

Peet Limited
Lakelands East: Lot 9099 Mandjoogordap Drive,
Mandurah

Black Swan Swamp Revegetation Management Plan

28 July 2020

56778-131170 (Rev 8)

JBS&G Australia Pty Ltd T/A Strategen-JBS&G

Table of Contents

1.	Introduction	1
1.1	Purpose and scope	1
1.2	Background.....	3
2.	Site description	6
2.1	Climate.....	6
2.2	Topography.....	6
2.3	Geology and soils.....	7
2.4	Vegetation and flora.....	7
2.5	Fauna	7
3.	Revegetation strategy.....	9
3.1	Revegetation objectives and scope.....	9
3.2	Completion criteria and indicator	10
4.	Management actions	11
4.1	Areas.....	11
4.1.1	Revegetation areas	11
4.1.2	Landscaping areas	12
4.2	Weed control.....	13
4.3	Seedling planting	14
4.4	Grazing control	15
4.5	Hygiene measures	16
4.6	Timeframe	16
4.7	Conservation mechanism	16
5.	Monitoring.....	17
5.1	Monitoring methodology	17
5.1.1	Revegetation areas	17
5.1.2	Landscaping areas.....	18
5.2	Monitoring actions	18
6.	Contingency measures.....	19
7.	Plan implementation	20
7.1	Roles and responsibilities	20
7.1.1	Peet project manager	20
7.1.2	Revegetation contractor	20
7.1.3	Landscaping contractor.....	21
7.1.4	City of Mandurah	21
7.1.5	Environmental consultant.....	21

8. Audit, review and reporting.....	22
9. Limitations	23
10. References	24

List of Tables

Table 1: EPBC 2013/7048 Condition 3 and where condition is addressed in RMP	1
Table 2: Completion criteria and indicators for revegetation objectives for the revegetation site.....	10
Table 3: Management actions (revegetation areas).....	11
Table 4: Management actions (landscaping areas in the offset site)	12
Table 5: Summary of weed control methods.....	14
Table 6: Revegetation species*	14
Table 7: Stocking rates of planted seedlings within revegetation area	15
Table 9: Monitoring program for revegetation and landscaping areas within the offset site	18
Table 10: Contingency actions for revegetation and landscaping areas within the offset site	19

List of Figures

Figure 1: Lakeland East offset site.....	5
Figure 2: Average monthly climate statistics for Mandurah (Station No. 9887)	6
Figure 3: Monitoring plot layout.....	17

Appendices

Appendix A Plants used by Carnaby’s Black Cockatoo (DEC 2011)

1. Introduction

This Revegetation Management Plan (RMP) has been prepared as required under *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) approval 2013/7048 for the development of Lot 9099 Mandjoogoordap Drive, Lakelands (Lakelands East) within the City of Mandurah (CoM). This RMP identifies management measures, monitoring actions, contingencies and reporting to be undertaken by Peet Mandurah Syndicate Limited (Peet) for the revegetation of up to 10.8 ha of degraded land at Black Swan Swamp (the offset site).

The offset site encompasses 10.8 ha of land located on the boundary of Black Swan Swamp, 0.5 km west of proposed development at Lakelands East, within the CoM (Figure 1). This RMP details revegetation and management actions to be implemented as part of revegetation activities which will serve as an environmental offset to the development. Peet will be responsible for implementation of this RMP.

1.1 Purpose and scope

This RMP has been prepared to satisfy Conditions 3 and 4 of EPBC 2013/7048 for the Lakelands East project. Table 1 details the requirements of Condition 3 of EPBC 2013/7048 and where the condition is addressed in this RMP.

Table 1: EPBC 2013/7048 Condition 3 and where condition is addressed in RMP

Condition number	Requirement	RMP section
3	To compensate for the loss of black cockatoo habitat trees , within one month of the date of the approval, the approval holder must prepare and submit a Revegetation Management Plan (RMP) for the Ministers approval to revegetate the offset site . The approval holder must not commence the action unless the Minister has approved the RMP. The RMP must include, but may not be limited to:	
a.	Objectives of the RMP;	Section 3.1
b.	Location, condition, size and suitability of the revegetation areas within the offset site ;	Section 1.2
c.	Detailed information on each stage of the revegetation project;	Section 4
d.	Black cockatoo tree and shrub species to be utilised, source of plant stock, stocking rates (at least six thousand two hundred (6200) tree or shrub plants, including no less than 3000 plants that are potential breeding species and no less than 3200 plants that are foraging species), planting method and schedule;	Section 3.2, Section 4.3 and Section 4.6
e.	Preventative management actions that will be implemented to manage weeds, feral animals and anthropogenic activities, within the offset site prior to, during and post planting;	Section 4
f.	Revegetation success criteria (that 3 years from the date of planting the approval holder must achieve a minimum of 80 percent survival rate of the planted potential breeding species and 80 percent survival rate of the planted foraging species), and detailed response measures and corrective actions should success criteria not be met;	Section 3.2 and Section 6
g.	Monitoring program, including the type, timing and frequency of monitoring;	Section 5
h.	Responsibilities for planning, implementing, management, reporting and monitoring the RMP;	Section 4 and Section 7
i.	Timeframes for the implementation of each stage of the RMP	Section 4.6
j.	Details on the conservation mechanism to protect and conserve the offset site .	Section 4.7

Condition 4 of EPBC 2013/7048 requires that:

*If the **Minister** approves the RMP, then the **approval holder** must implement the approved RMP.*

This RMP has been prepared to ensure that the proposed revegetation meets the requirements of an environmental offset for the proposed Lakelands East development.

This RMP includes revegetation and management actions as required by the Commonwealth Department of the Environment and Energy (DEE) including:

- Revegetation objectives and scope
- Revegetation completion criteria and indicators
- Management actions
- Species to be used in revegetation
- Plant numbers and densities
- Timeframe for revegetation program
- Weed control measures
- Watering regime (if required)
- Protection from grazing
- Maintenance measures
- Monitoring program.

1.2 Background

The proposed development at Lakelands East will consist of approximately 500 residential lots, Public Open Space (POS) and a primary school. The Project area has been used for agricultural grazing until recently and a small extractive quarry occurs in the north-east corner.

The Project area is parkland cleared, containing remnant Tuart, Marri and Jarrah trees within the former farm paddocks. The understorey over the entire site has been cleared as a result of the use of the site for cattle grazing. A small number of Banksia (*B. attenuata* and *B. menziesii*) and Sheoak (*Allocasuarina fraseriana*) trees occur on the highest point of the site along the eastern boundary. The overall condition of vegetation within the project area is degraded to completely degraded.

