



CLEARING PERMIT

Granted under section 51E of the Environmental Protection Act 1986

Purpose Permit number:	CPS 8150/2
Permit Holder:	Shire of Cuballing
Duration of Permit:	12 September 2019 – 12 September 2024

The Permit Holder is authorised to clear native vegetation subject to the following conditions of this Permit.

PART I – CLEARING AUTHORISED

- 1. Purpose for which clearing may be done**
Clearing for the purpose of road widening.
- 2. Land on which clearing is to be done**
Stratherne Road reserve (PIN 11542346), Cuballing
- 3. Area of Clearing**
The Permit Holder must not clear more than 20 native trees within the area hatched yellow on attached Plan 8150/2a.
- 4. Application**
This Permit allows the Permit Holder to authorise persons, including employees, contractors and agents of the Permit Holder, to clear native vegetation for the purposes of this Permit subject to compliance with the conditions of this Permit and approval from the Permit Holder.
- 5. Type of clearing authorised**
This Permit authorises the Permit Holder to clear native vegetation for the activities described in condition 1 of this Permit to the extent that the Permit Holder has the power to carry out works involving clearing for those activities under the *Local Government Act 1995* or any other written law.
- 6. Clearing not authorised**
The Permit Holder must not clear native vegetation beyond 8 meters from the Stratherne Road centreline.

PART II – MANAGEMENT CONDITIONS

- 7. 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.

8. Dieback and weed control

When undertaking any clearing 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.

9. Fauna management – Carnaby’s cockatoo

(a) Prior to undertaking any clearing authorised under this Permit:

- (i) the area shaded green on attached Plan 8150/2b shall be inspected by a *fauna specialist* who shall inspect *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 Carnaby’s cockatoo (*Calyptorhynchus latirostris*).
- (b) Where a *black cockatoo breeding tree(s)* with evidence of current breeding use by Carnaby’s cockatoo is identified and cannot be avoided in accordance with condition 7(a) of this Permit, 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 Carnaby’s cockatoo shall not be cleared whilst it is in use for that breeding season as determined by the *fauna specialist* under condition 9(b) of this Permit.
- (d) Where a *black cockatoo breeding tree(s)* with evidence of past breeding use by Carnaby’s cockatoo is identified and cannot be avoided in accordance with condition 7(a) of this Permit, that tree(s) shall only be cleared:
- (i) outside the *Carnaby’s cockatoo breeding season*; or
 - (ii) later the same day of the inspection required by condition 9(a)(ii) of this Permit; 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 Carnaby’s cockatoo identified, that cannot be avoided in accordance with condition 7(a) of this Permit, the Permit Holder shall install an artificial black cockatoo nest hollow.
- (f) Each artificial black cockatoo nest hollow required by condition 9(e) of this Permit must be installed prior to commencement of the next *Carnaby’s cockatoo breeding season* following clearing of the related *black cockatoo breeding tree*.
- (g) The artificial black cockatoo nest hollow(s) required by condition 9(e) of this Permit must:
- (i) be installed within the area hatched red on attached Plan 8150/2c being the Stratherne Road reserve (PINs 11542351, 11542344 and 11542346), Cuballing;
 - (ii) be designed and placed in accordance with the guidelines provided in Schedule 1 to this Permit; and
 - (iii) be monitored and maintained in accordance with the guidelines provided in Schedule 2 to this Permit, for a period of at least ten years.

10. Fauna management – red-tailed phascogale

(a) Prior to undertaking any clearing authorised under this Permit:

- (i) the area shaded yellow on attached Plan 8150/2b shall be inspected by a *fauna specialist* who shall identify *red-tailed phascogale habitat trees*; and

- (ii) each *red-tailed phascogale habitat tree* identified shall be inspected by a *fauna specialist* for evidence of use by red-tailed phascogale (*Phascogale calura*).
- (b) Where a *red-tailed phascogale habitat tree(s)* occupied by red-tailed phascogale is identified and cannot be avoided in accordance with condition 7(a) of this Permit, that tree(s) shall only be cleared:
 - (i) immediately after a repeat inspection undertaken by a *fauna specialist* if that inspection confirms it is not occupied by red-tailed phascogale.
- (c) Where a *red-tailed phascogale habitat tree(s)* with evidence of use (but not occupied) by red-tailed phascogale is identified and cannot be avoided in accordance with condition 7(a) of this Permit, that tree(s) shall only be cleared:
 - (ii) immediately after the inspection; or
 - (iii) immediately after a repeat inspection undertaken by a *fauna specialist* if that inspection confirms it is not occupied by red-tailed phascogale.
- (d) For each *red-tailed phascogale habitat tree*, that cannot be avoided in accordance with condition 10(b) and 10(c) of this Permit, the Permit Holder shall install a nest box.
- (e) The nest boxes (s) required by condition 10(d) of this Permit must:
 - (iv) be installed within the area hatched red on attached Plan 8150/2c being the Stratherne Road reserve (PINs 11542351, 11542344 and 11542346), Cuballing; and
 - (v) be designed and placed in accordance with the guidelines provided in Schedule 3 to this Permit.

11. Offset – Lot 434 on Deposited Plan 84296 (being Crown Reserve 2556)

- (a) By 12 September 2020, the Permit Holder shall provide to the *CEO* a copy of the executed change in purpose of the area hatched red on attached Plan 8150/2d within Lot 434 on Deposited Plan 84296 (being Crown Reserve 2556) from ‘Gravel’ to ‘Conservation’.
- (b) In the event that the change in purpose of Lot 434 on Deposited Plan 84296 (being Crown Reserve 2556) is not achieved in accordance with condition 11(a):
 - (i) the Permit Holder must submit a new offset proposal for the *CEO*’s approval by 17 October 2020; and
 - (ii) in preparing an offset proposal in accordance with condition 11(b)(i), the Permit Holder must comply with the principles in the Government of Western Australia’s *WA Environmental Offsets Policy* (September 2011) and have regard to the *WA Environmental Offsets Guidelines* (August 2014).

