



## CLEARING PERMIT

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

### PERMIT DETAILS

Area Permit Number: CPS 8582/1  
File Number: DWERTV3058  
Duration of Permit: From 5 June 2021 to 5 June 2033

### ADVICE NOTE

The funds referred to in condition 6 of this permit are intended for contributing towards the purchase of 30.61 hectares of native vegetation with habitat for Carnaby's cockatoo (*Calyptorhynchus latirostris*), Baudin's cockatoo (*Calyptorhynchus baudinii*) and Forest Red-tailed black cockatoo (*Calyptorhynchus banksii naso*).

### PERMIT HOLDER

Holcim (Australia) Pty Ltd

### LAND ON WHICH CLEARING IS TO BE DONE

Lot 3 on Plan 14769, Martin.

### AUTHORISED ACTIVITY

The permit holder must not clear more than 10.7 hectares of native vegetation within the area cross-hatched yellow in Figure 1 of Schedule 1.

### CONDITIONS

**1. Period during which clearing is authorised**

The permit holder must not clear any native vegetation after 5 June 2023.

**2. Avoid, minimise, and reduce impacts and extent of clearing**

In determining the native vegetation authorised to be cleared under this permit, the permit holder must apply the following principles, set out in descending order of preference:

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

**3. Weed and dieback management**

When undertaking any clearing authorised under this permit, the permit holder must take the following measures to minimise the risk of introduction and spread of *weeds* and *dieback*:

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

**4. Directional clearing**

The Permit Holder shall conduct clearing in a slow progressive manner from one direction to the other (e.g. east to west) to allow fauna to move into adjacent native vegetation ahead of the clearing activity.

**5. Conservation covenant**

By the 5 November 2021, the Permit Holder must provide to the *CEO* a copy of the conservation covenant under section 30B of the *Soil and Land Conservation Act 1945* setting aside the area within Lot 3 on Plan 14769, cross-hatched red on Figure 2 of Schedule 1, for the protection and management of native vegetation in perpetuity.

**6. Fauna management – black cockatoo habitat**

- (a) Prior to undertaking any clearing authorised under this permit within the area cross-hatched yellow on Figure 1 of Schedule 1, the permit holder must engage a *fauna specialist* to inspect trees identified as *black cockatoo breeding trees* within the report ‘Holcim Gosnells Quarry – Fauna Assessment of the Quarry Area’ dated 19 July 2017, for *evidence* of current or past breeding use by *black cockatoos species* listed below:
  - (i) *Calyptorhynchus latirostris* (Carnaby’s cockatoo);
  - (ii) *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo); and
  - (iii) *Calyptorhynchus baudinii* (Baudin’s cockatoo).
- (b) Where a *black cockatoo habitat tree* with no evidence of current or past use by *black cockatoo species* is identified in accordance with condition 6(a), that tree must only be cleared immediately after the inspection.
- (c) Where a *black cockatoo habitat tree* is identified within the areas cross-hatched yellow on Figure 1 of Schedule 1 and that tree shows *evidence* of current or past breeding use by *black cockatoo species* under condition 6(a), and clearing of that tree cannot be avoided, that tree must be monitored by a *fauna specialist* to determine when it is no longer in use for that breeding season.
- (d) Any *black cockatoo breeding tree* with evidence of current breeding use by *black cockatoo species* must not be cleared whilst it is in use for that breeding season as determined by the *fauna specialist* under condition 6(c).
- (e) For each *black cockatoo breeding tree* identified that cannot be avoided, the permit holder must install an artificial black cockatoo nest hollow.
- (f) Each artificial black cockatoo nesting hollow required by condition 6(e) must be installed prior to commencement of any clearing activities otherwise authorised under this permit.

- (g) The artificial black cockatoo nest hollow(s) required by condition 6(e) of this permit must:
- (i) be installed within Lot 3 on Plan 14769, within the area cross-hatched red on Figure 2 of Schedule 1;
  - (ii) be designed and placed in accordance with the specifications detailed in Schedule 2; and
  - (iii) be monitored and maintained in accordance with the specifications detailed in Schedule 3, for a period of at least ten years.

**7. Offsets – monetary contributions to the Offsets Fund**

Prior to undertaking any clearing authorised under this permit, the permit holder must provide documentary evidence to the *CEO* that funding of \$159,172 has been transferred to the Department of Water and Environmental Regulation for the purpose of establishing or maintaining native vegetation as an environmental offset for the clearing activities authorised under this permit.