The proposed development involves the clearing of native trees consisting of potential foraging and breeding habitat for black cockatoos. Clearing works will be managed to ensure the retention of 303 black cockatoo habitat trees, including no less than 120 native trees with a DBH of 500 mm or greater (potential breeding trees) and no less than 183 native trees considered to be black cockatoo foraging species with a DBH less than 500 mm (foraging species) within the project area.

To further mitigate the residual impact to Black Cockatoos, up to 10.8 ha of degraded land adjacent to Black Swan Swamp (the offset site) will be revegetated with black cockatoo foraging and breeding species within revegetation and landscaping areas in the offset site (Figure 1). The offset site is considered suitable for revegetation activities given its degraded condition and proximity to the Project area (i.e. the offset site will provide quality habitat for the same black cockatoos impacted by the Project). Legislative requirements.

1.2.1.1 City of Mandurah Town Planning Scheme No 3

The Lakelands East site is zoned 'Residential' and 'Urban Development' under the City of Mandurah Town Planning Scheme No. 3. The area has an existing structure plan approval through the Centennial Park Outline Development Plan (ODP) approved in July 2001.

The ODP designates Lakelands East for urban development. A revised ODP for Lakelands East has been endorsed by the City of Mandurah was approved by the Western Australian Planning Commission on 9 August 2013.

1.2.1.2 Environmental Protection Act 1986

The Lakelands East site is zoned 'Urban' under the Peel Region Scheme. The Environmental Protection Authority (EPA) formally assessed the Peel Region Scheme amendment under s 48A of the *Environmental Protection Act 1986* (EPA Bulletin 994, August 2000).

The Minister for the Environment's approval of the Peel Region Scheme amendment was not in effect until August 2002. In its assessment, the EPA considered that the only significant environmental factor in the Lakelands area was Paganoni Swamp. The EPA was satisfied that buffers proposed around Paganoni Swamp were adequate to protect the environmental values of the Swamp.






1.2.1.3 Environment Protection and Biodiversity Conservation Act 1999

Lakelands East was referred to the Commonwealth Department of the Environment (DotE; currently DEE) for assessment and approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 7 November 2013. The proposal was approved with conditions on 3 December 2014.

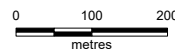
Conditions 3 and 4 of EPBC 2013/7048 require the preparation and implementation of a RMP to support the revegetation that is proposed within the offset site. The purpose of this plan is to meet the requirements of these conditions.



Legend

-  Project area
-  Landscaping areas
-  Potential revegetation areas
-  Development area
-  Offset site

Scale 1:10,000 at A4



Coord. Sys. GDA 1994 MGA Zone 50



Job No: 56778

Client: Peet Limited

Version: A

Date: 17-Jul-2020

Drawn By: hsullivan

Checked By: CT

**Lakelands East Residential
Development
Mandurah WA**

LAKELANDS EAST OFFSET SITE

FIGURE 1

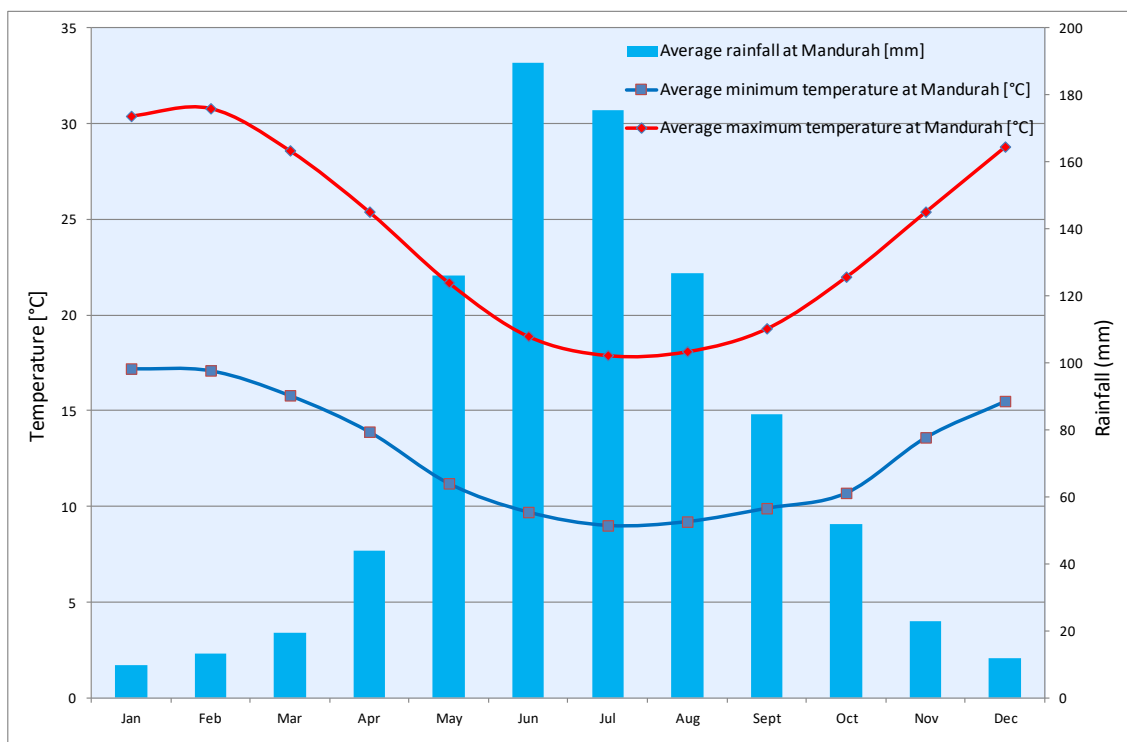


2. Site description

2.1 Climate

The Lakelands area experiences a Mediterranean climate characterised by mild, wet winters and warm to hot, dry summers. The Bureau of Meteorology (BoM) weather station at Mandurah (Station No. 9887), located approximately 7 km south of Lakelands, provides average monthly climate statistics for the locality, as illustrated in Figure 2.

Average annual rainfall recorded at Mandurah is 882.2 mm (BoM 2014). Rainfall may occur at any time of year; however, most occurs in winter in association with cold fronts from the southwest. Highest temperatures occur from December to March, with average monthly maximums ranging from 28.6°C in March to 30.8°C in February (BoM 2014). Lowest temperatures occur from June to September, with average monthly minimums ranging from 9.0°C in July to 9.9°C in September (BoM 2014).



