



## CLEARING PERMIT

*Granted under section 51E of the Environmental Protection Act 1986*

### PERMIT DETAILS

Area Permit Number: 8172/2  
File Number: DWERVT1170  
Duration of Permit: 20 June 2019 to 20 June 2031

### PERMIT HOLDER

City of Rockingham

### LAND ON WHICH CLEARING IS TO BE DONE

Lot 4 on Diagram 31062, Baldivis  
Lot 103 on Diagram 50627, Baldivis  
Lot 104 on Diagram 50627, Baldivis  
Lot 105 on Diagram 50627, Baldivis

### AUTHORISED ACTIVITY

The Permit Holder shall not clear more than 1.85 hectares of native vegetation within the area hatched yellow on attached Plan 8172/2a.

### CONDITIONS

#### 1. Period in which clearing is authorised

The Permit Holder shall not clear any native vegetation after 20 June 2021.

#### 2. Avoid, minimise and reduce the impacts and extent of clearing

In determining the amount of native vegetation to be cleared authorised under this Permit, the Permit Holder must have regard to the following principles, set out in order of preference:

- (a) avoid the clearing of native vegetation;
- (b) minimise the amount of native vegetation to be cleared; and
- (c) reduce the impact of clearing on any environmental value.

#### 3. Dieback and weed control

When undertaking any clearing or other activity authorised under this Permit, the Permit Holder must take the following steps to minimise the risk of the introduction and spread of *weeds* and *dieback*:

- (a) clean earth-moving machinery of soil and vegetation prior to entering and leaving the area to be cleared;
- (b) ensure that no known dieback or weed-affected soil, mulch, fill or other material is brought into the area to be cleared; and
- (c) restrict the movement of machines and other vehicles to the limits of the areas to be cleared.

#### 4. Fauna management – direction of clearing

The Permit Holder shall conduct clearing in a slow progressive manner towards surrounding remnant vegetation to allow fauna to escape the clearing activity.

## 5. Fauna management - black cockatoo breeding trees

- (a) Immediately prior to undertaking any clearing authorised under this Permit:
  - (i) the area cross-hatched yellow on attached Plan 8172/2a shall be inspected by a *fauna specialist* who shall identify *black cockatoo breeding trees*; and
  - (ii) each *black cockatoo breeding tree* identified shall be inspected by a *fauna specialist* for evidence of current or past breeding use by *black cockatoos*.
- (b) Where a *black cockatoo breeding tree(s)* with evidence of current breeding use by *black cockatoos* is identified and cannot be avoided, that tree(s) shall be monitored by a *fauna specialist* to determine when it is no longer in use for that breeding season.
- (c) Any *black cockatoo breeding tree(s)* with evidence of current breeding use by *black cockatoos* shall not be cleared while it is in use as determined by the *fauna specialist* under condition 5(b) of this Permit.
- (d) Where a *black cockatoo breeding tree(s)* with evidence of past breeding use by *black cockatoos* is identified and cannot be avoided, that tree(s) shall only be cleared:
  - (ii) later the same day of the inspection required under condition 5(a)(ii) of this Permit if that inspection does not identify evidence of current breeding use; or
  - (iii) later the same day of a repeat inspection undertaken by a *fauna specialist* if that inspection does not identify evidence of current breeding use.
- (e) For each *black cockatoo breeding tree* with evidence of current or past breeding use by *black cockatoos* that cannot be avoided, the Permit Holder shall install an artificial *black cockatoo* nest hollow.
- (f) Each artificial *black cockatoo* nest hollow required by condition 5(e) of this Permit must be installed prior to the commencement of the next *black cockatoo breeding season* following clearing of the related *black cockatoo breeding tree*.
- (g) The artificial *black cockatoo* nest hollow(s) required by condition 5(e) of this Permit must:
  - (i) be installed within the area cross-hatched red on attached Plan 8172/2b, being Lot 4 on Diagram 31062, Baldivis;
  - (ii) be designed and placed in accordance with the guidelines provided in Schedule 1 of this Permit; and
  - (iii) be monitored and maintained in accordance with the guidelines provided in Schedule 2 of this Permit, for a period of a minimum ten years.
- (h) The Permit Holder shall ensure that no less than nine artificial *black cockatoo* nesting hollows are installed within the area hatched red on attached Plan 8172/2b being Lot 4 on Diagram 31062, Baldivis.

## 6. Revegetation Plan

Within 12 months of the commencement of clearing, the Permit Holder shall implement and adhere to the 'Eco Logical Australia 2019. *Baldivis District Sporting Complex Revegetation Plan*. Prepared for City of Rockingham', including but not limited to the following actions;

- (a) commence *rehabilitating* the area hatched red on Plan 8172/2b by:
  - (i) undertaking an extensive *pre-planting* weed control program;
  - (ii) deliberately *planting* native vegetation that will provide primary foraging species for *black cockatoos* and enhance the species composition, structure and density of the Tuart/Jarraah woodland; and
  - (iii) ensuring only *local provenance* seeds and propagating material are used to *rehabilitate* the area.
- (b) establishing six 5 x 5 metre quadrat monitoring sites within the *rehabilitated* area;
- (c) fencing the *rehabilitated* area;
- (d) implementing hygiene protocols by cleaning earth-moving machinery of soil and vegetation prior to entering and leaving the site;
- (e) undertaking biannual weed control activities to maintain a minimum 80 per cent weed free state by the end of the project maintenance period; and
- (f) achieve the following completion criteria after the five year monitoring period for the area *rehabilitated* under this Permit.

