



## CLEARING PERMIT

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

<b>Purpose Permit number:</b>	CPS 7563/1
<b>Permit Holder:</b>	Commissioner of Main Roads Western Australia
<b>Duration of Permit:</b>	From 3 November 2017 to 3 November 2033

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

**1. Purpose for which clearing may be done**

Clearing for the purpose of road construction and upgrades including associated activities.

**2. Land on which clearing is to be done**

Great Northern Highway road reserve (PINs 1233233, 1258680, 11727263, 11727264, 11727265 and 11819629), Muchea;

Great Northern Highway road reserve (PINs 1338948, 1338949, 11320250, 11320253, 11513726, 11726209, 11726211, 11756006, 11756034, 11756040 and 11756041), Chittering;

Sugar Gum Drive road reserve (PIN 11086676), Chittering;

Blue Gum Way road reserve (PIN 11086892), Chittering;

Blue Plains Road road reserve (PIN 11513729), Chittering;

Maddern South Road road reserve (PINs 11429047 and 11726213), Chittering;

Reserve Road road reserve (PINs 11726219 and 11201126), Muchea;

Wandena Road road reserve (PIN 11726212), Muchea;

Old Gingin Road road reserve (PIN 11727261), Muchea;

Un-named road reserves (PINs 1338950 and 1338953) Chittering;

Lot M1264 on Diagram 5369, Muchea;

Lot M1909 on Diagram 11298, Chittering;

Lot 607 on Deposited Plan 409232, Muchea;

Lot 320 on Deposited Plan 409232, Muchea;

Lot M1957 on Diagram 13411, Chittering;

Lot 612 on Deposited Plan 409237, Chittering;

Lot 325 on Deposited Plan 409237, Chittering;

Lot 1 on Diagram 25838, Muchea;

Lot 321 on Deposited Plan 409233, Muchea;

Lot 7 on Diagram 42945, Muchea;

Lot 6 on Diagram 53408, Chittering;

Lot 8 on Diagram 54332, Muchea;

Lot 9 on Diagram 57633, Muchea;

Lot 22 on Diagram 76077, Muchea;

Lot 604 on Deposited Plan 409229, Muchea;

Lot 317 on Deposited Plan 409229, Muchea;

Lot 302 on Diagram 96028, Muchea;

Lot 80 on Diagram 96040, Muchea;

Lot 81 on Diagram 96040, Muchea;

Lot 611 on Deposited Plan 409236, Lower Chittering;

Lot 324 on Deposited Plan 409236, Lower Chittering;

Lot 13 on Plan 13680, Lower Chittering;  
Lot 83 on Deposited Plan 28306, Chittering;  
Lot 201 on Deposited Plan 34420, Chittering;  
Lot 202 on Deposited Plan 34420, Chittering;  
Lot 203 on Deposited Plan 34420, Chittering;  
Lot 204 on Deposited Plan 34420, Chittering;  
Lot 105 on Deposited Plan 42252, Chittering;  
Lot 850 on Deposited Plan 42736, Chittering;  
Lot 851 on Deposited Plan 42736, Chittering;  
Lot 77 on Deposited Plan 43751, Chittering;  
Lot 9500 on Deposited Plan 50560, Chittering;  
Lot 18 on Deposited Plan 59611, Chittering;  
Lot 16 on Deposited Plan 59609, Chittering;  
Lot 17 on Deposited Plan 59610, Chittering;  
Lot 609 on Deposited Plan 409234, Muchea;  
Lot 322 on Deposited Plan 409234, Muchea;  
Lot 610 on Deposited Plan 409235, Muchea;  
Lot 323 on Deposited Plan 409235, Muchea;  
Lot 601 on Deposited Plan 409226, Muchea;  
Lot 314 on Deposited Plan 409226, Muchea;  
Lot 11141 on Deposited Plan 188697 (Crown Reserve 209), Muchea;  
Lot 14764 on Deposited Plan 34420 (Crown Reserve 48484), Chittering;  
Lot 14767 on Deposited Plan 34420, Chittering; and  
Lot 500 on Deposited Plan 63597 (Crown Reserve 40350), Muchea.

**3. Area of clearing**

The Permit Holder must not clear more than 53 hectares of native vegetation within the combined areas cross-hatched yellow on attached Plan 7563/1a, Plan 7563/1b and Plan 7563/1c.

**4. Period within which clearing is authorised**

The Permit Holder shall not clear any native vegetation after 3 November 2022.

**5. 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.

**6. 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 *Main Roads Act 1930* or any other written law.

**7. Dieback and weed management**

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 combined areas cross-hatched yellow on attached Plan 7563/1a, Plan 7563/1b and Plan 7563/1c;
- (b) clean earth-moving machinery of soil and vegetation prior to entering the area cross-hatched red on attached Plan 7563/1d;
- (c) ensure that no *dieback* or *weed*-affected soil, *mulch*, *fill* or other material is brought into the area to be cleared; and
- (d) restrict the movement of machines and other vehicles to the limits of the areas to be cleared.

**8. Fauna management – black cockatoo nesting trees**

- (a) Prior to undertaking any clearing of *black cockatoo nesting trees* outside the period 1 March to 31 May, the Permit Holder shall engage a *fauna specialist* to conduct a *fauna survey* of those trees to identify any that are being utilised by *Calyptorhynchus latirostris* (Carnaby's cockatoo) or *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo).
- (b) Where a *black cockatoo nesting tree(s)* being utilised by Carnaby's cockatoo or forest red-tailed black cockatoo is identified, the Permit Holder shall monitor the *black cockatoo nesting tree(s)* to determine when the chick(s) has fledged; and
- (c) The Permit Holder shall not clear a *black cockatoo nesting tree* identified as being utilised by Carnaby's cockatoo or forest red-tailed black cockatoo until the chick(s) has fledged.

**9. Fauna management – artificial black cockatoo nest hollows**

- (a) By 31 May following the commencement of clearing, the Permit Holder shall install at least 13 artificial black cockatoo nest hollows.
- (b) The design and placement of the artificial black cockatoo nest hollows must be determined based on the guidelines provided in Schedule 1 and where possible should:
  - (i) be located close to *black cockatoo nesting trees* authorised to be cleared under this Permit; and
  - (ii) on land owned by the Permit Holder.
- (c) The Permit Holder must monitor and maintain the installed artificial black cockatoo nest hollows for a period of at least ten years.
- (d) Monitoring and maintenance must be undertaken in accordance with the guidelines provided in Schedule 2.

**10. Revegetation**

- (a) By 3 November 2023, the Permit Holder must establish at least 52 *Eucalyptus wandoo* within the combined areas cross-hatched yellow on attached Plan 7563/1a, Plan 7563/1b and Plan 7563/1c.
- (b) The Permit Holder must monitor the survival of the *Eucalyptus wandoo* established at least once every two years.
- (c) Within 12 months of monitoring identifying that less than 52 *Eucalyptus wandoo* remain, the Permit Holder must establish additional *Eucalyptus wandoo* to ensure at least 52 *Eucalyptus wandoo* remain.

**11. Offset**

The Permit Holder must fund the purchase of the area cross-hatched red on attached Plan 7563/1e for inclusion in the conservation estate managed by the Department of Biodiversity, Conservation and Attractions.

**12. Record keeping**

The Permit Holder must maintain the following records:

- (a) In relation to clearing:
  - (i) the date that clearing commenced; and
  - (ii) the date that each *black cockatoo nesting tree* was cleared.
- (b) In relation to condition 8:
  - (i) the location of the *black cockatoo nesting tree(s)* identified as being utilised by Carnaby's cockatoo or forest red-tailed black cockatoo 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 evidence by which it was determined the *black cockatoo nesting tree(s)* was being utilised including the date of that determination; and
  - (iii) the evidence by which it was determined the chick(s) had fledged including the date of that determination.

- (c) In relation to condition 9:
  - (i) the date that each artificial black cockatoo nest hollow was installed;
  - (ii) the location where each artificial black cockatoo nest hollow was installed recorded using a GPS unit set to GDA94, expressing the geographical coordinates in Eastings and Northings or decimal degrees;
  - (iii) a photo of each installed artificial black cockatoo nest hollow;
  - (iv) a description of how the design and placement of each artificial black cockatoo nest hollow was determined based on the requirements of condition 9(b);
  - (v) the dates when each artificial black cockatoo nest hollow was monitored;
  - (vi) the methodology and results of the artificial black cockatoo nest hollow monitoring;
  - (vii) the dates when each artificial black cockatoo nest hollow was maintained; and
  - (viii) a description of the maintenance activities undertaken for each artificial black cockatoo nest hollow.
  