Source: BoM 2014

Figure 2: Average monthly climate statistics for Mandurah (Station No. 9887)

2.2 Topography

The majority of the Lakelands area is located within the Spearwood dune system, with topographical features comprised of swales and dune ridges typical of the area (ATA 2004). Elevation within proximity to the revegetation site ranges from 2 mAH (meters Australian Height Datum) in the wetland sumps to 9.5 mAH to the east, adjacent to Stock Road (ATA 2004).

2.3 Geology and soils

The Lakelands area is situated within four geological units (ATA 2004):

- Clayey sand (Scp)
- Sand derived from Tamala Limestone (S₇)
- Limestone (LS₁)
- Bassendean sad (S₈).

The wetland areas associated with Paganoni and Black Swan Swamps fall within the Scp geological unit which is comprised of black, fine to medium grained quartz sands with a clay matrix (ATA 2004). The revegetation site occurs on the interface between this unit and the S₇ unit which is defined as pale yellowish brown limestone with fine to coarse grains (ATA 2004).

2.4 Vegetation and flora

ATA environmental undertook a flora and vegetation survey of the offset site and surrounds which has been included in the current Paganoni & Black Swan Swamps Management Plan (ATA 2004). Additionally, a site visit was undertaken by Strategen personnel on 18 July 2014 to assess the current condition of the site.

The offset site is adjacent to Black Swan Swamp which is described by ATA (2004) as; *Parkland cleared Tuart Woodland with occasional Marri trees present on the eastern side*. A total of three native tree species were recorded by Strategen within the offset site; *Eucalyptus gomphocephala* (Tuart), *Eucalyptus marginata* (Jarrah) and *Corymbia calophylla* (Marri) (Plate 1; Plate 2). Average canopy cover of tree species within the offset site was estimated to be 15%.

A number of weed species were also identified within the offset site, dominated by Couch grass (*Cynodon dactylon*) and Lupins (*Lupinus* spp.) Approximately 80–100% of the groundcover is comprised of weed species, thus vegetation condition was assessed as Degraded (Keighery 1994).

Given that the tree species proposed to be planted as part of the revegetation strategy are either present within the offset site or neighbouring areas, the site can be inferred to be conducive to the proposed strategy.

2.5 Fauna

Coffey Environments conducted a Level 1 Fauna Risk Assessment in 2009 and identified one key fauna habitat in the proposed Lakelands East development – paddock areas with scattered large trees (Coffey 2009). The fauna risk assessment also identified the wetland areas associated with Paganoni and Black Swan swamps as a separate habitat – wetland with *Melaleuca* and sedgeland.

The large trees within the development area are considered to provide potential breeding habitat for Forest Red-tailed Black-Cockatoos (*Calyptorhynchus banksii naso*), Baudin's Black-Cockatoos (*Calyptorhynchus baudinii*) and Carnaby's Black-Cockatoos (*Calyptorhynchus latirostris*).

Similar fauna habitat is considered to occur within the offset site.

Species which could potentially impact upon the success of the revegetation include kangaroos and rabbits. Coffey (2009) did not record any of these animals on-site during the Level 1 survey. However, these species are known from the local area and contingency measures to deal with any observed grazing by these animals are discussed in Section 6.



Plate 1: The offset site (1)



Plate 2: The offset site (2)

3. Revegetation strategy

3.1 Revegetation objectives and scope

This RMP outlines Peet's approach to achieving long-term conservation gains for Forest Red-tailed Black-Cockatoos, Baudin's Black-Cockatoos and Carnaby's Black-Cockatoos, to offset the residual impacts that may occur as a result of clearing foraging habitat and potential breeding habitat for the proposed Lakelands East development.

The RMP aims to secure a positive environmental outcome through the planting of 6200 tree or shrub plants, including no less than 3000 plants that are potential breeding species and no less than 3200 plants that are foraging species for the listed black cockatoo species. Revegetation is based on a "like for like" principle, targeting the protection, restoration and creation of habitat for black cockatoos. This is to be achieved by establishing vegetation comprised of species suitable for black cockatoo foraging, roosting and breeding. The end result of this revegetation work will be the creation of black cockatoo habitat protected and conserved in the long term that will have greater conservation value than the area to be cleared within the Lakelands East Development site (i.e. a mixture of trees and shrubs representing a native woodland structure compared to trees over grassland).

Revegetation will occur within two specified areas (revegetation areas and landscaping areas in the offset site) as displayed in Figure 1. Planting within revegetation areas will aim to replicate a native woodland vegetation structure utilising species considered as habitat for black cockatoos. Planting within landscaping areas in the offset site will use species considered as habitat for black cockatoos to complement landscaping plans and enhance the value of these areas to black cockatoos.

Planting of 6200 tree or shrub plants, including no less than 3000 plants that are potential breeding species and no less than 3200 plants that are foraging species will occur within the offset site. As areas specified as "revegetation" and "landscaping" have different end-uses, planting and monitoring methodology will be applied to each area as described in sections 4 and 5.

Revegetation objectives for the revegetation site are:

- Rehabilitate the site with known breeding species and foraging species for the Carnaby's Black-Cockatoo, Baudin's Black-Cockatoo and Forest Red-tailed Black-Cockatoo
- Promote vegetation growth and enhance vegetation health within degraded areas
- Ensure that there is a minimum of 80 percent survival of planted breeding species and 80 percent survival of planted foraging species ten years from the date of initial planting completion
- Define and guide the short-term management of the revegetation site during the establishment of the plants until ongoing management is handed to the City of Mandurah.

An indicative timeframe for revegetation activities is provided in Section 4.6.

3.2 Completion criteria and indicator

Revegetation completion criteria and indicators have been developed for each revegetation objective, to enable revegetation performance to be measured (Table 2). Completion criteria have been developed based on baseline environmental information gathered during a site visit undertaken on 18 July 2014 and available background information. A set of indicators have been developed for each criteria to enable the appropriate measurement of revegetation performance.

