fauna

Many birds inhabit the woodland and wetland areas of YRP. Of the 122 species recorded in the YRP 18 are known to breed in the area (Royal Australasian Ornithologists Union (RAOU) survey 1996D, Bamford and Bamford, 1990).

Carnaby's Black Cockatoo are known to frequent foraging habitat within YRP.

The presence of foxes, feral cats and the European Rabbit are having an impact on native fauna and flora in the YRP.

Cultural Heritage

The following Aboriginal sites registered with the Department of Indigenous Affairs are located within and adjoining Yellagonga Regional Park:

- S00160 – Lake Joondalup West;
- S01288 – Lake Joondalup North-West;
- S02187 – Lake Joondalup;
- S02321 – Lake Joondalup South-West;
- S02538 – Joondalup Caves;
- S02186 – Lake Goollelal;
- S0437 – West Walluburnup Swamp;
- S02539 – Bonorin Hill;
- S02279 – Wanneroo Scar Tree;
- S02572 – Joondalup Waugal Egg; and
- S02573 – Joondalup Drive Trees.

6 SPECIES SELECTION

6.1 Objective

Condition 11 requires the revegetation at YRP is to include “primary feeding plants for CBC”. Therefore, the plant species mix needs to focus on CBC foraging species that naturally occur in Yellagonga Regional Park (YRP) but also include as many species used by CBC for foraging that would occur at both YRP and Eglinton East.

In addition, for the purposes of long-term management of the revegetation sites, the long-term objective should be to restore a sustainable natural ecosystem appropriate to the YRP landscape, i.e. establish both an overstorey and understorey of native plants that suppresses weed growth and can regenerate naturally after disturbance events such as fire. This will require the inclusion of non-CBC food plants in the species lists.

Table 4: Yellagonga Regional Park Revegetation Site Descriptions

YRP Revegetation Site	Proposed Revegetation	Soil and Landform
1A	Jarrah-Marri-Banksia Open Forest	Upland - Spearwood Soils
1B	Tuart-Jarrah-Marri and Jarrah-Marri-Banksia Open Forest <i>Eucalyptus rudis</i> and <i>Melaleuca raphiophylla</i> on wetland margins.	Upland - Spearwood Soils Mid-lower slopes – Transition Soils Lower slope - Fringing Herdsman wetland soil on east end
2	Tuart-Jarrah-Marri and Jarrah-Marri-Banksia Open Forest <i>Eucalyptus rudis</i> and <i>Melaleuca raphiophylla</i> on wetland margins.	Upland - Spearwood Soils Mid-lower slopes – Transition Soils Lower slope - Fringing Herdsman wetland soil on east end
3	Tuart-Jarrah-Marri and Jarrah-Marri-Banksia Open Forest <i>Eucalyptus rudis</i> and <i>Melaleuca raphiophylla</i> on wetland margins.	Spearwood Soils Mid to lower slopes fringing Herdsman soils on east end

The revegetation sites consist of three soil and landform unit (Table 4):

- Upland - Spearwood Soils;
- Mid-lower slopes –Spearwood soils transitioning to Herdsman Soils; and
- Wetland margin - Herdsman Soils.

Therefore, three plant species lists will need to be developed for upland, mid-lower slope and fringing wetland areas.

6.2 Methodology

To develop the species list the following steps will occur:

6.2.1 Plant species at Eglinton East in Carnaby's Black Cockatoo Habitat:

Determine Eglinton East plant communities delineated as Carnaby's Black Cockatoo Feeding Habitat by comparing Figure 9 (PGV Environmental 2010) and "Carnaby's Black Cockatoo Habitat and Vegetation Condition" map (PGV Environmental 2013):

- BaBm *Banksia attenuata* and *B. menziesii* Low Woodland
- BaBmXp *Banksia attenuata* and *B. menziesii* Low Woodland over *Xanthorrhoea preissii*
- BaBmJf *Banksia attenuata* and *B. menziesii* Low Woodland over *Jacksonia furcellata*
- Ds *Banksia sessilis* (previously *Dryandra sessilis*) Open to Closed Heath
- DsHt *Banksia sessilis* and *Hakea trifurcata* Open to Closed Heath
- CqDs *Calothamnus quadrifidus* and *Banksia sessilis* Open to Closed Heath*

*ATA Environmental (2005) Vegetation Associations

Determine plant species present in each of these communities using PGV Environmental 2013 "Alkimos-Eglinton Composite Flora List", original references and site visits if required. Identify key species likely to be "primary feeding plants for Carnaby's Black Cockatoo".

6.2.2 Plant species at Yellagonga Regional Park once in Carnaby's Black Cockatoo Habitat

Determine plant communities once present at designated revegetation sites in YRP using available references, historical aerial photography and site visits if required. During the initial site visit (7th June 2013) within the remnant vegetation adjacent to the revegetation sites the following plant communities were identified:

- Marri (*Corymbia calophylla*) forest (with occasional Jarrah and Tuart),
- *Banksia prionotes* forest (with some *B. ilicifolia*, *B. menziesii* and *B. attenuata*) and;
- Flooded gum (*Eucalyptus rudis*) and Freshwater Paperbark (*Melaleuca rhaphiophylla*) woodland.

Determine plant species present in each of these communities using available references and site visits if required. Identify key species that are major components of these ecosystems and those listed as "feeding plants for Carnaby's Black Cockatoo".

6.2.3 Selecting plant species suitable for revegetation at YRP

The species list for the revegetation sites will be developed in consultation with DBCA with final approval to be obtained from DBCA. The final list will be compiled using the Eglinton plant species list and the YRP plant species lists and focusing on:

- Primary feeding plants for Carnaby's Black Cockatoo; and

- Restoring a sustainable natural ecosystem at Yellagonga Regional Park with species appropriate to the landscape.

The following key CBC species will be included in the final list of species to be used in revegetation at YRP (Table 5).

Table 5: Key Yellagonga Regional Park CBC Foraging Species

Plant	Common Name	Priority for planting for Carnaby's*
<i>Acacia saligna</i>	Orange Wattle	Low
<i>Banksia attenuata</i>	Slender Banksia	High
<i>Banksia dallanneyi</i>	Couch Honey-pot Dryandra	Low
<i>Banksia grandis</i>	Bull Banksia	High
<i>Banksia littoralis</i>	Swamp Banksia	High
<i>Banksia menziesii</i>	Firewood or Menzies' Banksia	High
<i>Banksia prionotes</i>	Acorn Banksia	High
<i>Banksia sessilis</i>	Parrot Bush	High
<i>Corymbia calophylla</i>	Marri	High(feeding, roosting, breeding)
<i>Eucalyptus gomphocephala</i>	Tuart	High (feeding, roosting or breeding)
<i>Eucalyptus marginata</i>	Jarra	Medium (feeding, roosting)
<i>Eucalyptus rudis</i>	Flooded Gum	Low (roosting only)
<i>Hakea lissocarpa</i>	Honeybush	Medium
<i>Hakea prostrata</i>	Harsh Hakea	High
<i>Hakea ruscifolia</i>	Candle Hakea	Medium
<i>Jacksonia furcellata</i>	Grey Stinkwood	Medium
<i>Xanthorrhoea preissii</i>	Grass Tree	Medium

*Groom 2011 (Plants Used by Carnaby's Black Cockatoo, DEC)

The agreed species list will have consideration of the most likely revegetation technique for success using data from DBCA's Banksia Woodland Restoration Project to Identify:

- Those likely to grow from propagules (seeds, rhizomes, tubers) from the Eglinton East transferred topsoil;
- Those that can be grown from seed (of appropriate local provenance) either by nursery propagation and then planting or by direct seeding;
- Those that can be grown from cuttings or division (of plant material of appropriate local provenance) by nursery propagation and then planting; and
- Recalcitrant species requiring more specialised propagation.

Tranen, DBCA and PGV Environmental worked collaboratively to determine the species list for the rehabilitation at YRP. The final list is provided at Appendix 9.

7 EGLINTON CLEARING AND REVEGETATION MANAGEMENT PLAN

7.1 Objectives

The key objectives are:

- Establish 1.9ha of primary CBC foraging species within the POS areas identified in Attachment A of the EPBC Approval; and
- Establish 50% of the streetscapes in the development with primary CBC foraging species.

7.2 Vegetation Removal

The removal of vegetation from each subdivision is guided by a specific Vegetation and Fauna Management Plan (VFMP) as required by the City of Wanneroo.

The VFMP details specific pre-clearing protocols such as protection of vegetation to be retained, fauna management, vegetation clearing, mulching woody material, waste management, dust and erosion management and contract staff management requirements.

7.3 Revegetation Onsite

The purpose of the revegetation areas on the Eglinton site is to create foraging habitat for CBC that is suitable for drainage and active recreational POS.

The landscape design for POS areas AA, AC, AD, AF, and T will be prepared as part of the subdivision works for each relevant stage of development. The landscape concept design and planting schedule for each POS will be provided to the Department in the annual Compliance Report required under Condition 3 of the 2010/5777 EPBC Approval to demonstrate that 10% (1.9ha overall) of the POS areas has been landscaped with known primary CBC foraging species.

Ten percent of each of these POS areas will be revegetated with primary CBC foraging species providing an overall 1.9ha of future foraging habitat. The revegetation will largely focus on tube stock plantings and relocation of salvaged Grass Trees.

Management of these areas is to be undertaken by the Proponent during inception and development stages. Following completion, management and maintenance of the open space areas is to be handed over and undertaken by the City of Wanneroo.

7.3.1 Public Open Space

The Public Open Space areas identified in Figure 5 are largely for drainage and recreation purposes and as such will be completely cleared and re-contoured as part of subdivision works. Approximately 10% of each of the POS areas (1.9ha overall) will be landscaped with known primary CBC foraging species.

The detailed landscape and engineering design for the POS areas will be prepared at each relevant stage of subdivision.

7.3.2 Fencing

It is unlikely that the POS areas identified in Figure 5 will retain any native vegetation. If, however the subdivision and civil design indicates that CBC foraging habitat within the POS areas can be retained these areas will be fenced and curtailed prior to preconstruction activity.

7.3.3 Species List

The indicative CBC foraging species list for the revegetation works at Eglinton has been prepared in consultation with the project's Landscape Architects. The species have been further supplemented with suitable species from the *Plants used by Carnaby's Black Cockatoo* (DEC, 2011) (Appendix 4). The indicative species list is shown below in Table 6.

Table 6: Eglinton Indicative Species List for Public Open and Space and Streetscapes.

Species	Common Name	Growth Form
<i>Agonis flexuosa</i>	Peppermint Tree	Tree
<i>Allocasuarina humilis</i>	Dwarf Sheoak	Medium Shrub
<i>Banksia ashbyi</i> 'Dwarf'	Ashby's Banksia	Low Medium Shrub
<i>Banksia attenuata</i>	Slender Banksia	Tree
<i>Banksia blechnifolia</i>	Southern Blechnum banksia	Low Shrub
<i>Banksia menziesii</i>	Firewood Banksia	Tree
<i>Callistemon viminalis</i>	Captain Cook Bottlebrush	Tall Shrub
<i>Corymbia ficifolia</i>	Red Flowering Gum	Tree
<i>Eremophila glabra</i> 'Kalbarri Carpet'	Kalbarri Carpet	Low Shrub
<i>Eucalyptus gomphocephala</i>	Tuart	Tree
<i>Eucalyptus tottiana</i>	Coastal Blackbutt	Tree
<i>Grevillea preissii</i> 'Sea Spray'	Salt Spray	Medium Shrub
<i>Hakea lissocarpa</i>	Honey Bush	Small Shrub
<i>Hakea ruscifolia</i>	Candle Hakea	Medium Shrub
<i>Hakea trifurcata</i>	Two Leaved Hakea	Tall Shrub
<i>Xanthorrhoea preissii</i>	Grass Tree	Grassy or Strappy

7.3.4 Planting Methodology

Plants should be installed as tubestock, 140mm or 200mm as a minimum with a native plant fertiliser tablet, such as Typhoon or similar. All newly planted areas will have a 75mm layer of bark mulch applied.

Plants are to be planted in random mixes at the required spacing in creating a naturalistic specie arrangement as would be generated in nature.

All plants shall be vigorous, well established, hardened off, of good form consistent with species or variety, not soft or forced, free from disease and insect pests, with large healthy root systems and no evidence of having been restricted or damaged. Trees shall have a single leading shoot.

7.3.5 Streetscapes

Native trees suitable for CBC will be utilised in streetscapes throughout the development area. These will be established by the Proponent following construction of roads. The trees will be maintained by Proponent until handover of the street environments to the City of Wanneroo.

To demonstrate that 50% of streetscapes have been planted with CBC foraging species, the landscape masterplan for each stage of development will be provided to the Department in the annual Compliance Report required under Condition 3 of the 2010/5777 EPBC Approval.

To minimise Carnaby's Black Cockatoos striking vehicles, these plantings must not be planted within 30m of roads with a speed limit of greater than 60 km/hour.

Following completion, management and maintenance of streetscape and road reserve areas is to be undertaken by the City of Wanneroo.

7.4 Weed Management

A complete post emergent herbicide programme shall be implemented to control and manage unwanted weeds and grasses. These weeds and grasses will include the following species:

- Crab Grass (*Digitaria spp.*)
- Johnson Grass (*Sorghum halepense*)
- Onion Grass (*Romulea rosea*)
- Medick Clover (*Medicago lupulina*) and
- All broad leaf weeds

7.5 Transfer of Public Open Space to the City of Wanneroo

The POS AA, AC, AD, AF, and T areas will be ceded to the CoW at each relevant stage of subdivision once the POS has been landscaped.

The typical maintenance period for works in relation to a POS area is normally for 2-year period. This is determined from the date of Practical Completion of the site landscape works by the appointed Contractor. Handover to the CoW may occur at some stage during the second year period.

Should the maintenance be handed to the City of Wanneroo at some time during the second year period the Client shall only be liable to pay for the maintenance as undertaken by the landscape Contractor up to the Council handover date without any penalty.

8 YELLAGONGA REVEGETATION MANAGEMENT PLAN

8.1 Objectives

The primary objective for the YRP revegetation sites is to create future CBC foraging and roosting and habitat. Whilst the primary objective is to create CBC habitat, the project will restore an ecosystem closely resembling the pre-cleared species composition to provide habitat for a range of flora and fauna species.

8.2 Revegetation Sites

The intent of the EPBC conditions is to offset the impacts of clearing CBC habitat at Eglinton through the following activities:

- Create 12.7ha of CBC habitat at YRP;
- Establish 1.9ha of known primary CBC foraging species within drainage and recreation POS at Eglinton; and
- Provide 50% of known primary CBC foraging species in streetscaping at Eglinton.

The DBCA Regional Parks Unit has identified four areas totalling 12.7ha of completely degraded habitat within YRP that are suitable for revegetation with primary known CBC foraging species (Attachment 2). The location of the revegetation sites is shown in Figure 1.

The sites were selected against the following criteria:

- The sites need to be already protected within a conservation park and appropriately zoned to ensure that the sites have long term security of tenure and ongoing management;
- Open areas with no native understorey and with scattered to no trees to allow easy spreading of topsoil and vegetative material; and
- The surrounding vegetation should contain CBC plant food sources and preferably be known as CBC feeding areas.

YRP has different geomorphic values to Eglinton however the revegetation sites would have originally contained CBC habitat. Tranen Revegetation Systems currently hold a stock of seed from the Eglinton Proposal area and will source provenance tubestock species suited to the natural area at YRP.

The locations of the YRP revegetation sites are shown in Figure 3 and described below in Table 7.

Table 7: Yellagonga Regional Park Revegetation Site Descriptions

Site	Size (ha)	Description	Current Condition
1a	3.49	Extensively cleared with some Marri trees over weeds in the north east corner	Completely Degraded
1b	2.61	Extensively cleared with isolated trees on western boundary (including a large <i>Ficus microcarpa</i> var. <i>hillii</i>) over weeds and wetland fringe	Completely Degraded
2	1.2	Extensively cleared, predominantly weeds and wetland fringe.	Completely Degraded
3	5.4	Extensively cleared with isolated trees and shrubs mid-slope and wetland fringe	Completely Degraded

The condition of the four revegetation sites is rated as Completely Degraded. The sites have been historically cleared and consist of bare paddocks with, in some cases, isolated remnant trees. The dominant weed species include particularly Guildford Grass (*Romulea rosea*), Lovegrass (*Eragrostis curvula*), Lupins (more on the mid-slopes), Veldtgrass (patchy), Broad leafed daisy (Probably *Taraxacum officinale*) and Pigface (*Carpobrotus edulis*) mostly on the lower parts of Sites 2 and 3, and Couch (*Cynodon dactylon*).

8.2.1 Tenure

The four YRP revegetation sites are owned in freehold by the WAPC and managed by DBCA under a *Conservation and Land Management Act 1984* management agreement.

In future, the four sites will be included in reserves created from the WAPC freehold land. The reserves are to be vested in the Conservation Commission of Western Australia for the purpose of Conservation Park.

8.2.2 Management

The YRP Management Plan identifies that the four sites are to be used for natural environment uses and passive recreation.

8.3 Site Preparation

The four sites are completely degraded and will require the same site preparation techniques.

1.1.1 Weed Control

Weeds are normally the greatest factor affecting revegetation success. If weeds are effectively controlled, then the likelihood of the project being a success are significantly improved. Weed control will commence as soon as possible at the offset sites to prevent new weed seed from being generated, and to exhaust the existing weed seed bank, regardless of when revegetation activities commence.