**8. Records that must be kept**

The permit holder must maintain records relating to the listed relevant matters in accordance with the specifications detailed in Table 1.

**Table 1: Records that must be kept**

| No. | Relevant matter   | Specifications  |
|-----|---|---|
| 1.  | In relation to the authorised clearing activities generally             | <ul style="list-style-type: none"> <li>(a) the species composition, structure, and density of the cleared area;</li> <li>(b) 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;</li> <li>(c) the date that the area was cleared;</li> <li>(d) the size of the area cleared (in hectares);</li> <li>(e) actions taken to avoid, minimise, and reduce the impacts and extent of clearing in accordance with condition 2; and</li> <li>(f) actions taken to minimise the risk of the introduction and spread of weeds and dieback in accordance with condition 3; and</li> <li>(g) direction of the clearing undertaken in accordance with condition 4.</li> </ul> |
| 2.  | In relation to black cockatoo fauna management pursuant to condition 6. | <ul style="list-style-type: none"> <li>(a) the time(s) and date(s) of inspection(s) of the suitable <i>black cockatoo habitat tree</i> by the <i>fauna specialist</i>;</li> <li>(b) a description of the inspection methodology employed by the <i>fauna specialist</i>;</li> </ul>   |

| No. | Relevant matter | Specifications   |
|-----|-----------------|--|
|     |                 | <p>(c) the species name of any fauna determined by the <i>fauna specialist</i> to be occupying the suitable <i>black cockatoo habitat tree</i>;</p> <p>(d) where the suitable <i>black cockatoo habitat tree</i> is determined by the <i>fauna specialist</i> to be occupied by <i>black cockatoo species</i>:</p> <p style="padding-left: 40px;">(i) the time and date that it was determined to be no longer occupied; and</p> <p style="padding-left: 40px;">(ii) a description of the evidence by which it was determined to be no longer occupied; and</p> <p>(e) the time and date that the suitable <i>black cockatoo habitat tree</i> was cleared.</p> |

## 9. Reporting

The permit holder must provide to the *CEO* the records required under condition 8 of this permit when requested by the *CEO*.

## DEFINITIONS

In this permit, the terms in Table have the meanings defined.

**Table 2: Definitions**

| Term                         | Definition  |
|------------------------------|---|
| black cockatoo habitat trees | means trees that have a diameter, measured at 130 centimetres from the base of the tree, of 50 centimetres or greater (or 30 centimetres or greater for <i>Eucalyptus salmonophloia</i> or <i>Eucalyptus wandoo</i> ) that contain hollows suitable for breeding by black cockatoo species.   |
| black cockatoo species       | means one or more of the following species:<br>(a) <i>Calyptorhynchus lateriosis</i> (Carnaby's cockatoo);<br>(b) <i>Calyptorhynchus baudinii</i> (Baudin's cockatoo); and/or<br>(c) <i>Calyptorhynchus banksii naso</i> (forest red-tailed black cockatoo).  |
| CEO                          | Chief Executive Officer of the department responsible for the administration of the clearing provisions under the <i>Environmental Protection Act 1986</i> .  |
| clearing                     | has the meaning given under section 3(1) of the EP Act.   |
| fauna specialist             | means a person who holds a tertiary qualification specialising 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 <i>Biodiversity Conservation Act 2016</i> . |
| fill                         | means material used to increase the ground level, or to fill a depression.  |
| dieback                      | means the effect of <i>Phytophthora</i> species on native vegetation.   |
| 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.   |
| native vegetation            | has the meaning given under section 3(1) and section 51A of the EP  |

| Term  | Definition  |
|-------|---|
|       | Act.  |
| weeds | <p>means any plant –</p> <ul style="list-style-type: none"> <li>(a) that is a declared pest under section 22 of the <i>Biosecurity and Agriculture Management Act 2007</i>; or</li> <li>(b) published in a Department of Biodiversity, Conservation and Attractions species-led ecological impact and invasiveness ranking summary, regardless of ranking; or</li> <li>(c) not indigenous to the area concerned.</li> </ul> |

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**END OF CONDITIONS**




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Mathew Gannaway  
**MANAGER**  
**NATIVE VEGETATION REGULATION**