Table 2: Completion criteria and indicators for revegetation objectives for the revegetation site

Objective		Completion criteria	Indicators
Creation and enhancement of Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo habitat.	Implement weed management protocols.	<ul style="list-style-type: none"> No greater than 10% weed cover No Declared Plants or weeds of national environmental significance. 	Revegetation monitoring results (refer to section 5).
	Ensure animals are not grazing on planted seedlings.	Implement contingency measures as outlined in section 6 if grazing is observed on planted seedlings.	Site inspection and revegetation monitoring results (refer to section 5).
Ensure that there is a minimum of 80 percent survival of planted breeding species and 80 percent survival of planted foraging species ten years from the date of initial planting completion.	Promote vegetation growth within degraded areas.	Establish local provenance species as detailed in Table 6 through seedling planting.	Revegetation monitoring results (refer to section 5).
		Ensure management actions as detailed in section 4 are complied with.	Site inspection, revegetation planting lists and invoices and 3 yearly revegetation monitoring results.
Rehabilitate the site with known breeding species and foraging species for the Carnaby's Black-Cockatoo, Baudin's Black-Cockatoo and Forest Red-tailed Black-Cockatoo and promote vegetation growth and enhance vegetation health within degraded areas.	Establish revegetation which focuses on foraging, roosting and breeding species for black cockatoo species as identified by DEC (2011) (Appendix A).	Plant a minimum of 6200 tree or shrub plants, including no less than 3000 plants that are potential breeding species and no less than 3200 plants that are foraging species of local origin within the offset site.	Site inspection and revegetation planting lists and invoices.
		Achieved 80% survival of planted potential breeding species and 80% survival of planted foraging species within the offset site ten years from the planting completion date.	Revegetation monitoring results (refer to section 5).

4. Management actions

4.1 Areas

4.1.1 Revegetation areas

Revegetation of up to 10.8 ha of land within specified revegetation areas will consist of weed control, seedling planting, grazing control and hygiene management. Seedling (tubestock) planting is considered the most effective revegetation method to meet the required completion criteria. Seedlings will be propagated in an accredited nursery from seed collected from within a 50 km radius of the revegetation site. This radius may need to be extended if the relevant local government have restrictions on seed collection at the time seed collection is required.

Direct seeding is not considered an optimal revegetation method for this site, as the revegetation success would be limited by the weedy condition of the ground cover and existing topsoil, the effectiveness of the tree species to grow from seed in situ and the limited availability of good quality topsoil from the Lakeland East development site.

Table 3 identifies the general management actions to be implemented within the revegetation areas. Further detail on these management actions and the proposed revegetation timeframe is provided in Section 4.2 - 4.5.

Table 3: Management actions (revegetation areas)

Item	Management action	Purpose	Timing	Responsibility
<i>Weed control</i>				
1.	Undertake a site inspection to identify the weed species, locations and abundance within revegetation areas.	To provide data to inform weed management.	Prior to revegetation activities taking place.	Revegetation contractor
2.	Undertake weed control (as described in section 4.2) at the revegetation areas based on the results of the site inspection at least twice prior to commencing revegetation activities.	To maximise potential for revegetation success.	Prior to seedling planting taking place in accordance with chemical specifications.	Revegetation contractor
3.	Undertake ongoing maintenance weed control as described in section 4.2.	To maximise potential for rehabilitation success.	Biannually for three years from the initial planting completion date. Should infill planting be required maintenance weed control would be applied biannually for three years from infill planting completion date.	Revegetation contractor
<i>Seedling planting</i>				
4.	Undertake seedling planting as described in Section 4.3.	To maximise potential for rehabilitation success.	After the completion of initial weed control.	Revegetation contractor
<i>Grazing control</i>				
5.	Install a minimum of three stakes and a protective guard around each seedling to provide micro-climate control and protect the vegetation from grazing by feral and native herbivorous animals (i.e. rabbits and kangaroos) and wind damage.	To minimise impact from animal activities.	After seedling planting.	Revegetation contractor
<i>Hygiene measures</i>				
6.	Ensure all plants and other materials used in revegetation are free of dieback and weeds.	To ensure dieback and weeds are not	Prior to revegetation	Revegetation contractor

Item	Management action	Purpose	Timing	Responsibility
		introduced or spread during revegetation.	activities taking place.	
7.	Ensure vehicles, machinery, equipment and footwear are free of mud and soil when entering revegetation areas.	To ensure dieback and weeds are not introduced or spread during revegetation.	At all times.	Revegetation contractor

4.1.2 Landscaping areas

Seedling planting within specified landscaping areas in the offset site will consist of weed control, seedling planting, grazing control and hygiene management. Seedling (tubestock) planting is the most common method used in landscaping and will allow the required completion criteria to be met. Seedlings will be propagated in an accredited nursery from seed collected from within a 50 km radius of the revegetation site. This radius may need to be extended if the relevant local government have restrictions on seed collection at the time seed collection is required.

Table 4 identifies the general management actions to be implemented within the landscaping areas in the offset site. Further detail on these management actions and the proposed revegetation timeframe is provided in Section 4.2 - 4.5.

Table 4: Management actions (landscaping areas in the offset site)

Item	Management action	Purpose	Timing	Responsibility
<i>Weed control</i>				
1.	Undertake a site inspection to identify the weed species, locations and abundance within the landscaping areas.	To provide data to inform weed management.	Prior to revegetation activities taking place.	Landscaping contractor
2.	Undertake weed control (as described in section 4.2) at the landscaping areas based on the results of the site inspection at least twice prior to commencing revegetation activities.	To maximise potential for revegetation success.	Prior to seedling planting taking place in accordance with chemical specifications.	Landscaping contractor
3.	Undertake ongoing maintenance weed control as described in section 4.2.	To maximise potential for rehabilitation success.	Biannually (as necessary) until responsibility of managing the revegetation site is transferred to City of Mandurah.	Landscaping contractor
<i>Seedling planting</i>				
4.	Undertake seedling planting as described in Section 4.3.	To maximise potential for rehabilitation success.	After the completion of initial weed control.	Revegetation contractor
<i>Grazing control</i>				
5.	Install a minimum of three stakes and a protective guard around each seedling to provide micro-climate control and protect the vegetation from grazing by feral and native herbivorous animals (i.e. rabbits and kangaroos) and wind damage.	To minimise impact from animal activities.	After seedling planting.	Landscaping contractor
<i>Hygiene measures</i>				
6.	Ensure all plants and other materials used in revegetation are free of dieback and weeds.	To ensure dieback and weeds are not introduced or spread during revegetation.	Prior to revegetation activities taking place.	Landscaping contractor
7.	Ensure vehicles, machinery, equipment and footwear are free of mud and soil when entering landscaping areas.	To ensure dieback and weeds are not introduced or spread during revegetation.	At all times.	Landscaping contractor

4.2 Weed control

Weed control techniques will comprise of chemical controls identified in Table 5. Subject to further detailed planning after the site inspection, weed control is likely to be undertaken twice prior to planting and two times per year following planting activities; however, this is dependent on the weed species present within the revegetation site, as different weed species may require different weed control actions at different times of the year.