PART III – RECORD KEEPING AND REPORTING

12. Record keeping

The Permit Holder must maintain the following records for activities done 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 or decimal degrees;
 - (ii) the date(s) that the area was cleared;
 - (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 7 of this Permit;
 - (v) actions taken to minimise the risk of the introduction and spread of *weeds* and *dieback* in accordance with condition 8 of this Permit;
 - (vi) actions taken in accordance with condition 9 of this Permit; and
 - (vii) actions taken in accordance with condition 10 of this Permit.

13. Reporting

- (a) At least 48 hours prior to commencing clearing authorised under this Permit, the Permit Holder shall advise the *CEO* in writing of the date that clearing is scheduled to commence.

- (b) On or before 30 June of each year following the commencement of clearing authorised under this Permit, the Permit Holder must provide to the *CEO* a written report of records required under condition 12 of this Permit.
- (c) The Permit Holder must produce the records required under condition 12 of this Permit when required by the *CEO*.

DEFINITIONS

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

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

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 *Eucalyptus salmonophloia* or *Eucalyptus wandoo*) that contain hollows suitable for breeding by Carnaby's cockatoo (*Calyptorhynchus latirostris*);

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

fauna specialist: means a person who holds a tertiary qualification specializing in environmental science or equivalent, and has a minimum of 2 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;


habitat tree(s): means trees that have a diameter, measured at 1.5 metres from the base of the tree, of 50 centimetres or greater.

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;

red-tailed phascogale habitat tree(s) means a tree of the *Eucalyptus* genus that contains a hollow(s) suitable to be used by red-tailed phascogale (*Phascogale calura*).

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 species-led ecological impact and invasiveness ranking summary, regardless of ranking; or
- (c) not indigenous to the area concerned.



Mathew Gannaway
SENIOR MANAGER
NATIVE VEGETATION REGULATION

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

19 March 2020

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.

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

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.

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

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.

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.

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).

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.

Observing parent behaviour around the hollow

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

Parent behaviour	Approximate age/stage of young
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)

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).

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.

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.

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.

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.

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.

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.

Monitoring of artificial hollows:

Monitoring aim	Frequency of visits	Monitoring techniques
To determine possible use by Carnaby's cockatoo	At least once during peak breeding season (i.e. between September and December)	<ul style="list-style-type: none"> • Observing behaviour of adults around hollow • Tapping to see if female will flush from hollow (best undertaken between 10am and 3pm when females most likely to be sitting) • Listening for nestlings • Looking for evidence of chewing • Looking inside nest
To confirm use by Carnaby's cockatoo	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"> • Breeding behaviour of adults around hollow or evidence of chewing • Female flushed from hollow • Noises from nestlings in hollow <p>Or to observe:</p> <ul style="list-style-type: none"> • Nestlings or eggs in nest
To determine nesting success by Carnaby's cockatoo	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"> • Looking inside nest to observe eggs or nestlings.
To determine use by any species	As often as possible.	<ul style="list-style-type: none"> • Inspection from ground as a minimum. • Looking inside nest for detailed observations.
To determine maintenance requirements	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"> • 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

Acknowledgements

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Schedule 3

Nest Boxes for Red-tailed Phascogales

Nest Boxes for Red-tailed Phascogales

The red-tailed phascogale (*Phascogale calura*), also known as Kengoor, is Specially Protected under Western Australia's State legislation as Conservation Dependent. This means that the species requires ongoing conservation intervention to prevent them from becoming a threatened species again.

The species was once known from much of arid and semi-arid Australia but is now only found in remnant vegetation in the southern Wheatbelt. One of the current threats to the species is nest hollow shortages due to habitat loss and degradation from land clearing and fire, and competition with native and pest birds and feral European honey bees.

Nest boxes can be used to help conserve red-tailed phascogales by enabling them to breed in areas where natural hollows are limited. This information sheet provides advice on how to select an appropriate site, broad guidelines on how to design and place a nest box, and general advice on how to maintain and monitor nest boxes.

It is important to remember that the retention of both old and dead trees that have suitable hollows for red-tail phascogales is important for breeding and hence the long-term survival of the species. The installation of nest boxes should not be used to justify the removal of natural hollow-bearing trees.

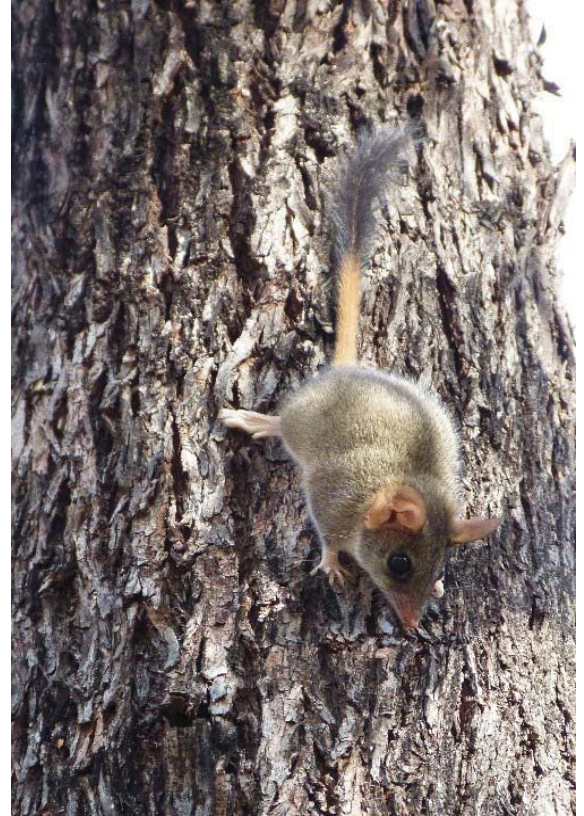


Photo: Meredith Spencer/Bush Heritage Australia

When to Use Nest Boxes

Nest boxes may be useful at sites where natural hollows are limited, such as where existing hollows are degrading and not being replaced quickly enough due to lack of tree regeneration. However, red-tailed phascogales don't always use nest boxes when provided. There are ways to select sites for nest boxes that will increase the chance that they will be used by red-tailed phascogales.

