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# Alkimos City Centre and Central (EPBC 2015/7561)

## Construction Environmental Management Plan

Prepared for  
Lendlease Communities (Australia) Pty Ltd  
by Strategen

November 2019



# **Alkimos City Centre and Central (EPBC 2015/7561)**

## **Construction Environmental Management Plan**

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November 2019

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## **Client: Lendlease Communities (Australia) Pty Ltd**

Report Version	Revision No.	Purpose	Strategen author/reviewer	Submitted to Client	
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**Declaration of accuracy**

I declare that:

1. To the best of my knowledge, all the information contained in, or accompanying this Construction Environmental Management Plan is complete, current and correct.
2. I am duly authorised to sign this declaration on behalf of the approval holder.
3. I am aware that:
  - a. Section 490 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) makes it an offence for an approval holder to provide information in response to an approval condition where the person is reckless as to whether the information is false or misleading.
  - b. Section 491 of the EPBC Act makes it an offence for a person to provide information or documents to specified persons who are known by the person to be performing a duty or carrying out a function under the EPBC Act or the Environment Protection and Biodiversity Conservation Regulations 2000 (Cth) where the person knows the information or document is false or misleading.
  - c. The above offences are punishable on conviction by imprisonment, a fine or both.

Signed



Full name (please print)

ANTHONY ROWBOTTOM

Organisation (please print)

LENDLEASE



## Executive Summary

Lendlease Communities (Australia) Pty Ltd (Lendlease) proposes to develop the following:

- Alkimos City Centre (Lot 9502, Marmion Avenue, Alkimos)
- Central Alkimos (Lot 9501, Marmion Avenue, Alkimos).

The purpose of this Construction Environmental Management Plan (CEMP) is to satisfy the requirements of Condition 2 of EPBC 2015/7561 by:

- providing measures to avoid and mitigate impact on Carnaby's Black Cockatoo and its habitat following commencement of the action (during construction)
- identifying performance indicators that measure the effectiveness of avoidance and mitigation measures
- identifying the monitoring, reporting and contingency measures that will be undertaken if performance targets are not met
- identifying timeframes for the implementation of avoidance and mitigation measures
- describing of the roles and responsibilities of personnel associated with implementing avoidance and mitigation measures.

The Project Area contains approximately 323.5 ha of potential foraging habitat for the endangered Carnaby's Black Cockatoo (CBC). Of this habitat, approximately 257 ha will be cleared for the development and approximately 66.64 ha retained within Parks and Recreation Reserves (PRR). A total of 103 potential breeding trees (>500mm diameter at breast height [DBH]) have been identified within the Project Area, of these trees a minimum of 16 will be retained within PRR.

An assessment of the potential impacts and risks to CBCs as a result of the Project construction activities has been undertaken. Results of the risk assessment have been used to develop management measures that form part of this CEMP.

Objectives, targets and performance indicators for key aspects have been developed for construction. Avoidance and mitigation measures will be implemented in the form of:

- site preparation and clearing controls
- waste management
- traffic management
- erosion and dust control.

Monitoring activities shall be undertaken to determine performance against objectives. Contingency measures will be initiated if monitoring indicates that targets and performance indicators are not being met.





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# 1. Introduction, purpose and context

Lendlease Communities (Australia) Pty Ltd (Lendlease) proposes to develop the following:

- Alkimos City Centre (Lot 9502, Marmion Avenue, Alkimos)
- Central Alkimos (Lot 9501, Marmion Avenue, Alkimos).

The proposed action was referred under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) to the former Department of the Environment (DotE, now the Department of Environment and Energy [DEE]) on 18 September 2015. The proposed action was determined to be a controlled action requiring assessment via preliminary documentation on 26 November 2015. On 30 March 2017 the proposed action was approved with conditions (EPBC 2015/7561).

## 1.1 Project description

Alkimos Lots 9501 and 9502 (the Project Area) covers a combined area of 480.4 ha and is located 14 km north of the Joondalup Strategic Metropolitan Centre and 40 km north-west of the Perth CBD (Figure 1). The proposed action involves works pertaining to the provision of an urban regional centre including a commercial centre, residential housing, schools, public amenities and transport routes.

The Project Area is situated within the south-east corner of the Alkimos-Eglinton District Structure Plan (DSP). The Alkimos-Eglinton DSP was assessed and subsequently approved under the *Environmental Protection Act 1986* (EP Act) by the Western Australian Minister for the Environment on 24 April 2006 (Ministerial Statement 722). Key conservation recommendations resulting from the assessment form the basis for the location of retained vegetation and conservation reserves within the Project Area.

The Project Area contains approximately 323.5 ha of potential foraging habitat for the endangered Carnaby's Black Cockatoo (CBC). Of this habitat, approximately 257 ha will be cleared for the development and approximately 66.64 ha retained within Parks and Recreation Reserves (PRR). A total of 103 potential breeding trees (>500mm diameter at breast height [DBH]) have been identified within the Project Area. Of these trees, a minimum of 16 will be retained within PRR and where possible additional trees will be preserved within the development area through incorporation into strategically located public open space and within road reserves. It is noted that 22 of the 103 trees contain potentially suitable hollows for black cockatoos (nesting and roosting activities) and of these 4 will be retained within PRR. An additional 6 trees that do not currently exhibit a DBH above 500 mm, however are considered to be future potential habitat trees (*Eucalyptus gomphocephala* (Tuart) and *E. totiana* (Coastal Blackbutt)), will be retained within PRR. In addition, a total of 12 nest hollows (transplanted from trees prior to clearing) or artificial nest boxes will be installed strategically within the Project Area in consideration of proximity to foraging habitat.

The Project will be developed over the next 20-30 years, with development of Alkimos Central taking place over 7-12 years. The initial Precinct will be developed over 16 stages. Clearing commenced on 26 September 2017 and construction of Stage 1 commenced in November 2017. Construction of Stage 16 is proposed to commence in June 2022 and completed by November 2022. The proposed staging schedule will be subject to further refinement as development progresses. The Alkimos City Centre will be developed over the next 20-30 years.