Criterion	Aspect	Completion targets	Completion criteria	Monitoring
1	Species richness	Species richness of 70 per cent of the species that have been planted.	Species richness and number of plants/m <sup>2</sup> in the <i>rehabilitation</i> area is at least 70 per cent of the species that have been planted.	The species and number of plants/m <sup>2</sup> in the <i>rehabilitation</i> area will be counted in years 1, 3 and 5.
2	Per cent cover of weeds.	A target of <=20 per cent of weed cover has been established for the <i>rehabilitation</i> site.	The <i>rehabilitation</i> area has <=20 per cent cover of weeds.	Monitor <i>rehabilitation</i> areas in years 1, 3 and 5.
3	No declared weeds are present.	Declared Weeds are managed in accordance with the <i>Biosecurity and Agriculture Management Regulations 2013</i> .	Declared weeds are absent from the <i>rehabilitation</i> .	Monitor the <i>rehabilitation</i> site for declared weeds by traversing the areas in years 1, 3 and 5.
4	Survival rate to be achieved.	If after planting a survival rate of at least 70 per cent is not achieved, infill seedling planting must occur within 12 months and monitored for a further 5 years.	The <i>rehabilitation</i> area needs to ensure a survival rate of at least 70 per cent of the species planted is achieved after 5 years, and replant any plants within 12 months of dying.	The number of surviving plants in the <i>revegetation</i> areas will be counted in years 1, 3 and 5.
5	Stem Density	A total native species stem density of 1 plant/m <sup>2</sup> .	The <i>rehabilitation</i> area contains a total native species stem density of 1 plant/m <sup>2</sup> .	Stem density to be assessed in years 1, 3 and 5.
6	Tree Density	A total of 540 trees must be planted comprising of 50 per cent Jarrah and 50 per cent Tuart tree species.	The <i>rehabilitation</i> area contains 540 trees comprising of 50 per cent Jarrah and 50 per cent Tuart tree species.	Tree density to be assessed in years 1, 3 and 5.
7	Stem density for <i>black cockatoo</i> foraging species.	A total native species stem density of 30 per cent of the total seedling numbers (0.3 plants/m <sup>2</sup> ) planted will be primary foraging species for <i>black cockatoo</i> species.	The <i>rehabilitation</i> area contains a total native species stem density of at least 30 per cent of the total seedling numbers planted which provide primary foraging habitat for <i>black cockatoo</i> species.	Stem density for <i>black cockatoo</i> foraging species to be assessed in years 1, 3 and 5.
8	Vegetation Condition	<i>Rehabilitate</i> to good condition.	<i>Rehabilitation</i> area is in good condition	Vegetation condition to be assessed in years 1, 3 and 5.

## 7. Revegetation area conservation covenant

Prior to 1 November 2020, the Permit Holder shall:

- (a) give a conservation covenant under section 30B of the *Soil and Land Conservation Act 1945* setting aside the *rehabilitated* area hatched red on Plan 8172/2b for the protection of vegetation in perpetuity; and
- (b) provide to the *CEO* a copy of the executed conservation covenant.

### PART III - RECORD KEEPING AND REPORTING

#### **8. Records must be kept**

The Permit Holder must maintain the following records for activities done in pursuant to this Permit:

- (a) In relation to the clearing of native vegetation authorised under this Permit:
  - (i) the location where the clearing occurred, recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings;
  - (ii) the date that the area was cleared; and
  - (iii) the size of the area cleared (in hectares).
  - (iv) actions taken to avoid, minimise and reduce the impacts and extent of clearing in accordance with condition 2 of the Permit.
  - (v) actions taken to minimise the risk of the introduction and spread of *weeds* and *dieback* in accordance with condition 3 of the Permit;
  - (vii) actions taken in accordance with condition 4 of this Permit; and
  - (viii) actions taken in accordance with condition 7 of this Permit.
  
- (b) In relation to fauna management pursuant to condition 5 of this Permit:
  - (i) the time(s) and date(s) of inspection(s) by the *fauna specialist*;
  - (ii) a description of the *fauna specialist* inspection methodology employed;
  - (iv) the location of each *black cockatoo breeding tree* identified, recorded using a GPS unit set to GDA94, expressing the geographical coordinates in Eastings and Northings or decimal degrees;
  - (iv) a description of the evidence of current or past breeding use observed for each *black cockatoo breeding tree* identified;
  - (v) a photo of each *black cockatoo breeding tree* with evidence of current or past breeding use identified;
  - (vi) for each *black cockatoo breeding tree* with evidence of current breeding use:
    - (1) the time and date it was determined to no longer be in use for that breeding season; and
    - (2) the evidence by which it was determined to no longer be in use for that breeding season.
  - (vii) the time and date each *black cockatoo breeding tree* with evidence of current or past breeding use was cleared;
  - (viii) the date each artificial *black cockatoo* nest hollow was installed;
  - (ix) the location of each artificial *black cockatoo* nest hollow installed, recorded using a GPS unit set to GDA94, expressing the geographical coordinates in Eastings and Northings or decimal degrees;
  - (x) a photo of each artificial *black cockatoo* nest hollow installed;
  - (xi) the dates each artificial *black cockatoo* nest hollow installed was monitored;
  - (xii) a description of the monitoring methodology employed for each artificial *black cockatoo* nest hollow installed;
  - (xiii) a description of the monitoring observations for each artificial *black cockatoo* nest hollow installed;
  - (xiv) the date(s) each artificial *black cockatoo* nest hollow installed was maintained;
  - (xv) a description of the maintenance activities undertaken for each artificial *black cockatoo* nest hollow installed; and
  - (xvi) the total number of artificial hollows installed.
  
- (c) In relation to the revegetation of areas pursuant to condition 6 of this Permit:
  - (i) a description of the *rehabilitation* activities undertaken;
  - (ii) the size of the area *rehabilitated* (in hectares); and
  - (iii) the date that the area was *rehabilitated*.