Where and when do red-tailed phascogales nest?

Red-tailed phascogales are largely found in old-growth woodlands, predominantly dominated by Wandoo and York Gum and associated with Red Sheoak. Red-tailed phascogales have a preference for habitats that contain numerous tree hollows, have semi-continuous canopy and are long unburnt. Red-tailed phascogales are known to nest in hollow logs, tree hollows, and the skirts and stumps of Grass Trees.

Phascogales use nesting hollows all year round for sleeping during the day as they are a nocturnal species that is active during the night. They may use several hollows within their home range. Mating occurs during a three-week period in July, and young are born 28-30 days later. The young remain dependent on the mother from August to October.

Is my site suitable for nest boxes?

It is recommended that nest boxes be used in known nesting areas where there has been a decrease in the availability of natural nesting hollows. To decide if your site is suitable for nest boxes you need to consider the following criteria (Table 1). Protecting habitat, revegetating and controlling competitive pest species are alternative conservation actions that can also be used to complement the placement of artificial hollows.

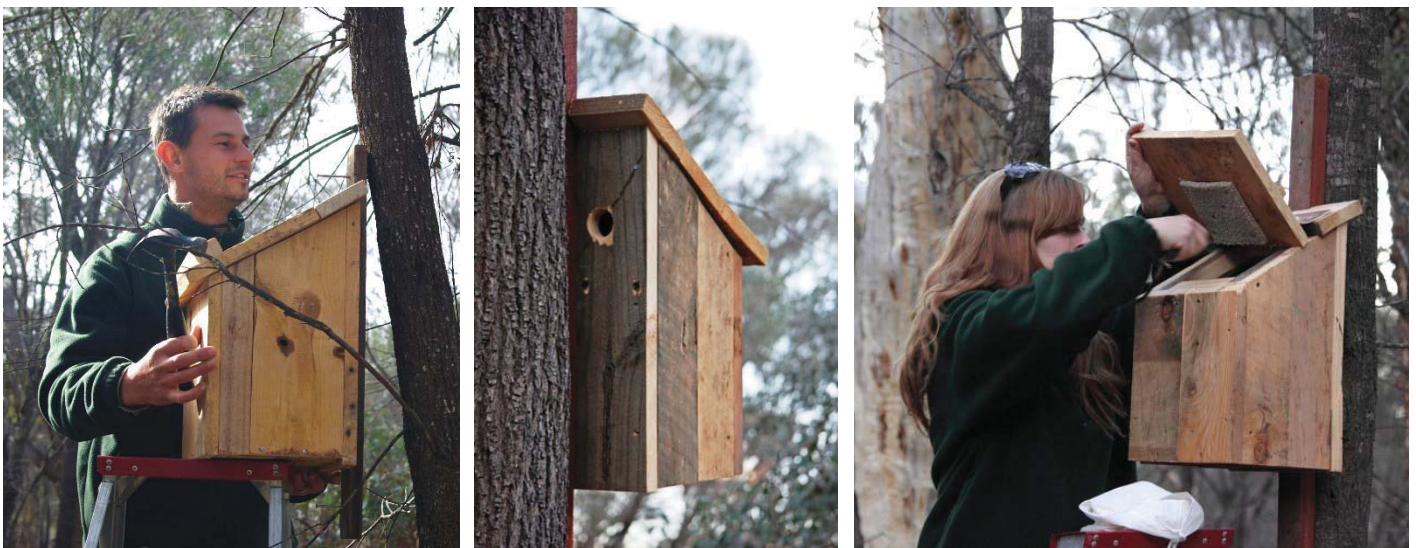
Table 1: Criteria to determine if a site is suitable for the placement of nest boxes

1.	The site contains suitable habitat within the known breeding range of the species	
	<i>Important consideration</i>	Red-tailed phascogales generally nest in woodlands dominated by Wandoo and York Gum and associated with Red Sheoak. The species is currently only known to persist in the southern Wheatbelt.
2.	The site is in an area where it is suspected or known that there is a lack of available tree hollows preventing breeding that would otherwise occur, due to the loss of suitable hollow-bearing trees (either through clearing or natural die-off).	
	<i>Important consideration</i>	Indirect evidence that may indicate a lack of available tree hollows includes sightings of red-tailed phascogales within rural buildings.
3.	The hollows are placed in secure locations and the owner/manager of these areas is supportive and willing to provide the necessary long-term security and annual maintenance for the entire time that the artificial hollow will be in place.	
	<i>Important consideration</i>	For advice on the monitoring and maintenance requirements, please refer to the section on how to monitor and maintain nest boxes.
4.	A suitable artificial hollow design is used.	
	<i>Important consideration</i>	For greatest chance of success, please refer to the section on how to design and place nest boxes

How to Design and Place Nest Boxes

There are various designs for nest boxes available but it best to tailor the design of the nest box to the specific nesting requirements of the red-tailed phascogale. This will encourage red-tailed phascogales to use the nest box while discouraging other species.

It is recommended that multiple nest boxes are placed at 50 m intervals around a site as red-tailed phascogales are known to regularly move between several nesting hollows.



Nest boxes being attached with nails (left), with a rear entrance hole (centre), and with a hinged lid and carpet (right).
 Photo: Angela Sanders/Bush Heritage Australia (left), DBCA (centre and right)

Nest box design

With any nest box design for red-tailed phascogales, it is important to ensure that it fits the following general specifications (Table 2). A diagram is also provided of a recommended design by Bush Heritage Australia, which they have successfully used to monitor red-tailed phascogales in Kojonup.