- (d) In relation to condition 10:
  - (i) the date that at least 52 *Eucalyptus wandoo* were first established;
  - (ii) the location where at least 52 *Eucalyptus wandoo* were first established recorded using a GPS unit set to GDA94, expressing the geographical coordinates in Eastings and Northings or decimal degrees;
  - (iii) the dates when the survival of the *Eucalyptus wandoo* were monitored;
  - (iv) the number of surviving *Eucalyptus wandoo* recorded during each monitoring event;
  - (v) the dates when any additional *Eucalyptus wandoo* were established to meet condition 10(c); and
  - (vi) the location where any additional *Eucalyptus wandoo* were established to meet condition 10(c) recorded using a GPS unit set to GDA94, expressing the geographical coordinates in Eastings and Northings or decimal degrees.

### 13. 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 12 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 has been undertaken, a written report confirming that no clearing under this permit has been undertaken, must be provided to the *CEO* on or before 30 June of each year.
- (c) Prior to 3 August 2033, the Permit Holder must provide to the *CEO* a written report of records required under condition 12 of this Permit where these records have not already been provided under condition 13(a) of this Permit.

### Definitions

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

**black cockatoo nesting 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 or forest red-tailed black cockatoo;

**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 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 *Wildlife Conservation Act 1950*;

**fauna survey:** means a field-based investigation of the biodiversity of fauna;

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

**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; and

**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.



---

James Widenbar  
A/SENIOR MANAGER  
CLEARING REGULATION

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

4 October 2017

## **Schedule 1**

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

## Artificial hollows for Carnaby's cockatoo



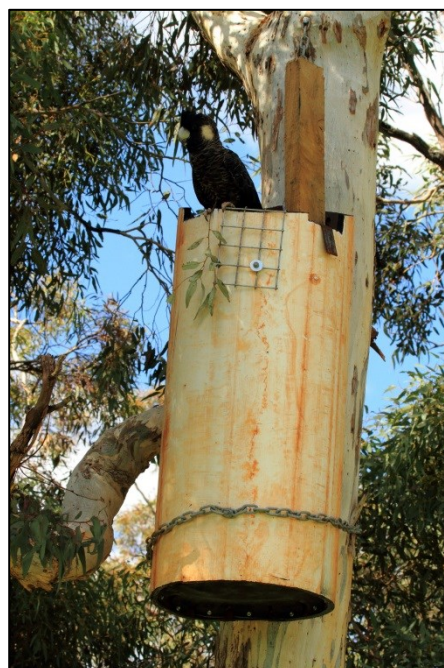
## How to design and place artificial hollows for Carnaby's cockatoo

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

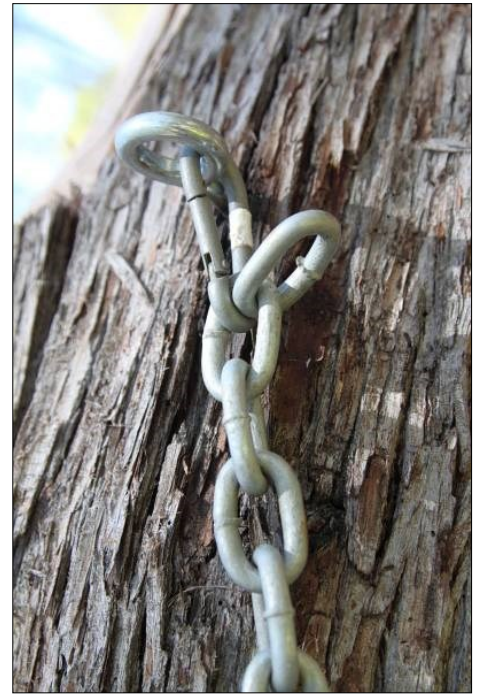
Once artificial hollows have been placed they require monitoring and maintenance to ensure they continue to be useful for nesting by Carnaby's cockatoo. It is important to monitor artificial hollows to determine use by Carnaby's cockatoo, other native species as well as pest species. By undertaking monitoring 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>

## 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.

---

### **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)

---

### **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
<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:

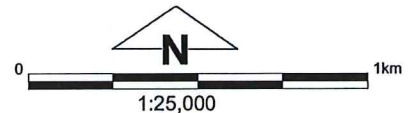
<http://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-animals/208-saving-carnaby-s-cockatoo>

# Plan 7563/1a



## Legend

-  Imagery
-  Clearing Instruments Activities
-  Local Government Authority



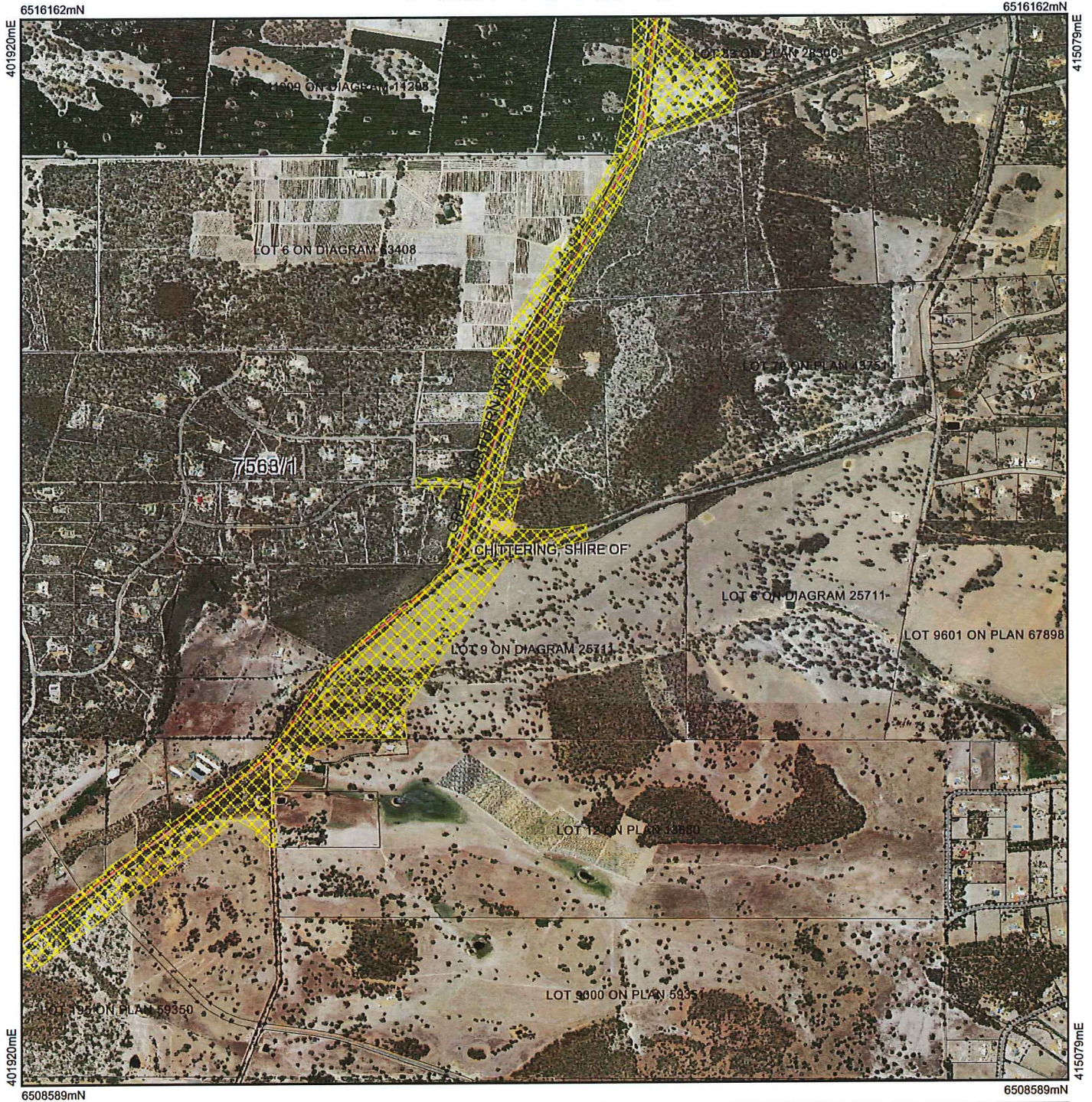
(Approximate when reproduced at A4)  
 UTM Zone 50S  
 World Geodetic System 1984