The YRP sites are presently mostly completely degraded, which allows for the boom spraying of broad-spectrum herbicides (i.e. glyphosate) targeting the widest range of species. As this technique is indiscriminate, it should only be employed in areas where there is no threat of off-target damage to

remnant native vegetation. In areas unsuitable for boom spraying, targeted spot spraying will be undertaken. As most weeds are likely to exist as seeds in the soil surface layer, an effective method of controlling weeds will be to scalp away the surface topsoil into narrow windrows or into a separate pile to one side. The need for treatment of weeds should therefore be reduced.

Pre-emergent herbicide is effective in killing seeds as they germinate and may be considered for use in some areas on the approval of DBCA.

Herbicide spraying will only be undertaken by operators who:

- Are appropriately qualified and licensed in herbicide application;
- Have demonstrated experience in the ability to identify, and distinguish between, native and weed species; and
- Are familiar with the most appropriate control measures, timing, herbicides, and application rates for the target species.

8.3.1 Earthworks

The sites will require ripping to break compaction and promote plant growth

8.3.2 Site Protection

The potential for rapid, widespread and lasting damage to plants and seedlings through fauna predation on the offset sites is high. In 2007 Main Roads WA undertook a trial in nearby Neerabup Regional Park, testing eight different kangaroo deterrent treatments and the effect that these had on planted seedling survival rates (NMCG 2008). The most effective treatment in terms of both plant survival and species richness was the installation of a 1.8 m chain link exclusion fence. Whilst this fence did restrict kangaroo activity, it did not restrict rabbits. Losses in the fenced plot after 10 weeks due to predation were 7%, but in the control plot 50% losses were recorded due to predation in the same period.

To minimise risk and ensure a successful outcome, fauna control measures are required. The Regional Parks Unit uses a standard 1.2m agricultural fence across all of the parks which kangaroos can easily clear. In this circumstance, DBCA has agreed to the construction of a 1.8 m tall chain link fence around the areas to be revegetated. Eglinton will construct the fence with a buried rabbit proof skirt that will provide the greatest level of protection for all plants. Once the site is fenced, rabbit control will be undertaken in accordance with the Regional Parks Pest Animal Control Plan. Eglinton will remove the 1.8m fence when the completion criteria for the revegetation project have been met and the original 1.2m agricultural fence will be reinstated. Should DBCA determine to keep the 1.8m fence in place beyond the five-year monitoring period to continue to provide protection from grazing animals, Eglinton will not be responsible for removing the fence.

Although the soil will be exposed following removal of weeds and before native vegetation establishes, soil erosion is expected to be relatively minor during this period. Large established trees surround most of the sites, providing a natural windbreak. In areas that are not protected by trees and are exposed to high winds, shade cloth may be attached to the perimeter fences to provide a barrier to the wind. The western half of Site 1A is located at the top of a ridge that slopes to the east. Parts of this site may be exposed to the summer easterly winds, and temporary internal windbreak fencing may also be required.

8.4 Planting Design, Planting Schedule and Revegetation Timeframes

The planting design and schedule for each rehabilitation site will be prepared from the approved species list provided at Appendix 9.

The detailed planting design and schedule will be submitted to the Department in the annual Compliance Report required under Condition 3 of the 2010/5777 EPBC Approval to demonstrate that the 12.7ha of revegetation at YRP has been designed and the final number of species identified.

8.5 Methodology

8.5.1 Seedling Planting

Seedling planting is the most reliable revegetation technique when seedlings are cared for and planted at the appropriate time of year. In a typical year planted seedling survival rates are expected to be in the order of 60 – 90% (based on monitoring of over one million seedlings planted by Tranen), making it a much more reliable technique than direct seeding.

Seedlings typically grown in Perth vary significantly in size from cell trays (34mm x 34mm x 50mm) to deeper rooted forestry tubes (50mm x 50mm x 120mm). Tubestock size is important for survival, especially in fast drying nutrient and structure poor sandy soils such as those found at the Yellagonga offset sites. Forestry tubes will be primarily used in the revegetation program, as by placing the active roots deeper into the soil profile they are less susceptible to soil moisture fluctuations and survival rates will therefore be optimised.

Assuming a seedling survival rate of 80% (which might be expected during normal weather conditions) and a final plant density requirement of 1.6 plants/m², the seedling planting rate when used as a stand-alone revegetation technique therefore should be 2 plants/m².

In a recent study into *Banksia attenuata*, low-phosphorus native plant fertiliser tablets were found to increase growth significantly (Grose, 2013). Therefore all seedlings will have one 10 g low-phosphorus fertiliser tablet buried adjacent to the rootball of each seedling.

The species to be planted will be the predominant *Banksia* species of the area together with the appropriate *Eucalyptus* and *Allocasuarina* species. The strategy is to establish all strata, through tubestock plantings and continue intensive weed control.

All species are to be grown in forestry tubes 50 x 50 x 125mm.

8.5.2 Completion Criteria

In order for a site to be considered rehabilitated (or progressing satisfactorily towards being rehabilitated) a number of factors need to be considered in both the short and long term, with the most appropriate factors to this site being:

- Native plant density;
- Species richness;
- Weed competition; and
- Ecological processes (i.e. flowering and reproduction, fauna utilisation, etc.).

By setting target levels for these factors, a quantitative measure of progress can be made. Should the required levels not be achieved, not only will this trigger remedial action, but will also determine the extent of the action required.

Completion criteria need to be practically achievable, without compromising the long-term goals of the project.

Table 11 was left in draft form in previous versions of the CRMP pending surveys in nearby remnant bushland as well as in Eglinton to determine realistic values rather than determine the criteria on an arbitrary basis. PGV Environmental undertook the necessary surveys to determine the completion criteria in August 2017 (Appendix 10).

Based on the survey results (Appendix 10) the completion criteria are detailed in Table 8.

Table 8: Yellagonga Regional Park Revegetation Sites Completion Criteria

Native species category	Species Richness	Density	CBC Species
Trees	100% of $2.0/100\text{m}^2 = 2.0/100\text{m}^2$	540 stems per hectare	1700 stems per hectare
Large shrubs	80% of $2.3/100\text{m}^2 = 1.8/100\text{m}^2$	525 stems per hectare	
Other (shrubs, herbs, sedges etc)	60% of $12.8/100\text{m}^2 = 7.7/100\text{m}^2$		

Weed Species

The listing of a species as a Declared Plant and the rankings assigned to various weeds within the *Environmental Weed Strategy for Western Australia* (Department of Conservation and Land Management, 1999) based on weed distribution, invasiveness and impacts, allows the weeds present at the sites to be prioritised into groups.

Need to provide list of all weed species present at both sites and prioritise in accordance with the weed strategy.

Weed Completion criteria:

- No introduction of new weed species to the rehabilitation sites
- Maintain weed cover to less than 10% across the entire rehabilitation site
- Target priority weed species outlined in the above list aiming for eradication across the entire rehabilitation site (i.e. individual weed cover shall not exceed 5%)

During site visits whilst on ground works are being carried out, informal monitoring of the site will be carried out by the on-ground Project Managers, and the works contractor to ensure that any issue arising such as plant death or grazing can be attended to in a timely manner.

8.6 Monitoring

Monitoring of revegetation activities within the YRP revegetation sites will occur twice annually in spring and autumn for a minimum of five years after planting, to demonstrate progress towards the completion criteria. Monitoring will include an assessment of weeds present and signs of pest animal species such as rabbits and kangaroos.

Two monitoring methods will be implemented for each site, namely:

- Three photo monitoring points will be set up in each of the four areas to enable comparison of the area over time, and
- Three monitoring plots 10 m x 10 m will be set up in each of the four areas.

An annual report will be provided to the DBCA describing the monitoring outcomes, along with any recommendations on the need for infill planting, weed and/or pest control. This document will also contribute to reporting requirements associated with the Commonwealth environmental approvals process.

In the event Dieback (*Phytophthora cinnamomi* or some other species) is suspected as being the cause of the decline, discussions with the DBCA and Department will occur to review and refine the revegetation plan and completion criteria as appropriate.

8.7 Carnaby's Black Cockatoo Monitoring Program

It is also proposed that at year 2018 an annual CBC monitoring program be undertaken within the revegetation areas at Eglinton and YRP to determine CBC activity.

The DBCA are developing a standard methodology for monitoring CBC, the design and methodology of the monitoring program will be discussed with the DBCA and provided as an addendum to this CRMP.

9 IMPLEMENTATION TIMEFRAME AND RESPONSIBILITIES

9.1 Implementation Schedule

The management actions listed in Table 9 below outline the prescribed actions for implementing the CRMP at YRP and Eglinton. The table addresses the actions listed in the Sections 7 and 8 of this document and outlines relevant timing for implementation. The following phases are referred to in the management action table:

- Pre-construction (PC) refers to the period prior to any clearing of CBC habitat at Eglinton with the exception of the area shown in yellow in Attachment D of the EPBC Approval (Appendix 1);
- Construction (C) refers to the period of initial clearing from the Eglinton site;
- Revegetation (R) refers to the actions to be undertaken at YRP; and
- Ongoing (O) refers to an action that should be ongoing for the life of the project (ie final stage of Eglinton development).

9.2 Responsibility

Eglinton is responsible for a number of preliminary actions that will inform the preparation of the final species list for the YRP sites. The DBCA and Tranen worked closely with Eglinton to finalise the species list which was provided to the Department in the annual Compliance Report.

The implementation of the CRMP will be the responsibility of Eglinton through their Environmental Consultants and Tranen.

9.3 Timeframe

The timeframe for the project is approximately 17 years with the final stage of the development scheduled for completion in 2031, however this is dependent on market conditions.

The YRP revegetation component will be completed ten years post planting.

The indicative schedule for the CRMP is shown below in Table 9.

Table 9: CRMP Actions and Timing

Key Tasks	Phase	Action	Action	Purpose	Priority	Timeframe	Responsibility	Status
Species Selection Strategy	PC	1	Determine Plant Communities once present at YRP revegetation sites.	To restore sustainable ecosystem at YRP	H	2013	Eglinton/PGV/DBCA	Complete
	PC	2	Identify CBC foraging species present in each plant community.	To ensure correct provenance of the species being used for revegetation and maximise survival rate	H	2013	Eglinton/PGV	Complete
	PC	3	Develop an agreed approach for selecting species for revegetation from Eglinton and YRP species lists.	Restore sustainable ecosystem at YRP	H	2013	Eglinton/DBCA	Complete
	PC	4	Identify revegetation technique for each species.	Focus on species that have high rate of return to provide early CBC habitat and are cost effective to establish.	H	2013	Tranen/PGV	Complete
	PC	5	Set Completion Targets	To determine end of revegetation project	H	2013	Eglinton/PGV/DBCA	Complete
	PC	6	Design monitoring program	To ensure success of revegetation works.	H	2013	Eglinton/PGV/Tranen	Complete
	PC	7	Provide the species list and completion criteria in the annual Compliance Report provided to the Department to meet Condition 3 of the EPBC 2010/5777 approval.	Keeping the Department informed an ensuring compliance with EPBC Approval	H	2013	Eglinton/PGV	Complete
YRP Planting Schedule	PC	8	Prepare planting design and schedule for YRP sites based on agreed species list	To inform the design of the CBC habitat.	H	2013	Eglinton/Tranen	Complete
	PC	9	Discuss with the DBCA and agree on planting design and schedule	To have an agreed approach to the YRP revegetation	H	2013	PGV/Tranen/DBCA	Complete

Key Tasks	Phase	Action	Action	Purpose	Priority	Timeframe	Responsibility	Status
	PC	10	Provide the planting design in the annual Compliance Report provided to the Department to meet Condition 3 of the EPBC 2010/5777 approval.	Keeping the Department informed an ensuring compliance with EPBC Approval	H	2013	Eglinton/PGV	Complete
Eglinton Revegetation Plan								
	O	11	Provide landscape design package for POS areas AA, AC, AD, AF and T in the annual Compliance Report at the relevant stage of subdivision to demonstrate revegetation of 10% of each POS with CBC foraging species. The package will include layout of POS, CBC species to be established, completion criteria as per City of Wanneroo requirements, ongoing maintenance and timeline for transfer of POS to the City of Wanneroo.	To create 1.9 ha of CBC foraging species at Eglinton	M	2013-2031	Eglinton/Emerge/PGV	Ongoing
	O	12	Establish 50% of streetscapes with suitable CBC foraging species.	To establish future CBC foraging species in accordance with the EPBC Approval	M	2013-2031	Eglinton/Emerge/PGV	Ongoing
YRP Revegetation Plan	C	13	Contract a qualified rehabilitation and revegetation contractor to undertake on-ground planning for and revegetation works across the YRP sites.	To ensure success of revegetation works	H	2013	Eglinton/PGV	Ongoing
	PC	14	Prepare revegetation site works plan, schedule and costs.	Detailed plan of works	H	2013	Tranen/PGV	Ongoing

Key Tasks	Phase	Action	Action	Purpose	Priority	Timeframe	Responsibility	Status
	PC	15	Review site works and revegetation plan with DBCA.	Agreed approach for the revegetation and site works.	H	2013	Eglinton/Tranen/PGV/DBCA	Complete
	C	16	Discuss community participation with DBCA. DBCA to keep local community informed of project and to manage communication with Local Groups (note DBCA to manage community process).	Keep community informed about project	M	2013	Eglinton/PGV/DBCA	Ongoing
	C	17	Implement weed management, ripping, and fencing as per site works plan	Site to be prepared prior to first delivery of topsoil	M	2014	Tranen	Ongoing
	R	18	Signs indicating that rehabilitation work is occurring should be erected along the fence lines (e.g. No access – rehabilitation in progress). DBCA Regional Parks Unit standard signs to be used.	Keeping the public informed	L	2013-2019	Eglinton	Ongoing
		19	Minimise the use of herbicides in riparian areas.	Protect wetland ecosystems from herbicide run-off		2014-2019	Tranen	Ongoing
	R	20	tubestock planting	To maximise species for CBC habitat	M	2014-2018	Tranen	Ongoing
	R	21	Implement vegetation monitoring program.	Monitor success of revegetation	M	2014	PGV/Tranen	Ongoing
	R	22	Undertake short term monitoring of weed control success to identify any outbreaks following weed removal or suppression.	To manage weed outbreaks post planting	L	2014-2016	Tranen	Ongoing
	R	23	Supplement with infill planting when required.	To ensure completion criteria is met	L	2014-2019	Tranen	Ongoing
	R	24	Site maintenance to be carried out. This will include maintenance of tree guards and perimeter	To minimise impacts to new CBC habitat	L	2014-2019	Tranen/DBCA	Ongoing

Key Tasks	Phase	Action	Action	Purpose	Priority	Timeframe	Responsibility	Status
			fence, weed management and rabbit control as required.					
	R	25	Design a monitoring survey for future CBC activity.	To determine if new habitat is being visited by CBC	L	2016	Eglinton/PGV	Ongoing
	R	26	Discuss community monitoring of CBC activity once YRP phase is complete.	To encourage community ownership of new habitat	L	2016	Eglinton/PGV/DB CA	Ongoing
	O	27	Monitor CBC activity on a biannual basis five years post revegetation.	To determine if revegetation project has met primary objective of providing CBC with foraging opportunities	L	2019-2031	Eglinton/PGV/DB CA	Ongoing
	R	28	Handover YRP sites to the DBCA		L	2019	Eglinton	Ongoing

Table 10: Indicative Timeframes

Key Tasks	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-31
YRP Species List										
YRP Site Preparation										
YRP Revegetation										
Eglinton Establish CBC Foraging Species in POS and Streetscapes										

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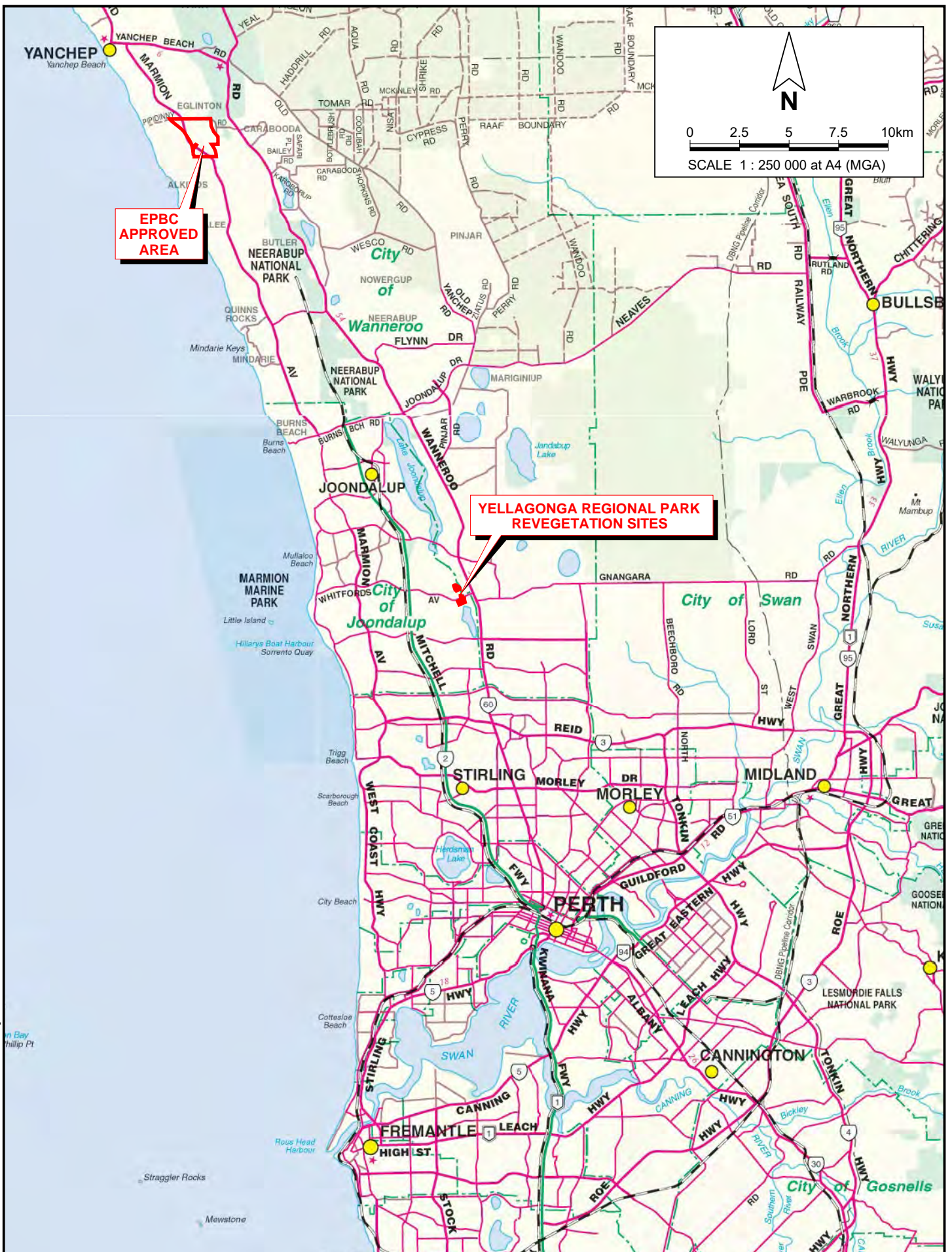
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FIGURES





NOTES

- 1) An easement of up to 32 metres may be required for the proposed 132kV overhead transmission line. This may have implications on adjacent land uses. Final width of the easement and the location of the substation will need to be confirmed as part of the future structure planning of Centre Zones.
- 2) Location of the proposed Water Corporation Groundwater Bore Sites and associated 300 metre Well Head Protection Zones is indicative only, to be confirmed at subdivision stage.