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

**13 MAY 2021**



# SCHEDULE 1

The boundary of the area authorised to be cleared is shown in the map below (

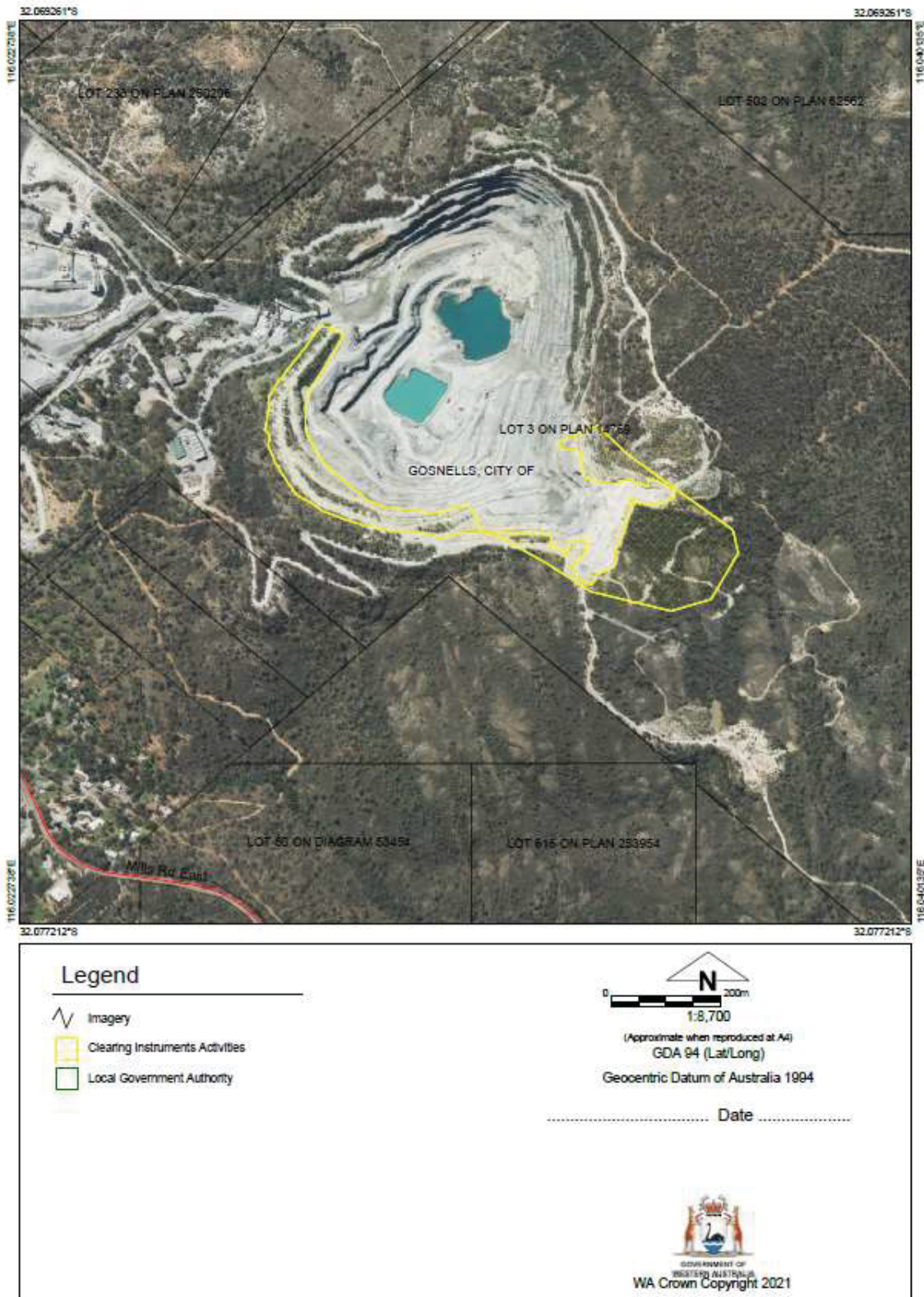
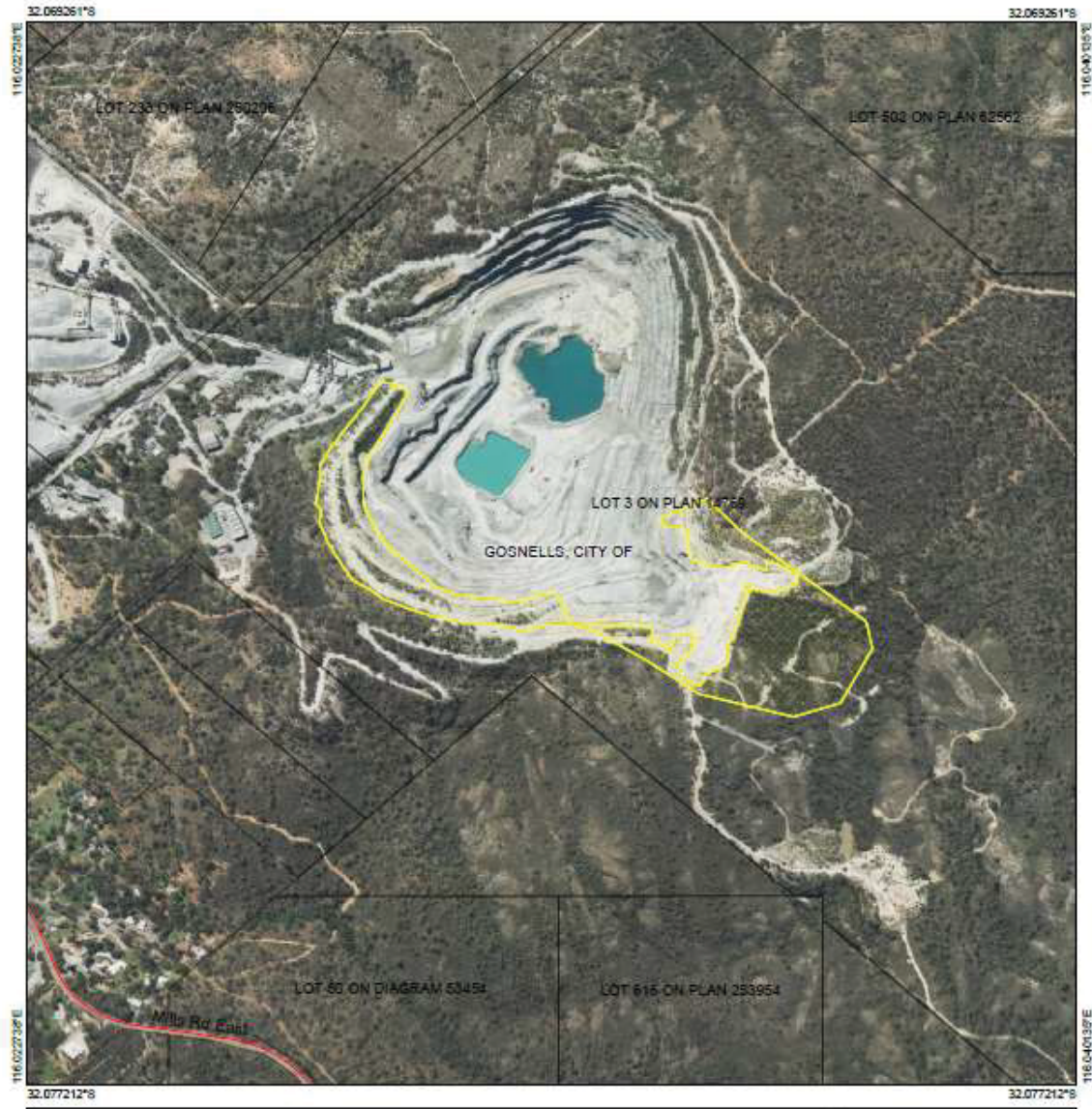