*[Signature]* Date *7/1/012*



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

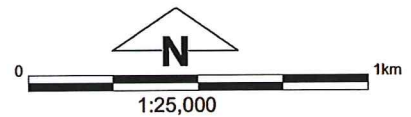


# Plan 7563/1b



## Legend

-  Imagery
-  Clearing Instruments Activities
-  Local Government Authority



(Approximate when reproduced at A4)  
UTM Zone 50S  
World Geodetic System 1984

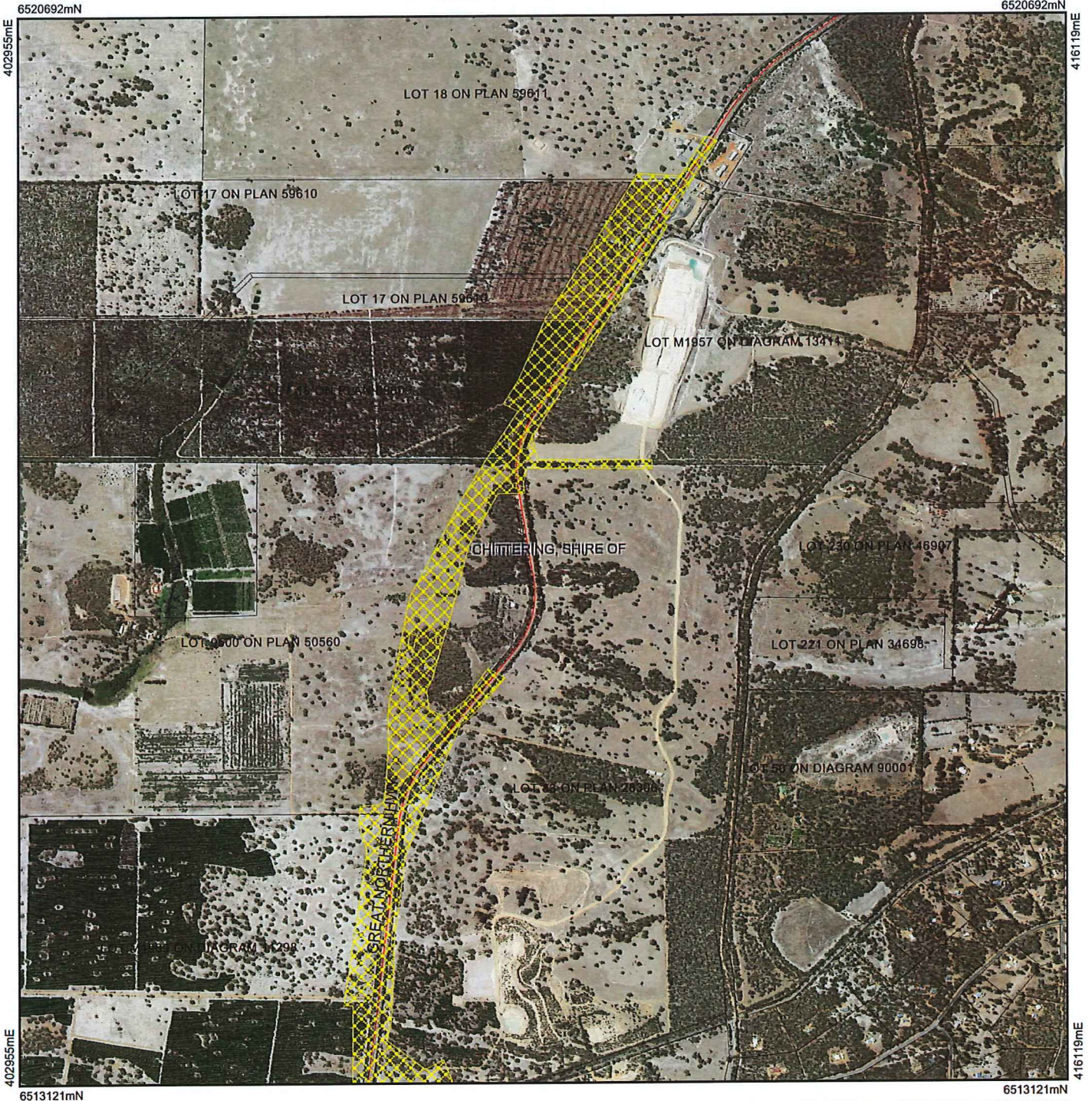
*Tom* ..... Date *4/10/17* .....

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



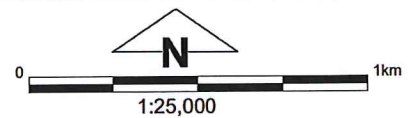
GOVERNMENT OF  
WESTERN AUSTRALIA  
WA Crown Copyright 2017

# Plan 7563/1c



## Legend

-  Imagery
-  Clearing Instruments Activities
-  Local Government Authority



(Approximate when reproduced at A4)  
 UTM Zone 50S  
 World Geodetic System 1984

*[Signature]* ..... Date ... *4/11/17* .....

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

# Plan 7563/1d



## Legend

-  Imagery
-  Roads
-  Local Government Authority
-  Clearing Instruments Conditions



(Approximate when reproduced at A4)

UTM Zone 50S

World Geodetic System 1984

*James* ..... Date *4/10/17*

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



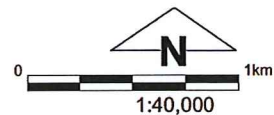
GOVERNMENT OF  
WESTERN AUSTRALIA  
WA Crown Copyright 2017

# Plan 7563/1e



## Legend

-  Imagery
-  Local Government Authority
-  Clearing Instruments Conditions



(Approximate when reproduced at A4)  
 UTM Zone 50S  
 World Geodetic System 1984

.....*Imran*..... Date *6/10/17*.....

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



## 1. Application details

### 1.1. Permit application details

Permit application no.: 7563/1  
Permit type: Purpose Permit  
Application date: 18 April 2017

### 1.2. Applicant details

Applicant's name: Commissioner of Main Roads Western Australia

### 1.3. Property details

Properties:

Great Northern Highway road reserve (PINs 1233233, 1258680, 11727263, 11727264, 11727265 and 11819629), Muchea;  
Great Northern Highway road reserve (PINs 1338948, 1338949, 11320250, 11320253, 11513726, 11726209, 11726211, 11756006, 11756034, 11756040 and 11756041), Chittering;  
Sugar Gum Drive road reserve (PIN 11086676), Chittering;  
Blue Gum Way road reserve (PIN 11086892), Chittering;  
Blue Plains Road road reserve (PIN 11513729), Chittering;  
Maddern South Road road reserve (PINs 11429047 and 11726213), Chittering;  
Reserve Road road reserve (PINs 11726219 and 11201126), Muchea;  
Wandena Road road reserve (PIN 11726212), Muchea;  
Old Gingin Road road reserve (PIN 11727261), Muchea;  
Un-named road reserves (PINs 1338950 and 1338953) Chittering;  
Lot M1264 on Diagram 5369, Muchea;  
Lot M1909 on Diagram 11298, Chittering;  
Lot 607 on Deposited Plan 409232, Muchea;  
Lot 320 on Deposited Plan 409232, Muchea;  
Lot M1957 on Diagram 13411, Chittering;  
Lot 612 on Deposited Plan 409237, Chittering;  
Lot 325 on Deposited Plan 409237, Chittering;  
Lot 1 on Diagram 25838, Muchea;  
Lot 321 on Deposited Plan 409233, Muchea;  
Lot 7 on Diagram 42945, Muchea;  
Lot 6 on Diagram 53408, Chittering;  
Lot 8 on Diagram 54332, Muchea;  
Lot 9 on Diagram 57633, Muchea;  
Lot 22 on Diagram 76077, Muchea;  
Lot 604 on Deposited Plan 409229, Muchea;  
Lot 317 on Deposited Plan 409229, Muchea;  
Lot 302 on Diagram 96028, Muchea;  
Lot 80 on Diagram 96040, Muchea;  
Lot 81 on Diagram 96040, Muchea;  
Lot 611 on Deposited Plan 409236, Lower Chittering;  
Lot 324 on Deposited Plan 409236, Lower Chittering;  
Lot 13 on Plan 13680, Lower Chittering;  
Lot 83 on Deposited Plan 28306, Chittering;  
Lot 201 on Deposited Plan 34420, Chittering;  
Lot 202 on Deposited Plan 34420, Chittering;  
Lot 203 on Deposited Plan 34420, Chittering;  
Lot 204 on Deposited Plan 34420, Chittering;  
Lot 105 on Deposited Plan 42252, Chittering;  
Lot 850 on Deposited Plan 42736, Chittering;  
Lot 851 on Deposited Plan 42736, Chittering;  
Lot 77 on Deposited Plan 43751, Chittering;  
Lot 9500 on Deposited Plan 50560, Chittering;  
Lot 18 on Deposited Plan 59611, Chittering;  
Lot 16 on Deposited Plan 59609, Chittering;  
Lot 17 on Deposited Plan 59610, Chittering;  
Lot 609 on Deposited Plan 409234, Muchea;  
Lot 322 on Deposited Plan 409234, Muchea;  
Lot 610 on Deposited Plan 409235, Muchea;  
Lot 323 on Deposited Plan 409235, Muchea;  
Lot 601 on Deposited Plan 409226, Muchea;  
Lot 314 on Deposited Plan 409226, Muchea;  
Lot 11141 on Deposited Plan 188697 (Crown Reserve 209), Muchea;  
Lot 14764 on Deposited Plan 34420 (Crown Reserve 48484), Chittering;  
Lot 14767 on Deposited Plan 34420, Chittering; and  
Lot 500 on Deposited Plan 63597 (Crown Reserve 40350), Muchea.