Table 2: General specifications for red-tailed phascogale nest boxes

Component	Specification
Material	Rough-sawn untreated Jarrah or other native Australian hard woods with > 15mm thickness ensures that it is durable enough to last > 5 years and provides adequate thermal insulation. Softwoods, like marine ply, can be used as long as they are not treated with toxic preserving chemicals like copper or arsenic. <u>DO NOT USE</u> : treated timber, chipboard, pine, interior ply, any materials under 15 mm thickness, toxic/smelly paint.
Joinery	Long, galvanised screws or nails. Make sure that there are no projecting nails or screws. Non-toxic waterproof glue can also be used. <u>DO NOT USE</u> : Toxic/smelly glues
Entrance hole	Rear entrance hole with a diameter of 30 - 40 mm
Cavity	Cavity size approximately 20 - 30 mm x 20 - 30 mm x 20 - 30 mm. Weatherproof and dark. Toe holds on inside walls enabling animals to climb out (i.e. walls should be made from rough-sawn timber or notched with a circular saw)
Base	Recessed inside walls. Three small (<10 mm) drainage holes.
Lid	Hinged lid to allow for inspection but well-secured to prevent brush-tailed possums from gaining access. A piece of carpet or perspex glued to the inside of the lid to discourage bees. Sloped from the back and overhanging the front and side by 25 mm for weather protection.
Nesting material	Weathered wood chips, shredded Jarrah bark or Paperbark, and/or untreated sheep's wool. Filled to cover the base of the internal cavity.

Mounting and placement

It is important that nest boxes are placed where they will be accessible for future monitoring and maintenance, but preferably not conspicuous to the general public.

Nest boxes should be mounted on rough-barked trees, preferably Wandoo, York Gum or Red Sheoak, with a diameter of ≥ 30 cm. DO NOT place nest boxes on trees that have existing hollows.

Nest boxes should be mounted so that that it is vertical and securely fastened to a tree at a height of 3 - 5 m above ground level. Red-tailed phascogales show no preference for aspect of nest boxes, but they should preferably be positioned to provide shelter from prevailing weather, particularly from sun and rain.

The best way to secure a nest box to a tree is by using two to four long galvanised screws or nails and securing it directly into the tree. One or two of the screws/nails should be through the pre-drilled holes at the back of the box.

Safety

Care needs to be taken when placing nest boxes to ensure human safety is considered at all times. Nest boxes are heavy and require lifting and manoeuvring into position.

How to Monitor and Maintain Nest Boxes

It is important to monitor and maintain nest boxes after they have been erected to:

- determine if the nest box is being used by red-tailed phascogales or other species (native or pest),
- determine the effectiveness of the design and placement of the nest box,
- identify any problems with pest species or maintenance requirements, and
- resolve any problems to ensure the nest box continues to be useful for nesting by red-tailed phascogale.

It is important to continue a regime of regular maintenance while the nest box is required.



Red-tailed phascogales inside a nest box.
Photo: Angela Sanders/Bush Heritage Australia

How do I monitor nest boxes?

Before undertaking monitoring of nest boxes for red-tailed phascogales, it is recommended that you seek advice from the Department of Biodiversity, Conservation and Attractions. It is also important to contact the Department's Wildlife Licensing Section to determine if a licence to disturb fauna is required (wildlifelicensing@dbca.wa.gov.au).

Monitoring nest boxes requires keen observation and naturalist skills. It is often not possible to observe direct evidence of use and therefore inferences must be made based on other observations. There are a variety of techniques available to monitor nest boxes, and a combination of several is likely to achieve the best results (Table 3).

Keep in mind that it is important to limit disturbance to any animals using the nest box, particularly during the breeding season. Animals should not be physically disturbed or handled.

When monitoring a nest box, always ensure that it is done as quickly and quietly as possible to avoid disturbing any animals that may be using it. Phascogales are nocturnal animals and therefore it is best to monitor them near sunrise or sunset. Therefore, if a phascogale is disturbed during the monitoring and leaves the nest box, the sun is not too bright, and it is not too hot.

Nest boxes can be left for long-periods of time without checking but ideally should be monitored once a year during the early mating season (July).

The information collected from the monitoring should be written down and reported. There are standard fauna report forms available on the Department's website (<https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-animals>) that can be used to record the details of your sighting.

Alternatively, if you are frequently monitoring a larger number of nest boxes, you can put the details into a spreadsheet. Records should be submitted to the Department by emailing fauna@dbca.wa.gov.au. The Department will put the records into the Threatened and Priority Fauna Database and it will be used to inform conservation and management decisions.

Any other opportunistic sightings of Threatened and Priority species are always appreciated and can also be reported via the same email.

Important information to record includes: observer's name and contact details, date and time, location, fauna species, description of the animal or a photo, vegetation description, and observation description (i.e. details about nest box monitoring, signs of use, animal behaviour etc.).