### 1.1.1 Terminology

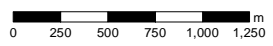
For the purpose of this document, the following terminology will be used:

- Project Area (defined above)
- Parks and Recreation Reserve (PRR) areas (illustrated in Figure 2)
- Development Area (covering the portion of the Project Area subject to development, i.e. outside the PRR areas)
- Revegetation Areas (portions of PRR areas subject to revegetation works).



**Figure 1: Project Area**

Scale 1:40,000 at A4



Coordinate System: GDA 1994 MGA Zone 50  
 Note that positional errors may occur in some areas  
 Date: 12/05/2017  
 Author: JCrute

Source: Aerial image: ESRI online, approx. 2010.



**Legend**

- Project area
- Peet Alkimos LSP
- Lot 3 Romeo Road, Alkimos EPBC Referral LSP
- South Alkimos LSP
- Road



## 1.2 Purpose

The purpose of this Construction Environmental Management Plan (CEMP) is to satisfy the requirements of Condition 2 of EPBC 2015/7561 by:

- providing measures to avoid and mitigate impact on CBC and its habitat following commencement of the action (during construction)
- identifying performance indicators that measure the effectiveness of avoidance and mitigation measures
- identifying the monitoring, reporting and contingency measures that will be undertaken if performance targets are not met
- identifying timeframes for the implementation of avoidance and mitigation measures
- describing of the roles and responsibilities of personnel associated with implementing avoidance and mitigation measures.

How this CEMP addresses Condition 2 and sub-conditions of EPBC 2015/7561 is detailed in Table 1 below.

Table 1: Conditions of approval reference table

Ref	Cond	Plan reference	Condition requirement	How the plan addresses condition requirements
1	2	N/A refer below.	To mitigate impacts to Carnaby's Black Cockatoos, the person taking the action must prepare and submit a Construction Environmental Management Plan (CEMP), for the approval of the Minister.	This CEMP has been prepared to address condition 2. Refer to rows below regarding how condition 2 and sub-conditions have been addressed.
2	The person taking the action must not commence clearing unless the Minister has approved the CEMP.		Clearing commenced in September 2017 and the original version of this CEMP was approved by DoEE on 26 July 2017.	
3	The CEMP must include, but is not limited to:		N/A – refer to rows below.	
4	2a	Section 4	a) avoidance and mitigation measures to prevent impacts to Carnaby's Black Cockatoo habitat following the commencement of the action, the measures must include measures to control site access, weeds, <i>Phytophthora</i> dieback, erosion and dust.	Avoidance and mitigation measures to prevent impacts to CBC habitat will be undertaken as described in the section referenced.
5	2b	Section 2	b) performance indicators that measure the effectiveness of avoidance and mitigation measures to prevent impacts to Carnaby's Black Cockatoo habitat.	Performance indicators have been developed as described in the section referenced.
6	2c	Section 5 Section 6	c) details of performance monitoring, reporting and contingency measures if performance indicators are not met.	Performance monitoring, reporting and contingency measures are proposed as described in the sections referenced.
7	2d	Section 4 Section 5 Section 6	d) timeframes for the implementation of the above measures.	Timeframes for the implementation of the above measures have been developed as described in the sections referenced.
8	2e	Section 8	e) descriptions of the roles and responsibilities of personnel associated with implementing each of the above measures.	Roles and responsibilities are detailed in sections referenced.

Ref	Cond	Plan reference	Condition requirement	How the plan addresses condition requirements
9	N/A	NA	If the Minister approves the CEMP, then the approved CEMP will be implemented.	Lendlease will continue to be responsible for the implementation of this CEMP as the EPBC Act approval holder.

### 1.3 Land details

The Project Area is located 40 km northwest of Perth, Western Australia, intersected by Marmion Avenue, with the future Mitchell Freeway extension forming the eastern boundary, on Lots 9501, 9502 of Deposited Plan 400279 (Figure 1).

The Project Area forms part of the 2660 ha Alkimos-Eglinton District, located 40 km northwest of Perth and is zoned for urban and open space purposes under the Metropolitan Region Scheme. The proposed action complements the previously referred 226 ha residential and community development at Lot 1004, 80L Romeo Road and 2611 Marmion Avenue, Alkimos, WA (Alkimos Beach; EPBC 2011/5902), which commenced in 2012. Alkimos Beach and additional approved developments within the surrounding Alkimos area are presented in Figure 1.

### 1.4 Statutory and policy context

#### 1.4.1 Alkimos-Eglinton MRS Amendment 1029/33

The Eglinton/South Yanchep Project area is located within the wider Alkimos-Eglinton District which was the subject of MRS Amendment 1029/33. This MRS Amendment was assessed by the Environmental Protection Authority (EPA) under s 48A of the EP Act, approved by the Minister for Environment on 24 April 2006 (Ministerial Statement 722), and gazetted by the WA Government on 23 June 2006.

The result of the EPA assessment was the identification of regionally significant areas of the site, principally identified for their geoh heritage and biodiversity values. Therefore, environmental conditions for MRS Amendment 1029/33 published by the WA Minister for the Environment, requires the inclusion of the regional significant areas in Parks and Recreation and Public Purpose zonings in the MRS and states that these areas shall only be used for '*conservation, landscape and complimentary purposes*'.

#### 1.4.2 Alkimos-Eglinton District Structure Plan

Following from the MRS Amendment the Project area was also subject to the Alkimos-Eglinton District Structure Plan (DSP), adopted by the Western Australian Planning Commission (WAPC) in August 2009.

The DSP outlines the broad principles for the management of the three Alkimos-Eglinton Regional Open Space (ROS) areas (PRR within the Project Area) as follows:

- to be preserved for conservation, landscape and complimentary purposes
- to preserve the majority of the ROS in its natural state, allowing for retention of representative examples of the vegetation, flora and habitats currently present on the site
- to provide linkages across the site for fauna movement, contributing to the protection of biodiversity
- to provide adequate and appropriate public access to ROS for sustainable passive recreation and protect the values of the ROS from uncontrolled pedestrian access by provided Dual Use Paths (DUP) in and through the ROS that connect to the DUP network in the adjacent areas
- to erect appropriate fencing to discourage uncontrolled access
- to create a clear boundary between the ROS and private land
- to design edges between ROS and adjacent urban areas to minimise disturbance to the ecological values of the ROS

- to protect the linkage values and biodiversity values of the ROS.