## 9. Reporting

- (a) The Permit Holder must provide to the *CEO* on or before 30 June of each year, a written report:
  - (i) of records required under condition 8 of this Permit; and
  - (ii) concerning activities done by the Permit Holder under this Permit between 1 January to 31 December of the preceding calendar year.
- (b) If no clearing authorised under this Permit was undertaken between 1 January to 31 December of the preceding calendar, a written report confirming that no clearing under this permit has been carried out, must be provided to the *CEO* on or before 30 June of each year.
- (c) Prior to 20 April 2031, the Permit Holder must provide to the *CEO* a written report of records required under condition 8 of this Permit where these records have not already been provided under condition 9(a) of this Permit.

## DEFINITIONS

The following meanings are given to terms used in this Permit:

**black cockatoo(s)** means Carnaby's cockatoo (*Calyptorhynchus latirostris*), Baudin's cockatoo (*Calyptorhynchus baudinii*) and forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*);

**black cockatoo breeding tree/s** means trees that have a diameter, measured at 1.5 metres from the base of the tree, of 50 centimetres or greater (or 30 centimetres or greater for *Euclayptus salmonophloia* or *Eucalyptus wandoo*) that contain hollows suitable for nesting by Carnaby's cockatoo, Baudin's cockatoo or forest red-tailed black cockatoo;

**black cockatoo breeding season** means the period from 1 June to 29 February of any given year;

**CEO** means the Chief Executive Officer of the Department responsible for the administration of the clearing provisions under the *Environmental Protection Act 1986*;

**dieback** means the effect of *Phytophthora* species on native vegetation;

**fauna specialist** means a person who holds a tertiary qualification specialising in environmental science or equivalent, and has a minimum of two years work experience in fauna identification and surveys of fauna native to the region being inspected or surveyed, or who is approved by the *CEO* as a suitable fauna specialist for the bioregion, and who holds a valid fauna licence issued under the *Biodiversity Conservation Act 2016*.

**fill** means material used to increase the ground level, or fill a hollow;

**local provenance** means native vegetation seeds and propagating material from natural sources within 100 kilometres and the same Interim Biogeographic Regionalisation for Australia (IBRA) subregion of the area cleared;

**mulch** means the use of organic matter, wood chips or rocks to slow the movement of water across the soil surface and to reduce evaporation;

**planting** means the re-establishment of vegetation by creating favourable soil conditions and planting seedlings of the desired species;

**rehabilitate/ed/ion/ing** means actively managing an area containing native vegetation in order to improve the ecological function of that area;

*weed/s* means any plant -

- (a) that is a declared pest under section 22 of the *Biosecurity and Agriculture Management Act 2007*;  
or
- (b) published in a Department of Biodiversity, Conservation and Attractions Regional Weed Rankings Summary, regardless of ranking; or
- (c) not indigenous to the area concerned.



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Mathew Gannaway  
MANAGER  
NATIVE VEGETATION REGULATION

*Officer delegated under Section 20  
of the Environmental Protection Act 1986*

8 October 2019

## **SCHEDULE 1**

### **How to design and place artificial hollows for Carnaby's cockatoo**

## Artificial hollows for Carnaby's cockatoo



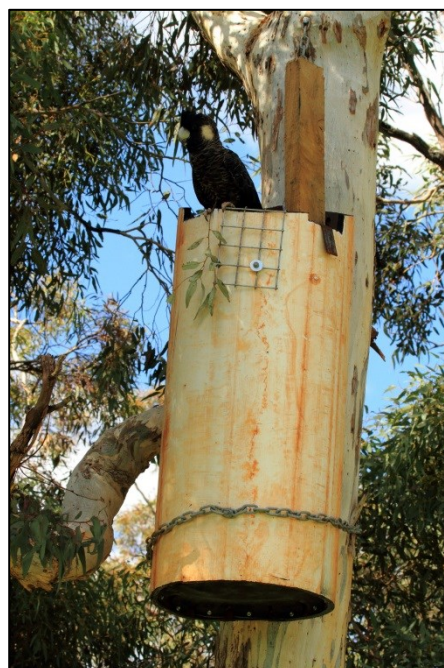
## How to design and place artificial hollows for Carnaby's cockatoo

Artificial hollows can be used to help conserve the threatened Carnaby's cockatoo by enabling the cockatoos to breed in areas where natural hollows are limited.

A wide variety of artificial hollow designs have been used with mixed success. Evidence suggests that, while the hollow must meet some basic requirements, other factors such as proximity to existing breeding areas may be more important in determining the success of artificial hollows. Before using this information sheet to construct or install an artificial hollow, you should refer to the criteria listed in the separate information sheet; *When to use artificial hollows for Carnaby's cockatoo*.

This information sheet contains broad guidelines for the design and placement of artificial hollows for Carnaby's cockatoo.

Below are three examples of successful artificial hollows used by Carnaby's cockatoo for nesting. Artificial hollows made from a natural log with cut side entrance (left), white industrial pipe with top entrance (centre) and natural log with natural side entrance (right).



Photos by Christine Groom (left and right) and Rick Dawson (centre)



## Walls

The walls of the artificial hollow need to be constructed from a material that is;

- Durable enough to withstand exposure to elements for an extended period of time (i.e. 20+ years).
- Able to simulate the thermal properties of a natural tree hollow.
- Not less than 380 mm in internal diameter.
- Preferably 1.2 m deep overall and 1m deep to top of substrate/nesting material.

Successful artificial hollows have been constructed from sections of salvaged natural hollow, black and white industrial pipe. When using non-natural materials care must be taken to ensure there are no toxic residues and that the materials are safe to ingest.

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## Base

The base of the artificial hollow must be;

- Able to support the adult and nestling(s).
- Durable enough to last the life of the nest.
- Free draining.
- At least 380 mm in diameter.
- Covered with 200 mm of sterile, dry, free draining material such as charcoal, hardwood woodchips or wood debris.

### **Do not use:**

- Saw dust or fibre products that will retain moisture.

Example materials that could be used for artificial hollow bases include heavy duty stainless steel, galvanised or treated metal (e.g. Zinalume ®), thick hardwood timber slab or marine ply (not chipboard or MDF). The base material must be cut to size to fit internally with sharp or rough edges ground away or curled inwards and fixed securely to the walls.