Colloquial name:  
Local Government  
Authority:

Great Northern Highway Upgrade Muchea to Wubin Stage 2 – Muchea North  
Shire of Chittering

#### 1.4. Application

Clearing area (ha)  
53

No. trees

Method of clearing  
Mechanical Removal

Purpose category:  
Road construction or upgrades

#### 1.5. Decision on application

Decision on application: Granted

Decision date: 4 October 2017

Reasons for decision: The clearing permit application has been assessed against the clearing principles, planning instruments and other matters in accordance with section 51O of the *Environmental Protection Act 1986* (EP Act). It has been concluded that the proposed clearing is at variance to principles (a), (b), (d) and (f), may be at variance to principle (h) and is not likely to be at variance to the remaining principles.

It is considered that the proposed clearing will result in the following impacts:

- loss of up to 53 hectares of vegetation that comprises a high level of biological diversity;
- loss of up to 53 hectares of Carnaby's cockatoo foraging habitat;
- loss of up to 13 trees with suitable nest hollows for Carnaby's cockatoo;
- loss of up to 16.41 hectares of the Banksia Woodlands of the Swan Coastal Plain threatened ecological community; and
- the potential to spread dieback to vegetation subject to a conservation covenant.

The Delegated Officer determined that:

- avoiding trees with suitable nest hollows being utilised during the breeding season, installing artificial nest hollows, and reestablishing *Eucalyptus wandoo* trees within the application area will mitigate impacts to nesting Carnaby's cockatoos and the loss of suitable nesting habitat;
- the acquisition and conservation of 211 hectares of remnant native vegetation will counterbalance significant residual impacts to biodiversity, Carnaby's cockatoo foraging habitat and the Banksia Woodlands of the Swan Coastal Plain threatened ecological community; and
- implementing weed and dieback hygiene measures will mitigate the risk of significant impacts to adjoining native vegetation and conservation areas.

The Delegated Officer also took into consideration that impacts have been avoided and minimised through realignment of sections of the highway and that upgrades to the road will provide a public benefit including improved road safety.

Given the above, the Delegated Officer decided to grant a clearing permit subject to dieback and weed management, fauna management, revegetation and offset conditions.

## 2. Site Information

### 2.1. Existing environment and information

#### 2.1.1. Description of the native vegetation under application

##### Vegetation Description

Four Hedde vegetation complexes are mapped over the application area including:

- Mogumber Complex South which is described as an open woodland of *Corymbia calophylla* (marri), with some admixture of *Eucalyptus marginata* (jarrah) and a second storey of *Eucalyptus tottiana* (pricklybark) - *Banksia attenuata* - *Banksia menziesii* - *Banksia ilicifolia*;
- Moondah Complex which is described as a low closed to low open forest of *B. attenuata* - *B. menziesii* - pricklybark - *B. prionotes* on slopes, open woodland of marri - *Banksia* species in valley;
- Reagan Complex which is described as vegetation ranging from low open woodland of *Banksia* species and pricklybark to closed heath depending on the depth of soil; and

##### Clearing Description

The applicant proposes to clear up to 53 hectares of native vegetation for the purpose of upgrading Great Northern Highway between SLK 38.6 (near Old Gingin Road) and SLK 51.4 (near Sandalford Drive). Clearing of the 53 hectares will occur within an application area measuring 248.45 hectares.

The applicant has advised that a planning review identified various deficiencies in the section of highway under application including sharp crests and sags, tight bends, uneven surfaces and unforgiving roadside areas with trees close to the seal edge. Due to the age and condition of the road, the planned works will largely involve the construction of a new road adjacent to the existing road, with some sections of online reseal and widening. The proposed alignment is predominantly to

##### Vegetation Condition

Completely Degraded; no longer intact, completely/almost completely without native species (Keighery, 1994);

TO

Pristine; pristine or nearly so, no obvious signs of disturbance (Keighery, 1994).

Vegetation condition was determined by surveys undertaken by Phoenix Environmental Sciences:

- pristine = 2 per cent
- excellent = 8 per cent
- very good = 17 per cent
- good = 8 per cent
- degraded = 7 per cent
- completely degraded = 58 per cent (Arup Jacobs Joint Venture, 2017)

- Coonambidgee Complex which is described as vegetation ranging from a low open forest and low woodland of pricklybark - *B. attenuata* - *B. menziesii* - *B. ilicifolia* with localised admixtures of *B. prionotes* to an open woodland of marri - *Banksia* species (Heddle et al., 1980).

the east of the existing road with a section between (approximately) SLK 48.2 and SLK 50.4 constructed to the west (Arup Jacobs Joint Venture, 2017).

Vegetation clearing will be required for the following activities:

- construction of approximately 3.7 kilometres of dual carriageway from the end of the Perth – Darwin National Highway (Swan Valley Section) [also referred to as Northlink]. Each carriageway will be a 9 metre wide seal on an 11 metre wide formation;
- construction of approximately 5.7 kilometres of single carriageway with a 10 metre wide seal on a 12 metre wide formation;
- construction of approximately 1.4 kilometres of four lane carriageway with two 3.5 metre wide northbound and southbound lanes, separated by a minimum 4.65 metre median;
- widening of approximately 2 kilometres of the existing road;
- realignment of the intersections at Old Gingin Road, Reserve Road, Wandena Road, Maddern South Road and Sugar Gum Drive;
- construction of access roads with consolidated access to the highway to service properties near Reserve Road, Sugar Gum Drive, at approximately SLK 48.8 and opposite the Chittering Roadhouse;
- provision of new intersections to link the existing highway (retained as a local access road) to the new sections of the highway;
- construction and realignment of private driveways;
- upgrade and installation of culverts;
- removal of redundant, existing road reserve fence and installation of new road reserve fence;
- installation of signage and line markings and removal of redundant signage;
- installation of safety barriers where required;
- relocation of utilities within the road reserve corridor (communications and power); and
- installation of road lighting (Arup Jacobs Joint Venture, 2017).

Laydown areas, vehicle turnaround bays and other ancillary areas required for construction of the permanent works will be located in previously cleared (paddock) areas, where practicable (Arup Jacobs Joint Venture, 2017).

Areas in completely degraded condition included paddocks, roads and other infrastructure, and cleared and revegetated non-indigenous woodlands (Arup Jacobs Joint Venture, 2017).

### 3. Assessment of application against clearing principles

#### (a) Native vegetation should not be cleared if it comprises a high level of biological diversity.

##### Comments

##### Proposed clearing is at variance to this principle

Initial flora and vegetation surveys commissioned by the applicant undertaken in October 2014, May 2015 and September 2015 recorded a total of 273 plant taxa (223 native) within the application area and immediate surrounds (Phoenix Environmental Sciences, 2015). A supplementary survey undertaken in October and November 2016 recorded an additional 61 plant taxa (41 native) of which 19 were not recorded in the initial surveys (Phoenix Environmental Sciences, 2017). Approximately 35 per cent of the application area was determined to be in good or better condition using the Keighery (1994) scale (Arup Jacobs Joint Venture, 2017).

As discussed under principle (b), the proposed clearing will result in the loss of up to 53 hectares of Carnaby's cockatoo foraging habitat and 13 trees with suitable nest hollows, five of which showed evidence of use. This will increase the risk of further declines in breeding success and population size of the species. No significant impacts to ecological linkages are expected.