### 1.4.3 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act referral was submitted to DotE on 18 September 2015. The Project was determined to be a controlled action (EPBC 2015/7561), requiring assessment via preliminary documentation on 26 November 2015. On 12 December 2016, DEE issued a proposed approval decision for endorsement by Lendlease. The EPBC Act approval was issued on 30 March 2017. This CEMP has been prepared in accordance with condition 2 of the EPBC 2015/7561 approval, as indicated in Table 1.

## 1.5 Existing environment

### 1.5.1 Vegetation

The flora and vegetation of the Project Area has been surveyed as part of the larger Alkimos – Eglinton area as documented in Trudgen and Keighery (1990), Armstrong (1996), ATA Environmental (2002) and ATA Environmental (2005) (all cited in Emerge 2013) (Figure 5).

A detailed field survey was carried out by Emerge Associates in October 2012 to assess the vegetation association and condition across the Project Area (Emerge 2013). Twenty-three vegetation associations were identified during the current survey and the Project Area was found to be dominated by two broad groups (Emerge 2013):

- *Melaleuca* spp. / *Lomandra maritima* / *Xanthorrhoea preissii* / *Acacia* spp. heath on dune systems
- *Eucalyptus* spp. / *Banksia* spp. woodlands in lower lying areas and limestone.

The detailed field survey found that the vegetation condition was highly variable, ranging from Completely Degraded (middle of the Project Area) to Excellent (northern section). The PRR was generally in Very Good condition and also comprised the best quality areas of parabolic dune vegetation (EcoLogical 2011).

### 1.5.2 Fauna habitat

#### *Carnaby's Black Cockatoo*

Carnaby's Black Cockatoos (*Calyptorhynchus latirostris*) are endemic to the south-west of Western Australia. They mainly occur in uncleared remnant native eucalypt woodlands, especially those that contain Salmon Gum, Wandoo, and in shrubland or kwongan heathland dominated by *Hakea*, *Dryandra*, *Banksia* and *Grevillea* species (Department of Sustainability Environment Water Population and Communities [DSEWPac] 2012a). Current data on distribution of this species shows that there are numerous records along the Northern Swan Coastal Plain, including records in and around the Project Area.

#### *Habitat within the Project Area*

Twenty-three vegetation associations have been identified across the Project Area, consisting of two broad groups (Emerge 2013):

- *Melaleuca* spp. / *Lomandra maritima* / *Xanthorrhoea preissii* / *Acacia* spp. heath on dune systems
- *Eucalyptus* spp. / *Banksia* spp. woodlands in lower lying areas and limestone.

The Project Area comprises 480.4 ha, of which 323.5 ha comprises Carnaby's Black Cockatoo habitat as described below.

#### *Foraging habitat*

A total of 323.5 ha of potential foraging habitat for CBC is situated within the Project Area (Strategen 2015). Of this habitat, approximately 257 ha will be cleared for the development and approximately 66.64 ha retained in PRR (Figure 2).

***Potential breeding trees***

A detailed tree survey was undertaken in August 2014 assessing the 178 trees identified in the Project Area (Paperbark Technologies 2014). Of these 178 trees, the survey found 22 trees exhibiting existing tree hollows.





**Figure 2: Parks and Recreation Reserve areas, Carnaby's Black Cockatoo habitat and revegetation areas**

Scale 1:18,000 at A4  
 0 100 200 300 400 m

Coordinate System: GDA 1994 MGA Zone 50  
 Note that positional errors may occur in some areas  
 Date: 29/06/2017  
 Author: JCrute  
 Source:

**Legend**

- ▲ Habitat tree locations
- Potential rehabilitation areas
- Parks and Recreation Reserve
- Project area boundary



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## 1.6 Potential impacts and risks

An assessment of the potential impacts and risks to CBCs as a result of the Project construction activities has been undertaken. Results of the risk assessment have been used to develop management measures that form part of this CEMP.

### 1.6.1 Threats to Carnaby's Black Cockatoos

Threats to CBCs are described in the *EPBC Act referral guidelines for three threatened black cockatoo species* (DSEWPaC 2012b) and are summarised as follows:

Habitat loss and degradation, including:

- loss and isolation of mature, hollow-bearing trees necessary for breeding
- lack of or loss of younger age class trees required to replace old trees that die or are destroyed, leading to a shortage of hollows in the future
- loss, degradation and fragmentation of foraging habitat<sup>1</sup>
- removal of native vegetation corridors, restricting the birds' ability to migrate across the landscape
- loss, degradation and isolation of night roost sites and surrounding feeding or watering habitat
- loss and degradation of habitat by secondary impacts such as introduction of dieback caused by *Phytophthora cinnamomi* (and other plant diseases), weed invasion which can affect seed set, and hydrological changes (such as flooding, drainage or salinity).

Interactions with humans, including:

- death or injury when hit by cars or trucks, particularly road constructions that concentrate birds
- at roadsides to feed on roadside vegetation and spilt grain, or drink from rainwater retained as puddles on roadsides
- death or injury from crop protection measures which may trap or injure birds, or prohibit them from accessing nearby native vegetation
- disturbance to birds from noise, light, vibrations and fumes
- shooting of birds (for example where they are coming into conflict with humans over fruit or nut crops)
- poaching of birds and eggs.

Adverse impacts from invasive species, including:

- competition for nest hollows with European honeybees and invading bird species
- injury and death from European honeybees.

### 1.6.2 Potential impacts

Potential impacts on CBCs as a result of the Project were identified and assessed as part of the EPBC Act approvals process. The key impacts as described in Table 2 have been derived from a review of threats to CBC (as described in Section 1.5 above). In order to ensure that potential impacts and associated Project risks have been effectively translated into the implementation phase of the Project an assessment, a risk assessment has been undertaken (Table 2).