Table 3: Techniques for monitoring nest boxes

Technique	Description of Technique
Observation from the ground – looking for signs of use outside the nest box	<p>Look for signs of recent use from the outside, particularly noting any chew or scratch marks, and any discolouration around the entrance hole(s).</p> <p>Cobwebs covering the entrances will indicate that the nest box has not been used recently.</p> <p>A light piece of string nailed over the entrance hole is a useful way to determine if an animal is inside the nest box because animals entering the box will push the end of the string in with them.</p>
Observation from the ground – observing insect activity outside the nest box	<p>Faecal matter produced by animals attracts insects, especially flies and ants.</p> <p>Blowflies around a nest usually indicates that a death has occurred.</p>
Observation from the ground – stag watching	<p>Stag watching is when you watch the nest box for a certain period of time to see if any animals exit the nest box. The following methodology is recommended:</p> <ul style="list-style-type: none"> • Choose a place to sit within 2 -5 m of the nest box and within sight of its entrance holes • Sit quietly from at least 10 minutes before dusk until at least 30 minutes after sunset. • When movement is observed, see if you can identify the animal in any natural light available by observing its shape and size. If this is not possible, use a torch to illuminate the animal to see its distinguishing features. • Take notes of the important information (see above).
Observation via a camera – telescopic camera	<p>To avoid disturbing any animals that may be using the next box, look inside the nest via the entrance holes with the aid of a telescopic pole and camera or mirror.</p>
Observation via a camera (long-term monitoring) – remote camera	<p>Cameras can be installed in or nearby a nest box to watch remotely to see if the nest box is used. This technique allows for monitoring/information to be gathered throughout the year, including throughout the breeding season.</p> <p>When installing a camera nearby a nest box, make sure it is in sight of the entrance holes at the rear of the nest box. If you are installing a camera inside the nest box, make sure it is prepared before the nest box is mounted to a tree so that the camera can easily be turned on and off without disturbing any animals inside the nest box.</p> <p>There are various types of nest-box camera kits with infra-red lights that can be used.</p>
Observation via a ladder – looking for signs of use inside the nest box	<p>If the nest box appears to be empty (confirmed by the use of a camera), quietly approach the nest box using a ladder and open the hinged lid slowly.</p> <p>If there is an animal in the nest box, quietly close the lid and leave the area as quietly as possible to reduce any further disturbance.</p> <p>If there are no animals in the nest box, the inside of the nest box can be checked for signs of use, particularly noting any feathers, fresh or old scats, scratch marks, discolouration, and new or disturbed nesting material.</p> <p><u>DO NOT</u> approach the nest box if there are bees present. Research has found that bees will move out by themselves and so won't have a long-term impact on nest box use, particularly if you have several nest boxes at your site.</p> <p>Watch out for spiders, ants and other insects that may be using the nest box and can inflict stings or bites when disturbed.</p>

How do I maintain nest boxes?

Nest boxes can be left for long periods of time, but they may still require maintenance to ensure they continue to have the greatest chance of being used by red-tailed phascogale. Therefore, it is best to make periodic maintenance checks at least every two years. Maintenance checks can be undertaken while monitoring, but it is preferable that they are undertaken prior to the breeding season so that any problems identified can be addressed before breeding occurs. If breeding is occurring, maintenance should be delayed if it is likely to disturb the animals. 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.

At a minimum, maintenance checks should assess the following:

- Condition of attachment points,
- Stability of tree or pole used to mount the nest box,
- Presence of black rats,
- Presence of feral bees,
- Presence of dead animals,
- Condition of nest box, particularly the base, and
- Condition of nesting material.

Likely maintenance includes:

- Control of black rats using rat traps (weekly if black rats are present);
- Control of feral bees with the help of an apiarist (only if bees become an issue);
- Adjustment of nest box placement (only if rains entering or excessive heat in the summer is an issue);
- Replacement of nest box due to deterioration (rarely for hard woods, occasionally for soft woods); and

Replacement of wet and mouldy nesting material (rarely if using hard woods with holes drilled into the base).

Further Reading

Bush Heritage Australia's species webpage: [Red-tailed Phascogales](#)

Acknowledgements

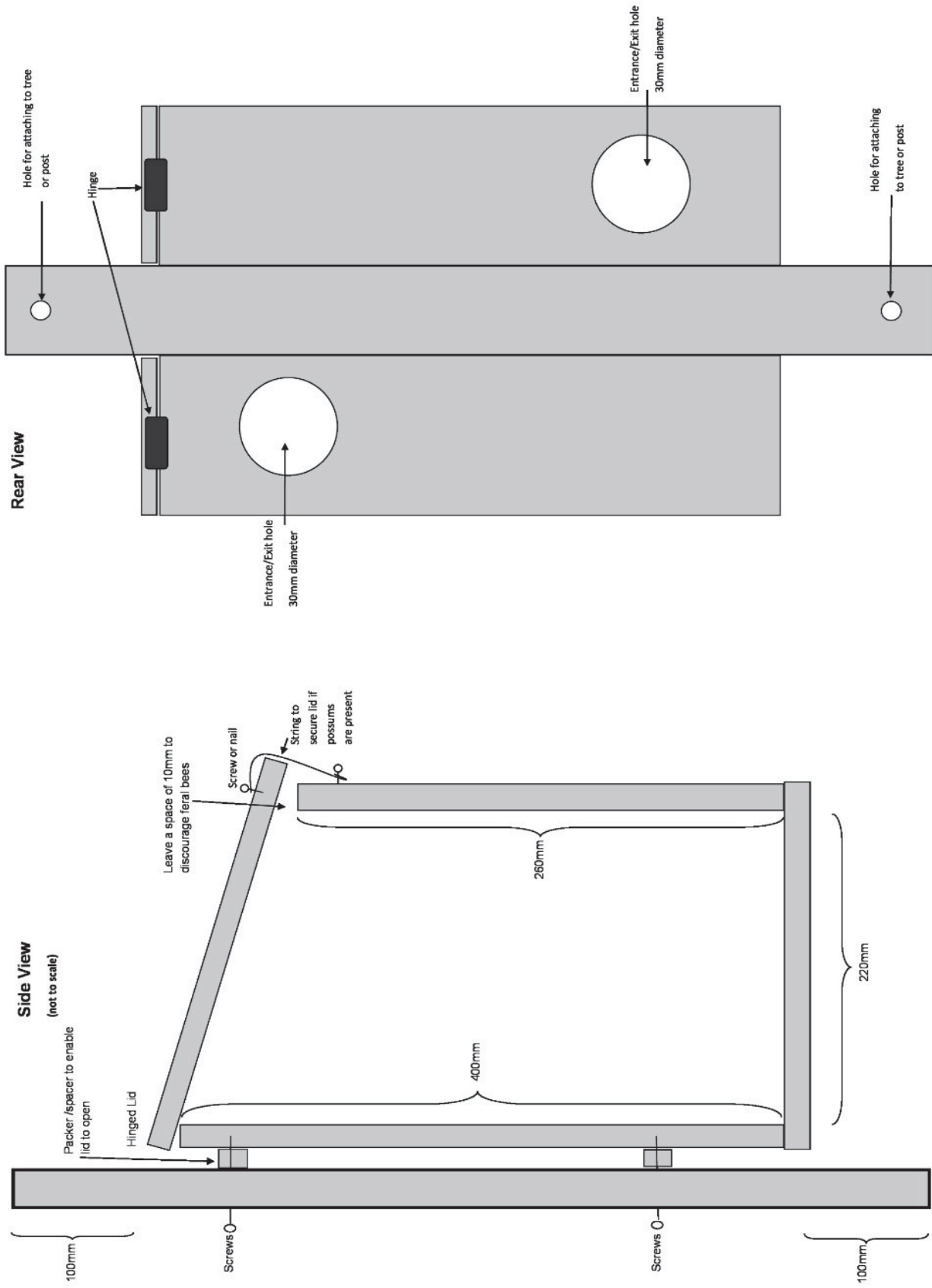
This information sheet was developed with contributions on monitoring methods and nest box design from Bush Heritage Australia.