Carnaby's cockatoo eggs in an artificial hollow.  
*Photo by Rick Dawson*

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## Entrance

The entrance of the artificial hollow must;

- Have a diameter of at least 270 mm).
- Preferably be top entry which will minimise use by non-target species.

Top entry hollows are unattractive to nest competitors such as feral bees, galahs and corellas. Side entry hollows have been successful in areas where feral bees are not a problem and where galahs and corellas are deterred.

## Ladder

For artificial hollows made of non-natural materials, or of processed boards, it is necessary to provide a ladder to enable the birds to climb in and out of the hollow easily.

The ladder must be;

- Securely mounted to the inside of the hollow.
- Made from an open heavy wire mesh such as WeldMesh™ with mesh size of 30 - 50 mm, or heavy chain.

### Do not use:

- A material that the birds can chew.
- Galvanized because the birds may grip or chew the ladder and ingest harmful compounds.

If using mesh for the ladder, the width will depend on the curvature of the nest walls. A minimum width of about 60 - 100 mm is recommended.

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## Sacrificial chewing posts

For artificial hollows made of non-natural materials, or of processed boards, it is necessary to provide sacrificial chewing posts. The birds chew material to prepare a dry base on which to lay their egg(s).

The sacrificial chewing posts must:

- Be made of untreated hardwood such as jarrah, marri or wandoo
- Be thick enough to satisfy the birds' needs between maintenance visits.
- Extend beyond the top of the hollow as an aid to see whether the nest is being used.
- Be placed on the inside of the hollow.
- Be attached in such a way that they are easy to replace e.g. hook over the top of hollow or can slide in/out of a pair of U bolts fitted to the side of the hollow.

It is recommended that at least two posts are provided. Posts 70 x 50 mm have been used, but require replacing at least every second breeding season when the nest is active. Birds do vary in their chewing habits and therefore the frequency at which the chewing posts require replacement will also vary.



Bottom of an artificial hollow showing ladder that is fixed to the wall and a chewed sacrificial post which is 200 mm from the floor.

Photo by Rick Dawson

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## Mountings

The artificial hollows must be mounted such that:

- The fixings used will last the duration of the nest e.g. galvanized bracket or chain fixed with galvanized coach screws.
- It is secured by more than one anchor for security and stability.
- It is positioned vertically or near vertically.

## Placement

Sites should be chosen within current breeding areas and where they can be monitored, but preferably not conspicuous to the general public. It is important that artificial hollows are placed where they will be accessible for future monitoring and maintenance. For more detail refer to the separate information sheet; *When to use artificial hollows for Carnaby's cockatoo*.

The height at which artificial hollows should be placed is variable. The average height of natural hollows in dominant tree species in the area is a good guide. Natural hollows used by Carnaby's cockatoos have been recorded as low as 2 m above the ground. If located on private property the hollows can be placed lower to the ground so they are accessible by ladder or a rope and pulley system can be used. Where public access is possible artificial hollows should be placed at least 7 m high (i.e. higher than most ladders) and on the side of the tree away from public view to reduce the chance of interference or poaching.

Carnaby's cockatoo show no preference for aspect of natural hollows, however, it may still be beneficial to place artificial hollows facing away from prevailing weather and where they receive the most shade and protection.

Artificial hollows to be placed in trees require:

- Accessibility of the tree for a vehicle, elevated work platform or cherry picker.
- A section of trunk 2-3 m long suitable for attaching the hollow

If necessary, artificial hollows may be placed on poles, but this may result in excessive exposure to sun during very hot weather. When erected on poles there should be:

- A hinge at the bottom of the pole that can be secured when the pole is in the upright position.
- Access for a vehicle to assist raising the pole.

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## Safety

Care needs to be taken when placing artificial hollows to ensure safety is considered at all times. Artificial hollows are heavy and require lifting and manoeuvring into position up to 7 m above the ground.

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## Maintenance and monitoring

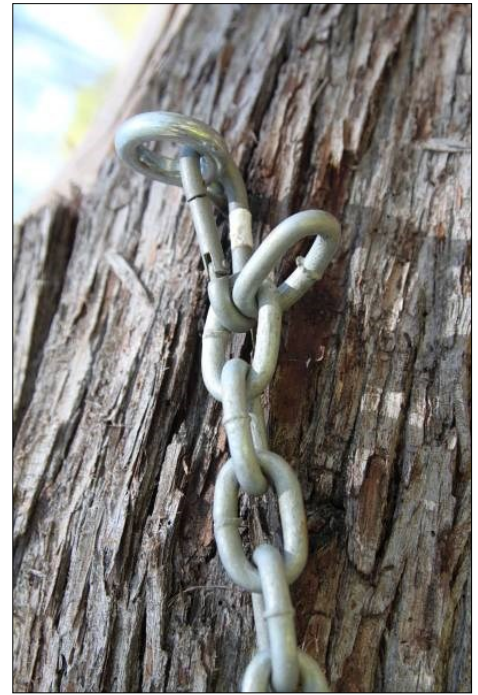
Once artificial hollows have been placed they require monitoring and maintenance to ensure they continue to be useful for nesting by Carnaby's cockatoo. It is important to monitor artificial hollows to determine use by Carnaby's cockatoo, other native species as well as pest species. By undertaking monitoring the success of the design and placement of artificial hollows can be determined and areas for improvement identified for future placement of artificial hollows.

Monitoring can also assess whether any maintenance is required. Without regular maintenance artificial hollows are unlikely to achieve their objective (that is, they will fail to provide nesting opportunities for threatened cockatoos). Therefore it is important to continue a regime of regular maintenance while the artificial hollow is required. It may be several (to many) decades until a natural replacement hollow is available.