<sup>1</sup> This is particularly important in breeding areas: removal of vegetation around breeding sites, and the removal of native vegetation corridors that connect breeding and foraging sites, reduces the amount of food available to breeding birds and can affect chick survival rates. Breaks of more than 4 km have been shown to prevent breeding birds reaching resources.

Table 2: Potential impacts on CBC as a result of construction activities

Impact	Description
Injury or death of CBCs during clearing and construction operations	Clearing operations involves the use of vehicles and machinery which may interact with CBCs and their habitat while in operation. During construction, there is potential for vehicle strikes that may result in injury or death. Feral predators such as dogs, cats and foxes may be attracted to food waste associated with construction activities, which may coincide with increased levels of predation on CBCs.
Habitat impacts through introduction and / or spread of <i>Phytophthora cinnamomi</i> (dieback)	The action has the potential to introduce and / or spread dieback into PRR and across the Project area, which could lead to the decline in vegetation health and the resulting displacement of CBCs, as well as increasing the risk of further infestation. Soil containing dieback may be transported on machinery and equipment used during clearing operations.
Habitat impacts through introduction and / or spread of weeds	The action has the potential to introduce and / or spread weeds into PRR and across the Project area which could lead to the decline in vegetation health and the resulting displacement of CBCs. Habitat contained in PRR within the Project Area is considered to be at risk of establishment of invasive species through edge effects if not managed appropriately. Soil containing weed and seed matter may be transported on machinery and equipment used during clearing operations.
Displacement of CBCs by dust, noise, light, vibrations and fumes	Dust, noise, light, vibrations and fumes may disrupt the natural occupancy of CBCs within the Project Area (construction areas, retained vegetation, uncleared or adjacent habitat). CBCs would possibly avoid the construction area or relocate in response to such a disturbance.
Habitat impacts to PRR areas from encroachment or over clearing	Clearing operations have the potential to encroach into PRR areas, potentially damaging CBC habitat through clearing, weed or dieback introduction.

## 2. Environmental outcomes and performance indicators

Environmental outcomes and performance indicators for key aspects have been developed in order to comply with condition 2 of EPBC 2015/7561. Performance indicators have been developed to demonstrate performance against management objectives as presented in Table 3.

Table 3: Objectives, targets and performance indicators

Environmental outcome	Objective	Target	Performance indicator
Protection of CBC nesting habitat	To ensure no clearing occurs within the 66.64 ha of CBC retained within the PRR.	A minimum of 66.64 ha of CBC habitat is retained within the area identified as retained vegetation in Figure 2 following PRR handover.	No clearing within the PRR.
	To ensure appropriate access restrictions to PRR are maintained.	If construction is immediately adjacent to the PRR, temporary and/or permanent delineation measures <sup>^</sup> must be installed along the entire stage boundary and at least 50 m from the edge of the stage clearing footprint, prior to clearing of that stage.	No evidence of unauthorised access to PRR. Installation of PRR delineation measures. <sup>^</sup>
	To ensure if clearing is proposed during CBCs breeding season*, potential breeding trees within 30 m from construction areas are inspected.	No clearing of potential breeding trees during breeding season within 30 m of construction areas without an inspection deeming the trees are not being used by CBCs.	Potential breeding trees inspected by a suitably qualified ecologist prior to clearing if clearing is undertaken during the breeding season*.
Protection of CBCs	Prevent injury or death of CBCs by clearing and construction operations.	No injury/death of CBCs as a result of construction activities.	No records of CBCs injury/death.

Environmental outcome	Objective	Target	Performance indicator
	Mitigate displacement of CBCs as a result of construction activities and associated impacts (i.e. dust, noise, light, vibrations and fumes).	Emissions resulting from construction activities are contained within the immediate vicinity of the construction works taking place.	No off-site or on-site complaints in relation to construction emissions (i.e. dust, noise, light, vibrations and fumes).
Protection of retained vegetation	Prevent impacts to PRR from encroachment or over clearing.	A minimum of 66.64 ha of CBC habitat is retained within the area identified as retained vegetation in Figure 2 following PRR handover.	No instances of over clearing.
	To ensure no more than 257 ha of potential CBC habitat is cleared from the Project Area.	No more than 257 ha of potential CBC habitat is cleared from the Project Area following the completion of clearing activities.	No clearing outside of approved boundary.
	To maintain the health and condition of native vegetation within the PRR.	Monitoring shows: <ul style="list-style-type: none"> <li>significant weed density is lower than it was prior to the commencement of construction works, after 5 years</li> <li>no spread of significant plant pathogens, 5 years following the commencement of construction</li> <li>no evidence of widespread predation by significant pests.</li> </ul>	No evidence of vegetation decline as a result of significant weeds, pests and plant pathogens#.
		No spread of dieback within the PRR attributable to construction activities.	All vehicles and machinery certified clean of soil prior to commencing clearing activities.

\*The CBC breeding season is from July to December each year. ^Permanent and/or temporary PRR delineation measures include fencing, signage and other access restrictions/deterrents. #Significance in this instance are defined as weeds, pests and plant pathogens that have serious impact on bushland, including Declared Pests under the BAM Act, Weeds of National Significance, dieback and rabbits or others identified during monitoring.

### 3. Risk assessment

A qualitative risk assessment has been undertaken using the methods, definitions and matrix described in the *Environmental Management Plan Guidelines* (Department of the Environment 2014). The risk framework is presented in Table 4 and the definitions for the qualitative measure of likelihood and consequence are presented in Table 5. The risk matrix is presented in Table 6.