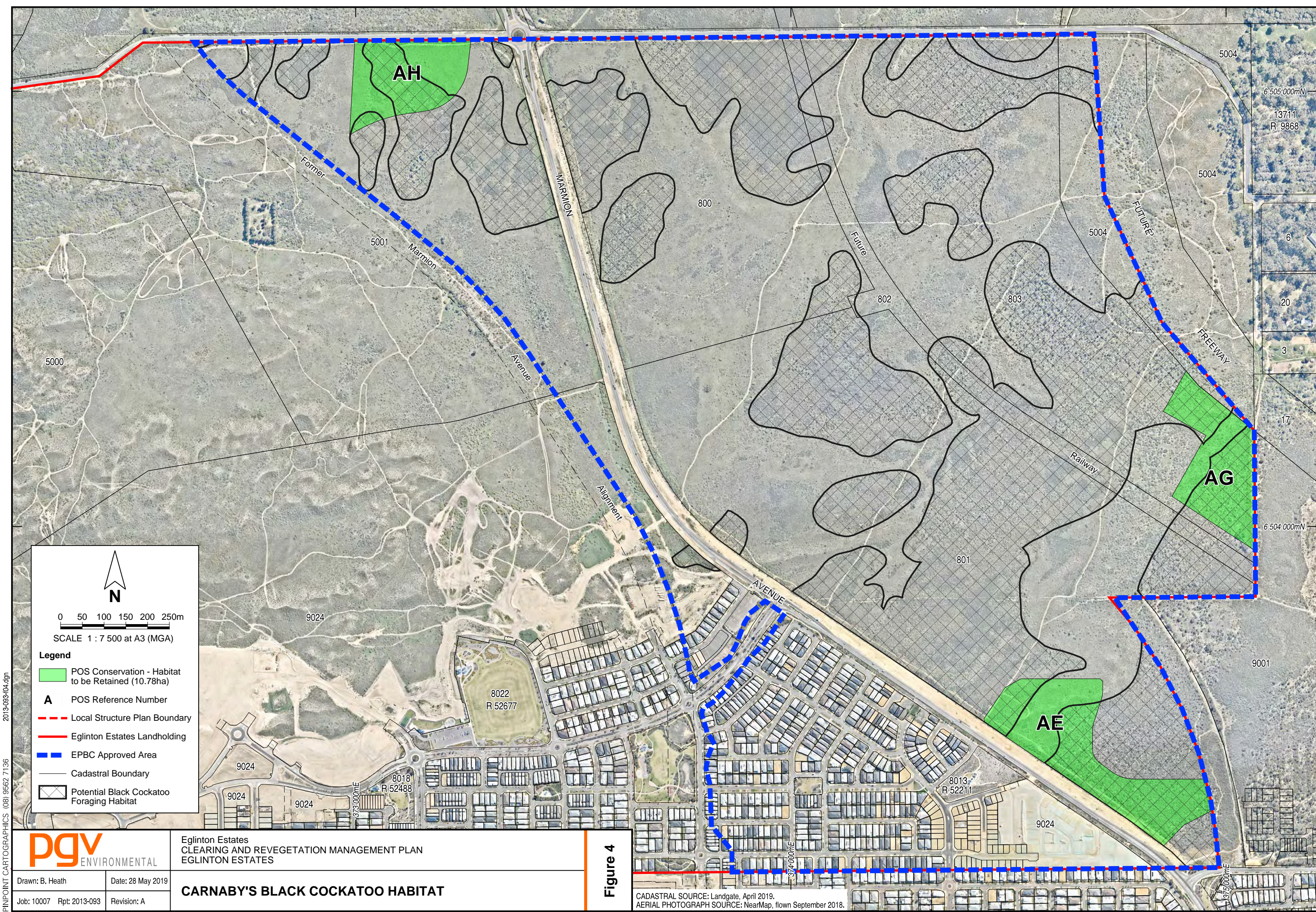
- 3) Road locations linking to other land holding outside the structure plan boundaries are indicative only and subject to further planning.
- 4) The location of the Possible Private School is indicative only. Should a future development of an Education Establishment be proposed through a subdivision and/or development application, it will be subject to a detailed traffic analysis and assessment against relevant planning policies, including Liveable Neighbourhoods.

SOURCE: Plan No. EGL191L, 30-10-17.

<p>pgv ENVIRONMENTAL</p>	
Drawn: B. Heath	Date: 20 May 2019
Job: 10007 Rpt: 2013-093	Revision: A

<p>Eglinton Estates CLEARING AND REVEGETATION MANAGEMENT PLAN EGLINTON ESTATES</p>	
<p>EGLINTON LOCAL STRUCTURE PLAN</p>	





N

050100150200250m

SCALE 1 : 7 500 at A3 (MGA)

Legend

POS Conservation - Habitat to be Retained (10.78ha)

A

POS Reference Number

Local Structure Plan Boundary

Eglinton Estates Landholding

EPBC Approved Area

Cadastral Boundary

Potential Black Cockatoo Foraging Habitat

2013-093-104.dgn
PINPOINT CARTOGRAPHICS (08) 9562 7136

pgv

ENVIRONMENTAL

Drawn: B. Heath

Date: 28 May 2019

Job: 10007 Rpt: 2013-093

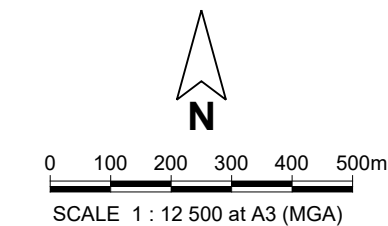
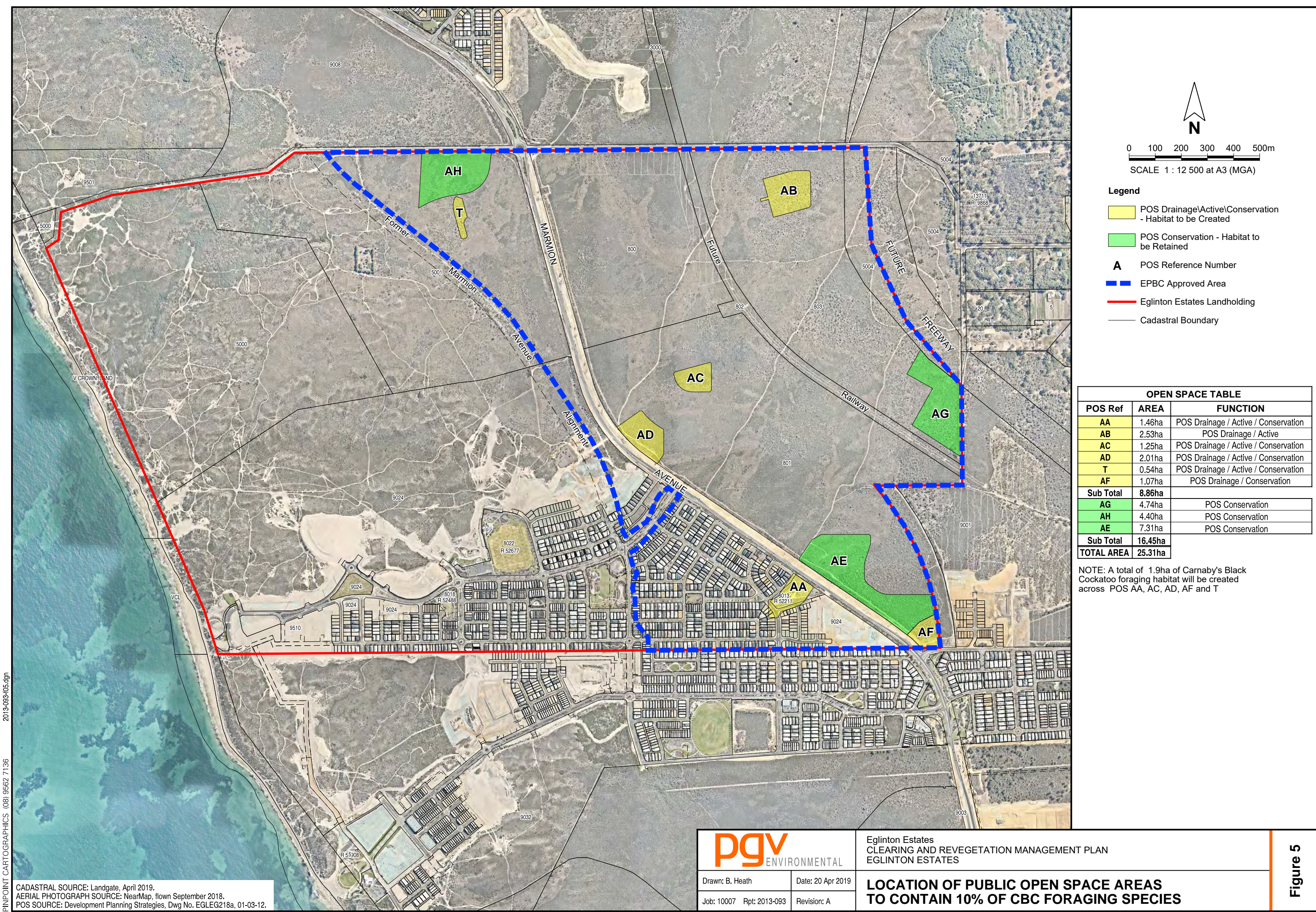
Revision: A

Eglinton Estates
CLEARING AND REVEGETATION MANAGEMENT PLAN
EGLINTON ESTATES

CARNABY'S BLACK COCKATOO HABITAT

Figure 4

CADASTRAL SOURCE: Landgate, April 2019.
AERIAL PHOTOGRAPH SOURCE: NearMap, flown September 2018.



- Legend**
- POS Drainage\Active\Conservation - Habitat to be Created
 - POS Conservation - Habitat to be Retained
 - A** POS Reference Number
 - EPBC Approved Area
 - Eglinton Estates Landholding
 - Cadastral Boundary

OPEN SPACE TABLE		
POS Ref	AREA	FUNCTION
AA	1.46ha	POS Drainage / Active / Conservation
AB	2.53ha	POS Drainage / Active
AC	1.25ha	POS Drainage / Active / Conservation
AD	2.01ha	POS Drainage / Active / Conservation
T	0.54ha	POS Drainage / Active / Conservation
AF	1.07ha	POS Drainage / Conservation
Sub Total	8.86ha	
AG	4.74ha	POS Conservation
AH	4.40ha	POS Conservation
AE	7.31ha	POS Conservation
Sub Total	16.45ha	
TOTAL AREA	25.31ha	

NOTE: A total of 1.9ha of Carnaby's Black Cockatoo foraging habitat will be created across POS AA, AC, AD, AF and T

2013-093-105.dgn
PINPOINT CARTOGRAPHICS (08) 9562 7136
CADASTRAL SOURCE: Landgate, April 2019.
AERIAL PHOTOGRAPH SOURCE: NearMap, flown September 2018.
POS SOURCE: Development Planning Strategies, Dwg No. EGLEG218a, 01-03-12.

Drawn: B. Heath

Job: 10007 Rpt: 2013-093

Date: 20 Apr 2019

Revision: A

Eglinton Estates
CLEARING AND REVEGETATION MANAGEMENT PLAN
EGLINTON ESTATES

**LOCATION OF PUBLIC OPEN SPACE AREAS
TO CONTAIN 10% OF CBC FORAGING SPECIES**

Figure 5

APPENDIX 1

EPBC Approval 2010-5777



Australian Government

Department of Sustainability, Environment, Water, Population and Communities

Approval

Eglinton Estates Residential Development, Lot 1007 & Part Lot 1008, Pipidinny Road, Eglinton, WA (EPBC 2010/5777)

This decision is made under sections 130(1) and 133 of the *Environment Protection and Biodiversity Conservation Act 1999*.

Proposed action

person to whom the approval is granted Eglinton Estates Pty Ltd

proponent's ACN (if applicable) ABN: 48 009 460 397

proposed action The clearing of approximately 298 ha of native vegetation for the urban development of Lot 1007 and the eastern portion of Lot 1008, Pipidinny Road, Eglinton, WA, [See EPBC Act referral 2010/5777], within the footprint shown as a blue dotted line in Attachment A.

Approval decision

Controlling Provision	Decision
Listed threatened species and communities (sections 18 & 18A)	Approved

conditions of approval This approval is subject to the conditions specified below.

expiry date of approval

This approval has effect until 28 February 2038.

Decision-maker

name and position Barbara Jones
Assistant Secretary
North, West and Offshore Assessment Branch

signature

date of decision 30/4/2013

Conditions attached to the approval

1. Within 30 days after the **commencement** of the action, the person taking the action must advise the **department** in writing of the actual date of **commencement**.
2. The person taking the action must maintain accurate records substantiating all activities associated with or relevant to the conditions of approval, including measures taken to implement the management plans required by this approval, and make them available upon request to the **department**. Such records may be subject to audit by the **department** or an independent auditor in accordance with section 458 of the **EPBC Act**, or used to verify compliance with the conditions of approval. Summaries of audits will be posted on the **department's** website. The results of audits may also be publicised through the general media.
3. Within three months of every 12 month anniversary of the **commencement** of the action, the person taking the action must publish a report on their website addressing compliance with the conditions of this approval over the previous 12 months, including implementation of any management plans as specified in the conditions. Non-compliance with any of the conditions of this approval must be reported to the **department** at the same time as the compliance report is published.
4. Upon the direction of the **Minister**, the person taking the action must ensure that an independent audit of compliance with the conditions of approval is conducted and a report submitted to the **Minister**. The independent auditor must be approved by the **Minister** prior to the commencement of the audit. Audit criteria must be agreed to by the **Minister** and the audit report must address the criteria to the satisfaction of the **Minister**.
5. If the person taking the action wishes to carry out any activity otherwise than in accordance with the management plans as specified in the conditions, the person taking the action must submit to the **department** for the **Minister's** written approval a revised version of that management plan. The varied activity shall not commence until the **Minister** has approved the varied management plan in writing. The **Minister** will not approve a varied management plan unless the revised management plan would result in an equivalent or improved environmental outcome over time. If the **Minister** approves the revised management plan, the revised management plan must be implemented in place of the management plan originally approved.
6. If the **Minister** believes that it is necessary or convenient for the better protection of listed threatened species to do so, the **Minister** may request that the person taking the action make specified revisions to the management plan/s specified in the conditions and submit the revised management plan/s for the **Minister's** written approval. The person taking the action must comply with any such request. The revised approved management plan/s must be implemented. Unless the **Minister** has approved the revised management plan/s, then the person taking the action must continue to implement the management plan/s originally approved, as specified in the conditions.
7. If, at any time after 5 years from the date of this approval, the person taking the action has not **substantially commenced** the action, then the person taking the action must not **substantially commence** the action without the written agreement of the **Minister**.