For further advice on monitoring and maintenance of artificial hollows please refer to the separate information sheet; *How to monitor and maintain artificial hollows for Carnaby's cockatoo*.



Carnaby's cockatoo female prospecting an artificial hollow.  
Photo by Rick Dawson



Example fixing for artificial hollow  
Photo by Christine Groom

### Acknowledgements

This information sheet is a joint initiative of Birdlife Australia, the Western Australian Museum and the Department of Parks and Wildlife. Many individuals have contributed to its preparation. Special acknowledgement is made for the contributions of Ron Johnstone from the WA Museum, Alan Elliott from the Serpentine-Jarrahdale Land care Centre and Denis Saunders. This updated version was compiled by Rick Dawson Department of Parks and Wildlife).

### Other information sheets in the series: Artificial hollows for Carnaby's cockatoo

- *How to design and place artificial hollows for Carnaby's cockatoo*
- *How to monitor and maintain artificial hollows for Carnaby's cockatoo*

Information sheets available on the *Saving Carnaby's cockatoo* webpage:

<http://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-animals/208-saving-carnaby-s-cockatoo>

## **SCHEDULE 2**

**How to monitor and maintain artificial hollows for Carnaby's cockatoo**

## Artificial hollows for Carnaby's cockatoo



## How to monitor and maintain artificial hollows for Carnaby's cockatoo

It is important to monitor and maintain artificial hollows after they have been erected. Monitoring ensures that the effectiveness of the artificial hollow can be determined. It also means that problems with pest species or any maintenance requirements can be identified and resolved.

Without regular maintenance, artificial hollows are likely to fail to achieve their objective (that is, they will fail to provide nesting opportunities for threatened cockatoos). Therefore it is important to continue a regime of regular maintenance while the artificial hollow is required. It may be several (to many) decades until a natural replacement hollow is available.

Monitoring should be undertaken in order to detect:

- Use by Carnaby's cockatoo
- Maintenance requirements
- Use by other native species
- Use by pest species (e.g. feral bees, galahs, corellas etc.)



Carnaby's cockatoo female prospecting an artificial hollow.  
*Photo by Rick Dawson*

### **How do I monitor artificial hollows?**

Before undertaking monitoring of artificial hollows for Carnaby's cockatoo it is recommended that you seek advice from BirdLife Australia, the WA Museum or the Department of Parks and Wildlife. It is also important to contact Parks and Wildlife, Wildlife Licensing Section, to determine if a scientific licence is required ([wildlifelicencing@dpaw.wa.gov.au](mailto:wildlifelicencing@dpaw.wa.gov.au)).

Monitoring artificial hollows requires keen observation and naturalist skills. It is often not possible to observe evidence of breeding directly (i.e. nestlings or eggs) and inferences must be made based on observation. There are many techniques available to monitor artificial hollows. A combination of several is likely to achieve the best results.

### **Looking for signs of use**

Cobwebs covering the entrance to the hollow will indicate that the hollow has not been used recently. This would also apply to other light debris that may have fallen to cover the opening partially. Signs of recent use or interest in the hollow include evidence of chewing.

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### **Observing parent behaviour around the hollow**

The behaviour of parent birds around a hollow will indicate an approximate age of young in the nest.

<b>Parent behaviour</b>	<b>Approximate age/stage of young</b>
Prospecting for hollow	Unborn
Male only seen out of hollow	Egg or very young nestling (< 3 - 4 weeks)
Both parents seen entering/exiting the hollow	Nestling(s) have hatched (> 3 - 4 weeks)

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### **Observing feeding flocks**

Flocks of all male birds indicate that the females are incubating eggs. When flocks are mixed it suggests the birds have either not laid yet or that the nestlings have hatched and no longer require brooding (approximately 3 - 4 weeks old).

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### **Tapping**

When females are sitting on eggs they will usually respond to tapping at the base of their tree (or pole) by appearing at the entrance or flying from the hollow opening. This is not a guarantee of breeding activity, but an indication that it is possibly occurring in the hollow.

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### **Observing insect activity around nest**

The faecal matter produced by nestlings in a nest attracts insects, especially flies and ants. The type and number of these insects will help indicate how old any nestlings present may be. Factors such as temperature and humidity will also affect insect activity and so observations of insect activity should only be used as supporting evidence for other indications of age/use. Blowflies around a nest usually indicate that a death has occurred.

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### **Listening for nestlings**

With experience it is possible to determine if one or two nestlings are present and a broad estimate of age based on the type and loudness of noises they make.

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### **Looking inside the nest**

This can be achieved either with the aid of a telescopic pole and camera or mirror, or with the use of a ladder or other climbing equipment. This method can obtain the most detailed monitoring information for artificial hollows. However it is also the most time consuming and difficult to organise. Special equipment is likely to be needed depending on the height and positioning of artificial hollows. There are also safety issues associated with ladder or rope climbing options to reach nests to undertake observations.

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### **How often should I monitor artificial hollows?**

The minimum frequency of monitoring and the techniques used will be determined by the aims of the monitoring and the resources available. It is important to limit disturbance to breeding birds and this should be considered when determining the techniques used and frequency.

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### **How do I maintain artificial hollows?**

Artificial hollows require maintenance to ensure they continue to have the greatest chance of them being used by Carnaby's cockatoos. Periodic maintenance checks should be undertaken at least every two years, preferably annually. These checks should be undertaken prior to the breeding season which is between July and January with breeding occurring later in this period in southern areas. It is important to maintain a regime of regular maintenance as long as the artificial hollow is required. It may take several (to many) decades until a natural replacement hollow is available.