Table 4: Risk framework

		Consequence				
Likelihood		Minor	Moderate	High	Major	Critical
	Highly Likely	Medium	High	High	Severe	Severe
	Likely	Low	Medium	High	High	Severe
	Possible	Low	Medium	Medium	High	Severe
	Unlikely	Low	Low	Medium	High	High
	Rare	Low	Low	Low	Medium	High

Table 5: Likelihood and consequence

Qualitative measure of likelihood (how likely is it that this event/circumstances will occur after management actions have been put in place/are being implemented)	
Highly likely	Is expected to occur in most circumstances
Likely	Will probably occur during the life of the project
Possible	Might occur during the life of the project
Unlikely	Could occur but considered unlikely or doubtful

<b>Qualitative measure of likelihood (how likely is it that this event/circumstances will occur after management actions have been put in place/are being implemented)</b>	
Rare	May occur in exceptional circumstances
<b>Qualitative measure of consequences (what will be the consequence/result if the issue does occur)</b>	
Minor	Minor risk of failure to achieve the plan's objectives. Results in short term delays to achieving plan objectives, implementing low cost, well characterised corrective actions.
Moderate	Moderate risk of failure to achieve the plan's objectives. Results in short term delays to achieving plan objectives, implementing well characterised, high cost/effort corrective actions.
High	High risk of failure to achieve the plan's objectives. Results in medium-long term delays to achieving plan objectives, implementing uncertain, high cost/effort corrective actions.
Major	The plan's objectives are unable to be achieved, with significant legislative, technical, ecological and/or administrative barriers to attainment that have no evidenced mitigation strategies.
Critical	The plan's objectives are unable to be achieved, may include widespread and severe environmental harm, with no evidenced mitigation strategies.

Project risks were determined based on key project impacts identified as part of the EPBC Act assessment process. Qualitative measures of likelihood and consequences were determined to establish a risk ranking in accordance with the risk framework (Table 4). Potential risks were ranked to determine inherent risk arising from a potential impact prior to the implementation of mitigation/management measures. Although all impacts/risks were ranked as having a low residual risk, mitigation measures have been identified for each key impact/risk identified (summarised further in Section 4). The outcomes of the risk assessment are presented in Table 6 including the key mitigation/management measures that have been discussed further in Section 4.

Table 6: Risk assessment

Environmental / management outcome	Performance indicators	Risk related event or circumstance	Likelihood	Consequence	Risk level	Management measures	Residual likelihood	Residual consequence	Residual risk level	Detection / monitoring activity/ies	Contingency response	Feasible / effective corrective actions
Protection of CBC nesting habitat	No evidence of unauthorised access to PRR. Installation of PRR delineation measures^.	Lack of integrity of PRR fencing, signage and other access restrictions/deterrents.	Possible	Moderate	Medium	Section 4	Rare	Minor	Low	Section 5	Section 6	High
	No records of CBCs injury/death.	Failure to demarcate clearing boundaries.	Possible	Moderate	Medium	Section 4	Rare	Minor	Low	Section 5	Section 6	High
	No off-site or on-site complaints in relation to construction emissions (i.e. dust, noise, light, vibrations and fumes).	Failure to monitor total area cleared. Unauthorised access within the PRR, e.g. observations of unauthorised vehicles or machinery, damage to fencing.	Possible Possible	Moderate Moderate	Medium Medium	Section 4 Section 4	Rare Rare	Minor Minor	Low Low	Section 5 Section 5	Section 6 Section 6	High High
Protection of CBCs	Potential breeding trees inspected prior to clearing if clearing is undertaken during the breeding season*.	CBC presence within nesting hollows while clearing being undertaken.	Unlikely	High	Medium	Section 4	Rare	High	Low	Section 5	Section 6	High
		Failure to record CBC injury/deaths occurring on site.	Possible	Minor	Low	Section 4	Rare	Minor	Low	Section 5	Section 6	High
		Lack of monitoring of erosion.	Possible	Minor	Low	Section 4	Rare	Minor	Low	Section 5	Section 6	High
		Lack of monitoring of dust generation.	Possible	Minor	Low	Section 4	Rare	Minor	Low	Section 5	Section 6	High
		Lack of dust management equipment and protocols.	Possible	Minor	Low	Section 4	Rare	Minor	Low	Section 5	Section 6	High
		Lack of monitoring of vegetation health.	Possible	Moderate	Medium	Section 4	Rare	Minor	Low	Section 5	Section 6	High
Delineation and protection of retained vegetation	No instances of over clearing during construction.	Clearing limits not defined, demarcated or communicated.	Possible	High	Medium	Section 4	Rare	High	Low	Section 5	Section 6	High
	No evidence of vegetation decline as a result of significant weeds, pests and plant pathogens.	Health of PRR and adjacent vegetation impacted by construction.	Possible	Moderate	Medium	Section 4	Rare	Minor	Low	Section 5	Section 6	High
	All vehicles and machinery certified clean of soil prior to commencing clearing activities.	Import and transport of weeds and dieback within construction area.	Possible	High	Medium	Section 4	Rare	Minor	Low	Section 5	Section 6	High

## 4. Management measures

Management measures for the proposed construction activities are summarised in the following section. The avoidance and mitigation measures support the objectives as presented in Table 7. Areas of uncertainty associated with the proposed action include:

- the presence and extent of dieback
- the presence of nesting CBCs.

Management measures in place to reduce the uncertainty associated with these issues include:

- identification and delineation of known dieback infested areas
- hygiene controls
- delineation of clearing boundaries
- timing clearing activities to avoid cockatoo breeding season
- inspection of potential breeding trees and temporary rescheduling of clearing activity.

Table 7: Construction environmental management

CEMP item	Action	Timing	Responsibility
<b>Site preparation and clearing</b>			
1	<p>Induct all personnel working on site in relation to the following:</p> <ul style="list-style-type: none"> <li>• restricted and/or 'no-go' areas, including the PRR and other restricted/protected areas on site</li> <li>• key requirements of the PRRMP</li> <li>• key requirements of the Construction Environmental Management Plan (CEMP) relating to protection of CBCs (hygiene measures, waste management, traffic management, erosion and dust control).</li> </ul> <p>The induction package will be dated and a record of employees/contractors whom have undertaken the induction maintained.</p>	Prior to commencing work on site	Project Manager / Construction contractor
2	Clearly mark CBC habitat proposed to be retained (as indicated on Figure 2) on construction drawings and delineated by survey pegs and/or temporary fencing along the entire stage boundary.	Pre- & during clearing	Project Manager
3	Clearly mark trees proposed to be retained on construction drawings and by coloured tape within the Project site.	Pre- & during clearing	Project Manager
4	Provide GPS co-ordinates of areas approved to be cleared and those required to be retained to the contractor to ensure no unapproved clearing is undertaken.	Pre & during clearing	Project Manager
5	Install appropriate fencing or barriers to restrict access to unwanted tracks in PRR areas.	During construction	Construction contractor
6	Install appropriate temporary signage to restrict unauthorised access to the PRR.	Pre and during construction	Construction contractor
7	Ensure no domestic animals, traps or firearms are permitted onsite*.	Pre & during clearing	All personnel
8	If clearing occurs during CBC breeding season, habitat tree assessments of potential breeding trees within 30 m from the construction area must be conducted to check for nesting hollows and use by CBCs.	Pre-clearing, during CBC breeding season – within 7 days prior to clearing	Project Manager
9	If active CBC nests are located on site, the tree must be clearly demarcated and not cleared until fledglings have left the nest.	Pre-clearing, if active CBC nests are located.	Project Manager