8. Unless otherwise agreed to in writing by the **Minister**, the person taking the action must publish all management plans referred to in these conditions of approval on their website. Each management plan must be published on the website within 1 month of being approved.
9. To mitigate impacts to Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*), the person taking the action must not **clear** any land that is proposed to be **retained** that is also habitat for Carnaby's Black Cockatoo, (as shown in Attachment B).
10. To protect and enhance habitat for **listed threatened species** that is **retained** on the proposal site, the person taking the action must:
 - (a) prepare and submit, within 12 months of the date of this approval, a *Conservation Management Plan* detailing management of habitat for **listed threatened species** that is **retained** on the **proposal site** for the **Minister's** approval. The plan must include:
 - i. measures to physically delineate (through fencing or other means) areas that will be **retained**;
 - ii. erosion and dust control measures during construction;
 - iii. the management of weeds, *Phytophthora* dieback, bushfire and feral animals;
 - iv. identification of any degraded habitat for **listed threatened species** and **revegetation** of those areas;
 - v. a monitoring program for **listed threatened species** and their habitat;
 - vi. performance indicators and corrective actions;
 - vii. roles and responsibilities;
 - viii. time frames for the implementation of the above measures; and
 - ix. how condition 10(b) will be implemented, including who will be responsible for the long-term management of the **retained** land, and how the land will be protected in the long-term.

If the Minister approves the plan, the approved plan must be implemented.

- (b) within 5 years of the **substantial commencement** of the action, the person taking the action must provide the **department** with written evidence, including certificates of title, that the 'POS Conservation' areas (marked in green in Attachment A) has been transferred to the City of Wanneroo for the purpose of conservation.
11. To mitigate impacts to Carnaby's Black Cockatoo, the person taking the action must fully implement the **revegetation** of at least 12.7 ha of native vegetation (including **primary feeding plants** for Carnaby's Black Cockatoo) in the Yellagonga Regional Park (in consultation with the **DEC**) using seed and topsoil collected in accordance with the *Clearing and Revegetation Management Plan* required under condition 12.
12. To mitigate impacts to Carnaby's Black Cockatoo, the person taking the action must prepare and submit a *Clearing and Revegetation Management Plan* (the plan) for the **Minister's** approval. The plan must include:
 - (a) a commitment to the staged collection of native seed prior to **clearing**, and collection of topsoil following clearing, from within Carnaby's Black Cockatoo foraging habitat as shown in Attachment B (checked in black, but excluding those areas shaded green in Attachment B), for use in **revegetation**;
 - (b) a commitment to store native seed and topsoil, and transport it to a receiving site(s) where **revegetation** is being undertaken by the **DEC** or another receiving party (or parties), and at least 50% of the collected seed and topsoil must be used within 20 km of the **proposal site**;

(c) detailed protocols for staged collection and use of native seed and topsoil required by conditions 12(a) and 12(b) to be developed in consultation with an **independent revegetation expert** (approved in writing by the department) and the **DEC** or other receiving party (or parties) including:

- i. the optimal methodology for native seed and topsoil collection from the **proposal site**;
- ii. how clearing will be staged to best harvest utilise the native seed and topsoil resource for **revegetation**;
- iii. how native seed and topsoil will be stored and transported,
- iv. measures to manage any topsoil from the site that contains invasive weeds (at a level that makes that soil not suitable for use in **revegetation**) or soil infestations such as *Phytophthora*; and
- v. onsite supervision and implementation monitoring mechanisms.

(d) a commitment to **revegetate** at least 1.9 ha of native vegetation within Public Open Space on the **proposal site**;

(e) methodology for **revegetation**, both on-site, and in Yellagonga Regional Park (as required under condition 11), using native seed and topsoil collected in accordance with the protocols required by condition 12(c), along with:

- i. survival targets proposed for plantings;
- ii. performance indicators and corrective measures;
- iii. roles and responsibilities; and
- iv. timeframes for the implementation and management of the above measures.

(f) a commitment for at least 50% of plantings for trees and shrubs in street-scaping to consist of plants known to be **primary feeding plants** for Carnaby's Black Cockatoo. Site selection for street-scaping must take account of any risk of vehicle strike to Carnaby's Black Cockatoos.

If the **Minister** approves the plan, then the approved plan must be implemented.

13. To offset the loss of habitat for Carnaby's Black Cockatoo, within 12 months of the date of this approval, the person taking the action must:

(a) provide monies to the **DEC** to fully fund the acquisition of:

- i. an offset property that contains at least 850 ha of good quality foraging habitat for Carnaby's Black Cockatoo, that is within the 'Regans Ford' locality according to Landgate's WA Atlas; or
- ii. another parcel of land approved in writing by the **department**; and

(b) provide the **department** with a textual description and map clearly defining the location and boundaries of the offset property described in condition 13(a), which must be accompanied with the **offset attributes** and a **shapefile**.

14. The person taking the action must not undertake any **clearing** of habitat for Carnaby's Black Cockatoo (as shown in Attachment B hatched in black) apart from of the area outlined in yellow in Attachment D, unless:

(a) the *Clearing and Revegetation Management Plan* required under condition 12 has been approved by the **Minister**; and

(b) for each proposed clearing stage, the **department** has been provided written evidence that the **DEC** or other receiving party (or parties) agree(s) to utilise the seed and soil for the purposes of **revegetation** in accordance with the protocols developed under condition 12(c).

15. To mitigate impacts to the Graceful Sun Moth (*Synemon gratiosa*) and offset the loss of habitat for that species, the person taking the action must:

- (a) not **clear** any land that is proposed to be **retained** that is also habitat for the Graceful Sun Moth (as shown in Attachment C);
- (b) provide monies to the **DEC** to maintain and improve the quality of at least 180 ha of Graceful Sun Moth habitat within the Wilbinga Conservation Park. This funding must be adequate to fully fund, for a period of 20 years, all management actions deemed necessary by the **DEC** to mitigate known threats to Graceful Sun Moths and their habitat; and improve habitat quality through **revegetation** or restoration. All funding must be provided within 12 months of the date of this approval; and
- (c) prepare and submit, within 6 months of the date of this approval, a *Wilbinga Conservation Park Graceful Sun Moth Habitat Management Funding Plan* (the plan) detailing how condition 15(b) will be satisfied, for the **Minister's** approval. The plan must include:
 - i. what management actions are likely to be funded;
 - ii. the amount of funding that will be provided;
 - iii. written evidence that the **DEC** agree that the funding is adequate for them to undertake the management actions.

If the **Minister** approves the plan, the approved plan must be implemented.

Definitions

Clearing of native vegetation, including the cutting down, felling, thinning, logging, removing, killing, destroying, poisoning, ringbarking, uprooting or burning of native vegetation.

Construction includes any preparatory works required to be undertaken including the erection of any onsite temporary structures and the use of heavy duty equipment for the purpose of breaking the ground for buildings or infrastructure.

Substantial commencement of the action is when more than 1 ha of land on the proposal site has been impacted by **clearing** or **construction**.

DEC is the Western Australian Government's Department of Environment and Conservation (or equivalent agency).

Department is the Australian Government Department administering the *Environment Protection and Biodiversity Conservation Act 1999*.

EPBC Act is the *Environment Protection and Biodiversity Conservation Act 1999*.

Independent revegetation expert. A scientist with relevant qualifications and expertise in best-practise **revegetation** (including the use of native seed and topsoil in **revegetation**), who is not affiliated with the person taking the action.

Listed Threatened Species are species listed under the EPBC Act including Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) and the Graceful Sun Moth (*Synemon gratiosa*).

Minister is the Minister administering the *Environment Protection and Biodiversity Conservation Act 1999* and includes a delegate of the Minister.

Offset attributes means an '.xls' file capturing relevant attributes of the Offset Area, including the EPBC reference ID number, the physical address of the offset site, coordinates of the boundary points in decimal degrees, the EPBC protected matters that the offset compensates for, any additional EPBC protected matters that are benefiting from the offset, and the size of the offset in hectares.

Primary feeding plants for Carnaby's Black Cockatoo include: any *Banksia*; any plants identified in a relevant search of the DEC's Plants for Carnaby's Search Tool (at <http://www.dec.wa.gov.au/management-and-protection/threatened-species/5983-plants-for-carnabys-search-tool.html>); or other plants approved in writing by the **Department**.

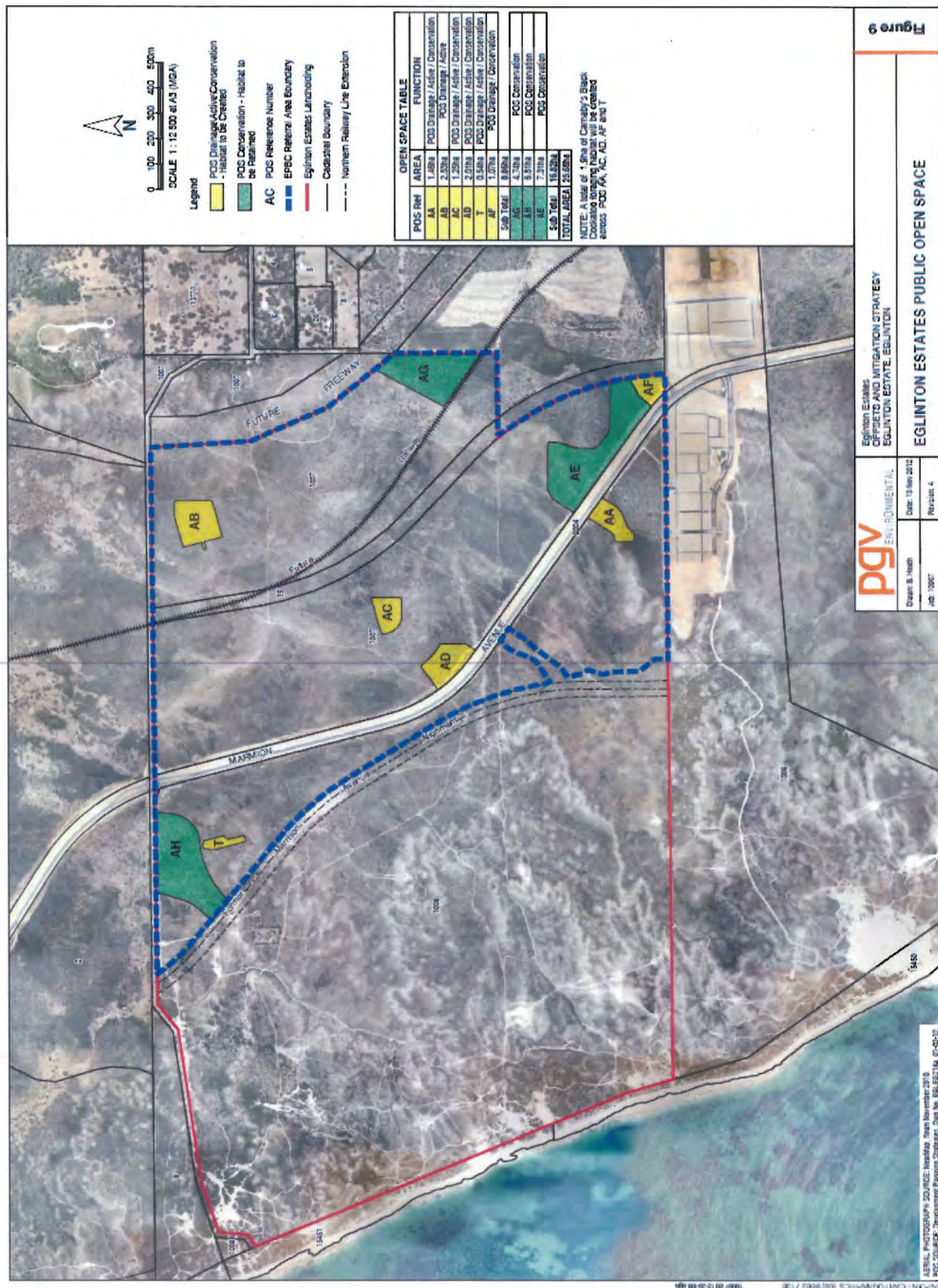
Proposal site is the area shown at Attachment A as EPBC Referral Area Boundary.

Retained land means: the 'POS Conservation' areas marked in green in Attachment A.

Revegetation is the removal of weeds and the long-term establishment of native vegetation.

Shapefile means an ESRI Shapefile containing '.shp', '.shx' and '.dbf' files and other files capturing attributes of the Offset Area, including the shape, EPBC reference ID number and EPBC protected matters present at the relevant site. Attributes should also be captured in '.xls' format.

Attachment A



Attachment B



Attachment C



Attachment D



APPENDIX 2

CRMP V6 APPROVAL



Australian Government
Department of the Environment

Our reference: EPBC 2010/5777

Contact Officer: Sam Wagstaff
Telephone: (02) 6274 2741 Facsimile: (02) 6274 1878
Email: sam.wagstaff@environment.gov.au

Mr Damian Molony
McGees Property – Perth
Level 2, 26 Clive Street
West Perth WA 6005

Dear Mr Molony

Eglinton Estates Residential Development, Lot 1007 & Part Lot 1008, Pipidiny Road, Eglinton, WA (EPBC 2010/5777)

I refer to the email dated 1 November 2013 from your consultant to Sam Wagstaff, which attached a copy of the Clearing and Revegetation Management Plan (CRMP version 6), as required under condition 12 of the approval decision dated 30 April 2013.

The CRMP version 6 has been reviewed by officers of the department and has been found to meet the requirements of the condition. On this basis, and as delegate of the Minister for the Environment, I have decided to approve the Plan.

In accordance with condition 12 of EPBC 2010/5777 the approved plan must be implemented. Under condition 5, if the person taking the action wants to act other than in accordance with the approved plan, the approval holder must submit a revised plan for approval. Until the Minister (or his delegate) has approved the revised plan, the person taking the action must continue to implement the original plan/s.

If you have any enquiries please contact Sam Wagstaff on 02 6274 2741.

Yours sincerely

S. Gaddes

Shane Gaddes
Assistant Secretary
Compliance & Enforcement Branch
Environment Assessment and Compliance Division

8 November 2013

CC: Belinda Heath, PGV Environmental

APPENDIX 3

SECTION 143 VARIATION APPROVAL 20 OCTOBER 2015



Australian Government
Department of the Environment



Our reference: 2010/5777

Contact Officer: Rochelle Tomkins
Telephone: (02) 6275 9455 Facsimile: (02) 6274 1878
Email: post.approvals@environment.gov.au

Mr Darren Walsh
CEO / Managing Partner
PO Box 243
SUBIACO WA 6904

Dear Mr Walsh

EPBC 2010/5777 – Eglinton Estates: Clearing of Native Vegetation from Lot 1007 and Part Lot 1008 – Variation to Approval Conditions 12 and 13

I refer to your letter of 25 May 2015 to the Department, on behalf of Eglinton Estates Pty Ltd requesting a variation to conditions 12 and 13 of the approval dated 30 April 2013.

Officers of the Post Approvals Section have assessed your request and provided advice regarding the variation. As delegate of the Minister for the Environment, I have decided to approve your request to vary conditions 12 and 13 of the approval in accordance with the provisions of the national environment law, the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The variation of conditions of approval does not relieve the person to whom it has been granted from an obligation to comply with any other law of the Commonwealth, state or territory that is applicable to do the action and to have any right, title or interest that is required to access land or waters and to do the action.

Please ensure that you maintain accurate records of all activities associated with, or relevant to the conditions of approval, so that they can be made available to the department on request. Such documents may be subject to audit and used to verify compliance. Summaries of results of audits may be published by the department. Information about the monitoring and audit program can be found on the department's website at www.environment.gov.au/epbc/compliance/auditing.html.

If you have any enquiries please contact Rochelle Tomkins on 02 6275 9455.

Yours sincerely

Kynan Gowland
A/g Assistant Secretary
Compliance & Enforcement Branch
Environment Standards Division

20 October 2015



VARIATION TO CONDITIONS ATTACHED TO APPROVAL

Eglinton Estates Residential Development, Lot 1007 & Part Lot 1008, Pipidinny Road, Eglinton, WA (EPBC 2010/5777)

This decision to vary a condition of approval is made under section 143 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Approved action

Person to whom the approval is granted	Eglinton Estates Pty Ltd ABN: 48 009 460 397
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Approved action	The clearing of approximately 298 ha of native vegetation for the urban development of Lot 1007 and the eastern portion of Lot 1008, Pipidinny Road, Eglinton, WA [See EPBC Act referral 2010/5777], within the footprint shown as a blue dot line in <u>Attachment A</u> .
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Variation

Variation of conditions of approval	The variation is: Delete conditions 12 and 13 attached to the approval dated 30 April 2013 and substitute with the conditions specified below.
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Date of effect	This variation has effect on the date the instrument is signed
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Person authorised to make decision

name and position	Kynan Gowland Assistant Secretary (A/g) Compliance & Enforcement Branch
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Signature	
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Date of decision	20/10/ 2015
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Condition attached to the approval

12. To mitigate impacts to Carnaby's Black Cockatoo, the person taking the action must prepare and submit a *Clearing and Revegetation Management Plan* (the plan) for the **Minister's** approval. The plan must include:
- a) A commitment to the staged collection of native seed prior to **clearing** from within Carnaby's Black Cockatoo foraging habitat as shown in Attachment B (checked in black, but excluding those areas shaded green in Attachment B), and the collection of topsoil from 33 ha of the project site, from within 73 ha of good or better condition Carnaby's Black Cockatoo habitat as shown in Attachment B (checked in black), for use in **revegetation**.
 - b) A commitment to store native seed (excluding that which is required for revegetation on-site and within Yellongonga Regional Park) and transport it to a seed bank or receiving site(s) where **revegetation** is being undertaken by the **DPaW** or another receiving party (or parties).
 - c) Detailed protocols for staged collection and use of native seed and topsoil required by conditions 12a, 12d and 12e to be developed in consultation with an **independent revegetation expert** (approved in writing by the Department) and the **DPaW** or other receiving party (or parties) including:
 - i. The optimal methodology for native seed and topsoil collection from the **proposal site**
 - ii. How clearing will be staged to best utilise the native seed and topsoil resource for **revegetation**
 - iii. How native seed and topsoil will be stored and transported
 - iv. Measures to manage any topsoil from the site that contains invasive weeds (at a level that makes that soil not suitable for use in **revegetation**) or soil infestation such as *Phytophthora*, and
 - v. On-site supervision and implementation of monitoring mechanisms.
 - d) A commitment to **revegetate** at least 1.9 ha of native vegetation within Public Open Space on the proposal site.
 - e) Methodology for revegetation, both on-site, and in Yellagonga Regional Park (as required under condition 11), using native seed and topsoil collected in accordance with the protocols require by condition 12c, along with:
 - i. Survival targets proposed for plantings
 - ii. Performance indicators and corrective measures
 - iii. Roles and responsibilities, and
 - iv. Timeframes for the implementation and management of the above measures.
 - f) A commitment for at least 50% of planting of trees and shrubs in street-scaping to consist of plants known to be **primary feeding plants** for Carnaby's Black Cockatoo. Site selection for street-scaping must take account of any risk of vehicle strike to Carnaby's Black Cockatoos.