Weed control will commence in winter, prior to revegetation activities commencing. This will be in the form of a broad scale weed spray over the revegetation site to reduce initial weed loads prior to planting. Follow up weed control activities will be in the form of spot spraying around planted seedlings. Weed control post planting will be focussed on the immediate areas surrounding planted seedlings (e.g. 1 m radius around planted seedlings). This approach will increase the survival of planted seedlings while maintaining the current and future vegetation type of the revegetation site (native trees over grass). Applying broad scale weed control to the entire revegetation site will not result in a sustainable long term outcome due to:

- High seed load of weed species within the soil
- Lack of native vegetation understorey and mid-storey currently within the revegetation site.

Additionally, given the lack of native understorey vegetation within the revegetation site, applying regular ongoing broad scale weed control across the revegetation site post planting will increase the risk of erosion which will significantly impede revegetation goals and likely lead to a decline of both the revegetation site and surrounding vegetation. Weed control will be undertaken by Peet until handover of management to the site to the City of Mandurah. Handover to the City is expected to occur within three years of the commencement of revegetation activities.

Table 5: Summary of weed control methods

Weed control method		Indicative target weed type
Chemical control	Initial broad scale spray herbicide application (using towed boom spray rigs)	For blanket control of most weed species including grass weeds prior to revegetation germination/ seedling planting.
	Spot spray herbicide application	For targeted control of most weed species including grass weeds after revegetation germination/ seedling planting.
	Stem injection, cut and paint	To control large woody weeds.

4.3 Seedling planting

4.3.1.1 Seed collection and species list

Plants used in revegetation activities will be propagated from native seed collected from the local area. Seed will be collected from a 50 km radius from the revegetation site by licensed seed collectors, with an indicative seed mix based on the species list provided in Table 6.

These species have been selected to meet the objectives of the RMP which involve establishing vegetation comprised of species suitable for black cockatoo foraging, roosting and breeding. Seed for these species are easily propagated and also readily available in the local area. Nevertheless, only species defined within EPBC 2013/7048 as potential breeding or foraging species for black cockatoos (Tuart, Marri, Jarrah, *Acacia saligna*, *Banksia attenuata*, *Banksia grandis*, *Banksia menziesii* and *Allocasuarina fraseriana* species) will be considered as part of the 6200 plants that are required to be planted.

The resulting habitat at the revegetation site will be of greater conservation value than that which is currently present (i.e. a mixture of trees and shrubs representing a native woodland structure compared to trees over grassland). Seed collection will be undertaken in late-spring to summer of the year preceding planting activities.

Table 6: Revegetation species*

Species name	Common name
<i>Acacia saligna</i>	Orange Wattle
<i>Allocasuarina fraseriana</i>	Sheoak
<i>Banksia attenuata</i>	Slender Banksia
<i>Banksia baxteri</i>	Baxter's Banksia
<i>Banksia coccinea</i>	Scarlet Banksia
<i>Banksia hookeriana</i>	Hooker's Banksia
<i>Banksia nivea</i>	Honeypot Dryandra
<i>Banksia sessilis</i>	Parrot Bush
<i>Corymbia calophylla</i>	Marri
<i>Corymbia ficifolia</i>	-
<i>Eremophila glabra</i>	Tar Bush
<i>Eucalyptus marginata</i>	Jarrah
<i>Eucalyptus gomphocephala</i>	Tuart
<i>Eucalyptus preissiana</i>	Bell-fruited Mallee
<i>Eucalyptus rudis</i>	Blackbutt
<i>Grevillea bipinnatifida</i>	Fuchsia Grevillea
<i>Grevillea paniculata</i>	-
<i>Grevillea wilsonii</i>	Native Fuchsia
<i>Hakea amplexicaulis</i>	Prickly Hakea
<i>Hakea erinacea</i>	Hedge-hog Hakea
<i>Hakea gilbertii</i>	-
<i>Hakea lissocarpa</i>	Honey Bush
<i>Hakea petiolaris</i>	Sea Urchin Hakea
<i>Hakea prostrata</i>	Harsh Hakea
<i>Hakea trifurcata</i>	Two-leaf Hakea
<i>Jacksonia furcellata</i>	Grey Stinkwood
<i>Melaleuca leuropoma</i>	-

These species either have a DEC planting priority due to their ability to provide feeding habitat for Carnaby’s Black Cockatoo (Groom 2011), and/or they are provide suitable foraging habitat for the Forest Red-tailed Black Cockatoo and/or Baudin’s Black Cockatoo.

Due to the nature of the revegetation site (i.e. overstorey species and limited good quality topsoil), habitat creation will be focussed on seedling planting rather than direct seeding to maximise potential for revegetation success. As a result, no initial site works (e.g. ripping, scarifying or topsoil transfer) will be required.

Seedling planting will be undertaken in early winter, within one month of the first rains. Indicative stocking rates for foraging and potential breeding species to be used in revegetation activities are provided in Table 7.

Table 7: Stocking rates of planted seedlings within revegetation area

Use by black cockatoos	Number of seedlings (total)	Stocking rate (seedlings/ha)*
Foraging species	3200 seedlings	620
Potential breeding species	3000 seedlings	581
TOTAL	6200 seedlings	1201

* stocking rates are based on the number of seedlings required per hectare to meet completion criteria assuming that only the revegetation area (5.16 ha) is planted.

If the target survival rate (Table 2) is not met (determined by revegetation monitoring) contingency actions as described in Section 6 will be implemented.

Seedlings (in the form of Tubestock) used for planting should be suitably mature, between 6 to 12 months to enable optimal establishment and growth. Tubestock should also not be root bound and planting should be undertaken as follows:

- Optimal location of each species at the site should be chosen at the time of planting to ensure appropriate condition for each species (e.g. topography, shade/sun, soil moisture etc)
- Seedling should be planted so that the stem is vertical and the base of the plant is slightly below the original soil surface
- Soil surrounding the seedling root ball should be pressed in firmly to avoid air pockets
- A minimum of three stakes and a protective guard manufactured for such purpose should be placed around the seedling to protect the vegetation from grazing and wind damage.

Peet will also determine, in consultation with CoM, the appropriateness of additives, which could include Seasol, water granules, soil breaker, water retainer, wetting agent or fertiliser tablets. If they are required, they will be added at the relevant time (i.e. in the hole prior to planting or upon watering-in plants).

It is anticipated that no post-planting watering is needed as winter rain will provide adequate water to support the tubestock following planting. The timing of seedling planting will ensure that natural rainfall will provide the planted seedlings with access to sufficient water during their establishment phase. If during monitoring plant stress is observed a wetting agent or additional watering options will be investigated as described in Table 10.