As discussed under principle (c), the proposed clearing is unlikely to result in any impacts to rare flora.

Flora and vegetation surveys commissioned by the applicant recorded a total of seven species of priority flora listed by the Department of Biodiversity, Conservation and Attractions (DBCA) (Arup Jacobs Joint Venture, 2017). These include:

- *Stylidium squamellosum* (Priority 2);
- *Acacia drummondii* subsp. *affinis* (Priority 3);
- *Haemodorum loratum* (Priority 3);
- *Verticordia serrata* var. *linearis* (Priority 3);
- *Anigozanthos humilis* subsp. *chrysanthus* (Priority 4);
- *Eucalyptus caesia* (Priority 4); and
- *Verticordia lindleyi* subsp. *lindleyi* (Priority 4).

The recorded locations of *Stylidium squamellosum* (two plants), *Anigozanthos humilis* subsp. *chrysanthus* (three plants) and *Verticordia lindleyi* subsp. *lindleyi* (65 plants) all occur outside the application area within or in the vicinity of Barracca Nature Reserve. No significant impacts are expected to any of these species.

Of the 70 plants of *Verticordia serrata* var. *linearis* recorded, only one is proposed to be cleared and therefore significant impacts are not expected.

A single plant of *Eucalyptus caesia* was recorded but based on information obtained from a site inspection by Department of Water and Environmental Regulation (DWER) officers, and advice received from DBCA, this plant is expected to have been planted (DWER, 2017; DBCA, 2017a). No significant impacts to the conservation status of *Eucalyptus caesia* are expected.

Of the 906 plants of *Acacia drummondii* subsp. *affinis* recorded, 627 will be cleared. The majority of plants were recorded at three locations, at the northern (two) and southern (one) ends of the application area. Single plants were also recorded between these locations. The species appears to be well represented in the area and the loss of up to 627 plants is not likely to have a significant impact to the conservation status of the species (DBCA, 2017a).

A single plant of *Haemodorum loratum* was recorded in surveys commissioned by the applicant and is proposed to be cleared.

An additional population of *Haemodorum loratum* was identified in surveys commissioned by a different applicant for an adjacent application (CPS 7574/1) (Maia Environmental Consultancy, 2017). The additional population was identified as containing 70 plants, 39 of which are proposed to be cleared under CPS 7574/1. Of the remaining 31 plants, it is estimated that approximately half occur within the CPS 7563/1 application area. It is expected that a viable population will remain and therefore impacts to the conservation status of the species are not expected to be significant.

As discussed under principle (d), the proposed clearing will result in the loss of up to 16.41 hectares of the Banksia Woodlands of the Swan Coastal Plain threatened ecological community (TEC) listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

According to available datasets, no priority ecological communities (PECs) listed by DBCA (other than the Commonwealth listed Banksia Woodlands of the Swan Coastal Plain TEC which is listed as Priority 3 in Western Australia) are mapped within or adjacent to the application area. No PECs other than the Banksia Woodlands of the Swan Coastal Plain PEC were recorded in flora and vegetation surveys commissioned by the applicant (Phoenix Environmental Sciences, 2015; Phoenix Environmental Sciences, 2017). No significant impacts to any PECs other than the Banksia Woodlands of the Swan Coastal Plain PEC are expected.

As discussed under principles (e) and (f), the application area is not likely to contain significant remnant native vegetation in an area that has been extensively cleared, or significant watercourse or wetland vegetation.



As discussed under principle (h), no clearing within conservation areas is proposed.

It is considered that the application area comprises a high level of biological diversity given the application size, condition of the vegetation, and the presence of a TEC and significant foraging and breeding habitat for Carnaby's cockatoo.

The proposed clearing is at variance to this principle.

It is considered that a suitable offset will counterbalance impacts to biodiversity. Section 4 provides further information detailing the assessment of the proposed offset.

#### Methodology

##### References:

Arup Jacobs Joint Venture (2017)  
DBCA (2017a)  
DWER (2017)  
Keighery (1994)  
Maia Environmental Consultancy (2017)  
Phoenix Environmental Sciences (2015)  
Phoenix Environmental Sciences (2017)

##### Geographic Information System (GIS) Datasets:

Aerial Imagery  
SAC Bio Datasets (accessed 9 August 2017)

#### **(b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.**

#### Comments

##### **Proposed clearing is at variance to this principle**

Fauna surveys commissioned by the applicant recorded one fauna species listed as rare or likely to become extinct under the *Wildlife Conservation Act 1950* (WC Act) within the application area and immediate surrounds; Carnaby's cockatoo (*Calyptorhynchus latirostris*). The species was recorded on numerous occasions through both direct observations and foraging evidence (Arup Jacobs Joint Venture, 2017). This included an observation of a group of 22 birds as well as observations of six pairs of birds roosting/nesting in trees and two chicks (heard inside hollows) (Phoenix Environmental Sciences, 2017).

A total of 228.8 hectares of suitable foraging habitat and 2369 habitat trees (trees with a diameter at breast height of 500 millimetres or greater – or 300 millimetres or greater for wandoo) for Carnaby's cockatoo were recorded. This included 22 trees with suitable nest hollows showing evidence of use (current or recent), and a further 32 trees with suitable nest hollows that did not exhibit signs of use (Arup Jacobs Joint Venture, 2017).

The vast majority of the vegetated portion of the application area contains suitable Carnaby's cockatoo foraging habitat. The applicant has avoided the majority of the 54 trees with suitable nest hollows. The application area contains 13 trees with suitable nest hollows (11 wandoo and two marri), five of which (all wandoo) showed evidence of use. Galahs were observed at one of the five trees. In relation to the other eight trees, one was observed to have bees present and another was observed to have an owl present (Arup Jacobs Joint Venture, 2017). All the trees where chicks were heard in hollows or where pairs of Carnaby's cockatoos were observed roosting/nesting have been avoided.

The proposed clearing of up to 53 hectares of Carnaby's cockatoo foraging habitat and 13 trees with suitable nest hollows will increase the risk of further declines in breeding success and population size of the species.

The application area occurs on the edge of the modelled distribution of forest red-tailed black cockatoo (*Calyptorhynchus banksii* subsp. *naso*) also listed as rare or likely to become extinct under the WC Act (Commonwealth of Australia, 2012). Historical but infrequent records of the species occur in the vicinity of the application area but no observations of the species (visual, heard calls or foraging evidence) were recorded in surveys commissioned by the applicant (Arup Jacobs Joint Venture, 2017). Suitable foraging, roosting and breeding habitat is present but it is considered unlikely that the species would breed in the area. The local area (10 kilometre radius) retains approximately 40 per cent native vegetation (approximately 22,000 hectares) and is expected to contain similar habitat values. Given this, and that the species is only likely to be an infrequent visitor to the area, no significant impacts are expected.

Given the linear nature of the application area, the main risk of significant impacts to ground dwelling fauna is considered to relate to the widening of the existing cleared road corridor which represents a barrier to fauna movement between remnant patches of native vegetation. The two main areas where substantial dense cover of remnant native vegetation occurs on both sides of Great Northern Highway are:

- north of Maddern South Road; and
- south of Reserve Road.

A total of four ground dwelling fauna species listed as rare or likely to become extinct under the WC Act or as priority fauna by the Department of Biodiversity, Conservation and Attractions, were considered "possible" or "likely" to occur within the application area based on surveys commissioned by the applicant (Arup Jacobs Joint Venture, 2017). This includes:

- western quoll (*Dasyurus geoffroii*) (rare or likely to become extinct);

- black-striped snake (*Neelaps calonotos*) (Priority 3);
- western brush wallaby (*Macropus irma*) (Priority 4); and
- southern brown bandicoot (or quenda) (*Isodon obesulus fusciventer*) (Priority 5).

Given the mobility of the four above listed species, it is considered unlikely that clearing of a wider road corridor as proposed will result in significant impacts to the ability of any of the species to cross the road corridor and utilise remaining native vegetation within the local area.

Given the proposed clearing will result in the loss of significant habitat for Carnaby's cockatoo, the proposed clearing is at variance to this principle.

It is considered that impacts to Carnaby's cockatoo habitat can be mitigated and offset. Section 4 provides further information detailing the mitigation measures and assessment of the proposed offset.

**Methodology**    References:  
 Arup Jacobs Joint Venture (2017)  
 Commonwealth of Australia (2012)  
 Phoenix Environmental Sciences (2017)

GIS Datasets:  
 NLWRA, Current Extent of Native Vegetation  
 Imagery

**(c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.**

**Comments**        **Proposed clearing is not likely to be at variance to this principle**  
 According to available datasets, no records of rare flora occur within the application area.