If the **Minister** approves the plan, then the approved plan must be implemented.

13. To offset the loss of habitat for Carnaby's Black Cockatoo, the person taking the action must, by January 2016:
- a) Provide monies to the DPaW to fully fund the acquisition of:
 - i. An offset property (or properties) that contains at least 886 ha of good quality foraging habitat for Carnaby's Black Cockatoo, that is within the 'Regans Ford' or Gingin area, or
 - ii. Another parcel of land approved in writing by the **Department**.

- b) Provide the **Department** with a textual description and map clearly defining the location and boundaries of the offset property (or properties) described in condition 13(a), which must be accompanied with the **offset attributes** and a **shapefile**.

APPENDIX 4
CRMP V8 APPROVAL



Ms Belinda Heath
Senior Environmental Consultant
PGV Environmental
Unit 1 Guthrie Street
OSBORNE PARK WA 6017

Dear Ms Heath

(EPBC 2010/5777) Eglinton Estates - Clearing of native vegetation from Lot 1007 & pt Lot 1008: Clearing and Revegetation Management Plan

Thank you for your letter dated 14 January 2016 to the Department, seeking approval of the *Eglinton Estates Clearing and Revegetation Management Plan*, version 8 in accordance with condition 12 of the approval decision dated 30 April 2013.

Officers of this Department have considered the *Eglinton Estates Clearing and Revegetation Management Plan* and are satisfied that it meets the requirements of condition 12 of the approval for this project. On this basis, and as a delegate of the Minister for the Environment, I have decided to approve the *Eglinton Estates Clearing and Revegetation Management Plan version 8*. This plan must now be implemented.

In accordance with EPBC 2010/5777 condition 5, if the approval holder wants to act other than in accordance with this approved plan, the approval holder must submit a revised plan for approval. Until the Minister (or his delegate) has approved the revised plan, the approved version of the plan must continue to be implemented.

Should you require any further information please contact Heather Cross, Project Officer on (02) 6274 1432 or by email: post.approvals@environment.gov.au.

Yours sincerely

Shane Gaddes
Assistant Secretary
Compliance & Enforcement Branch
Environment Standards Division

9/5/2016

APPENDIX 5

SECTION 143 VARIATION APPROVAL

JUNE 2019



Australian Government

Department of the Environment and Energy

Belinda Heath
Senior Environmental Consultant
PGV Environmental
Unit 1, 61 Guthrie Street
OSBORNE PARK WA 6017

**Eglinton Estates Residential Development, Eglinton, WA (EPBC 2010/5777)
Variation of conditions 3, 9, 11, 12 and 14 and approval of revised Conservation
Management Plan and Clearing and Revegetation Management Plan**

Dear Ms Heath

Thank you for your letter dated 17 April 2019 to the Department, for and on behalf of Eglinton Estates Pty Ltd, requesting:

- variation of conditions 9, 11, 12 and 14 and Attachment A, Attachment B and Attachment D of the approval dated 30 April 2013;
- approval of *Eglinton Estates Conservation Management Plan, 5 June 2019* in accordance with condition 10 and approval of *Eglinton Estates Clearing and Revegetation Management Plan, 5 June 2019* in accordance with condition 12 (the plans).

Officers of this Department have reviewed the variation request. As delegate of the Minister for the Environment, I have varied conditions of EPBC Approval 2010/5777 under section 143(1)(c) of the *Environment Protection and Biodiversity Conservation Act 1999*. The variation is to align the retained conservation area AG with the Local Structure Plan and to remove the requirement of using native seed and top soil from the proposal site for revegetation. In addition, requirements for reporting have been updated. The conditions of approval must now be undertaken in accordance with the varied conditions and attachments specified in the variation notification, which has been attached for your information.

Officers of this Department have considered the plans and are satisfied *Eglinton Estates Conservation Management Plan, 5 June 2019* meets the requirements of condition 10 and *Eglinton Estates Clearing and Revegetation Management Plan, 5 June 2019* meets the requirements of condition 12 of the approval as varied. On this basis, and as a delegate of the Minister for the Environment, I have decided to approve the *Eglinton Estates Conservation Management Plan, 5 June 2019* and *Eglinton Estates Clearing and Revegetation Management Plan, 5 June 2019*. These plans must now be implemented.

As you are aware, the Department has an active monitoring program which includes monitoring inspections, desk top document reviews and audits. Please ensure that you maintain accurate records of all activities associated with, or relevant to, the conditions of approval so that they can be made available to the Department on request.

Should you require any further information please contact Panna Patel, Post Approvals Section, on 02 6275 9299 or by email: post.approvals@environment.gov.au.

Yours sincerely

A handwritten signature in black ink, appearing to read 'G. Manning', written over a horizontal line.

Greg Manning, Assistant Secretary
Assessments (WA, SA, NT) and Post Approvals Branch

17 June 2019

Note: Under s 491 of the *Environment Protection and Biodiversity Conservation Act 1999* it is an offence to knowingly provide false and/or misleading information to a departmental officer.



VARIATION OF CONDITIONS ATTACHED TO APPROVAL
Eglinton Estates Residential Development, Lot 1007 & Part Lot 1008,
Pipidinny Road, Eglinton WA (EPBC 2010/5777)

This decision to vary conditions of approval is made under section 143 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Approved action

Person to whom the approval is granted	Eglinton Estates Pty Ltd ABN: 48 009 460 397
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Approved action	The clearing of approximately 298 ha of native vegetation for the urban development of Lot 1007 and the eastern portion of Lot 1008, Pipidinny Road, Eglinton, WA [see EPBC Act referral 2010/5777], within the footprint shown as a blue dotted line in Attachment A.
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Variation

Variation of conditions attached to approval	<p>The variation is:</p> <p>Delete conditions 3, 9, 11, 12 and 14 attached to the approval and substitute with the conditions 3, 3A, 3B, 9, 11, 12 and 14 specified in the table below.</p> <p>Delete Attachment A, Attachment B and Attachment D and substitute with Attachment A, Attachment B and Attachment D specified in the table below.</p> <p>Delete the definition of Clearing and substitute with the definition of Clearing specified in the table below.</p> <p>Add the definitions of Business Day, Commencement, DBCA and Plan(s).</p>
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Date of effect	This variation has effect on the date the instrument is signed
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Person authorised to make decision

Name and position	Greg Manning Assistant Secretary Assessments (WA, SA, NT) and Post Approval Branch
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Signature	
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Date of decision	17 June 2019
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Date of decision	Conditions attached to approval
Original dated 30/4/2013	1. Within 30 days after the commencement of the action, the person taking the action must advise the department in writing of the actual date of commencement .
Original dated 30/4/2013	2. The person taking the action must maintain accurate records substantiating all activities associated with or relevant to the conditions of approval, including measures taken to implement the management plans required by this approval, and make them available upon request to the department . Such records may be subject to audit by the department or an independent auditor in accordance with section 458 of the EPBC Act , or used to verify compliance with the conditions of approval. Summaries of audits will be posted on the department's website. The results of audits may also be publicised through the general media.
As varied on the date this instrument was signed	3. Within three months of every 12 month anniversary of the commencement of the action, the person taking the action must publish a report on their website addressing compliance with the conditions of this approval over the previous 12 months, including implementation of any management plans as specified in the conditions.
As varied on the date this instrument was signed	<p>Reporting non-compliance</p> <p>3.A. The person taking the action must notify the Department in writing of any non-compliance with the conditions or non-compliance with the commitments made in plans. The notification must be given as soon as practicable, and no later than two business days after becoming aware of the non-compliance. The notification must specify:</p> <ul style="list-style-type: none"> a. the condition which is or may be in breach; and b. a short description of the non-compliance.
As varied on the date this instrument was signed	<p>3.B. The person taking the action must provide to the Department the details of any non-compliance with the conditions or commitments made in plans as soon as practicable and no later than 10 business days after becoming aware of the non-compliance, specifying:</p> <ul style="list-style-type: none"> a. any corrective action or investigation which the person taking the action has already taken or intends to take in the immediate future; b. the potential impacts of the non-compliance; and c. the method and timing of any remedial action that will be undertaken by the person taking the action.
Original dated 30/4/2013	4. Upon the direction of the Minister , the person taking the action must ensure that an independent audit of compliance with the conditions of approval is conducted and a report submitted to the Minister . The independent auditor must be approved by the Minister prior to the commencement of the audit. Audit criteria must be agreed to by the Minister and the audit report must address the criteria to the satisfaction of the Minister .

Date of decision	Conditions attached to approval
Original dated 30/4/2013	5. If the person taking the action wishes to carry out any activity otherwise than in accordance with the management plans as specified in the conditions, the person taking the action must submit to the department for the Minister's written approval a revised version of that management plan. The varied activity shall not commence until the Minister has approved the varied management plan in writing. The Minister will not approve a varied management plan unless the revised management plan would result in an equivalent or improved environmental outcome over time. If the Minister approves the revised management plan, the revised management plan must be implemented in place of the management plan originally approved.
Original dated 30/4/2013	6. If the Minister believes that it is necessary or convenient for the better protection of listed threatened species to do so, the Minister may request that the person taking the action make specified revisions to the management plan/s specified in the conditions and submit the revised management plan/s for the Minister's written approval. The person taking the action must comply with any such request. The revised approved management plan/s must be implemented. Unless the Minister has approved the revised management plan/s, then the person taking the action must continue to implement the management plan/s originally approved, as specified in the conditions.
Original dated 30/4/2013	7. If, at any time after 5 years from the date of this approval, the person taking the action has not substantially commenced the action, then the person taking the action must not substantially commence the action without the written agreement of the Minister .
Original dated 30/4/2013	8. Unless otherwise agreed to in writing by the Minister , the person taking the action must publish all management plans referred to in these conditions of approval on their website. Each management plan must be published on the website within 1 month of being approved.
As varied on the date this instrument was signed	9. To mitigate impacts to Carnaby's Black Cockatoo (<i>Calyptorhynchus latirostris</i>), the person taking the action must not clear any land that is proposed to be retained that is also habitat for Carnaby's Black Cockatoo.
Variation dated 25/10/2018	10. To protect and enhance habitat for listed threatened species that is retained on the proposal site, the person taking the action must: (a) prepare and submit, within 12 months of the date of this approval, a <i>Conservation Management Plan</i> detailing management of habitat for listed threatened species that is retained on the proposal site for the Minister's approval. The plan must include: i. measures to physically delineate (through fencing or other means) areas that will be retained ; ii. erosion and dust control measures during construction; iii. the management of weeds, <i>Phytophthora</i> dieback, bushfire and feral animals;

Date of decision	Conditions attached to approval
	<ul style="list-style-type: none"> iv. identification of any degraded habitat for listed threatened species and revegetation of those areas; v. a monitoring program for listed threatened species and their habitat; vi. performance indicators and corrective actions; vii. roles and responsibilities; viii. time frames for the implementation of the above measures; and ix. how condition 10(b) will be implemented, including who will be responsible for the long-term management of the retained land, and how the land will be protected in the long-term. <p>If the Minister approves the plan, the approved plan must be implemented.</p> <p>(b) within 10 years of the substantial commencement of the action, the person taking the action must provide the department with written evidence, including certificates of title, that the 'POS Conservation ' areas (marked in green in <u>Attachment A</u>) have been transferred to the City of Wanneroo for the purpose of conservation.</p>
As varied on the date this instrument was signed	<p>11. To mitigate impacts to Carnaby's Black Cockatoo, the person taking the action must fully implement the revegetation of at least 12.7 ha of native vegetation (including primary feeding plants for Carnaby's Black Cockatoo) in the Yellagonga Regional Park (in consultation with the DBCA) in accordance with the <i>Clearing and Revegetation Management Plan</i> required under condition 12.</p>
As varied on the date this instrument was signed	<p>12. To mitigate impacts to Carnaby's Black Cockatoo, the person taking the action must submit a <i>Clearing and Revegetation Management Plan</i> (the plan) for the Minister's approval. The plan must include:</p> <ul style="list-style-type: none"> (a) a commitment to revegetate at least 1.9 ha of native vegetation within Public Open Space on the proposal site; (b) methodology for revegetation, both on-site, and in Yellagonga Regional Park (as required under condition 11) along with: <ul style="list-style-type: none"> i. survival targets proposed for plantings; ii. performance indicators and corrective measures; iii. roles and responsibilities; and iv. timeframes for the implementation and management of the above measures. (c) a commitment for at least 50% of plantings for trees and shrubs in street-scaping to consist of plants known to be primary feeding plants for Carnaby's Black Cockatoo. Site selection for street-scaping must take account of any risk of vehicle strike to Carnaby's Black Cockatoos.

Date of decision	Conditions attached to approval
	If the Minister approves the plan, then the approved plan must be implemented.
Variation dated 20/10/2015	<p>13. To offset the loss of habitat for Carnaby's Black Cockatoo, the person taking the action must, by January 2016:</p> <p>(a) provide monies to DPaW to fully fund the acquisition of:</p> <ol style="list-style-type: none"> an offset property (or properties) that contains at least 886 ha of good quality foraging habitat for Carnaby's Black Cockatoo, that is within the 'Regans Ford' or Gingin area or another parcel of land approved in writing by the department; and <p>(b) provide the department with a textual description and map clearly defining the location and boundaries of the offset property (or properties) described in condition 13(a), which must be accompanied with the offset attributes and a shapefile.</p>
As varied on the date this instrument was signed	14. The person taking the action must not undertake any clearing of habitat for Carnaby's Black Cockatoo (such habitat being designated in <u>Attachment B</u> as the areas hatched in black), except for the area designated in <u>Attachment D</u> by yellow outline, unless the <i>Clearing and Revegetation Management Plan</i> required under condition 12 has been approved by the Minister .
Variation dated 17/7/2013	15. Revoked

Date of decision	Definitions attached to approval
As varied on the date this instrument was signed	Business day means a day that is not a Saturday, a Sunday or a public holiday in the state or territory of the action.
As varied on the date this instrument was signed	Clearing means the cutting down, felling, thinning, logging, removing, killing, destroying, poisoning, ringbarking, uprooting or burning of native vegetation.
As varied on the date this instrument was signed	<p>Commencement means the first instance of any specified activity associated with the action including clearance of vegetation and construction of any infrastructure. Commencement does not include minor physical disturbance necessary to:</p> <ol style="list-style-type: none"> undertake pre-clearance surveys or monitoring programs; install signage and /or temporary fencing to prevent unapproved use of the project area; protect environmental and property assets from fire, weeds and pests.
Original dated 30/4/2013	Construction includes any preparatory works required to be undertaken including the erection of any onsite temporary structures and the use of heavy duty equipment for the purpose of breaking the ground for

Date of decision	Definitions attached to approval
	buildings or infrastructure.
Original dated 30/4/2013	Substantial commencement of the action is when more than 1 ha of land on the proposal site has been impacted by clearing or construction .
As varied on the date this instrument was signed	DBCA is the Western Australian Government Department of Biodiversity, Conservation and Attractions (or equivalent agency) (formerly DEC and DPaW).
Original dated 30/4/2013	DEC is the Western Australian Government's Department of Environment and Conservation (or equivalent agency).
Variation dated 20/10/2015	DPaW is the Western Australian Government's Department of Parks and Wildlife (or equivalent agency).
Original dated 30/4/2013	Department is the Australian Government Department administering the <i>Environment Protection and Biodiversity Conservation Act 1999</i> .
Original dated 30/4/2013	EPBC Act is the <i>Environment Protection and Biodiversity Conservation Act 1999</i> .
Original dated 30/4/2013	Independent revegetation expert. A scientist with relevant qualifications and expertise in best-practise revegetation (including the use of native seed and topsoil in revegetation), who is not affiliated with the person taking the action.
Variation dated 17/7/2013	Listed Threatened Species are species listed under the EPBC Act including Carnaby's Black Cockatoo (<i>Calyptorhynchus latirostris</i>).
Original dated 30/4/2013	Minister is the Minister administering the <i>Environment Protection and Biodiversity Conservation Act 1999</i> and includes a delegate of the Minister.
Original dated 30/4/2013	Offset attributes means an '.xls' file capturing relevant attributes of the Offset Area, including the EPBC reference ID number, the physical address of the offset site, coordinates of the boundary points in decimal degrees, the EPBC protected matters that the offset compensates for, any additional EPBC protected matters that are benefiting from the offset, and the size of the offset in hectares.
As varied on the date this instrument was signed	Plan(s) means any of the documents required to be prepared, approved by the Minister , and/or implemented by the approval holder and published on the website in accordance with these conditions.
Original dated 30/4/2013	Primary feeding plants for Carnaby's Black Cockatoo include: any <i>Banksia</i> ; any plants identified in a relevant search of the DEC's Plants for Carnaby's Search Tool (at http://www.dec.wa.gov.au/management-and-protection/threatened-species/5983-plants-for-carnabys-search-tool.html); or other plants approved in writing by the Department .