CEMP item	Action	Timing	Responsibility
<b>Waste management</b>			
10	Maintain work areas in a clean and tidy manner to ensure that feral and other pest species are not attracted to site.	Pre-& during construction	All personnel
11	All bins shall have secure lids which remain closed and will need to be emptied regularly.	Pre-& during construction	All personnel
<b>Traffic management</b>			
12	A maximum speed limit of 40 km/h is permitted within the construction area and will be sign posted within the construction area.	Pre-& during construction	All personnel
<b>Weed and dieback management</b>			
13	Induct all construction personnel in relation to dieback and weeds risk, potential impacts and management.	Prior to commencing work on site and Pre- & During construction	Project Manager
14	Undertake baseline and follow-up dieback assessments of the PRR, as advised by the suitably qualified Dieback Survey Consultant	Prior to the commencement of work on site, where site works are adjacent (up to 50 m) to the PRR and as appropriate.	Dieback Survey Consultant
15	Make sure all vehicles; machinery and equipment are clean prior to entering site.	During construction	All personnel
16	Restrict access of vehicles to areas of construction to minimise the spread or introduction of weeds or pathogens. Access restrictions will be communicated through inductions, signage and fencing.	Pre- & during construction	All personnel
17	In the event construction vehicles are required to enter PRR areas, all vehicles, machinery and equipment will be free of mud and soil prior to entering retained vegetation to prevent introduction and spread of weeds and pathogens.	At all times	All personnel
18	Clean on exit all vehicles, machinery, equipment and footwear if activities undertaken within any known dieback infested areas.	During construction and revegetation works.	All personnel
19	Ensure any fill/soil brought onto site is certified disease free.	During construction	All personnel
<b>Erosion and dust control</b>			
20	Cleared areas will be stabilised to prevent wind-blown dust generating on site.	During construction	Construction contractor
21	Water carts will be used in conjunction with earth moving activities and as required based on prevailing weather conditions at the time of construction works.	During construction	Construction contractor

\*Traps and, less likely, firearms may potentially be utilised from time to time by specialist contractors acting under licence by Department of Biodiversity, Conservation and Attractions and under strictly controlled conditions in the conduct of fauna surveys or pest animal control.

## 5. Monitoring

### 5.1 Monitoring program

Table 8 details the monitoring actions for the CEMP to evaluate performance against targets identified above. The monitoring program has been developed to achieve the following monitoring objectives:

- to protect CBC nesting habitat
- to protect CBCs
- to delineate and protect retained vegetation.



Table 8: Monitoring actions

CEMP item	Monitoring objective	Performance Indicators	Monitoring parameter	Frequency/timing	Location	Responsibility
22	To protect CBC nesting habitat	No clearing within the PRR. No evidence of unauthorised access to PRR. Installation of PRR delineation measures.	Integrity of PRR fencing, signage and other access restrictions/deterrents	Fortnightly for the first 6 months following commencement of clearing and then quarterly thereafter during construction	Around the PRR near clearing boundaries	Construction contractor
23			Approved clearing boundaries	Fortnightly during clearing, or as otherwise required by regulatory authorities as part of construction site inspections	Clearing boundaries	Construction contractor
24			Total area cleared	Annually during construction after clearing has commenced	Project Area	Construction contractor
25			Evidence of unauthorised access within the PRR, e.g. observations of unauthorised vehicles or machinery, damage to fencing	Opportunistically during other PRR inspections	Around the PRR	Construction contractor
26			Potential breeding trees inspected within seven days prior to clearing if clearing is undertaken during the breeding season.	CBC activity / presence within nesting hollows	Bi-annually (prior to and on completion of the CBC breeding season [July to December])	Project Area
27	Within seven days of the commencement of clearing where clearing of trees with nesting hollows is proposed	Project Area			Environmental consultant	
28	To protect CBCs	No records of CBCs injury/death. No off-site or on-site complaints in relation to construction emissions (i.e. dust, noise, light, vibrations and fumes).	Record CBC injury/deaths occurring on site	Opportunistically	Project Area	All personnel
29			Visual observations of erosion	Opportunistically during construction	Drainage areas or bare slopes	Construction contractor
30			Visual observations of dust generation	Opportunistically during construction	Unsealed surfaces prone to dust generation (e.g. roads, stockpiles)	Construction contractor
31			Dust suppression equipment / actions	Opportunistically during construction	Where potential dust generation is taking place	Construction contractor

CEMP item	Monitoring objective	Performance Indicators	Monitoring parameter	Frequency/timing	Location	Responsibility
32			Visual observation of vegetation health	Monthly during construction	PRR and retained CBC habitat beyond clearing boundaries	Project Manager/ Construction contractor
33			Complaints register	Opportunistically during construction	N/A	Construction contractor
34	To delineate and protect retained vegetation	No instances of over clearing.	Total area cleared Clearing register	Annually during construction after clearing has commenced	Project Area	Construction contractor
		No clearing outside of approved boundary.				
35		No evidence of vegetation decline as a result of significant weeds, pests and plant pathogens.	Vegetation health monitoring as described in the PRRMP	As described in the PRRMP	PRR areas	Project manager
36		All vehicles and machinery certified clean of soil prior to commencing clearing activities.	Hygiene register	As required, during clearing and construction	NA	Construction contractor
37		Vehicle hygiene within dieback infested areas.	Dieback infested areas mapped	Prior to commencement of clearing	All areas	Project manager

## 5.2 Data handling and management

Data collected by the Environmental Consultant and/or any other specialists in the course of monitoring activities will be provided to the Lendlease Project Manager who will ensure all data and records are stored and maintained to inform reporting, review and compliance assessments. Numerical data will preferably be stored using Microsoft Excel and spatial data in shapefile format or similar widely used formats.