Citation

Department of Biodiversity, Conservation and Attractions. (2018). *Fauna Notes – Nest Boxes for Red-tailed Phascogales* Retrieved from <http://www.dbca.wa.gov.au/>

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Side view (left) and rear view (right) of a red-tailed phascogale nest box design. Image: Bush Heritage Australia

Plan 8150/2a

117°12'18.000"E

117°12'36.000"E

117°12'54.000"E

32°46'48.000"S

32°47'6.000"S

32°46'48.000"S

32°47'6.000"S





117°12'18.000"E

117°12'36.000"E

117°12'54.000"E

Legend

CPS layers

-  CPS areas approved to clear
-  Cadastre - LGATE 218

Local Government Authority (LGA) Boundaries (LGATE-233)

0 0.1 0.2 0.3 0.4 km



Mathew

Gannaway

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Environmental Protection Act 1986

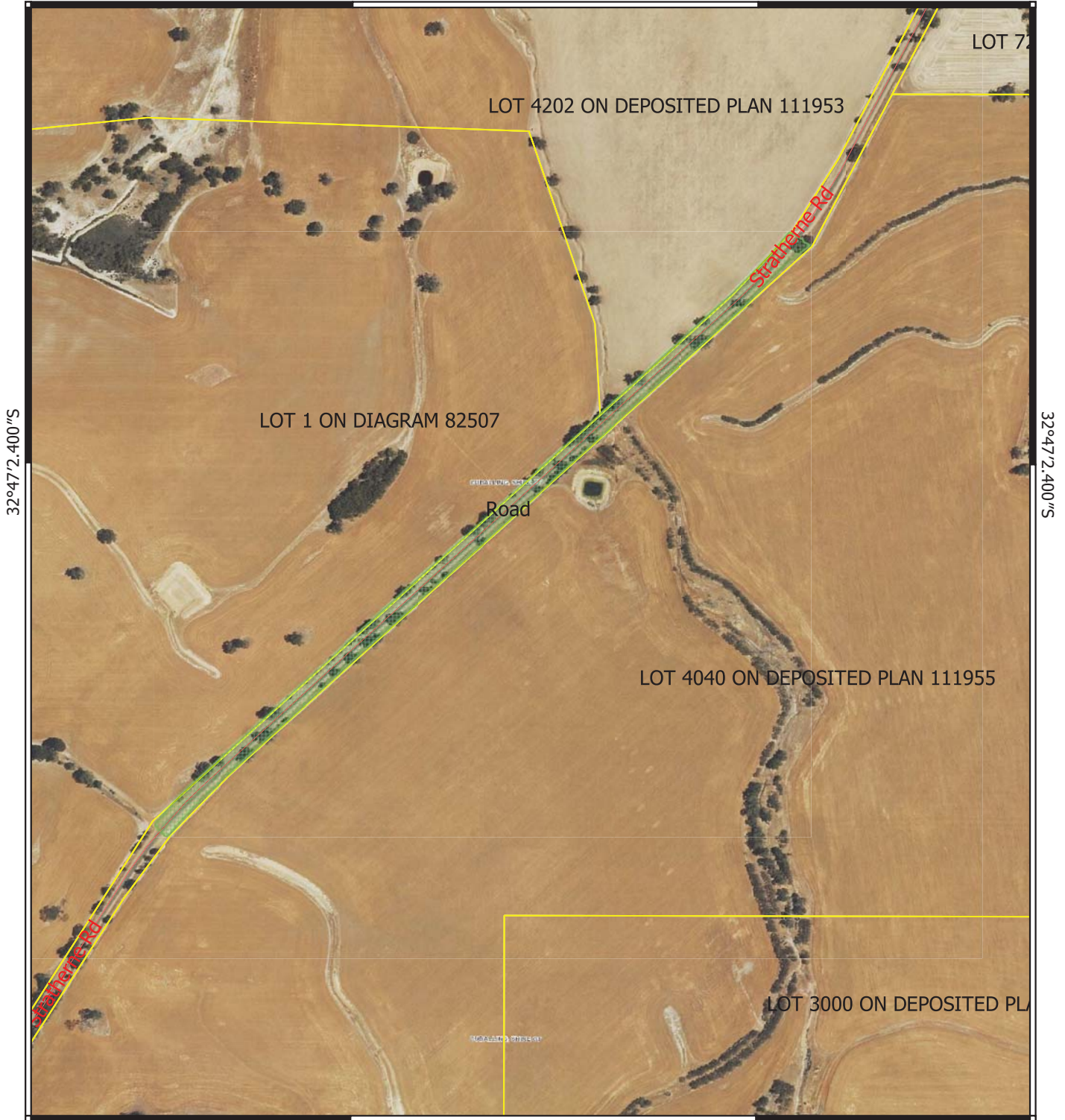


GOVERNMENT OF
WESTERN AUSTRALIA

Plan 8150/2b



117°12'36.000"E

117°12'54.000"E



Legend

CPS layers

-  Area subject to conditions
-  Cadastre - LGATE 218

base layers

-  Road Centrelines

Local Government Authority (LGA) Boundaries (LGATE-233)