APPENDIX 6

DBCA LIST OF FORAGING SPECIES


Plants Used by Carnaby's Black Cockatoo

List prepared by Christine Groom, Department of Environment and Conservation 15 April 2011

For more information on plant selection or references used to produce this list please visit the Plants for Carnaby's Search Tool webpage at www.dec.wa.gov.au/plantsforcarnabys



Department of
Environment and Conservation

Our environment, our future 

Species	Used for			Priority for planting for Carnaby's	Growth form	Flower colour	Soil type				Sun exposure	Soil drainage				Origin
	Feeding	Nesting	Roosting				Clayey	Gravelly	Loamy	Sandy		Well drained	Poorly drained	Waterlogged	Salt affected	
Acacia baileyana (Cootamundra wattle)*				Low	Tree	Yellow					○ ☀					Australian native
Acacia pentadenia (Karri Wattle)				Low	Tree	Cream					○ ☀					WA native
Acacia saligna (Orange Wattle)				Low	Tree	Yellow					○ ☀					WA native
Agonis flexuosa (Peppermint Tree)				Low	Tree	White					○ ☀					WA native
Araucaria heterophylla (Norfolk Island Pine)				Low	Tree	Green					○ ☀					Exotic to Australia
Banksia ashbyi (Ashby's Banksia)				Medium	Tree or Tall shrub	Yellow, Orange					○ ☀					WA native
Banksia attenuata (Slender Banksia)				High	Tree	Yellow					○ ☀					WA native
Banksia baxteri (Baxter's Banksia)				Medium	Tall shrub	Yellow					○ ☀					WA native
Banksia carlinoides (Pink Dryandra)				Medium	Medium or small shrub	White, cream, pink					○ ☀					WA native
Banksia coccinea (Scarlet Banksia)				Medium	Tree	Red					○ ☀					WA native
Banksia dallanneyi (Couch Honeypot Dryandra)				Low	Medium or small shrub	Orange, brown					○					WA native
Banksia ericifolia (Heath-leaved Banksia)				Medium	Tall shrub	Orange					○					Australian native
Banksia fraseri (Dryandra)				Medium	Medium or small shrub	Orange					○ ☀					WA native
Banksia gardneri (Prostrate Banksia)				Low	Medium or small shrub	Orange					○ ☀					WA native
Banksia grandis (Bull Banksia)				High	Tree	Yellow					○ ☀					WA native
Banksia hookeriana (Hooker's Banksia)				Medium	Tall shrub	Orange					○ ☀					WA native
Banksia ilicifolia (Holly Banksia)				High	Tree	Cream					○ ☀					WA native
Banksia kippistiana (Dryandra)				Medium	Medium or small shrub	Yellow					○ ☀					WA native
Banksia leptophylla				Low	Medium or small shrub	Yellow					○ ☀					WA native
Banksia littoralis (Swamp Banksia)				High	Tree	Yellow					○ ☀					WA native
Banksia menziesii (Firewood or Menzie's Banksia)				High	Tree	Yellow, pink, red					○ ☀					WA native
Banksia mucronulata (Swordfish Dryandra)				Medium	Medium or small shrub	Yellow					○ ☀					WA native
Banksia nivea (Honeypot Dryandra)				High	Medium or small shrub	Orange					○ ☀					WA native
Banksia nobilis (Golden Dryandra)				Medium	Tall shrub	Orange					○					WA native
Banksia praemorsa (Cut-leaf Banksia)				Medium	Tall shrub	Red, yellow, green					○					WA native
Banksia prionotes (Acorn Banksia)				High	Tree	Orange					○					WA native

Species	Used for			Priority for planting for Carnaby's	Growth form	Flower colour	Soil type				Sun exposure	Soil drainage				Origin
	Feeding	Nesting	Roosting				Clayey	Gravelly	Loamy	Sandy		Well drained	Poorly drained	Waterlogged	Salt affected	
Banksia quercifolia (Oak-leaved Banksia)				Medium	Tall shrub	Brown					○					WA native
Banksia sessilis (Parrot Bush)				High	Tree	Cream					○					WA native
Banksia speciosa (Showy Banksia)				High	Tree	Yellow					○					WA native
Banksia squarrosa (Pingle)				High	Tall shrub	Yellow					○					WA native
Banksia tricuspid (Lesueur Banksia or Pine Banksia)				Medium	Tree	Orange					○					WA native
Banksia undata (Urchin or Cut-leaf Dryandra)				High	Tall shrub	Yellow					○					WA native
Banksia verticillata (Granite Banksia)				Low	Tree	Yellow					○					WA native
Brassica campestris (Canola, Rape)**				Low	Herb	Yellow					○					Exotic to Australia
Callistemon viminalis (Captain Cook Bottlebrush)				Medium	Tall shrub	Red					○					Australian native
Callitris sp.				Medium	Tree						○					WA native
Carya illinoensis (Pecan)				Low	Tree	Yellow					○					Exotic to Australia
Casuarina cunninghamiana (River Sheoak)*				Low	Tree	Red					○					Australian native
Citrullus lanatus (Pie or Afghan Melon)*				Low	Scrambler, climber or percher	Yellow					○					Exotic to Australia
Corymbia calophylla (Marri)				High	Tree	Cream					○					WA native
Corymbia ficifolia (Red Flowering Gum)				Medium	Tree	Red					○					WA native
Corymbia haematoxylon (Mountain Marri)				Medium	Tree	White					○					WA native
Corymbia maculata (Spotted Gum)				Low	Tree	White					○					Australian native
Darwinia citriodora (Lemon-scented Darwinia)				Low	Medium or small shrub	Red, orange, yellow					○					WA native
Diospyros sp. (Sweet Persimmon)				Low	Tree						○					Exotic to Australia
Eremophila glabra (Tarbush)				Low	Tall shrub	Various					○					WA native
Erodium aureum (Corkscrew Grass or Storksbill)*				Low	Herb	Pink					○					Exotic to Australia
Erodium botrys (Corkscrew Grass or Storksbill)*				Low	Herb	Purple					○					Exotic to Australia
Eucalyptus caesia (Silver Princess)				Medium	Tree	Pink					○					WA native
Eucalyptus camaldulensis (River Red Gum)				Low	Tree	Cream, yellow					○					Australian native
Eucalyptus citriodora (Lemon Scented Gum)				Medium	Tree	Red					○					Australian native
Eucalyptus diversicolor (Karri)				Low	Tree	Cream					○					WA native
Eucalyptus globulus (Tasmanian Blue Gum)				Low	Tree	White					○					Australian native
Eucalyptus gomphocephala (Tuart)				High	Tree	White					○					WA native
Eucalyptus grandis (Flooded Gum, Rose Gum)				Low	Tree	White, cream					○					Australian native
Eucalyptus longicornis (Red Morrell)				Low	Tree	White					○					WA native
Eucalyptus loxophleba (York Gum)				Low	Tree	White					○					WA native
Eucalyptus marginata (Jarrah)				Medium	Tree	White					○					WA native
Eucalyptus occidentalis (Swamp Yate)				Low	Tree	Cream					○					WA native
Eucalyptus patens (Blackbutt)				Medium	Tree	White					○					WA native
Eucalyptus pleurocarpa (Tallerack)				Medium	Tree	White					○					WA native

Species	Used for			Priority for planting for Carnaby's	Growth form	Flower colour	Soil type				Sun exposure	Soil drainage				Origin
	Feeding	Nesting	Roosting				Clayey	Gravelly	Loamy	Sandy		Well drained	Poorly drained	Waterlogged	Salt affected	
Eucalyptus preissiana (Bell-fruited Mallee)				Medium	Tree	Yellow					○					WA native
Eucalyptus robusta (Swamp Mahogany)				Medium	Tree	White					○					Australian native
Eucalyptus rudis (Flooded Gum)				Low	Tree	White					○					WA native
Eucalyptus salmonophloia (Salmon Gum)				High	Tree	White					○					WA native
Eucalyptus salubris (Gimlet)				Medium	Tree	White, cream					○					WA native
Eucalyptus tottdiana (Coastal Blackbutt or Prickley Bark)				Medium	Tree	White					○					WA native
Eucalyptus wandoo (Wandoo)				High	Tree	White					○					WA native
Ficus sp. (Fig)				Low	Tree						○ ☀					Australian native
Grevillea armigera (Prickly Toothbrushes)				Medium	Tall shrub	Green, yellow, black					○ ☀					WA native
Grevillea bipinnatifida (Fuschia Grevillea)				Medium	Medium or small shrub	Red					○ ☀					WA native
Grevillea hookeriana (Red Toothbrushes)				Medium	Tall shrub	Red					○					WA native
Grevillea hookeriana subsp. apiculoba (Black Toothbrushes)				Medium	Medium or small shrub	Black					○					WA native
Grevillea paniculata (Kerosene Bush)				Medium	Tall shrub	White					○ ☀					WA native
Grevillea paradoxa (Bottlebrush Grevillea)				Medium	Medium or small shrub	Cream, pink					○					WA native
Grevillea petrophiloides (Pink Poker)				Medium	Tall shrub	Pink					○					WA native
Grevillea robusta (Silky Oak)				Medium	Tree	Orange					○					Australian native
Hakea auriculata				Medium	Tall shrub	White					○ ☀					WA native
Hakea candolleana				Medium	Medium or small shrub	White					○					WA native
Hakea circumalata (Coastal Hakea)				Medium	Medium or small shrub	White, pink					○ ☀					WA native
Hakea commutata				Medium	Medium or small shrub						○ ☀					WA native
Hakea conchifolia				Medium	Medium or small shrub	White, cream, pink					○					WA native
Hakea costata (Ribbed Hakea)				Medium	Medium or small shrub	White					○					WA native
Hakea cristata (Snail Hakea)				Medium	Medium or small shrub	White					○ ☀					WA native
Hakea cucullata (Snail Hakea)				Medium	Tall shrub	Pink					○					WA native
Hakea cyclocarpa (Ramshorn)				Medium	Medium or small shrub	White					○ ☀					WA native
Hakea eneabba				Medium	Medium or small shrub	Yellow					○					WA native
Hakea erinacea (Hedgehog Hakea)				Medium	Medium or small shrub	Cream					○ ☀					WA native
Hakea falcata (Sickle Hakea)				Medium	Tall shrub	White					○ ☀					WA native
Hakea flabellifolia (Fan-leaved Hakea)				Medium	Medium or small shrub	Brown					○					WA native
Hakea gilbertii				Medium	Medium or small shrub	White					○					WA native
Hakea incrassata (Golfball or Marble Hakea)				Medium	Medium or small shrub	Cream					○ ☀					WA native
Hakea lasiantha (Woolly Flowered Hakea)				Medium	Tall shrub	White					○ ☀					WA native
Hakea lasianthoides				Medium	Tall shrub	White					☀					WA native
Hakea laurina (Pin-cushion hakea)				Medium	Tree	Red					○ ☀					WA native
Hakea lissocarpha (Honeybush)				Medium	Medium or small shrub	White					○ ☀					WA native

Species	Used for			Priority for planting for Carnaby's	Growth form	Flower colour	Soil type				Sun exposure	Soil drainage				Origin
	Feeding	Nesting	Roosting				Clayey	Gravelly	Loamy	Sandy		Well drained	Poorly drained	Waterlogged	Salt affected	
Hakea megalosperma (Lesueur Hakea)				Medium	Medium or small shrub	White, cream, pink, red					○					WA native
Hakea multilineata (Grass Leaf Hakea)				Medium	Tall shrub	Pink					○					WA native
Hakea obliqua (Needles and Corks)				Medium	Tall shrub	White					○					WA native
Hakea oleifolia (Dungyn or Olive-leaved Hakea)				Medium	Tree	White					○					WA native
Hakea pandanicaarpa subsp. crassifolia (Thick-leaved Hakea)				Medium	Tall shrub	Cream					○					WA native
Hakea polyanthema				Medium	Medium or small shrub	White					○					WA native
Hakea petiolaris (Sea Urchin Hakea)				Medium	Tall to medium shrub	Cream, pink					○					WA native
Hakea preissii (Needle Tree)				Medium	Tall shrub	Yellow					○					WA native
Hakea prostrata (Harsh Hakea)				High	Tall to mediumshrub	White					○					WA native
Hakea psilorrhyncha				Medium	Tall shrub	Cream					○					WA native
Hakea ruscifolia (Candle Hakea)				Medium	Tall shrub	White					○					WA native
Hakea scoparia (Kangaroo Bush)				Medium	Tall shrub	Cream					○					WA native
Hakea smilacifolia				Medium	Medium or small shrub	White					○					WA native
Hakea spathulata				Medium	Medium or small shrub	Red					○					WA native
Hakea stenocarpa (Narrow-fruited Hakea)				Medium	Medium or small shrub	White					○					WA native
Hakea sulcata (Furrowed Hakea)				Medium	Medium or small shrub	White					○					WA native
Hakea trifurcata (Two-leaved Hakea)				High	Tall shrub	White					○					WA native
Hakea undulata (Wavy-leaved Hakea)				High	Tall shrub	White					○					WA native
Hakea varia (Variable-leaved Hakea)				Medium	Tall shrub	White					○					WA native
Helianthus annuus (Sunflower)*				Low	Herb	Yellow					○					Exotic to Australia
Hibiscus sp. (Hibiscus)				Low	Tall shrub	Various					○					Exotic to Australia
Isopogon scabriusculus				Medium	Medium or small shrub	Pink					○					WA native
Jacaranda mimosifolia (Jacaranda)				Low	Tree	Blue, purple					○					Exotic to Australia
Jacksonia furcellata (Grey Stinkwood)				Medium	Tall shrub	Orange					○					WA native
Lambertia inermis (Chittick)				Medium	Tree	Red, orange, yellow					○					WA native
Lambertia multiflora (Many-flowered Honeysuckle)				Medium	Medium or small shrub	Orange, yellow					○					WA native
Liquidamber styraciflua (Liquid Amber)				Medium	Tree	Green					○					Exotic to Australia
Lupinus sp. (Lupin)*				Low	Herb	Yellow, blue					○					Exotic to Australia
Macadamia integrifolia (Macadamia)				Medium	Tree	White					○					Australian native
Malus domestica (Apple)				Low	Tree	White					○					Exotic to Australia
Melaleuca leuropoma				Medium	Medium or small shrub	Cream, purple, yellow					○					WA native
Melia azedarach (Cape Lilac or White Cedar)**				Low	Tree	Purple					○					Exotic to Australia
Mesomeleana sp.				Medium	Grassy or strappy						○					WA native
Protea repens				Medium	Tree or medium to small shrub	White, cream, pink					○					Exotic to Australia
Protea 'Pink Ice'				Medium	Tree or medium to small shrub	White, cream, pink					○					Exotic to Australia

Species	Used for			Priority for planting for Carnaby's	Growth form	Flower colour	Soil type				Sun exposure	Soil drainage				Origin
	Feeding	Nesting	Roosting				Clayey	Gravelly	Loamy	Sandy		Well drained	Poorly drained	Waterlogged	Salt affected	
Pinus canariensis (Canary Island Pine)				Low	Tree	Brown					○					Exotic to Australia
Pinus caribea (Caribbean Pine)				Low	Tree	Brown					○					Exotic to Australia
Pinus pinaster (Pinaster or Maritime Pine)**				Medium	Tree	Brown					○					Exotic to Australia
Pinus radiata (Radiata Pine)**				Medium	Tree	Brown					○ ☀					Exotic to Australia
Prunus amygdalus (Almond Tree)				Medium	Tree						○					Exotic to Australia
Raphanus raphanistrum (Wild Radish)*				Low	Herb	Various					○					Exotic to Australia
Tipuana tipu (Tipu or Rosewood Tree)**				Low	Tree	Yellow					○					Exotic to Australia
Xanthorrhoea preissii (Grass Tree)				Medium	Grassy or strappy	Cream					○					WA native

* Weed

** Potential weed

APPENDIX 7

YELLAGONGA REGIONAL PARK
BUSH FOREVER DESCRIPTION

YELLAGONGA REGIONAL PARK, WANNEROO/WOODVALE/KINGSLEY

Boundary Definition: protected area/bushland/conservation wetland boundary

SECTION 1: LOCATION INFORMATION

Bush Forever Site no. 299

Area (ha): bushland 380.9 (Site also includes open water.)