Data will be provided to the Lendlease Project Manager upon submission of monitoring reports.

## 6. Contingency response, corrective actions

Contingency measures will be initiated if monitoring indicates that targets and performance indicators are not being met. Table 9 outlines trigger levels relating to each aspect and subsequent targets, performance indicators and contingency measures. Given the aspects and objectives of the CEMP relate to the protection of CBC habitat during construction activities, the contingency measures in this section are used as the 'environmental emergency procedures' referred to in DoE 2014, i.e. serious environmental incidents such as hydrocarbon spills are considered by Strategen as negligible risk.

Table 9: Contingency measures

Trigger level	Contingency action	Responsibility
<b>Protection of CBC nesting habitat</b>		
Integrity of temporary and/or permanent fencing compromised	<ul style="list-style-type: none"> <li>Determine how integrity was compromised, if possible.</li> <li>Determine if additional measures required to prevent reoccurrence.</li> <li>Undertake maintenance of fencing and implement additional measures as required.</li> <li>Monitor success of measures undertaken.</li> </ul>	Project Manager/ Construction Contractor
Clearing of more than 66.64 ha of CBC earmarked for retention within the PRR	<ul style="list-style-type: none"> <li>Determine extent of clearing of CBC habitat within PRR.</li> <li>Report clearing breach to DEE.</li> <li>Undertake required remedial measures as determined with DEE.</li> </ul>	Project Manager
Unrestricted access, or unauthorised access by Lendlease contractors or members of the public	<ul style="list-style-type: none"> <li>Determine how access was gained and, if possible, the likely time of access.</li> <li>Implement remedy, which could include: <ul style="list-style-type: none"> <li>repair fence/s</li> <li>erect signs to highlight prohibited access</li> <li>review education measures (e.g. inductions, toolbox/site meetings and communications)</li> <li>re-induct contractors including revision of induction as required</li> <li>reiterate to contractors the importance of not entering the PRR unless authorised, through toolbox meetings, training sessions etc.</li> </ul> </li> <li>Monitor success of control.</li> </ul>	Project Manager
Clearing of trees containing hollows without inspection being completed undertaken during the CBC breeding season	<ul style="list-style-type: none"> <li>Determine if any impacts have occurred, check hollows of felled trees for cockatoos.</li> <li>Investigate cause.</li> <li>Re-train operators in clearing requirements.</li> <li>Report clearing breach to DEE.</li> <li>Report to Department of Department of Biodiversity, Conservation and Attractions (DBCA) as necessary.</li> <li>Undertake required remedial measures as determined with DEE.</li> </ul>	Project Manager
CBC use of hollows identified during inspections	<ul style="list-style-type: none"> <li>Clearly identify and demarcate the tree(s) in use.</li> <li>Report tree(s) to Construction Manager and Project Manager.</li> <li>Maintain a 10 m buffer from the tree(s) including appropriate demarcation (bunting, flagging).</li> <li>Do not clear vegetation within the 10 m buffer.</li> <li>Retain the nesting tree(s) during the nesting season (July to December).</li> <li>Re-inspect the tree(s) at the end of nesting season to confirm all birds have vacated the nest.</li> <li>report the status of nesting tree(s) to the Construction Project Manager and Lendlease Project Manager and confirm suitability for clearing.</li> </ul>	Environmental Consultant / Project Manager
<b>Protection of CBCs</b>		
CBCs injured during construction activities	<ul style="list-style-type: none"> <li>Investigate cause.</li> <li>Determine remedial measures following a review of management procedures.</li> <li>Report to Department of DBCA as necessary.</li> <li>Implement revised management measures and/or provide additional staff education.</li> </ul>	Project Manager
Excessive dust levels are observed	<ul style="list-style-type: none"> <li>Investigate cause including an assessment of equipment and dust suppression equipment.</li> <li>Increase the frequency of dust suppression actions and/or implement additional dust control measures as appropriate.</li> <li>Continue monitoring (visual observations) to determine success of implemented management actions.</li> <li>Monitor success of control.</li> </ul>	Project Manager/ Construction Contractor

Trigger level	Contingency action	Responsibility
Complaint received regarding emissions	<ul style="list-style-type: none"> <li>Investigate cause.</li> <li>Increase the frequency of emission control measures, such as dust, noise and fume suppression actions and/or implement additional control measures as appropriate.</li> <li>Continue monitoring (visual observations) to determine success of implemented management actions.</li> <li>Monitor success of control.</li> </ul>	Project Manager/ Construction Contractor
<b><i>Delineation and protection of retained vegetation</i></b>		
Integrity of temporary and/or permanent fencing compromised	<ul style="list-style-type: none"> <li>Determine how integrity was compromised, if possible.</li> <li>Determine if additional measures required to prevent reoccurrence.</li> <li>Undertake maintenance of fencing and implement additional measures as required.</li> <li>Monitor success of measures undertaken.</li> </ul>	Project Manager/ Construction Contractor
Observations indicate presence of dieback in previously uninfested areas of PRR	<ul style="list-style-type: none"> <li>Identify potential sources of dieback spread and determine likely cause.</li> <li>Update mapped distribution of dieback affected areas.</li> <li>Undertake dieback control -control methods may include phosphite treatment to minimise the spread of dieback.</li> <li>Review success of dieback control methods and continue monitoring.</li> <li>Review and update management plan accordingly.</li> </ul>	Project Manager/ Environmental Consultant
Incorrect hygiene procedures being undertaken by work machinery at authorised access points into retained vegetation	<ul style="list-style-type: none"> <li>Determine why appropriate hygiene procedures were not followed.</li> <li>Implement remedy, which could include: <ul style="list-style-type: none"> <li>educating employees on appropriate hygiene measures</li> <li>erect signs to highlight prohibited access.</li> </ul> </li> <li>Review education measures (e.g. inductions, toolbox/site meetings and communications).</li> <li>Monitor success of control.</li> </ul>	Project Manager/ Construction Contractor