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Environmental Protection Act 1986



GOVERNMENT OF
WESTERN AUSTRALIA

Plan 8150/2c

117°10'48.000"E 117°11'20.400"E 117°11'52.800"E 117°12'25.200"E 117°12'57.600"E 117°13'30.000"E

32°45'36.000"S
32°46'00.000"S
32°46'24.000"S
32°46'48.000"S
32°47'12.000"S
32°47'36.000"S
32°48'00.000"S

32°45'36.000"S
32°46'00.000"S
32°46'24.000"S
32°46'48.000"S
32°47'12.000"S
32°47'36.000"S
32°48'00.000"S



117°10'48.000"E 117°11'20.400"E 117°11'52.800"E 117°12'25.200"E 117°12'57.600"E 117°13'30.000"E

Legend

 Areas subject to conditions

Local Government Authority (LGA) Boundaries (LGATE-233)



0 0.5 1 km



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Environmental Protection Act 1986



GOVERNMENT OF
WESTERN AUSTRALIA

Plan 8150/2d

117°20'6.000"E

117°20'7.800"E

117°20'9.600"E

117°20'11.400"E

32°39'52.200"S

32°39'54.000"S

32°39'55.800"S

32°39'57.600"S

32°39'52.200"S

32°39'54.000"S

32°39'55.800"S

32°39'57.600"S

117°20'6.000"E

117°20'7.800"E

117°20'9.600"E



117°20'11.400"E

LOT 434 ON DEPOSITED PLAN 84296

LOT 1

Legend

CPS layers

-  CPS subject to conditions
-  Cadastre - LGATE 218

Local Government Authority (LGA) Boundaries (LGATE-233)

0 10 20 30 40 m



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Environmental Protection Act 1986



GOVERNMENT OF
WESTERN AUSTRALIA



1. Application details

1.1. Permit application details

Permit application No.: 8150/2
Permit type: Purpose Permit

1.2. Applicant details

Applicant's name: Shire of Cuballing
Application received date: 27 February 2020

1.3. Property details

Property: Stratherne Road reserve (PIN 11542346)
Local Government Authority: Shire of Cuballing
Localities: Cuballing

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	Purpose category:
	20	Mechanical Removal	Road construction or upgrades

1.5. Decision on application

Decision on Permit Application: Granted

Decision Date: 19 March 2020

Reasons for Decision:

On 19 August 2019, Clearing Permit CPS 8150/1 was granted to clear 20 trees for the purpose of road widening within Stratherne Road reserve (PIN 115423456). One appeal was lodged against the grant of this permit.

This clearing permit amendment gives effect to the determination of the Minister for Environment (Minister) to allow the appeal (Appeal Number: 046 of 2019). The Minister has requested the Department of Water and Environmental Regulation (DWER) to:

- More clearly exclude the majority of hollow-bearing trees from the scope of the approval by limiting clearing to within 8 metres of either side of the road centreline;
- Require the Shire to inspect any potential habitat trees for Carnaby's cockatoos, red-tailed phascogales or other threatened fauna immediately prior to clearing, delay clearing of any trees found to be occupied by these species until no longer in use, and install artificial nesting boxes to replace any confirmed habitat trees required to be cleared; and
- Require the Shire to keep records on efforts in relation to the implementation of these fauna management conditions, and report to the Department as required.

Given the above, the Delegated Officer decided to grant a clearing permit to reflect the Ministers determination.

2. Site Information

Clearing Description

The application is to clear 20 native trees within Stratherne Road reserve (PIN 11542346), Cuballing, for the purpose of road widening.

Vegetation Description

The application area is mapped as the 'Avon Wheatbelt' region of the Interim Biogeographic Regionalisation for Australia (IBRA), and is mapped as the following Beard vegetation association:

- 1023, described as Medium woodland; York gum (*Eucalyptus loxophleba*), wandoo (*Eucalyptus wandoo*) and salmon gum (*Eucalyptus salmonophloia*) (Shepherd et al., 2001).

A site inspection of the application area was conducted by Department of Water and Environmental Regulation (DWER) on 10 September 2018. The site inspection identified that vegetation within the application predominantly comprises *Eucalyptus wandoo* over introduced grasses with occasional *Allocasuarina* spp. and native shrubs. Several planted *Callistemon* and *Eucalyptus* species were observed on the northern side of the road.

Reconnaissance and Targeted Flora and Vegetation survey undertaken in May 2019 by Ecoedge identified two vegetation units within the application area:

- Woodland of *Eucalyptus wandoo* and *Allocasuarina huegeliana* over tall open shrubland of *Acacia acuminata* over grassland of *Avena fatua* and *Bromus diandrus* and open herbland of *Dianella revoluta*, *Dittrichia graveolens*, *Hypochaeris glabra* and *Solanum nigrum* on grey-brown sandy loam; and

- Scattered trees of *Eucalyptus wandoo* and *Allocasuarina huegeliana* over mainly introduced annual species of herbs and grasses on yellow-brown sandy loam.

Vegetation Condition

The condition of the vegetation within the application area is considered to be:

- Degraded: Structure severely disturbed; regeneration to good condition requires intensive management (Keighery, 1994); to
- Completely degraded: No longer intact, completely/almost completely without native species (Keighery, 1994).

The condition of the vegetation was determined based on the DWER site inspection (DWER, 2018). Flora survey undertaken by Ecoedge (2019) classified all of the remnant vegetation as completely degraded (Keighery, 1994), with much of the road verge in the application area being previously cleared in the past, especially on the north side of the road.