If monitoring determines that revegetation requires supplementary seedling planting in subsequent years, this will be undertaken prior to the main winter rainfall, within one month of the first rains and following the required soil preparation and weed treatment as described in Table 10.

4.4 Grazing control

Tree guards are to be installed around planted seedlings which will provide protection from browsing animals. No further controls are required during initial revegetation works. If impacts

from animal activities (i.e. evidence of grazing) are recorded during monitoring, contingency measures as described in Table 10 will be implemented.

4.5 Hygiene measures

To reduce the risk of introducing dieback into the offset site, seed sources to be used in tubestock will be propagated by a NIASA (Nursery Industry Accreditation Scheme of Australia) accredited nursery. Vehicles, machinery, equipment and footwear will also be free of mud and soil when entering the offset site.

4.6 Timeframe

An indicative timeframe for revegetation activities is provided in Table 8.

Table 8: Indicative revegetation schedule

Activity	Timing
Baseline monitoring	Spring (September – November) 2015
Seed collection	Spring (September – November) 2015
Plant propagation	December 2015 – June 2016
Initial (pre-planting) weed control	June 2016 prior to seedling planting
Follow up (pre-planting) weed control	June/July 2016
Seedling planting	June/July 2016
Ongoing weed control	Biannually (as necessary) until handover (anticipated to be handed over to the CoM in 2018)
Revegetation survey	July 2019
Infill planting*	Within 12 months of 2019 revegetation survey
Revegetation survey	3 years from the date of the 2019/2020 infill planting
Infill planting*	Within 12 months of 2022/23 revegetation survey
Revegetation survey	3 years from the date of the 2022/2023 infill planting
Infill planting*	Within 12 months of 2025/26 revegetation survey
Final revegetation report	10 years from the date of the 2016 planting completion date.

*Only required if surveys indicate that survival rates of planted potential breeding species or planted foraging species are below 80 percent

4.7 Conservation mechanism

Black Swan Swamp is a Conservation Category geomorphic sumpland and is protected under the Environmental Protection (Swan Coastal Plain Lakes) Policy 2000. The area around Black Swan Swamp is recognised by both local and state agencies for its ecological value and its potential to provide habitat for species of conservation significance. The area is identified in the CoM Biodiversity Strategy (City of Mandurah 2013) as a Local Natural Area and under Environmental Protection Authority Bulletin 12 as a Peel Regionally Significant Natural Area (EPA 2010), which prioritises the area for management and conservation.

A conservation covenant is progressing under one of the following legislative mechanisms and will be applied over the offset site by 30 June 2020:

- Transfer of Land Act 1893
- Soil and Land Conservation Act 1945
- National Trust of Australia (WA) Act 1964.

Conservation covenants are voluntary agreements made between a landholder and an authorised body (such as a Covenant Scheme Provider) that aims to protect and enhance the natural, cultural and / or scientific values of a piece of land. They can apply to all or part of a property and are usually registered on the title of the land. This will ensure that the offset site and its value to black cockatoos is retained in perpetuity.

5. Monitoring

This section details monitoring requirements for the revegetation site.

5.1 Monitoring methodology

5.1.1 Revegetation areas

Monitoring plots will be established within revegetation areas to enable monitoring data to be collected. Six 10 m by 10 m monitoring plots will be set up within revegetation areas taking into consideration species type, topography etc. Each plot will be divided into five 1 m x 1 m quadrats based on a method provided by Dr Eleanor Bennett (Bennett E [Bennett Environmental Consulting Pty Ltd] 2012, pers. comm. 10 September). A pictorial representation of the monitoring plots is illustrated in Figure 3. Data will be collected from each of the five 1 m x 1 m quadrats, in order to enable collection of representative data from each quadrat. Data collected from each quadrat will include:

- Flora species composition
- Vegetation structure
- Density of flora species.

Numbers of trees will be recorded from the entire 10 m by 10 m monitoring plot to obtain an appropriate representative sample.

Each plot will be monitored every three years during spring (commencing in spring 2019) as per Table 8 until handover (anticipated to be handed over to CoM in 2026). Given the relatively homogeneous planting mix for revegetation areas, data recorded from monitoring plots will be extrapolated as part of data analysis to obtain a comparison with completion criteria. Specifically, this will involve an extrapolation of data to obtain a value for the number of seedlings/ha in the revegetation areas which will be compared to a target stocking rate which is dependent on final landscaping plans.

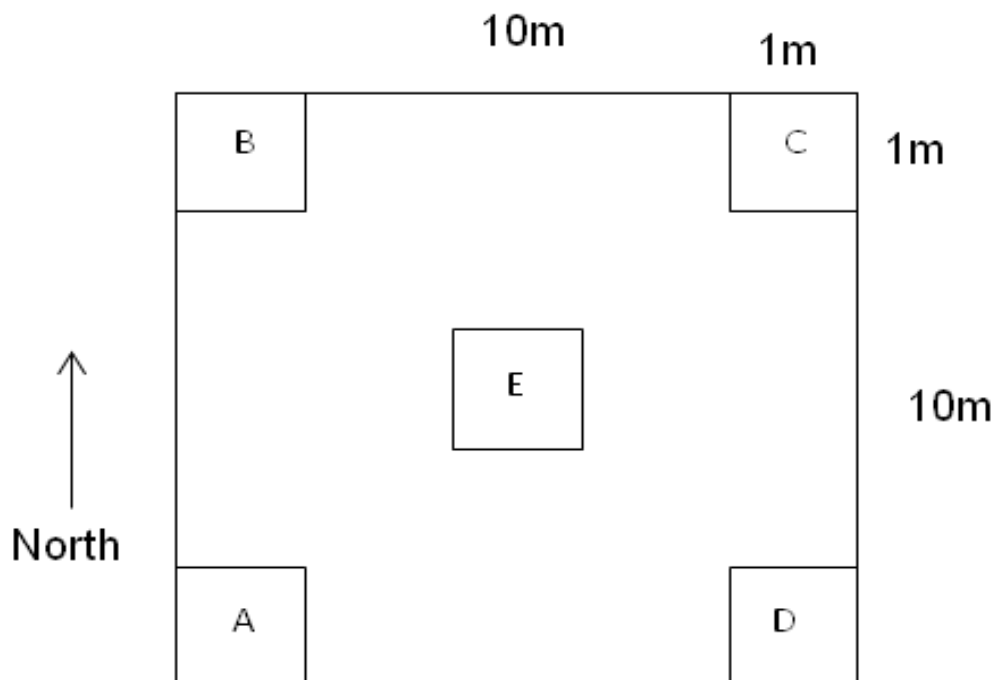


Figure 3: Monitoring plot layout

5.1.2 Landscaping areas

Landscaping areas within the offset site will be monitored at the same time as revegetation areas. Monitoring within landscaping areas will comprise of a visual observation of plant health. Any occurrences of the following will be recorded:

- Plant stress
- Plant mortality
- Weed species.