## 7. Reporting and review

### 7.1 Compliance reporting

Condition 7 of EPBC 2015/7561 requires that the following reporting is undertaken:

*Within 3 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 each of the conditions of this approval, including implementation of any management plans as specified in the conditions. Documentary evidence providing proof of the date of publication and non-compliance with any of the conditions of this approval must be provided to the Department at the same time as the compliance report is published. Reports must remain on the website for the life of the approval. The person taking the action must continue to comply with this condition until such time as agreed in writing by the Minister.*

The report required for condition 7 will assess conformance with the actions described in this CEMP, to substantiate implementation of the plan as required by condition 2. The annual report will be informed by monitoring data and reports as generated in implementing the program described in Section 5.

In addition to findings of the annual compliance audit, the compliance report will include the findings of any relevant environmental assessments, such as dieback assessments, including any adaptive management response(s).

#### 7.1.1 CEMP and technical review and adaptive management

CEMP review shall be initiated:

- following significant incidents

- where monitoring indicates that performance is not being achieved against KPIs
- periodically every 12 months.

Technical review of and evaluation of the monitoring program will be undertaken annually as part of the CEMP to ensure monitoring parameters, timing, location and outputs are addressing all key risk areas and management plan objectives adequately. The review will be undertaken by Lendlease and the Environmental Consultant with advice from technical specialists as appropriate (e.g. dieback, vegetation and fauna specialists).

To ensure uncertainty is reduced over time, and that plan outcomes/performance indicators are achieved, the following will be evaluated during review stages and incorporated into revisions of the CEMP:

- new and relevant data/information gained as a result of implementing the plan or from external sources (e.g. academic literature, EPBC Act policy statements)
- effectiveness of CEMP coordination, scheduling, monitoring, risk management, auditing and reporting activities
- risks, including in response to the risk level, changing circumstances or the results from implementing corrective actions
- effectiveness of management measures with significant levels of uncertainty, relatively long implementation timeframes, and upon which the plan is highly dependent
- consequences of significant environmental incidents.

## 8. Environmental management roles and responsibilities

This CEMP will be implemented by Lendlease and its contractors during construction activities. All contractors and staff will be required to operate in accordance with this CEMP. Key personnel and responsibilities are described in the following sections:

### 8.1 Responsibilities

This CEMP will be implemented by Lendlease and its contractors during construction activities. All contractors and staff will be required to operate in accordance with this CEMP. Key personnel and responsibilities are described in the following sections:

#### 8.1.1 Lendlease Project Manager

The primary responsibilities of the Project Manager include:

- act as primary liaison between DEE, City of Wanneroo (CoW), DBCA and contractors
- engage suitably qualified contractors to implement the CEMP as required
- ensure all contracts contain relevant CEMP provisions and check these provisions are undertaken
- review reports provided by the contractors as required
- ensure all site personnel are aware of the requirements of the CEMP
- report to DEE in accordance with condition 3 of EPBC 2015/7561
- act as the key 'Emergency Contact', responsible for implementation of emergency response procedures (Section 6).

#### 8.1.2 Construction Contractor

The primary responsibilities of the Construction Contractor include:

- assist the Project Manager to ensure construction activities do not adversely affect black cockatoo habitat within the retained vegetation area
- ensure all site personnel are aware of the requirements of the CEMP and related plans
- provide support to the Project Manager as required during the construction phase

- maintain relevant records and provide reports on clearing activities to the Project Manager including:
  - \* map describing the areas of clearing and locations of delineation works that have occurred
  - \* key construction dates
  - \* environmental incidents, relevant (e.g. toolbox) meeting minutes and environmental observations (e.g. of feral fauna or black cockatoos).

### 8.1.3 Environmental Consultant

The primary responsibilities of the Environmental Consultant include

- identify trees with hollows in the Development Area to be removed and relocated
- monitor nesting hollows
- monitor rehabilitation works
- technical review of and evaluation of the monitoring program.

### 8.1.4 Pest Control Contractor

The primary responsibilities of the Pest Control Contractor include:

- maintain relevant records and provide progress activity reports to the Project Manager which include details of activities undertaken
- conduct any measures required for controlling rabbits or other feral fauna.

### 8.1.5 Dieback Survey Consultant

The Dieback Survey Consultant will be suitably qualified and registered with the DBCA. The primary responsibilities of the Dieback Survey Consultant include:

- conduct baseline survey of the PRR areas to determine the location of any existing dieback infestations
- provide a report and map to inform hygiene management and location of rehabilitation works.

## 9. Glossary of terms

CEMP	Construction Environmental Management Plan
CoW	City of Wanneroo
DBH	Diameter at breast height
DEE	Department of Environment and Energy (Cth)
Development Area	Lots 9501 and 9502 Marmion Avenue, Alkimos, excluding Parks and Recreation Reserves
DotE	Department of the Environment (Cth; former)
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities (Cth; former)
DSP	District Structure Plan

EP Act	<i>Environment Protection Act 1986 (WA)</i>
EPA	Environment Protection Authority (WA)
EPBC Act	<i>Environment Protection and Biodiversity and Conservation Act 1999 (Cth)</i>
LandCorp	Western Australian Land Authority
Lendlease	Lendlease Communities (Australia) Pty Ltd
MNES	Matters of National Environmental Significance
MRS	Metropolitan Region Scheme
DBCA	Department of Biodiversity, Conservation and Attractions
Project Area	Lots 9501 and 9502 Marmion Avenue, Alkimos
PRR	Parks and Recreation Reserve
PRRMP	Parks and Recreation Reserve Management Plan
ROS	Regional Open Space
WAPC	Western Australian Planning Commission

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