Map no. 27, 28, 34
NW

Map sheet series ref. no. 2034–I SW, 2034–II

Other Names: Contains Lake Joondalup and Lake Goollelal

Local Authorities (Suburb): City of Joondalup (Woodvale, Edgewater, Joondalup, Wanneroo, Kingsley)

Includes CALM Managed Land: Reserve 31048 (Recreation and Conservation of Flora and Fauna), 21708 (Protection of Flora and Fauna), 43290 (Conservation Park), 21176 (Forestry Purposes Pine Seedling Orchard)

System 6 (1983): M7 area of bushland goes beyond System area boundaries, all bushland described

SECTION 2: REGIONAL INFORMATION

LANDFORMS AND SOILS

Spearwood Dunes

Sands derived from Tamala Limestone (Qts: S7)

Tamala Limestone (Qtl: LS1, LS2)

Wetlands (within the Spearwood Dunes)

Holocene Swamp Deposits (Qrw: Sp1)

VEGETATION AND FLORA

Vegetation Complexes

Karrakatta Complex — Central and South

Cottesloe Complex — Central and South

Wetlands

Herdsmen Complex

Floristic Community Types

Supergroup 2: Seasonal Wetlands

S7 Northern woodlands to forests over tall sedgeland alongside permanent wetlands

Supergroup 4: Uplands centred on Spearwood and Quindalup Dunes

25 Southern *Eucalyptus gomphocephala* — *Agonis flexuosa* woodlands

28 Spearwood *Banksia attenuata* or *B. attenuata* — *Eucalyptus* woodlands

WETLANDS

Wetland Types: lake, sumpland, river

Natural Wetland Groups

Spearwood Dunes

Yanchep (S.1)

Wetland Management Objectives: Conservation (779.7ha), not assessed

Swan Coastal Plain Lakes EPP: 638.1ha + 63.7ha + 8.2ha = 710ha (total)

THREATENED ECOLOGICAL COMMUNITIES

Not assessed, Not determined

SECTION 3: SPECIFIC SITE DETAIL

Landscape Features: open water, vegetated wetland, vegetated uplands

Vegetation and Flora: limited survey (DEP 1996 (Yela 01–03), DPUD 1992b, EPA and WAWA 1990, Tauss 1996)

Structural Units: mapping (DPUD 1996, EPA and WAWA 1990)

Uplands: *Eucalyptus gomphocephala* Closed Forest to Woodland; *Eucalyptus gomphocephala* Tall Open Forest over *Banksia grandis* Low Open Forest; *Eucalyptus calophylla* Closed to Open Forest; *Banksia attenuata* and *Eucalyptus marginata* Woodland; Mixed *Eucalyptus marginata*, *E. calophylla* and *Banksia attenuata* Open Forest

Wetlands: *Eucalyptus rudis* Scattered Open Forest to Low Woodland; *Melaleuca raphiophylla* Low Open to Low Closed Forest; *Melaleuca raphiophylla* and *Banksia littoralis* Open Forest; Closed to Open Sedgeland dominated by *Schoenoplectus validus*, *Baumea articulata*; *B. juncea*, **Typha orientalis*, *Juncus pallidus* and *Lepidosperma longitudinale* or combinations of *Schoenoplectus validus* and *Baumea articulata*; Mixed Herbland (on dry lake bed)

Scattered Native Plants: not assessed

Vegetation Condition: >75% Very Good to Excellent, <25% Good to Degraded, with areas of severe localised disturbance

Total Flora: 217 native taxa, 103 weed taxa (compiled from DEP 1996, Tauss 1996)

Significant Flora: *Jacksonia sericea* (3), *Conostylis bracteata* (3); *Persicaria lapathifolia* (in Herblands on dry lake bed only record in the PMR), *Hibbertia cuneiformis* (most likely a weed, not known to occur naturally north of Site 377), *Amyema miquelii* (uncommon on the Plain), *Lechenaultia linarioides*, *Ricinocarpus glaucus*

Fauna: multiple surveys for birds (122 species) (Bamford and Bamford 1990; RAOU 1996 D, 86 visits). Significant populations of Blue-billed Duck, Musk Duck, Hardhead, Splendid and Variegated fairy-wrens, Broad-tailed, Western and Yellow-rumped Thornbills, Weebill, Scarlet Robin, Golden Whistler and Grey Shrike-thrush. Significant bird species: category 1 (3), category 2 (5), category 3 (17) and category 4 (8). Limited survey for native mammals (6), reptiles and amphibians (6) (DPUD 1991). Significant mammal species: Western Brush Wallaby and Echidna; Quenda (Friend 1996 D). Significant native fish species: Native Goby (*Pseudogobius olorum*) and Pygmy Perch (*Edelia vittata*) (WAWA 1995)

Linkage: adjacent bushland to the north (Site 383, across road), east (Site 164, across road) and west; part of Greenways 4, 2, 5 (Tingay, Alan & Associates 1998a); part of a regionally significant contiguous bushland/wetland linkage (Part A, Map 7)

Other Special Attributes: recommended for protection in study of City of Wanneroo (Trudgen 1996); included within Yellagonga Regional Park (DPUD 1992b)

SECTION 4: INTERNATIONAL AND NATIONAL SIGNIFICANCE

Directory of Important Wetlands in Australia; Entered in the Register of the National Estate; Location for JAMBA/CAMBA species; subject to protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

SECTION 5: SELECTION CRITERIA AND RECOMMENDATIONS

Criteria: Representation of ecological communities, Rarity, General criteria for the protection of wetland, streamline and estuarine fringing and coastal vegetation

Recommendation: Site with Some Existing Protection; the care, control and management of this Site for conservation purposes within Yellagonga Regional Park is endorsed (see Table 3, Volume 1).

APPENDIX 8

**YELLAGONGA REGIONAL PARK SPECIES
LIST**

Species lists based on plot records from DEP (1996), Gibson et al. (1994), Griffin (1993), Keighery (1996) and Weston et al. (1992). Taxonomy and species attributes according to Keighery et al. (2006) as of 16th May 2005.

Wd?	Species Name	Common Name	Family	Major Plant Group	Significant Species	Endemic	Growth Form Code	Growth Form	Life Form	Life Form - aquatics	Common SSCP Wetland Species	BFS No	yela01 (FCT28)	yela02 (FCTs07)	yela03 (FCT25)
	Acacia cyclops	Red-eyed Wattle	Mimosaceae	Dicot		AUST	3	SH	P			299			y
	Acacia huegelii	Huegel's Wattle	Mimosaceae	Dicot		WA	3	SH	P			299	y		
	Acacia saligna	Coojong	Mimosaceae	Dicot		WA	3	SH	P			299		y	
*	Acetosella vulgaris	Sorrel	Polygonaceae	Dicot			4	H	P			299			y
*	Aira caryophyllea	Silvery Hairgrass	Poaceae	Monocot			5	G	A			299	y		
	Alexgeorgea nitens	Alexgeorgea	Restionaceae	Monocot		WA	6	S-R	P			299	y		
	Allocasuarina fraseriana	Fraser's Sheoak	Casuarinaceae	Dicot		WA	1	T	P			299	y		
	Amphipogon turbinatus	Amphipogon	Poaceae	Monocot		WA	5	G	P			299	y		
	Arthropodium capillipes	Summer Lily	Anthericaceae	Monocot		WA	4	H	PAB			299			y
	Astroloma pallidum	Astroloma	Epacridaceae	Dicot		WA	3	SH	P			299	y		
	Austrodanthonia occidentalis	Western Wallaby Grass	Poaceae	Monocot		WA	5	G	P			299	y		
	Austrostipa compressa	Golden Speargrass	Poaceae	Monocot		WA	5	G	P			299	y		
	Austrostipa flavescens	Tall Speargrass	Poaceae	Monocot		AUST	5	G	P			299			y
*	Avena fatua	Wild Oat	Poaceae	Monocot			5	G	A			299			y
	Banksia attenuata	Candle Banksia	Proteaceae	Dicot		WA	1	T	P			299	y		
	Banksia grandis	Bull Banksia	Proteaceae	Dicot		WA	1	T	P			299			y
	Banksia littoralis	Swamp Banksia	Proteaceae	Dicot		WA	1	T	P		y	299		y	
	Banksia menziesii	Firewood Banksia	Proteaceae	Dicot		WA	1	T	P			299	y		
	Bolboschoenus caldwellii	Marsh Clubrush	Cyperaceae	Monocot		AUST	6	S-C	P	AQE		299		y	
	Bossiaea eriocarpa	Common Bossiaea	Papilionaceae	Dicot		WA	3	SH	P			299	y		
*	Briza maxima	Blowfly Grass	Poaceae	Monocot			5	G	A			299	y		y
*	Briza minor	Shivery Grass	Poaceae	Monocot			5	G	A			299	y		
*	Bromus diandrus	Great Brome	Poaceae	Monocot			5	G	A			299			y
	Burchardia congesta	Kara	Colchicaceae	Monocot		WA	4	H	PAB			299	y		
	Caladenia flava subsp. flava	Cowslip Orchid	Orchidaceae	Monocot		WA	4	H	PAB			299	y		
	Centella asiatica	Centella	Apiaceae	Dicot			4	H (PR)	P		y	299		y	
	Centrolepis drummondiana	Sand Centrolepis	Centrolepidaceae	Monocot		AUST	6	S-C	A			299	y		
*	Cerastium glomeratum	Sticky Mouse-ear Chickweed	Caryophyllaceae	Dicot			4	H	A			299	y		
	Conostephium pendulum	Pearlflower	Epacridaceae	Dicot		WA	3	SH	P			299	y		
	Conostylis aculeata	Prickly Conostylis	Haemodoraceae	Monocot		WA	4	H	P			299	y		
	Crassula colorata var. colorata	Dense Stonecrop	Crassulaceae	Dicot		T	4	H	A			299	y		
	Daviesia decurrens subsp. decurrens MS	Daviesia	Papilionaceae	Dicot		WA	3	SH	P			299	y		
	Daviesia triflora	Three-flowered Daviesia	Papilionaceae	Dicot		WA	3	SH	P			299	y		
	Desmocladius flexuosus	Desmocladius	Restionaceae	Monocot			6	S-R	P			299	y		

Species lists based on plot records from DEP (1996), Gibson et al. (1994), Griffin (1993), Keighery (1996) and Weston et al. (1992). Taxonomy and species attributes according to Keighery et al. (2006) as of 16th May 2005.

Wd?	Species Name	Common Name	Family	Major Plant Group	Significant Species	Endemic	Growth Form Code	Growth Form	Life Form	Life Form - aquatics	Common SSCP Wetland Species	BFS No	yela01 (FCT28)	yela02 (FCTs07)	yela03 (FCT25)
	Dianella revoluta var. divaricata	Common Dianella	Phormiaceae	Monocot		WA	4	H	P			299		y	
*	Disa bracteata	South African Orchid	Orchidaceae	Monocot			4	H	PAB			299	y		y
	Drosera erythrorhiza subsp. erythrorhiza	Red Ink Sundew	Droseraceae	Dicot		WA	4	H	PAB			299	y		
	Drosera macrantha subsp. macrantha	Rainbow	Droseraceae	Dicot		WA	4	H	PAB			299	y		
	Dryandra sessilis var. sessilis	Hills Parrotbush	Proteaceae	Dicot		WA	3	SH	P			299			y
*	Ehrharta calycina	Perennial Veldtgrass	Poaceae	Monocot			5	G	P			299	y		
*	Ehrharta longiflora	Annual Veldtgrass	Poaceae	Monocot			5	G	A			299			y
	Eucalyptus calophylla	Marri	Myrtaceae	Dicot		WA	1	T	P			299			y
	Eucalyptus gomphocephala var. gomphocephala	Tuart	Myrtaceae	Dicot		WA	1	T/M	P			299			y
	Eucalyptus marginata subsp. marginata	Jarrah	Myrtaceae	Dicot		WA	1	T	P			299	y		
	Eucalyptus rudis subsp. rudis	Flooded Gum	Myrtaceae	Dicot		WA	1	T	P		y	299		y	
	Exocarpos sparteus	Broom Ballart	Santalaceae	Dicot		AUST	3	SH	P-PAR			299		y	
	Geranium retrorsum	Native Geranium	Geraniaceae	Dicot		T	4	H	A/P			299			y
*	Gladiolus caryophyllaceus	Pink Gladiolus	Iridaceae	Monocot			4	H	PAB			299	y		
	Gompholobium tomentosum	Common Gompholobium	Papilionaceae	Dicot		WA	3	SH	P			299	y		
	Haemodorum laxum	Haemodorum	Haemodoraceae	Monocot		WA	4	H	PAB			299	y		
	Hemarthria uncinata var. uncinata	Hemarthria	Poaceae	Monocot		AUST	5	G	P		y	299		y	
	Hibbertia cuneiformis	Cutleaf Hibbertia	Dilleniaceae	Dicot	r,s	WA	3	SH	P			299			y
	Hibbertia huegelii	Huegel's Hibbertia	Dilleniaceae	Dicot		WA	3	SH	P			299	y		
	Hibbertia hypericoides	Common Hibbertia	Dilleniaceae	Dicot		WA	3	SH	P			299	y		
	Homalosciadium homalocarpum	Homahoma	Apiaceae	Dicot		WA	4	H	A			299	y		
	Hovea trisperma var. trisperma	Common Hovea	Papilionaceae	Dicot		WA	3	SH	P			299	y		
	Hypocalymma robustum	Swan River Myrtle	Myrtaceae	Dicot		WA	3	SH	P			299	y		
*	Hypochaeris glabra	Flatweed	Asteraceae	Dicot			4	H	A			299	y		y
*	Isolepis marginata	Coarse Clubrush	Cyperaceae	Monocot		T	6	S-C	A			299	y		y
	Isotropis cuneifolia subsp. cuneifolia	Granny's Bonnets	Papilionaceae	Dicot		WA	4	H-SH	P			299	y		
	Jacksonia furcellata	Grey Stinkwood	Papilionaceae	Dicot		WA	3	SH/T	P			299		y	
	Lagenophora huegelii	Western Lagenophora	Asteraceae	Dicot		AUST	4	H	PAB			299	y		
	Lepidosperma longitudinale	Swamp Swordsedge	Cyperaceae	Monocot		AUST	6	S-C	P		y	299		y	
	Lepidosperma squamatum	Common Lepidosperma	Cyperaceae	Monocot		WA	6	S-C	P			299	y		
	Leporella fimbriata	Hare Orchid	Orchidaceae	Monocot		WA	4	H	PAB			299	y		
	Leucopogon parviflorus	Beard Heath	Epacridaceae	Dicot		WA	3	SH	P			299			y
	Leucopogon propinquus	Beard Heath	Epacridaceae	Dicot		WA	3	SH	P			299	y		
	Lomandra hermaphrodita	Lomandra	Dasypogonaceae	Monocot		WA	4	H	P			299	y		

Species lists based on plot records from DEP (1996), Gibson et al. (1994), Griffin (1993), Keighery (1996) and Weston et al. (1992). Taxonomy and species attributes according to Keighery et al. (2006) as of 16th May 2005.

Wd?	Species Name	Common Name	Family	Major Plant Group	Significant Species	Endemic	Growth Form Code	Growth Form	Life Form	Life Form - aquatics	Common SSCP Wetland Species	BFS No	yela01 (FCT28)	yela02 (FCTs07)	yela03 (FCT25)
	Lomandra preissii	Preiss's Lomandra	Dasypogonaceae	Monocot		WA	4	H	P			299	y		
	Lomandra suaveolens	Lomandra	Dasypogonaceae	Monocot		WA	4	H	P			299	y		
*	Lupinus cosentinii	Sandplain Lupin	Papilionaceae	Dicot			4	H	A			299			y
	Luzula meridionalis	Woodrush	Juncaceae	Monocot		AUST	6	S-J	PAB			299			y
	Macrozamia riedlei	Riedlé's Zamia	Zamiaceae	Cycad		WA	3	SH-H	P			299			y
	Melaleuca raphiophylla	Freshwater Paperbark	Myrtaceae	Dicot		WA	3	SH	P		y	299		y	
	Mesomelaena pseudostygia	Semaphore Sedge	Cyperaceae	Monocot		WA	6	S-C	P			299	y		
	Microlaena stipoides	Weeping Grass	Poaceae	Monocot		T	5	G	P			299	y		
	Microtis media	Common Mignonette Orchid	Orchidaceae	Monocot		WA	4	H	PAB			299	y	y	
*	Moraea flaccida	One-leaf Cape Tulip	Iridaceae	Monocot			4	H	PAB			299			y
	Myoporum caprarioides	Slender Myoporum	Myoporaceae	Dicot		WA	3	SH	P			299		y	
	Opercularia vaginata	Opercularia	Rubiaceae	Dicot		WA	3	SH-H	P			299	y		
*	Orobanche minor	Broom Rape	Orobanchaceae	Dicot			4	H	A-PAR			299			y
*	Pelargonium capitatum	Rose Pelargonium	Geraniaceae	Dicot			4	H-SH	P			299		y	
	Petrophile linearis	Pixie Mops	Proteaceae	Dicot		WA	3	SH	P			299	y		
*	Petrorhagia dubia	Velvet Pink	Caryophyllaceae	Dicot			4	H	A			299			y
	Pimelea argentea	Silver-leaved Banjine	Thymelaeaceae	Dicot		WA	3	SH	P			299			y
	Poranthera microphylla	Poranthera	Euphorbiaceae	Dicot		WA	4	H-SH	P			299	y		
	Pteridium esculentum	Bracken	Dennstaedtiaceae	Fern		AUST	4	H	P			299			y
	Pterostylis nana	Small Snail Orchid	Orchidaceae	Monocot		WA?	4	H	PAB			299	y		
	Ptilotus stirlingii var. stirlingii	Stirling's Mulla Mulla	Amaranthaceae	Dicot		WA	4	H-SH (PR)	P			299			2
	Schoenus curvifolius	Schoenus	Cyperaceae	Monocot		WA	6	S-C	P			299	y		
*	Sonchus asper subsp. glaucescens	Rough Sowthistle	Asteraceae	Dicot			4	H	A			299		y	
*	Sonchus oleraceus	Common Sowthistle	Asteraceae	Dicot			4	H	A			299			y
	Sowerbaea laxiflora	Purple Tassels	Anthericaceae	Monocot		WA	4	H	PAB			299	y		y
	Spyridium globulosum	Basket Bush	Rhamnaceae	Dicot		AUST	3	SH	P			299			y
	Stylidium brunonianum subsp. brunonianum	Pink Fountain Triggerplant	Stylidiaceae	Dicot		WA	4	H	P			299	y		
	Stylidium calcaratum	Book Triggerplant	Stylidiaceae	Dicot		AUST	4	H	A			299	y		
	Stylidium piliferum subsp. piliferum	Common Butterfly Triggerplant	Stylidiaceae	Dicot		WA	4	H	P			299	y		
	Thysanotus arenarius	Limestone Fringed Lily	Anthericaceae	Monocot		WA	4	H	PAB			299			y
	Trachymene pilosa	Small Laceflower	Apiaceae	Dicot			4	H	A			299	y		y
*	Trifolium campestre var. campestre	Hop Clover	Papilionaceae	Dicot			4	H	A			299			y
	Typha domingensis	Native Bulrush	Typhaceae	Monocot		T	6	S-J	PAB	AQE		299		y	
*	Ursinia anthemoides	Ursinia	Asteraceae	Dicot			4	H	A			299	y		

Species lists based on plot records from DEP (1996), Gibson et al. (1994), Griffin (1993), Keighery (1996) and Weston et al. (1992). Taxonomy and species attributes according to Keighery et al. (2006) as of 16th May 2005.