Maintenance checks should assess the following as a minimum:

- Condition of chewing posts (if present)
- Condition of attachment points
- Condition of hollow bases
- Stability of tree or pole used to mount the artificial hollow



Artificial hollow base needing repair.  
*Photo by Christine Groom*

### **Repairing hollows**

Any problems identified during maintenance checks should be addressed, and any repairs required done, as soon as possible. If breeding is currently occurring, maintenance may need to be delayed if it is likely to disturb the parents or nestling. Likely maintenance needs include replacement of chewing posts (frequently) or nest bases (occasionally) and repairing of any cracks (infrequently). Maintenance concerns regarding the security of attachment points or the stability of the tree or pole should be addressed as a priority for safety reasons.

For artificial hollows known to be used, spare chewing posts should be taken into the field when undertaking maintenance checks.

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**Monitoring of artificial hollows:**

Monitoring aim	Frequency of visits	Monitoring techniques
<b>To determine possible use by Carnaby's cockatoo</b>	At least once during peak breeding season (i.e. between September and December)	<ul style="list-style-type: none"> <li>• Observing behaviour of adults around hollow</li> <li>• Tapping to see if female will flush from hollow (best undertaken between 10am and 3pm when females most likely to be sitting)</li> <li>• Listening for nestlings</li> <li>• Looking for evidence of chewing</li> <li>• Looking inside nest</li> </ul>
<b>To confirm use by Carnaby's cockatoo</b>	At least two visits during peak breeding season (i.e. between September and December)	<p>To observe at least two of the following:</p> <ul style="list-style-type: none"> <li>• Breeding behaviour of adults around hollow or evidence of chewing</li> <li>• Female flushed from hollow</li> <li>• Noises from nestlings in hollow</li> </ul> <p>Or to observe:</p> <ul style="list-style-type: none"> <li>• Nestlings or eggs in nest</li> </ul>
<b>To determine nesting success by Carnaby's cockatoo</b>	The more visits, the better. Preferably fortnightly visits between July and December. As a minimum, at least 3 visits spread throughout breeding season.	<ul style="list-style-type: none"> <li>• Looking inside nest to observe eggs or nestlings.</li> </ul>
<b>To determine use by any species</b>	As often as possible.	<ul style="list-style-type: none"> <li>• Inspection from ground as a minimum.</li> <li>• Looking inside nest for detailed observations.</li> </ul>
<b>To determine maintenance requirements</b>	At least every two years and preferably annually if hollow fitted with sacrificial chewing posts, can be longer if without.	<ul style="list-style-type: none"> <li>• A basic maintenance check can be undertaken from the ground. A ladder or elevated work platform will be required for a comprehensive check and to replace sacrificial chewing posts</li> </ul>

**Acknowledgements**

This information sheet is a joint initiative of Birdlife Australia, the Western Australian Museum and the Department of Parks and Wildlife. Many individuals have contributed to its preparation. The updated version was compiled by Rick Dawson (Department of Parks and Wildlife) with assistance from Denis Saunders.

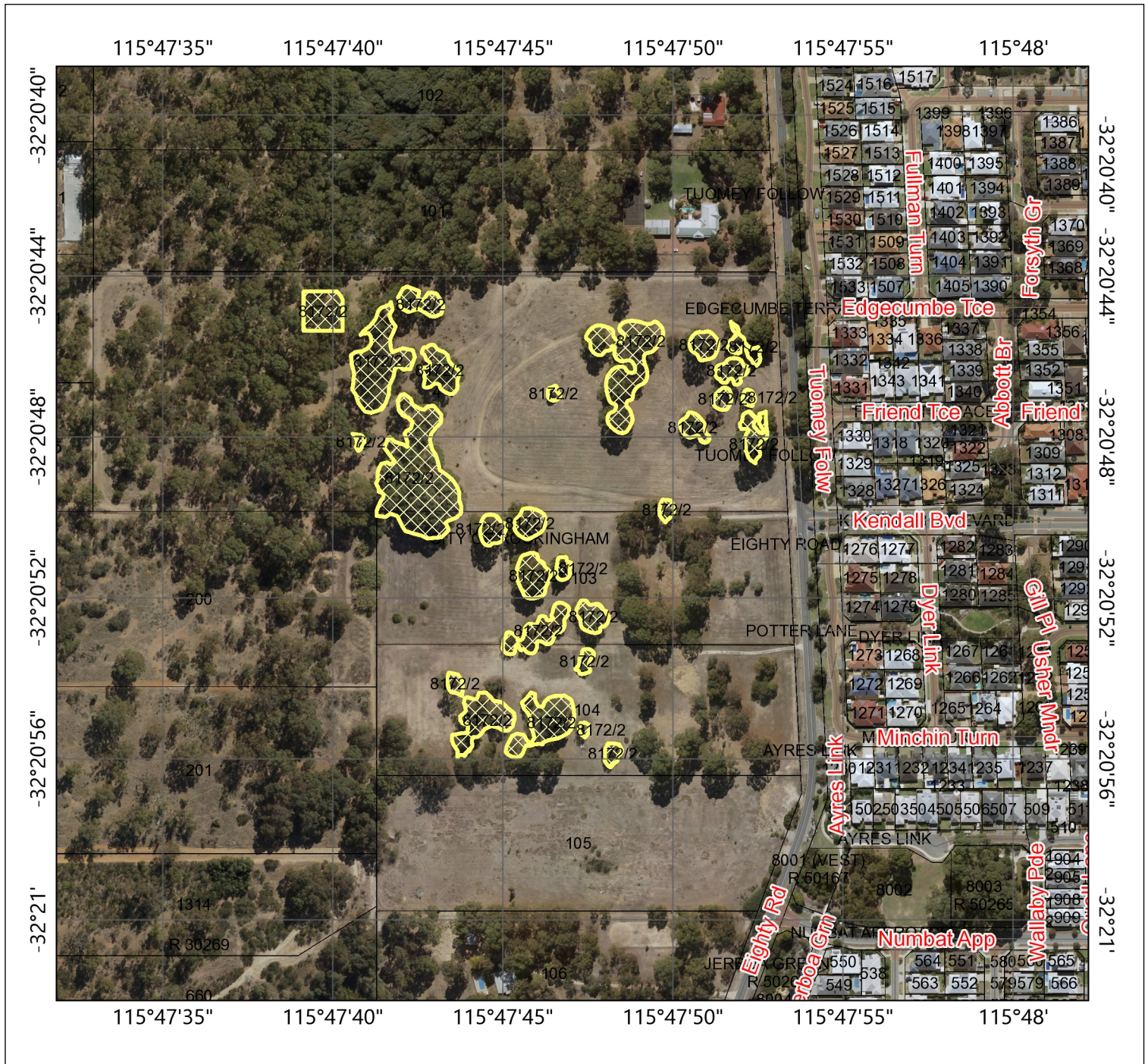
**Other information sheets in the series: Artificial hollows for Carnaby's cockatoo**