Soil type

The application area is mapped as the following land subsystems:

- Noombling Subsystem (Dryandra), which is mapped across approximately 87 per cent of the application area, and is described as Long gentle and undulating hillslopes and divides. Colluvium / weathered granite, gneiss and some dolerite. Yellow/brown and grey deep sandy duplexes, brown deep loamy duplexes, sandy gravels and shallow duplexes. Marri-Wandoo / Jam-Sheoak (Department of Primary Industries and Regional Development (DPIRD), 2019); and
- Popanyinning Subsystem (Pumphreys), which is mapped across approximately 13 per cent of the application area, and is described as Broad valley floor; yellow duplex soils and a narrow lower sandy terrace, spodic sand dunes (DPIRD, 2019).

Comments

The local area is considered a 10 kilometre radius of the application area.

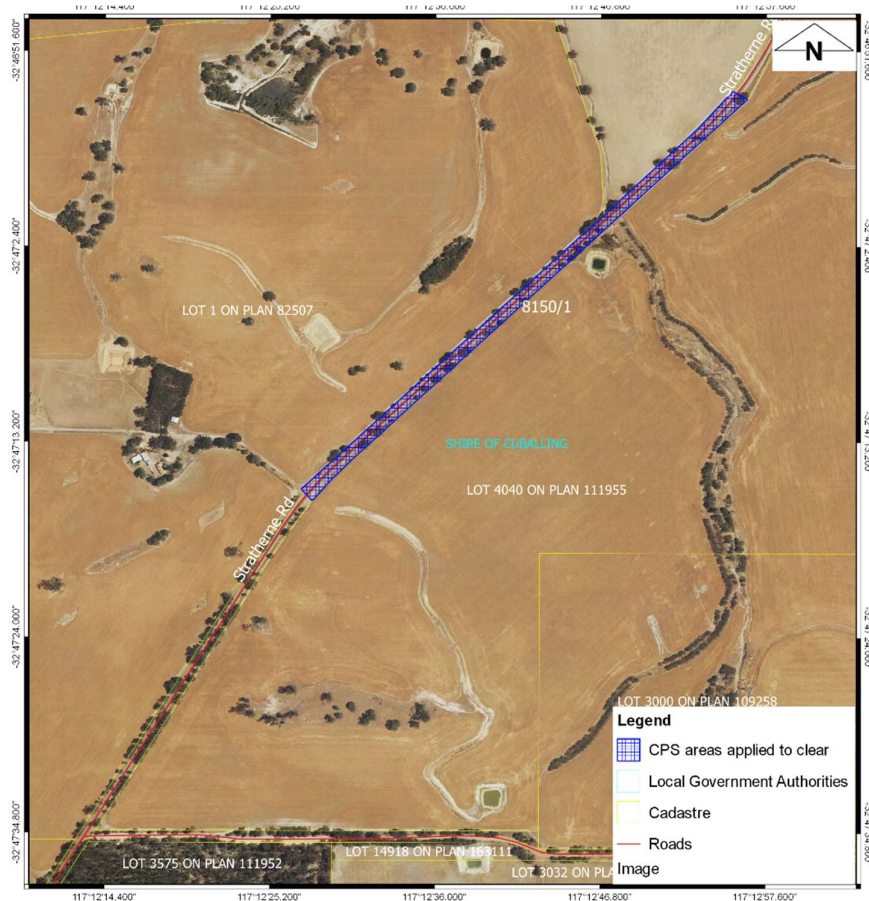


Figure 1 Application area cross hatched blue



Figure 2 Eastern end of the application area (DWER, 2019)



Figure 3 Western end of the application area (DWER, 2019)

3. Assessment of application against clearing principles, planning instruments and other matters

This amendment is the result of an appeal determination made by the Minister for Environment regarding the conditions of Clearing Permit CPS 8150/2.

The assessment against the clearing principles outlined in Schedule 5 of the *Environmental Protection Act 1986* is unchanged and can be found in the Decision Report prepared for Clearing Permit CPS 8150/1.

The Minister determined that the proposed clearing is at variance with clearing principle (b) from the evidence presented in the Report to the Minister for Environment prepared by the Appeals Convenor (Office of the Appeals Convenor, 2019).

Planning instruments and other relevant matters.

The assessment against planning instruments and other matters is unchanged and can be found in the Decision Report prepared for Clearing Permit CPS 8150/1.

4. References

- Department of Primary Industries and Regional Development (DPIRD) (2019). NRInfo Digital Mapping. Department of Primary Industries and Regional Development. Government of Western Australia. URL: <https://maps.agric.wa.gov.au/nrm-info/> (accessed 13 May 2019).
- Department of Water and Environmental Regulation (DWER) (2018) Site Inspection Report for CPS 8150/1. Department of Water and Environmental Regulation. Western Australia (DWER ref. A1724348).
- Ecoedge (2019). Reconnaissance and Targeted Flora and Vegetation Survey, Stratherne Road, Cuballing. DWER Ref: A1877608
- Keighery, B.J. (1994) Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc). Nedlands, Western Australia.
- Shepherd, D.P., Beeston, G.R. and Hopkins, A.J.M. (2001) Native Vegetation in Western Australia, Extent, Type and Status. Resource Management Technical Report 249. Department of Agriculture, Western Australia.
- Shire of Cuballing. (2018). Application for a clearing permit (purpose permit) form. Application form in relation to CPS 8150/1. DWER Ref: A1706295.

GIS databases:

- CPS Areas applied to clear
- NatureMap (conservation significant fauna)
- DAFWA Subsystems V5
- Soils of WA
- Vegetation Complexes – Swan Coastal Plain
- Managed Tenure
- Environmentally Sensitive Areas
- TPFL Data March 2019
- WAHerb Data March 2019
- Aboriginal Sites Register
- IBRA Vegetation WA
- WA TECPEC
- Land Degradation Hazards