Figure 1).



**Legend**

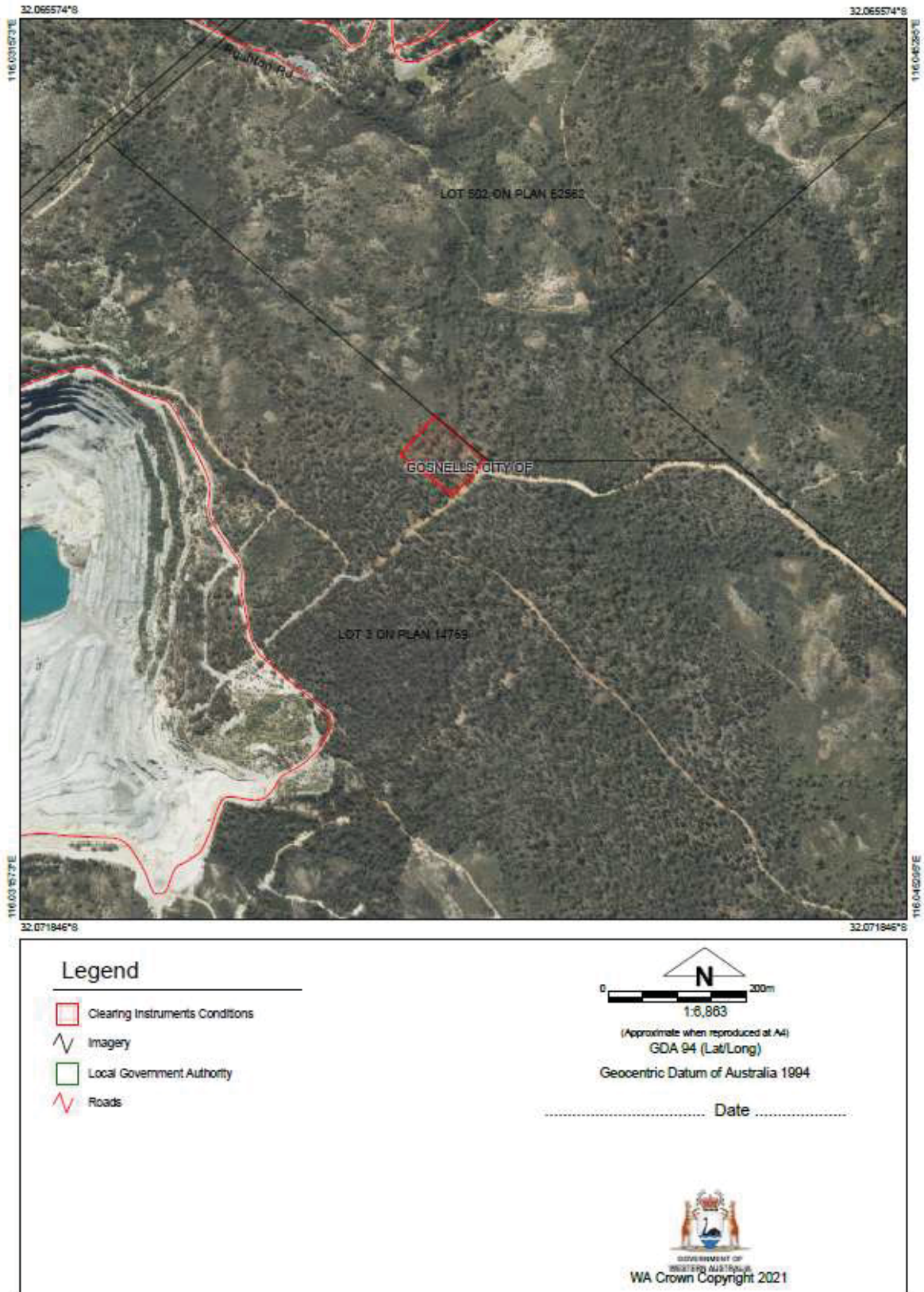
- Imagery
- Clearing Instruments Activities
- Local Government Authority

1:8,700  
 (Approximate when reproduced at A4)  
 GDA 94 (Lat/Long)  
 Geocentric Datum of Australia 1994  
 ..... Date .....

GOVERNMENT OF WESTERN AUSTRALIA  
 WA Crown Copyright 2021

**Figure 1: Map of the boundary of the area within which clearing may occur**





**Figure 2: Map of the boundary of the area (cross hatched red) within which artificial hollows are to be installed and the conservation covenant to be applied.**



## **SCHEDULE 2**

**How to design and place artificial hollows for Carnaby's cockatoo (Department of Parks and Wildlife, 2015)**

## Artificial hollows for Carnaby's cockatoo



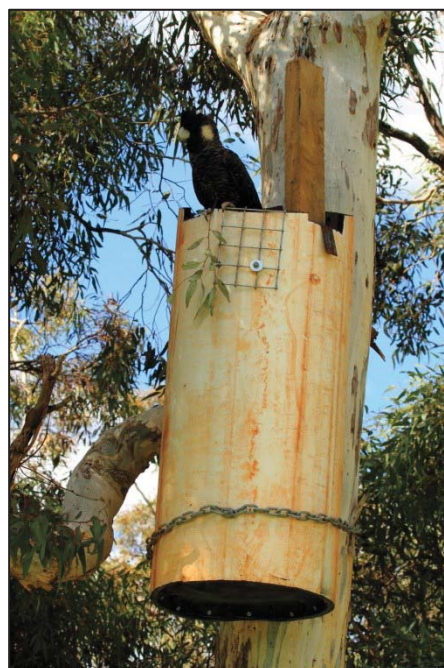
## How to design and place artificial hollows for Carnaby's cockatoo

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

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

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

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



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

## Walls

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

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

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

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## Base

The base of the artificial hollow must be;

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

### **Do not use:**

- Saw dust or fibre products that will retain moisture.