- *How to design and place artificial hollows for Carnaby's cockatoo*
- *How to monitor and maintain artificial hollows for Carnaby's cockatoo*

Information sheets available on the *Saving Carnaby's cockatoo* webpage:

<http://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-animals/208-saving-carnaby-s-cockatoo>

# Plan 8172/2a



## Legend

- CPS areas approved to clear
- Local Government Authorities
- LGA
- ROCKINGHAM, CITY OF
- Roads - Minor Roads
- Cadastre (LGATE\_218) - SLIP

0.1      0.07      0.1 Kilometers



WGS\_1984\_Web\_Mercator\_Auxiliary\_Sphere

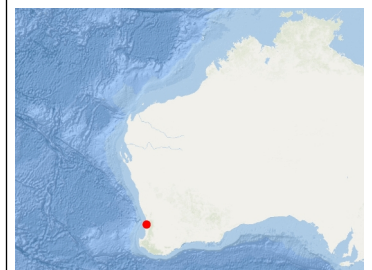
Mathew  
Gannaway  
2019.10.08  
12:02:55  
+08'00'

Officer with delegated authority under Section 20 of the Environmental Protection Act 1986.

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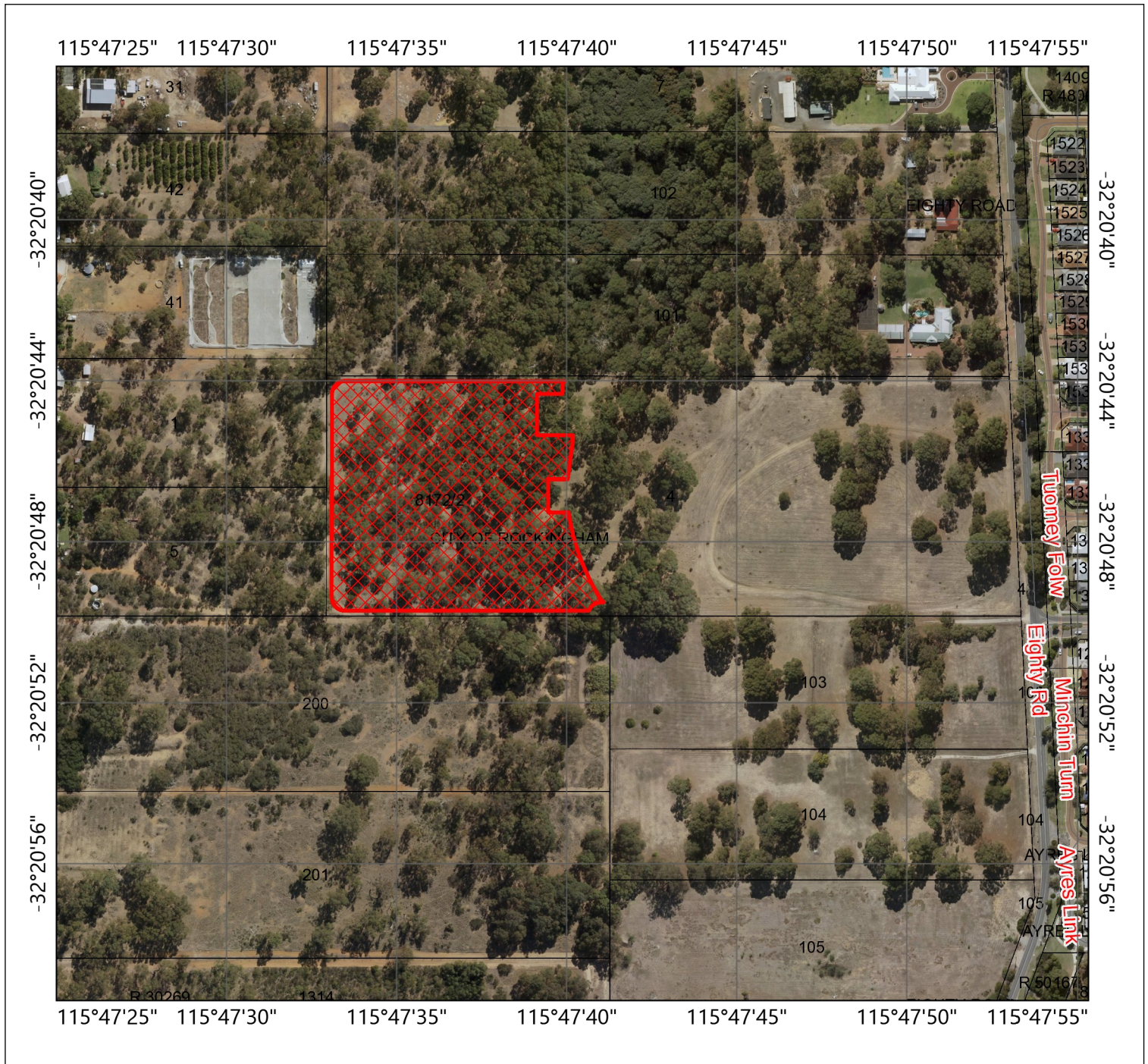
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## Locality Map