5.2 Monitoring actions

Table 9 details the monitoring program for revegetation to achieve the success criteria mentioned above.

Table 9: Monitoring program for revegetation and landscaping areas within the offset site

Item	Parameters	Frequency	Method	Purpose
1.	<ul style="list-style-type: none"> a. Plant density b. Species richness c. Plant health (i.e. evidence of water stress, pests, animal grazing). 	3 yearly as per Table 8.	<ul style="list-style-type: none"> • Opportunistic observation during monitoring • Monitoring of quadrats. 	<ul style="list-style-type: none"> • To monitor species density and richness • To monitor plant health and any evidence of animal grazing • To monitor establishment of vegetation and compare progress to completion criteria.
2.	<ul style="list-style-type: none"> a. Weed species. 	Annually until handover to the CoM.	<ul style="list-style-type: none"> • Observation during monitoring. 	<ul style="list-style-type: none"> • To monitor weed occurrence within revegetation and landscaping areas • To monitor weed growth in revegetation and landscaping areas and compare to completion criteria.

6. Contingency measures

Contingency actions will be initiated if monitoring indicates that management actions detailed for revegetation areas (Table 3) and landscaping areas within the offset site (Table 4) have not been successful or effective and/or completion criteria are not being achieved (Table 10). Where contingency actions are required to be implemented, they will be reported to DotE as part of the EPBC Act annual environmental reporting requirements, as detailed in Section 8.

Table 10: Contingency actions for revegetation and landscaping areas within the offset site

Item	Trigger	Action
1.	If any of the 3 yearly assessment reports determine that survival rates of planted potential breeding species or planted foraging species are below 80 percent.	<ul style="list-style-type: none"> • Identify cause. • Implement approach to remedy cause which could include: <ul style="list-style-type: none"> ○ collecting additional provenance seed for plant propagation to compensate for the insufficient native plant species richness and/or cover ○ undertaking infill seedling planting within 12 months of the date of survey ○ application of additives such as Seasol, water granules, soil breaker, water retainer, wetting agent or fertiliser tablets as deemed necessary by revegetation contractor ○ further weed and/or pest control if required post infill planting. • Monitor success of contingency measure(s).
2.	Approximately 20% of seedlings planted show evidence of damage by animal (i.e. grazing). Approximately 20% of seedlings planted show evidence of damage by pests. Approximately 20% of seedlings planted show evidence of water stress.	<ul style="list-style-type: none"> • Implement measures to prevent further damage which could include: <ul style="list-style-type: none"> ○ animal control program ○ installation of temporary fencing ○ application of pesticides in consultation with the CoM and Department of Parks and Wildlife (Parks and Wildlife) if required ○ applying wetting agent or supplementary watering ○ removing damaged plants and replanting ○ providing alternate species suitable to the site and provenance requirements. • Monitor success of contingency measure(s).
3.	No greater than 10% weed cover and no Declared Plants or weeds of national environmental significance.	<ul style="list-style-type: none"> • Investigate cause (e.g. adjacent sources of weed seed). • Implement measures to remove weeds (e.g. weed control) as practicable. • Monitor success of contingency measure(s).
4.	Unauthorised access (people and vehicles).	<ul style="list-style-type: none"> • Implement measures to prevent further unauthorised access (e.g. installation of temporary fencing and signage), as practicable. • Monitor success of contingency measure(s).
5.	Tubestock grown from seed collected within 50 km of the revegetation site is not available for infill planting	<ul style="list-style-type: none"> • Source tubestock grown from seed collected from the Swan Coastal Plain. • Monitor success of infill planting as per Section 5.

7. Plan implementation

This RMP will be implemented by Peet until responsibility of the revegetation site is transferred to the City of Mandurah (CoM). Management of the revegetation site is proposed to be handed over to CoM within three years of the commencement of revegetation activities. The revegetation site will be vested as Crown Reserve designated as Public Open Space (POS), with management vested to the City of Mandurah under Section 152 of the *Planning and Development Act 2005*.

7.1 Roles and responsibilities

All contractors and staff will be required to operate in accordance with this RMP. Key personnel and responsibilities are described in the following sections:

7.1.1 Peet project manager

The primary responsibilities of the Peet project manager include:

- Act as primary liaison between DEE, CoM, DBCA, and revegetation contractor
- Ensure all revegetation contracts contain relevant environmental management provisions
- Review progress activity reports prepared by revegetation contractor
- Ensure all relevant site personnel are aware of the requirements of the RMP.

7.1.2 Revegetation contractor

The rehabilitation contractor will be responsible for revegetation within specified revegetation areas, specifically:

- Undertaking revegetation activities to meet completion criteria (i.e. seedling planting, weed control, monitoring etc)
- Providing progress activity reports to the project manager which include details of activities undertaken, including, for example:
- Current status of the seed collection (species, quantities available, date and location of collection)
- Weed control details (herbicide name, volumes, method, date and location, weather conditions, other relevant observations)
- Plant propagation details (species, number proposed to be propagated, location and name of nursery and estimated date for that each species will be ready for planting)
- Planting (species, numbers planted, date and location of planting, conditions and other relevant observations [e.g. presence of rabbits, litter, erosion, illegal access])
- Ensuring all revegetation personnel are aware of the requirements of the RMP
- Providing support to the project manager and CoM as required.

7.1.3 Landscaping contractor

The landscaping contractor will be responsible for revegetation within specified landscaping areas, specifically:

- Undertaking revegetation activities to meet completion criteria (i.e. seedling planting, weed control, monitoring etc)
- Providing progress activity reports to the project manager which include details of activities undertaken, including, for example:
- Current status of the seed collection (species, quantities available, date and location of collection)
- Weed control details (herbicide name, volumes, method, date and location, weather conditions, other relevant observations)
- Plant propagation details (species, number proposed to be propagated, location and name of nursery and estimated date for that each species will be ready for planting)
- Planting (species, numbers planted, date and location of planting, conditions and other relevant observations [e.g. presence of rabbits, litter, erosion, illegal access])
- Ensuring all landscaping personnel are aware of the requirements of the RMP
- Providing support to the project manager and CoM as required.