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



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

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## Entrance

The entrance of the artificial hollow must;

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

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



## Ladder

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

The ladder must be;

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

### Do not use:

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

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

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## Sacrificial chewing posts

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

The sacrificial chewing posts must:

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

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



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

*Photo by Rick Dawson*

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## Mountings

The artificial hollows must be mounted such that:

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



## Placement

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

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

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

Artificial hollows to be placed in trees require:

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

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

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

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## Safety

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

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## Maintenance and monitoring

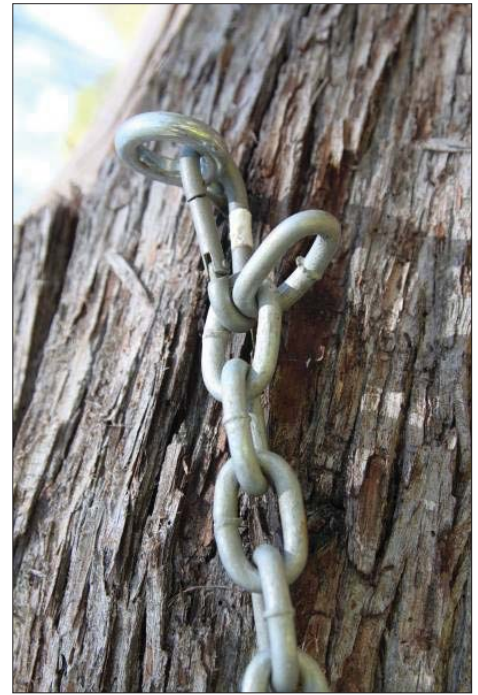
Once artificial hollows have been placed they require monitoring and maintenance to ensure they continue to be useful for nesting by Carnaby's cockatoo. It is important to monitor artificial hollows to determine use by Carnaby's cockatoo, other native species as well as pest species. By undertaking monitoring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

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

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



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



Example fixing for artificial hollow  
Photo by Christine Groom

### **Acknowledgements**

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

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

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

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

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

## **SCHEDULE 3**

**How to monitor and maintain artificial hollows for Carnaby's cockatoo (Department of Parks and Wildlife, 2015)**



## Artificial hollows for Carnaby's cockatoo



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

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

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

Monitoring should be undertaken in order to detect:

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



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

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

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

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



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

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

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

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

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

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### **Observing feeding flocks**

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

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### **Tapping**

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

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

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

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### **Listening for nestlings**

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

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### Looking inside the nest

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

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### How often should I monitor artificial hollows?

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

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### How do I maintain artificial hollows?

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

Maintenance checks should assess the following as a minimum:

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



Artificial hollow base needing repair.  
Photo by Christine Groom

### Repairing hollows

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

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

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**Monitoring of artificial hollows:**

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

**Acknowledgements**

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

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# Clearing Permit Decision Report

## 1. Application details and outcome

### 1.1. Permit application details

|                               |                            |
|-------------------------------|----------------------------|
| <b>Permit number:</b>         | CPS 8582/1                 |
| <b>Permit type:</b>           | Area permit                |
| <b>Applicant name:</b>        | Holcim (Australia) Pty Ltd |
| <b>Application received:</b>  | 27 June 2019               |
| <b>Application area:</b>      | 10.7 hectares (ha)         |
| <b>Purpose of clearing:</b>   | Extractive industry        |
| <b>Method of clearing:</b>    | Mechanical                 |
| <b>Property:</b>              | Lot 3 on Plan 14769        |
| <b>Location (LGA area/s):</b> | City of Gosnells           |
| <b>Localities (suburb/s):</b> | Martin                     |

### 1.2. Description of clearing activities

The application area is distributed across an area of 10.7 ha containing approximately 6.5 ha of native vegetation, which includes five vegetation communities and rehabilitated areas (see Figure 1, Section 1.3).

The proposed clearing is for the development of the south east extension to the existing pit at Gosnells Quarry.