Two rare flora species were recorded in surveys commissioned by the applicant; *Darwinia foetida* (Critically Endangered) and *Thelymitra stellata* (Endangered) (Phoenix Environmental Sciences, 2015; Phoenix Environmental Sciences, 2017).

The population of *Darwinia foetida* recorded occurs approximately 1.2 kilometres from the application area and is therefore unlikely to be impacted by the proposed clearing.

A single plant of *Thelymitra stellata* was recorded from a previously known population. Known habitat for this population occurs adjacent to the application area but the single plant was recorded approximately 1.1 kilometres from the application area. Targeted searches were undertaken at appropriate times for this species, as well as *Drakaea elastica* (Critically Endangered), within other potentially suitable habitat within the application area. No plants were located (Phoenix Environmental Sciences, 2017).

Given no rare flora were recorded within the application area, and no known habitat of the previously recorded *Thelymitra stellata* population occurs within the application area, the proposed clearing is not likely to be at variance to this principle.

**Methodology**    References:  
 Phoenix Environmental Sciences (2015)  
 Phoenix Environmental Sciences (2017)

GIS Datasets:  
 SAC Bio Datasets (accessed 9 August 2017)

**(d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.**

**Comments**        **Proposed clearing is at variance to this principle**  
 Flora and vegetation surveys commissioned by the applicant recorded a total of four patches of the EPBC Act listed TEC Banksia Woodlands of the Swan Coastal Plain. No other TECs were recorded (Arup Jacobs Joint Venture, 2017). According to available datasets, no other TECs are mapped within the application area.

Each of the four patches of the Banksia Woodlands of the Swan Coastal Plain TEC recorded includes portions both within and outside the application area (refer Figures 1 to 4). A breakdown of the patch sizes and extents within the application area is provided in Table 1.

Table 1 – TEC patches recorded.

Patch	Extent total (ha)	Extent within application area (ha)	Comment
Patch 1	4.02	1.28	Patch likely extends further south into adjacent vegetation not surveyed (refer Figure 1).
Patch 2	3.71	1.34	At least an additional 5.5 hectares of vegetation north of Patch 2 that has historically been disturbed and is regenerating is considered to represent a modified version of the TEC (DWER, 2017; Maia Environmental Consultancy, 2017) (refer Figure 2). 1.86 hectares of this area occurs within the application area with the remaining 3.64 hectares proposed to be cleared under CPS 7574/1.
Patch 3	8.82	5.60	Patch likely extends into adjacent vegetation not surveyed (Figure 3).
Patch 4	8.03	6.33	Patch likely extends into adjacent vegetation not surveyed (Figure 4).
Totals	24.58	14.55	Including the area representing a modified version of the TEC the total extent recorded is 30.08 hectares of which 16.41 hectares is within the application area.



Figure 1. TEC Patch 1 within (red hatch) and outside (green hatch) the application area (blue shading).

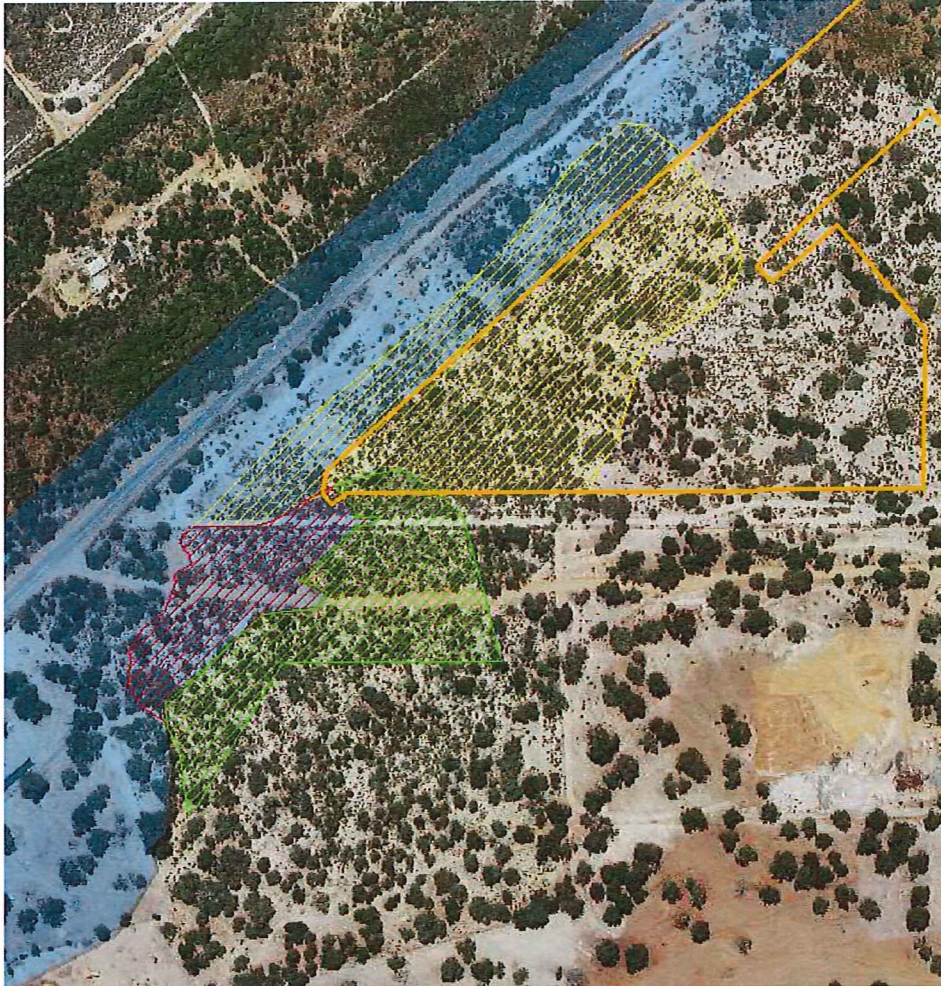


Figure 2. TEC Patch 2 within (red hatch) and outside (green hatch) the application area (blue shading). Additional historically disturbed and regenerating vegetation which is considered to represent a modified form of the TEC is shown hatched yellow. The CPS 7574/1 application area is outlined orange.



Figure 3. TEC Patch 3 within (red hatch) and outside (green hatch) the application area (blue shading).

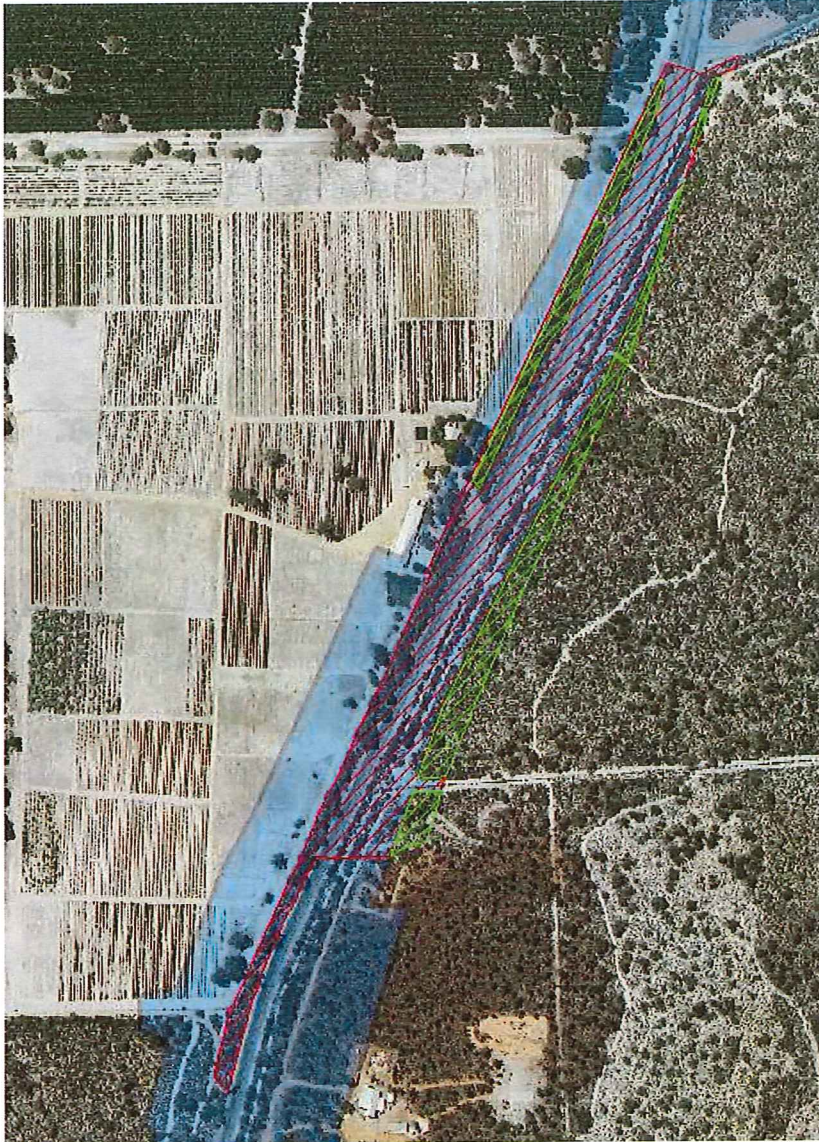


Figure 4. TEC Patch 4 within (red hatch) and outside (green hatch) the application area (blue shading).