7.1.4 City of Mandurah

It is proposed that the primary responsibility of CoM includes:

- Provide for the long term management of the revegetation site within the POS.

7.1.5 Environmental consultant

The environmental consultant appointed by Peet will be responsible for monitoring of the revegetation site and reporting.

8. Audit, review and reporting

Peet will maintain accurate records of all rehabilitation activities undertaken for the duration of the revegetation program until transfer of management to the CoM. These records will be made available to DEE upon request.

Within three months of every 12 month anniversary of the commencement of the action, Peet will also publish a report on their website, addressing compliance with each condition of approval for Lakeland East (EPBC 2013/7048). This includes condition 2 which requires the preparation of this RMP. Peet will advise DEE of the publication of the report.

9. Limitations

Scope of services

This report ("the report") has been prepared by Strategen-JBS&G in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and Strategen-JBS&G. In some circumstances, a range of factors such as time, budget, access and/or site disturbance constraints may have limited the scope of services. This report is strictly limited to the matters stated in it and is not to be read as extending, by implication, to any other matter in connection with the matters addressed in it.

Reliance on data

In preparing the report, Strategen-JBS&G has relied upon data and other information provided by the Client and other individuals and organisations, most of which are referred to in the report ("the data"). Except as otherwise expressly stated in the report, Strategen-JBS&G has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report ("conclusions") are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. Strategen-JBS&G has also not attempted to determine whether any material matter has been omitted from the data. Strategen-JBS&G will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to Strategen-JBS&G. The making of any assumption does not imply that Strategen-JBS&G has made any enquiry to verify the correctness of that assumption.

The report is based on conditions encountered and information received at the time of preparation of this report or the time that site investigations were carried out. Strategen-JBS&G disclaims responsibility for any changes that may have occurred after this time. This report and any legal issues arising from it are governed by and construed in accordance with the law of Western Australia as at the date of this report.

Environmental conclusions

Within the limitations imposed by the scope of services, the preparation of this report has been undertaken and performed in a professional manner, in accordance with generally accepted environmental consulting practices. No other warranty, whether express or implied, is made.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

Strategen-JBS&G accepts no liability for use or interpretation by any person or body other than the client who commissioned the works. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by Strategen-JBS&G, and should not be relied upon by other parties, who should make their own enquiries.

10. References

- ATA Environmental (ATA) 2004, Lakelands Mandurah – Paganoni & Black Swan Swamps Management Plan – August 2003-August 2008, report prepared for Peet & Company Ltd, 2004.
- Bureau of Meteorology (BoM) 2014, Climate statistics for Australian locations: Monthly climate statistics for Mandurah, [Online], Commonwealth of Australia, available from: http://www.bom.gov.au/climate/averages/tables/cw_009887.shtml, [26 August 2014].
- City of Mandurah 2013, Mandurah Planning Strategy – Biodiversity Strategy, November 2013, Mandurah, Western Australia.
- Coffey Environments 2009, Fauna Risk Assessment – Lakelands, report prepared for Peet Mandurah Syndicate Ltd, 2009.
- Department of Environment and Conservation (DEC) 2011, Plants Used by Carnaby's Black Cockatoo, [Online], Government of Western Australia, Available from: <http://www.dec.wa.gov.au/plantsforcarnabys> [21 July 2014].
- Department of the Environment (DotE) 2014, Conservation covenants, [Online], Australian Government, Available from: <http://www.environment.gov.au/topics/biodiversity/biodiversity-conservation/conservation-covenants> [11 December 2014].
- Environmental Protection Authority (EPA) 2010, Environmental Protection Bulletin Number 12 – Swan Bioplan – Peel Regionally Significant Natural Areas, December 2010 (reviewed December 2013), Perth, Western Australia.
- Groom, C. (2011). Plants Used by Carnaby's Black Cockatoo, Department of Environment and Conservation, Perth, Western Australia.
- Keighery B. 1994, Bushland Plant Survey: A Guide to Plant Community Survey for the Community, Wildflower Society, Floreat.

Appendix A Plants used by Carnaby's Black Cockatoo (DEC 2011)

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.dpaw.wa.gov.au/apps/plantsforcarnabys/index.html

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 Honey-pot 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 (Honey-pot 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 tricuspis (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 todtiana (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 pandanicarpa 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
Isoogon 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)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Low	Tree	Brown	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Exotic to Australia
Pinus caribea (Caribbean Pine)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Low	Tree	Brown	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Exotic to Australia
Pinus pinaster (Pinaster or Maritime Pine)**	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Medium	Tree	Brown	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Exotic to Australia
Pinus radiata (Radiata Pine)**	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Medium	Tree	Brown	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Exotic to Australia
Prunus amygdalus (Almond Tree)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Medium	Tree		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Exotic to Australia
Raphanus raphanistrum (Wild Radish)*	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Low	Herb	Various	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Exotic to Australia
Tipuana tipu (Tipu or Rosewood Tree)**	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Low	Tree	Yellow	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Exotic to Australia
Xanthorrhoea preissii (Grass Tree)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Medium	Grassy or strappy	Cream	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	WA native

* Weed

** Potential weed


© JBS&G Australia Pty Ltd T/A Strategen-JBS&G

This document is and shall remain the property of Strategen-JBS&G. The document may only be used for the purposes for which it was commissioned and in accordance with the Terms of Engagement for the commission. Unauthorised use of this document in any form whatsoever is prohibited.

Document Distribution

Rev No.	Copies	Recipient	Date
8	1: Final revised report under varied EPBC Condition 11. Changes include the addition of a contingency action and reformatting consistent with Strategen’s merger with JBS&G. Changes are minor with no increased impact to MNES.	Issue for use	16/07/2020

Document Status

Rev No.	Author	Reviewer	Approved for Issue		
		Name	Name	Signature	Date
A	D Panickar / A Welker, T Bowra				28 Jul 2014
0	A Welker / T Bowra				5 Aug 2014
1	D Panickar / D Walsh				28 Nov 2014
2	D Panickar / D Walsh				2 Dec 2014
3	D Panickar / D Walsh				12 Dec 2014
4	A Welker / D Walsh				22 Dec 2014
5	A Welker / D Walsh				8 Jan 2015
6	D White / E Payne / M Stone				22 Sep 2017
7	W Oversby / C O’Brien				19 February 2020
8	W Oversby	T Bowra	T Bowra		16/07/2020