The application was revised during the assessment process. The change included a reduction in the size of the application area from 31.18 ha to 10.7 ha to align with the approved Extractive Industry Licence (EIL) by the City of Gosnells.

### 1.3 Decision on application

|                       |  |
|-----------------------|--|
| <b>Decision:</b>      | Granted  |
| <b>Decision date:</b> | 13 May 2021  |
| <b>Decision area:</b> | 10.7 hectares of native vegetation, as depicted in Section 1.5, below. |

### 1.4 Reasons for decision

This clearing permit application was submitted, accepted, assessed and determined in accordance with sections 51E and 51O of the *Environmental Protection Act 1986* (EP Act). The Department of Water and Environmental Regulation (DWER) advertised the application for 21 days and one submissions was received. Consideration of matters raised in the public submission is summarised in Appendix B.

In making this decision, the Delegated Officer had regard for the site characteristics (see Appendix C), relevant datasets (see Appendix I), and the findings of flora and fauna surveys (see Appendix G), the clearing principles set out in Schedule 5 of the EP Act (see Appendix D), relevant planning instruments and any other matters considered relevant to the assessment (see Section 3).

The assessment identified that the proposed clearing will result in:

- the loss of 4.34 hectares of native vegetation that is suitable foraging and potential breeding habitat for black cockatoo species; and
- the potential introduction and spread of weeds and dieback into adjacent vegetation, and conservation areas which could impact on the quality of the adjacent vegetation and its habitat values.



After consideration of the available information, as well as the applicant's minimisation and mitigation measures (see Section 3.1), the Delegated Officer determined the proposed impacts on black cockatoo habitat can be minimised and managed to be unlikely to lead to an unacceptable risk to the environment. The applicant has suitably demonstrated avoidance and minimisation measures and the offset provided counterbalances the significant residual impacts to black cockatoo habitat (see Section 4). The offset involves the monetary contribution of \$159,172 to purchase 30.61 hectares of native vegetation with very good condition habitat for Carnaby's cockatoo (*Calyptorhynchus latirostris*), Baudin's cockatoo (*Calyptorhynchus baudinii*) and Forest Red-tailed black cockatoo (*Calyptorhynchus banksii naso*) to be protected in perpetuity.

The Delegated Officer decided to grant a clearing permit subject to conditions to:

- avoid, minimise to reduce the impacts and extent of clearing;
- take hygiene steps to minimise the risk of the introduction and spread of weeds and dieback to minimise impacts on adjacent vegetation;
- undertake slow, progressive one directional clearing to allow terrestrial fauna to move into adjacent habitat ahead of the clearing activity;
- inspection of hollows for black cockatoo prior to clearing to ensure no incidental impacts to individuals;
- replacement of hollows with artificial hollows to be placed within a 0.85 ha area that will be protected in perpetuity by a conservation covenant within Lot 3; and
- offset to counterbalance impact to black cockatoo foraging habitat.