Government of Western Australia  
Department of Water and Environmental Regulation

# Plan 8172/2b



## Legend

- ▣ CPS subject to conditions
- Local Government Authorities
- LGA
- ROCKINGHAM, CITY OF
- Roads - Minor Roads
- Cadastre (LGATE\_218) - SLIP

0.1                      0.07                      0.1    Kilometers



WGS\_1984\_Web\_Mercator\_Auxiliary\_Sphere

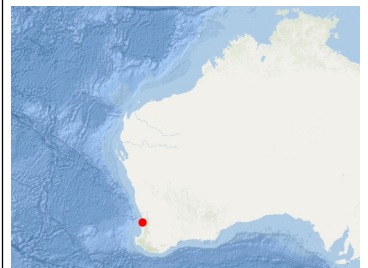
**Mathew Gannaway**  
 2019.10.08  
 12:03:34  
 +08'00'

Officer with delegated authority under Section 20 of the Environmental Protection Act 1986.

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## Locality Map



Government of Western Australia  
 Department of Water and Environmental Regulation



## 1. Application details

### 1.1. Permit application details

Permit application No.: 8172/2  
Permit type: Area Permit

### 1.2. Applicant details

Applicant's name: City of Rockingham  
Application received date: 20 August 2018

### 1.3. Property details

Property: Lot 4 on Diagram 31062, Baldivis  
Lots 103, 104 and 105 on Diagram 50627, Baldivis  
Local Government Authority: City of Rockingham  
Localities: Baldivis

### 1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	Purpose category:
1.85		Mechanical Removal	Public Recreation

### 1.5. Decision on application

Decision on Permit Application: Granted  
Decision Date: 8 October 2019  
Reasons for Decision: This clearing permit amendment gives effect to the determination of the Minister for Environment (Minister) to partly allow appeal 032 of 2019. The Minister has requested the Department of Water and Environmental Regulation amend Clearing Permit CPS 8172/1 to include an additional fauna management condition and include a condition that ensures the area proposed for the installation of artificial nesting hollows is conserved in perpetuity.

## 2. Site Information

**Clearing Description** The application is to clear 1.85 hectares of native vegetation within the above mentioned land parcels for the purpose of developing the future Baldivis District Sporting Complex for public recreation. The proposed Sporting Complex will include four large playing fields, two club rooms, 18 outdoor hard courts, an indoor recreation centre and outdoor youth space (GHD Pty Ltd, 2018).

**Vegetation Description** The application area intersects two mapped Swan Coastal Plain vegetation complexes, described as:

- Herdsmen Complex** : Sedgeland and fringing woodland of *Eucalyptus rudis* (Flooded Gum) - *Melaleuca* species; and
- Karrakatta Complex-Central And South**: Predominantly open forest of *Eucalyptus gomphocephala* (Tuart) - *Eucalyptus marginata* (Jarrah) - *Corymbia calophylla* (Marri) and woodland of *Eucalyptus marginata* (Jarrah) - *Banksia* species. *Agonis flexuosa* (Peppermint) is co-dominant south of the Capel River (Hedde et al., 1980).

The applicant commissioned GHD Pty Ltd to undertake a flora and vegetation survey that identified two vegetation types within the application area, described as:

- Tuart/Jarrah woodland**: *Eucalyptus gomphocephala* (Tuart), *Eucalyptus marginata* (Jarrah) and *Banksia attenuata* woodland over *Macrozamia riedlei* and *Xanthorrhoea gracilis* isolated shrubs over Iridaceae sp. and *Lupinus* spp. open herbland over *Ehrharta calycina*, *Briza maxima* and *Bromus diandrus* grassland (0.825 hectares); and
- Parkland cleared**: Scattered individual trees/shrubs (both native and planted) over introduced grasses and herbs (1.025 hectares) (GHD Pty Ltd, 2018).

**Vegetation Condition** The flora and vegetation survey identified the vegetation within the application area as being in a completely degraded (Keighery, 1994) condition, described on the Keighery scale as 'the structure of the vegetation is no longer intact and the area is completely or almost completely without native species'.

**Soil type** One soil type has been mapped by the Department of Primary Industries and Regional Development (DPIRD) across the application area known as the '**Spearwood S4a Phase**'

subsystem, which is described as flat to gently undulating sandplain with deep, pale and sometimes bleached, sands with yellow-brown subsoils (Schoknecht et al., 2004).



Figure 1: Application Area cross-hatched in blue

### 3. Assessment of application against clearing principles

The clearing permit has been amended to reflect an appeal determination by the Minister for Environment (Minister), which has resulted in a change to the fauna management conditions on the Clearing Permit, and the requirement for the applicant to place a conservation covenant over the area proposed for the installation of artificial nesting hollows.

The assessment against the clearing principles has not changed and can be found in the Clearing Permit Decision Report CPS 8172/1.

### Planning instruments and other relevant matters.

The clearing permit amendment was assessed against planning instruments and other relevant matters. The assessment against planning and other matters has not changed and can be found in the Clearing Permit Decision Report CPS 8172/1.

### 4. References

- GHD Pty Ltd (2018a) City of Rockingham Proposed Baldvis District Sporting Complex Flora and Vegetation Assessment. GHD Pty Ltd, Western Australia (DWER Ref: A1712536).
- Government of Western Australia. (2018). 2017 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of December 2017. WA Department of Biodiversity, Conservation and Attractions.
- Keighery, B.J. (1994) Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc). Nedlands, Western Australia.
- Hedde, E. M., Loneragan, O. W., and Havel, J. J. (1980) Vegetation Complexes of the Darling System, Western Australia. In Department of Conservation and Environment, Atlas of Natural Resources, Darling System, Western Australia.
- Schoknecht, N., Tille, P. and Purdie, B. (2004) Soil-landscape mapping in South-Western Australia – Overview of Methodology and outputs' Resource Management Technical Report No. 280. Department of Agriculture.