The proposed clearing will result in the loss of up to 16.41 hectares of the Banksia Woodlands of the Swan Coastal Plain TEC.

Approximately 326,000 hectares of the Banksia Woodlands of the Swan Coastal Plain TEC remained in 2008, or approximately 48 per cent of its original extent (DBCA, 2017b). Cumulative impacts such as that which would result from the proposed clearing are considered significant in the context of the ongoing incremental decline of the TEC extent.

The proposed clearing is at variance to this principle.

It is considered that a suitable offset will counterbalance impacts to the Banksia Woodlands of the Swan Coastal Plain TEC. Section 4 provides further information detailing the assessment of the proposed offset.

#### Methodology

##### References:

Arup Jacobs Joint Venture (2017)  
DBCA (2017b)  
DWER (2017)  
Maia Environmental Consultancy (2017)

##### GIS Datasets:

Aerial Imagery  
SAC Bio Datasets (accessed 9 August 2017)

**(e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.**

**Comments**

**Proposed clearing is not likely to be at variance to this principle**

The National Objectives and Targets for Biodiversity Conservation 2001-2005 include a target to have clearing controls in place that prevent clearance of ecological communities with an extent below 30 per cent of that present pre-1750 (i.e. pre-European settlement) (Commonwealth of Australia, 2001).

As indicated in Table 2, the Swan Coastal Plain bioregion, the Shire of Chittering and the mapped Hedde vegetation complexes retain greater than 30 per cent of their pre-European extents.

The local area (10 kilometre radius) retains approximately 40 per cent native vegetation (approximately 22,000 hectares).

Given the above, the application area is not likely to contain vegetation significant as a remnant in an area that has been extensively cleared. The proposed clearing is not likely to be at variance to this principle.

Table 2 – Vegetation remaining statistics.

	Pre-European extent (ha)	Current extent (ha)	Current extent (%)	% Current extent in all DBCA managed lands
<b>IBRA Bioregion*:</b>				
Swan Coastal Plain	1,501,222	578,432	39%	38% (218,946 hectares)
<b>Local Government Authority*:</b>				
Shire of Chittering	121,835	46,477	38%	10% (4,621 hectares)
	Pre-European extent (ha)	Current extent (ha)	Current extent (%)	% Remaining in all DBCA managed lands
<b>Hedde vegetation complex**:</b>				
Mogumber Complex South	14,822	5,723	39%	4% (619 hectares)
Moondah	17,713	7,233	41%	12% (2,075 hectares)
Reagan	9,181	3,107	34%	7% (606 hectares)
Coonambidgee	6,272	2,848	45%	10% (657 hectares)

**Methodology**

**References:**

Commonwealth of Australia (2001)

\*Government of Western Australia (2016)

\*\*Government of Western Australia (2017)

**GIS Datasets:**

IBRA Australia

Local Government Authority

SW Veg Complexes SCP 250K

NLWRA, Current Extent of Native Vegetation

Imagery

**(f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.**

**Comments**

**Proposed clearing is at variance to this principle**

According to available datasets, the application area intersects five minor non-perennial watercourses and two wetlands. One of the watercourses (Rocky Creek) is crossed four times (including tributaries). Rocky Creek flows in a southwest direction into Ellen Brook. Vegetation growing in or in association with watercourses will be cleared. Given the application is for upgrading Great Northern Highway clearing will be limited to relatively narrow watercourse crossings which is considered unlikely to result in significant impacts to the overall environmental values of those watercourses.

The two wetlands include a multiple use category palusplain (Ellen Brook Floodplain) located at the southern end of the application area, and a resource enhancement category palusplain located near the intersection of Great Northern Highway and Wandena Road. One of the tributaries of Rocky Creek is mapped as flowing through the resource enhancement category wetland.

A site inspection undertaken by Department of Water and Environmental Regulation officers on 11 July 2017 observed that the resource enhancement category wetland has been highly modified with little native vegetation remaining (DWER, 2017). The wetland is considered unlikely to contain significant environmental values. Similarly the multiple use category wetland is highly modified and is also unlikely to contain significant environmental values.

The proposed clearing is at variance to this principle, however, no significant watercourse or wetland related impacts are expected.

**Methodology**

**References:**

DWER (2017)

GIS Datasets:  
Geomorphic Wetlands (Classification), Swan Coastal Plain  
Hydrography, linear

**(g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.**

**Comments Proposed clearing is not likely to be at variance to this principle**

The application area is linear, approximately 13 kilometres in length with an average width of approximately 200 metres. The local area (10 kilometre radius) is estimated to retain 40 per cent (22,000 hectares) native vegetation cover.

Given the linear nature of the application area, the risk of appreciable land degradation as a result of the proposed clearing is substantially reduced. No significant erosion was observed along the existing Great Northern Highway corridor (DWER, 2017) and it is considered unlikely that any significant erosion would occur as a result of clearing a similar, although wider, corridor.

Given the extent of native vegetation remaining in the local area and that clearing will occur over a distance of approximately 13 kilometres, no significant salinity impacts are expected.

The proposed clearing is not likely to be at variance to this principle.

**Methodology** References:  
DWER (2017)

GIS Datasets:  
NLWRA, Current Extent of Native Vegetation  
Imagery

**(h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.**

**Comments Proposed clearing may be at variance to this principle**

The nearest DBCA managed conservation area is the Barracca Nature Reserve located adjacent to the application area near the intersection of Great Northern Highway and Maddern South Road.

The application area includes portions of Lots 80 and 81 on Diagram 96040, Muchea which contain native vegetation subject to an agreement to reserve under the *Soil and Land Conservation Act 1945*. None of the vegetation subject to the agreement to reserve is proposed to be cleared.

An additional 8 properties containing native vegetation subject to a conservation covenant under the *Soil and Land Conservation Act 1945* occur adjacent to the application area.

A strip of Barracca Nature Reserve approximately 30 metres wide along the Great Northern Highway road reserve border was assessed for dieback and deemed to be dieback infested. A strip of vegetation along the border of the Great Northern Highway road reserve and the properties subject to a conservation covenant was also assessed for dieback and deemed to be uninfested or uninterpretable. Vegetation on the opposite side of the road at this location was deemed to be dieback infested (Arup Jacobs Joint Venture, 2017). The vegetation subject to the agreement to reserve was not assessed for dieback and is separated from the application area by areas that are parkland cleared.

The proposed clearing has the potential to spread dieback to vegetation subject to a conservation covenant that has been assessed as dieback uninfested or uninterpretable. The proposed clearing may be at variance to this principle. Implementation of appropriate hygiene measures is considered likely to be able to adequately mitigate the risk of indirect impacts.

**Methodology** References:  
Arup Jacobs Joint Venture (2017)

GIS Datasets:  
DPaW Tenure  
NLWRA, Current Extent of Native Vegetation  
DAFWA Heritage Parcels  
Imagery

**(i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.**

**Comments**

**Proposed clearing is not likely to be at variance to this principle**

The application area is linear, approximately 13 kilometres in length, and according to available datasets intersects five minor non-perennial watercourses and two wetlands.

As discussed under principle (f), the wetlands intersected by the application area have been highly modified with little native vegetation remaining. Also, the proposed clearing is for upgrading Great Northern Highway and as a result direct impacts to watercourses are expected to be limited to the clearing of relatively narrow watercourse crossings. These crossings will be located near the existing Great Northern Highway crossings where surface water controls are already in place. Significant impacts to surface water quality are considered unlikely.

Noting the linear application area and that the local area (10 kilometre radius) is estimated to retain 40 per cent (22,000 hectares) native vegetation cover, the proposed clearing is considered unlikely to result in significant changes to groundwater quality.