Wd?	Species Name	Common Name	Family	Major Plant Group	Significant Species	Endemic	Growth Form Code	Growth Form	Life Form	Life Form - aquatics	Common SSCP Wetland Species	BFS No	yela01 (FCT28)	yela02 (FCTs07)	yela03 (FCT25)
*	Vicia sativa	Common Vetch	Papilionaceae	Dicot			4	H	A			299			y
*	Vulpia sp. scps	Fescue	Poaceae	Monocot			5	G	A			299	y		
	Wahlenbergia preissii	Preiss's Native Bluebell	Campanulaceae	Dicot		AUST	4	H	A			299	y		
	Waitzia suaveolens var. suaveolens	Fragrant Immortelle	Asteraceae	Dicot		WA	4	H	A			299	y		
	Xanthorrhoea preissii	Balga	Xanthorrhoeaceae	Monocot		WA	3	SH	P			299	y		
	Xanthosia huegelii subsp. huegelii MS	Xanthosia	Apiaceae	Dicot		WA	4	H-SH	P			299	y		

APPENDIX 9

**DBCA APPROVED REHABILITATION
SPECIES LIST**

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From: [Clarke, Karen](#)
To: [Belinda Heath](#); [Brundrett, Mark](#)
Cc: [Fisher, Timothy](#)
Subject: RE: YRP - Final species list
Date: Monday, 14 July 2014 12:50:01 PM
Attachments: [Yellagonga Proposed Seed Mix 140710_KCeditV2.xlsx](#)

Hi Belinda,
The list looks fine to me. I've corrected a few errors with track changes and added 1 comment (see attached). Why are some in red text? Give me a call on my mobile when you get a chance.
Cheers, Karen.

Karen Clarke
Ecologist (part-time: Mon am, Tues, Fri am)
M: 0427 081 398

Swan Region
Regional and Fire Management Services Division
Department of Parks and Wildlife (DPaW)
Cnr Australia II Drive and Hackett Drive, Crawley WA 6009
PO Box 104, Bentley Delivery Centre, WA 6983
T: (08) 9442 0353 F: (08) 9386 6399 M: 0427 081 398
E: karen.clarke@dpaw.wa.gov.au
<http://www.dpaw.wa.gov.au/>

From: Belinda Heath [belinda@pgv.net.au]
Sent: Thursday, 10 July 2014 8:10 AM
To: Clarke, Karen; Brundrett, Mark
Cc: Fisher, Timothy
Subject: YRP - Final species list

Hi Karen and Mark

Tranen have finalised the species list and the blend of seed for the rehab works at Yellagonga Regional Park.

Can you give the final tick off on the attached list?

Tranen are proposing to get the seeding done later next week.

Please feel free to me call to discuss

Kind Regards
Belinda

Belinda Heath
Senior Environmental Consultant

Unit 1, 61 Guthrie Street
Osborne Park WA 6017
belinda@pgv.net.au
F: 9202 8789
Mobile: 0429 500 027

[cid:image001.png@01CF9C16.67DD3E80]

www.pgv.net.au<<http://www.pgv.net.au/>>

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APPENDIX 10

COMPLETION CRITERIA MEMO

Eglinton CRMP – Yellagonga Regional Park Rehabilitation - Completion Criteria

1 Background

The Clearing and Revegetation Management Plan (CRMP) prepared as part of the EPBC Act approval of the Eglinton Estates development contained the requirement to rehabilitate 12.7ha of new Carnaby's Black Cockatoo (CBC) habitat in Yellagonga Regional Park (YRP).

Revegetation of two of the four areas identified for rehabilitation in YRP commenced in 2014. The plant species used for revegetation focussed on CBC foraging species that naturally occur in YRP as well as at Eglinton. Non-CBC habitat plant species were also included in the species list in order to restore a sustainable natural ecosystem appropriate to the YRP landscape, ie. both an overstorey and understorey of native plants.

Monitoring of the progress of the seed germination and tube stock planting has occurred twice year from 2015 and is ongoing.

According to the CRMP, the success of the rehabilitation works will be assessed using a number of factors including:

- Native plant density
- Species richness
- Weed competition
- Ecological processes (i.e. flowering and reproduction, fauna utilisation, etc.).

Table 11 of the CRMP, which was to include the quantitative numbers used to determine plant density and species richness was left in draft form pending surveys in nearby remnant bushland as well as in Eglinton to determine realistic values rather than determine the criteria on an arbitrary basis.

This memo provides the results of work undertaken by PGV Environmental to determine the completion criteria for Table 11.

2 Methodology

Table 11 proposes three different completion criteria to be determined as follows:

- The species richness of trees, large shrubs and other lifeforms (small shrubs, herbs, sedges etc) in nearby remnant bushland reference sites (most likely Neerabup National Park) but not necessarily;
- The density of trees, large shrubs and other lifeforms in nearby remnant bushland reference sites; and
- The density of Carnaby's Black Cockatoo species in each lifeform in areas of CBC habitat cleared at the Eglinton site.

Species Richness

The species richness of reference site in Neerabup National Park could have been determined either by establishing and scoring new sites or by using published information. It was determined to be far more cost effective to use existing published high quality data. That was found to be available in the Level 2 flora survey of the Mitchell Freeway extension from Burns Beach Road to Romeo Road undertaken by GHD for Main Roads Western Australia in 2013.

The Mitchell Freeway extension flora survey included sampling species from twenty-nine 10m x 10m quadrats in September to October 2013. The range of vegetation types included Banksia woodland, Tuart woodland, Jarrah-Banksia woodland, Banksia woodland and heath and heath.

The YRP rehabilitation sites are aiming to achieve a woodland vegetation structure with a variety of tree species including Tuart, Jarrah, Marri, Banksia, Sheoak and Eucalyptus tottiana. Eighteen of the GHD quadrats were sampled from vegetation types that match the structure being aimed for on the YRP rehabilitation sites. Therefore, the species richness of all perennial native species in the lifeforms of Tree, Large Shrubs (greater than 1m) and Other were counted.

Overall Plant Density

The quadrat data from the Mitchell Freeway extension flora survey did not contain information on the density of each species. Therefore, the density of Trees and Large Shrubs (>1m) was measured from newly established plots in and around Yellagonga Regional Park. The condition of the plant density reference plots was not of sufficient quality to count species richness and be used for that purpose. However, while the understorey was mostly in poor condition, the tree and large shrubs layer appeared to be in good condition and suitable to be used as reference plots for plant density completion criteria.

Four sites were chosen for the density count. Three were in the Yellagonga Regional Park on the western and eastern side of Lake Joondalup. The fourth was in a local bushland area just to the north of the Wanneroo Council Offices on Dundobar Road. At each location a 40m x 10m plot was measured out and all trees and large shrubs >1m high were counted. The survey was done on 23 August 2017.

An attempt was made to count the number of Other lifeforms (small shrubs, sedges, herbs etc) in an area with very good condition understorey. It was found to be extremely difficult to count individual plants as an understorey with 70-80% cover contains an intermingling mix of low shrubs, sedges, herbs, climbing plants etc.

As the understorey is not important for Carnaby's Black Cockatoo, and that any attempt to count plants in their natural environment could lead to a very uncertain figure, it was decided that the density of Other species was not required for the completion criteria.

CBC Species Density

The CRMP requires the rehabilitation areas to contain Carnaby's Black Cockatoo foraging and breeding habitat species density to be no less than the Eglinton clearing sites. The density of CBC species in the Eglinton site was determined using the existing six 10m x 10m plots being monitored in the three

Conservation POS areas. The number of CBC species was counted in each of the six plots on 22 March 2017. The CBC species in the plots included trees, large shrubs and small shrubs.

3 Results

Species Richness

A total of 18 quadrats from the Mitchell Freeway extension flora survey were considered suitable for counting species richness for Trees, Large Shrubs (>1m) and Other. Only native perennial species were counted. The results are shown in Table 1.

The woodland vegetation types surveyed by GHD in Neerabup National Park contained on average almost 2 tree species per 100m². The tree species in the quadrats included Tuart, Jarrah, Sheoak, Marri, Banksia attenuata, Banksia menziesii and Eucalyptus tottiana. All these species have been planted in the YRP rehabilitation sites.

The number of large shrubs was reasonably consistent between the sites and averaged 2.3 species per 100m². Larger shrubs included *Acacia cyclops*, *A. pulchella*, *A. saligna*, *A. rostellifera*, *Anthocercis littorea*, *Hakea prostrata*, *H. ruscifolia*, *H. trifurcata*, *Jacksonia sternbergiana*, *Macrozamia fraseri*, *Pimelea argentea*, *Spyridium globulosum* and *Xanthorrhoea preissii*. Most of these species have been planted in the YRP rehabilitation sites.

Native species in the Other category was also reasonably consistent with an average of 12.8 species per 100m².

On this basis, the completion criteria for the YRP rehabilitation sites are shown in Table 11.

Table 1: Species Richness

Site	Vegetation Type and trees present	Condition	# Species (native only)		
			Trees	Large Shrubs >1m	Perennial Small Shrubs
Q01	Banksia woodland (BaBm)	Very Good	2	5	21
Q02	Banksia woodland (BaBmAf)	Exc - VG	3	2	16
Q03	Banksia woodland (BmEt)	Exc - VG	2	1	25
Q04	Banksia woodland (BaAf)	Very Good	2	1	12
Q05	Banksia woodland (EmAfBa)	VG - G	3	0	13
Q07	Tuart woodland (Eg)	Good	1	4	4
Q08	Tuart woodland (Eg)	Vg - G	1	3	11
Q14	Banksia woodland (BaBmAf)	Very Good	3	3	14
Q15	Banksia woodland (BaBm)	Very Good	2	1	14
Q17	Tuart woodland (Eg)	Very Good	1	2	12
Q18	Tuart woodland (EgCc)	Very Good	2	3	11
Q19	Banksia woodland (BaAf)	Very Good	2	1	9
Q21	Tuart woodland (EgAfEm)	Very Good	3	1	8
Q22	Banksia woodland (BaBmAf)	Very Good	3	3	5
Q23	Banksia woodland (Bm) and Heath	Exc - VG	1	3	12
Q25	Jarrah - Banksia woodland (Em)	Good	1	3	8

Site	Vegetation Type and trees present	Condition	# Species (native only)		
			Trees	Large Shrubs >1m	Perennial Small Shrubs
Q26	Jarrah - Banksia woodland (Em)	Very Good	1	1	18
Q27	Tuart woodland (Eg)	Good	1	4	18
Average			1.9	2.3	12.8

Overall Plant Density

The results of the tree and large shrub density count from four sites in and around YRP are shown in Table 2.

The vegetation in the four sites was chosen to be woodlands of varying species composition as follows:

Site 1 – Tuart/Jarrah/Sheoak Woodland over *Banksia attenuata*/*B.menziesii* Low Open Woodland over *Hibbertia hypericoides*/*Mesomelaena pseudostygia* Low Closed Heath

Site 2 – Marri/Tuart Woodland over scattered *Banksia attenuata*/*B. sessilis* over *Macrozamia fraseri*/*Xanthorrhoea preissii* Shrubland

Site 3 – Marri/Jarrah Woodland over *Banksia grandis* Low Open Woodland over *Jacksonia sternbergiana*/*Xanthorrhoea preissii*/*Hibbertia cuneiformis* Tall Shrubland

Site 4 – Jarrah/Marri/Sheoak/*Banksia attenuata*/*B. menziesii* Low Open Woodland

The density of trees ranged from 16-31 per 400m² which equates to 4-7.75 per 100m² (average 5.4/100m²)

The density of large shrubs ranged from 5-46 per 400m² which equates to 1.25-11.5 per 100m² (average 5.25/100m²).

On this basis, the completion criteria for the YRP rehabilitation sites are determined to be 540 per hectare for Trees and 525 per hectare for Large Shrubs (Table 11).

Table 2: Tree and Large Shrub Density Count

Species	Site				Average
	1	2	3	4	
Trees					
Tuart	1	3	1		
Jarrah	3	1	6	1	
Marri		12	4	7	
<i>Allocasuarina fraseriana</i>	8			6	
<i>Banksia attenuata</i>	5	3	1	6	
<i>Banksia grandis</i>			4		
<i>Banksia menziesii</i>	3			11	
Density per 400m2	20	19	16	31	
Density per 100m2	5	4.75	4	7.75	5.38

Species	Site				Average
	1	2	3	4	
Tall Shrubs					
<i>Xanthorrhoea preissii</i>	4	2	35	18	
<i>Macrozamia fraseri</i>	1	7	4	2	
<i>Acacia saligna</i>		2			
<i>Banksia sessilis</i>		2			
<i>Jacksonia sternbergiana</i>			5		
<i>Hibbertia cuneiformis</i>			2		
Density per 400m ²	5	13	46	20	
Density per 100m²	1.25	3.25	11.5	5	5.25

CBC Species Density

The six permanent 10m x 10m monitoring plots in the Eglinton Conservation POS areas are considered representative of the type of Carnaby's Black Cockatoo habitat that is approved to be cleared at Eglinton. Four of the plots are Banksia woodlands, one is a Redheart (*Eucalyptus decipiens*) woodland and another is a dense Parrot Bush (*Banksia sessilis*) closed heath.

A total of eight native species were recorded in the six plots that are known to be used by CBC for foraging. No breeding or roosting habitat species occur in the plots or on the Eglinton site in general. There are no Tuart, Jarrah or Marri trees in the area to be cleared.

Two of the foraging species are trees, *Banksia attenuata* and *B. menziesii*, while the other six species are large or small shrubs.

The data in Table 3 shows that the density of foraging habitat species for the five woodland plots ranges from 12-22 species per 100m² (average 17). Banksia woodlands had an average of 9.25 Banksia trees per 100m² (925/ha). The woodland plots had an average of 9.6 foraging shrub species 100m² (960/ha).

In contrast, the dense Parrot Bush heath contained an estimate of around 35,000 foraging plants per 100m², all Parrot Bush shrubs.

The CRMP requires the rehabilitation areas to contain Carnaby's Black Cockatoo foraging and breeding habitat species density to be no less than the Eglinton clearing sites. Therefore, the completion criteria for the YRP rehabilitation site is determined to be 1700 per hectare (Table 11) The dense Parrot Bush heath number is not considered a reasonable number to include in the calculation as the Parrot Bush heath at Eglinton occurs on shallow limestone soils, the preferred soil type for *Banksia sessilis*. The YRP rehabilitation site is deep sand with no limestone, therefore a dense Parrot Bush heath would not be able to grow on the site.

Table 3: Density of Carnaby's Black Cockatoo Species at Eglinton

Strata	AE1	AE2	AG1	AG2	AH1	AH2
	Banksia woodland	Banksia woodland	<i>Eucalyptus decipiens</i>	Banksia woodland	Parrot Bush Heath	Banksia woodland
Trees						
<i>Banksia attenuata</i>	11	2	0	3	0	6
<i>Banksia menziesii</i>	5	5	0	5	0	0
Total/100m2	16	7	0	8	0	6
per m2	0.16	0.07	0	0.08	0	0.06
per ha	1600	700	0	800	0	600
Shrubs						
<i>Banksia sessilis</i>			14		350	
<i>Banksia dallanneyi</i>						5
<i>Hakea trifurcata</i>		3	8			
<i>Hakea lissocarpa</i>						4
<i>Xanthorrhoea preissii</i>		3		4		
<i>Jacksonia furcellata</i>						7
Total/100m2	0	6	22	4	350	16
per m2	0	0.06	0.22			
per ha	0	600	2200	0	0	0
Total trees and shrubs						
Total/100m2	16	13	22	12	350	22
Total per m2	0.16	0.13	0.22	0.12	3.5	0.22
per ha	1600	1300	2200	1200	35000	2200

4 Conclusion

Based on the survey results the completion criteria for Table 11 of the CRMP are proposed as follows.

Table 11: Yellagonga Regional Park Revegetation Sites Completion Criteria

Native species category	Species Richness	Density*	CBC Species*
Trees	100% of 2.0/100m ² = 2.0/100m ²	540 stems per hectare	1700 stems per hectare
Large shrubs	80% of 2.3/100m ² = 1.8/100m ²	525 stems per hectare	
Other (shrubs, herbs, sedges etc)	60% of 12.8/100m ² = 7.7/100m ²		