The proposed clearing is not likely to be at variance to this principle.

**Methodology**

GIS Datasets:  
Geomorphic Wetlands (Classification), Swan Coastal Plain  
Hydrography, linear  
Imagery  
NLWRA, Current Extent of Native Vegetation

**(j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.**

**Comments**

**Proposed clearing is not likely to be at variance to this principle**

The application area is linear, approximately 13 kilometres in length. The proposed clearing is unlikely to be in a location or of a scale that would result in an increase in the incidence or intensity of flooding.

The proposed clearing is not likely to be at variance to this principle.

**Planning instruments and other relevant matters.**

**Comments**

The clearing permit application was advertised for public comment on the former Department of Environment Regulation's website for a 21 day submissions period closing 8 June 2017. No public submissions were received.

**4. Avoidance, minimisation and offset**

The applicant has provided the following advice in relation to the avoidance and minimisation of impacts (Main Roads Western Australia, 2017b):

*"Realignment of the GNH has allowed for avoidance of a significant amount of native vegetation, conservation significant flora and habitat for Carnaby's Black Cockatoo. The proposed realignment involves both online and offline construction. Offline construction has been adopted where significant horizontal and vertical realignments are required to improve safety and upgrade GNH to meet current road design guidelines. Impacts to native vegetation, conservation significant flora and habitat for Carnaby's Black Cockatoo have been minimised through the areas of offline works, and avoided where possible."*

It is noted that impacts have been avoided and minimised through realignment of sections of the highway and that upgrades to the road will provide a public benefit including improved road safety.

To mitigate impacts to Carnaby's cockatoo nesting habitat the applicant proposed the following:

- pre-clearing inspections of trees with suitable nest hollows between August and December and if nesting is identified those trees will be avoided until they are no longer in use;
- the installation of 39 artificial nest hollows; and
- the planting of up to 2,436 *Eucalyptus wandoo* trees as part of landscaping works associated with the project.

It is considered that the following is required as a minimum to mitigate impacts to nesting Carnaby's cockatoos:

- Pre-clearing inspections during the breeding season (June to February) of the 13 trees with suitable nest hollows to confirm whether the hollows are being utilised for nesting. Clearing of the trees will be restricted until after any chicks have fledged.
- Installation of at least 13 artificial nest hollows prior to the next breeding season following the commencement of clearing as well as ongoing monitoring and maintenance of those hollows for a period of not less than 10 years.
- Re-establishment and maintenance of at least 52 *Eucalyptus wandoo* within the application area. A 4:1 ratio was applied being consistent with the ratio determined for the offset.

The assessment against the clearing principles has identified that the proposed clearing is at variance to principles (a), (b), (d) and (f). After consideration of the proposed avoidance, minimisation and mitigation measures, it is considered that the proposed clearing will result in the following significant residual impacts:



- loss of up to 53 hectares of vegetation that comprises a high level of biological diversity;
- loss of up to 53 hectares of Carnaby's cockatoo foraging habitat; and
- loss of up to 16.41 hectares of the Banksia Woodlands of the Swan Coastal Plain TEC.

To offset any significant residual impacts the applicant proposed to allocate 200 hectares of a "pre-impact" offset site being Lot M2091 on Plan 6457, Ippolo Road, Chittering. Lot M2091 is approximately three kilometres northwest of the application area and was purchased for conservation by the former Department of Parks and Wildlife in January 2014. The purchase was funded by the applicant for use as a "pre-impact" offset site. Lot M2091 is approximately 983 hectares in size and a total of 718.5 hectares has been utilised to date for offsets for other projects:

1. CPS 6456/1 – NorthLink WA Stage 1 – Tonkin Highway grade separations (Collier Road, Morley Drive and Benara Road) – 45 hectares
2. Ministerial Statement 1036 – Northlink WA Stages 2 and 3 – Tonkin Highway/Reid Highway interchange to Muchea – 673.5 hectares

Lot M2091 is predominantly in excellent (Keighery, 1994) condition and contains suitable Carnaby's cockatoo foraging habitat and vegetation types consistent with the Banksia Woodlands of the Swan Coastal Plain TEC. It contains an estimated 6,353 trees with a diameter at breast height of greater than 500 millimetres. 30 trees with hollows considered suitable for black cockatoo nesting were opportunistically identified although no evidence of black cockatoos using the 30 trees was identified (Coffey, 2015). The offset area contains environmental values that relate to the environmental values being lost.

In assessing whether the proposed offset is adequately proportionate to the significance of the environmental values being impacted, the Department of Water and Environmental Regulation undertook a calculation using the Commonwealth Offsets Assessment Guide. The calculation indicated that the allocation of 211 hectares is required to counterbalance the loss of Carnaby's cockatoo foraging habitat. At least 76 hectares of the 211 hectares would need to be representative of the Banksia Woodlands of the Swan Coastal Plain TEC. In response, the applicant has provided an area of 211 hectares of suitable Carnaby's cockatoo foraging habitat, at least 195 hectares of which is considered representative of the Banksia Woodlands of the Swan Coastal Plain TEC. The area was identified to be in excellent (Keighery, 1994) condition. Three of the 30 trees with hollows considered suitable for black cockatoo nesting occur within 200 metres of the 211 hectare area with the closest being approximately 60 metres away.

Given the above, the allocation of 211 hectares of Lot M2091 is considered adequate to counterbalance the significant residual impacts of the proposed clearing consistent with the *WA Environmental Offsets Policy September 2011*.

## 5. References

- Arup Jacobs Joint Venture (2017). Great Northern Highway Muchea to Wubin Upgrade Stage 2 – Main Roads Western Australia – Muchea North SLK 38.6-51.4 – Environment – Purpose Permit to Clear Native Vegetation – Supporting Information. Unpublished report prepared for Main Roads Western Australia. GNH-CN03-EN01-RPT-0004 Revision 5, 10 April 2017 (DWER Ref: A1413784-90).
- Coffey (2015). Flora, Vegetation and Fauna Assessment Lot M2091 Ippolo Road, Chittering. Unpublished report prepared for Main Roads Western Australia. Revision 0, 15 April 2015 (DWER Ref: A1413782).
- Commonwealth of Australia (2001). National Objectives and Targets for Biodiversity Conservation 2001-2005, Canberra.
- Commonwealth of Australia (2012). EPBC Act referral guidelines for three threatened black cockatoo species. Department of Sustainability, Environment, Water, Populations and Communities, Canberra.
- Department of Biodiversity, Conservation and Attractions (DBCA) (2017a). Species and Communities Branch flora advice received in relation to CPS 7563/1. Received 27 July 2017 (DWER Ref: A1490499).
- Department of Biodiversity, Conservation and Attractions (DBCA) (2017b). Species and Communities Branch threatened ecological communities advice received in relation to CPS 7563/1. Received 18 July 2017 (DWER Ref: A1478506).
- Department of Water and Environmental Regulation (DWER) (2017) Site Inspection Report for Clearing Permit Application CPS 7563/1. Site inspection undertaken 11 July 2017. Department of Water and Environmental Regulation, Western Australia (DWER Ref: A1494798).
- Government of Western Australia (2016). 2016 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of October 2016. WA Department of Parks and Wildlife, Perth.
- Government of Western Australia (2017). 2016 South West Vegetation Complex Statistics. Current as of December 2016. WA Department of Parks and Wildlife, Perth.
- 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.
- Keighery, B.J. (1994). Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc). Nedlands, Western Australia.
- Maia Environmental Consultancy (2017). Instant Products Group: Muchea Lot 195 – Detailed (Level 2) Flora and Vegetation Assessment – Version 1. Unpublished report prepared for Instant Products Group, 9 March 2017. Subiaco (DWER Ref: A1420067).
- Phoenix Environmental Sciences (2015). Flora and fauna assessment for Muchea North and Chittering study area – Great Northern Highway, Muchea to Wubin Upgrade Stage 2 Project. Unpublished report prepared for Muchea to Wubin Integrated Project Team (Main Roads WA, Jacobs and Arup). Version 0, 21 December 2015 (DWER Ref: A1413784-90).
- Phoenix Environmental Sciences (2017). Flora and fauna assessment for the Muchea North and Chittering study area – Report Addendum – Great Northern Highway, Muchea to Wubin Upgrade Stage 2 Project. Unpublished report prepared for Muchea to Wubin Integrated Project Team (Main Roads WA, Jacobs and Arup). Version 0, 15 February 2017 (DWER Ref: A1413784-90).