### 1.3. Site map

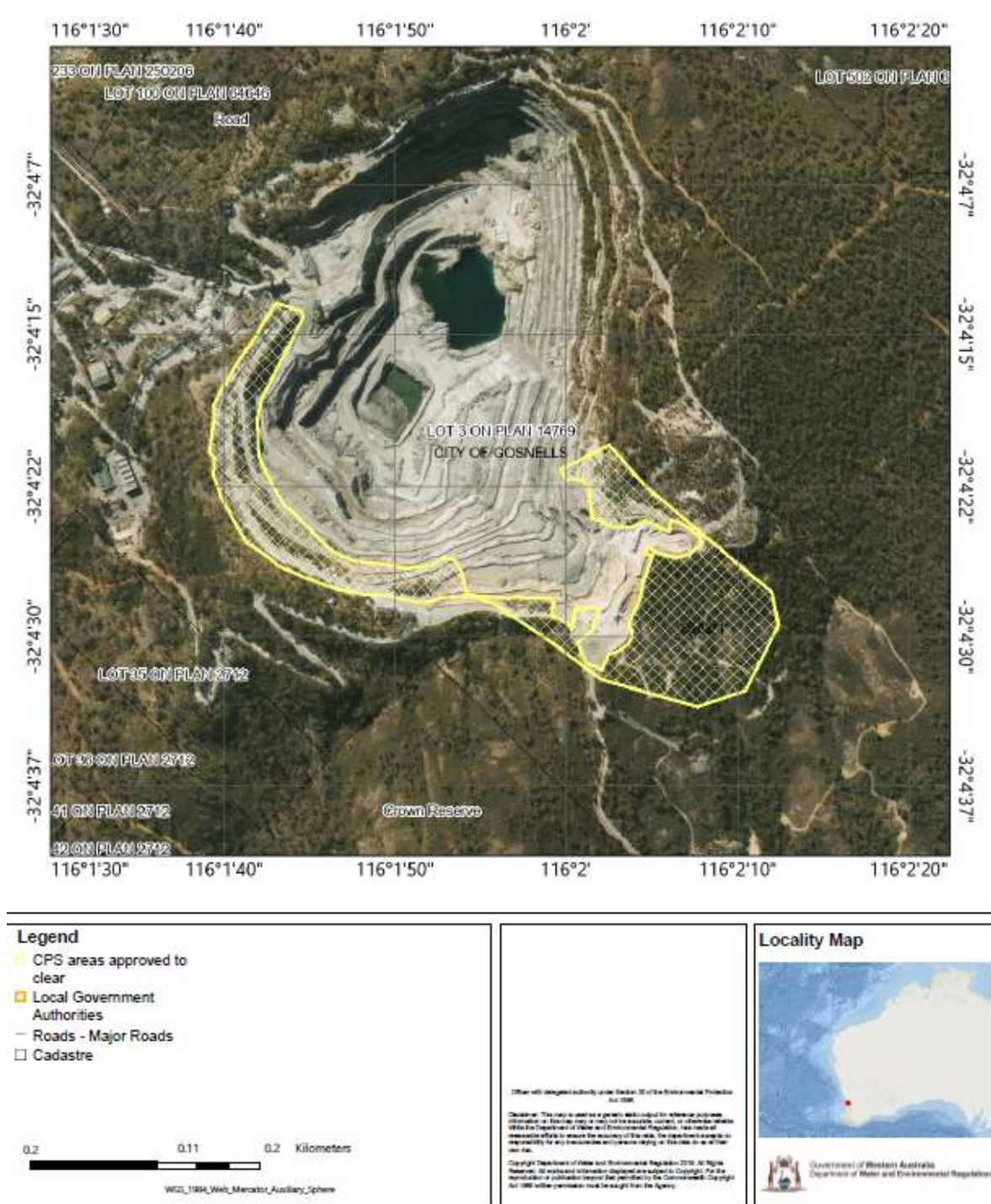


Figure 1. Map of the application area.

The area cross-hatched yellow indicates the area authorised to be cleared.

## 2. Legislative context

The clearing of native vegetation in Western Australia is regulated under the EP Act and the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* (Clearing Regulations).

In addition to the matters considered in accordance with section 51O of the EP Act (see Section 1.3), the Delegated Officer has also had regard to the objects and principles under section 4A of the EP Act, particularly:

1. the precautionary principle;
2. the principle of intergenerational equity;
3. the principle of the conservation of biological diversity and ecological integrity; and
4. the polluter pays principle

Other legislation of relevance for this assessment include:

- *Biodiversity Conservation Act 2016 (WA) (BC Act)*
- *Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act)*
- *Town Planning and Development Act 1928 (WA) (Repealed)*
- *Environmental Protection Act 1971 (WA) (EP Act 1971) (Repealed)*

Relevant policies considered during the assessment were:

- *WA Environmental Offsets Policy (2011)*

The key guidance documents which inform this assessment are:

- *A guide to the assessment of applications to clear native vegetation* (December 2013)
- *Procedure: Native vegetation clearing permits* (DWER, October 2019)
- *WA Environmental Offsets Guidelines* (August 2014)
- Technical guidance – *Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA, 2016)
- Technical guidance – *Terrestrial Fauna Surveys for Environmental Impact Assessment* (EPA, 2016)

### **3. Detailed assessment of application**

#### **3.1. Avoidance and mitigation measures**

The applicant advised that the proposed clearing has been minimised to as small an area as possible (Holcim, 2019). Holcim also operates in accordance with an existing Environmental Management Plan (EMP) that was prepared to support the EIL, as updated from time to time. The EMP provides mitigation measures for potential impacts of clearing on environmental values, including the following:

- Management processes in place to control any runoff or increase in sediment load as a result of clearing. Roads will have appropriate gullying and surface water infrastructure will be installed if required;
- Dieback and Weed Management Plan in place as part of the EMP to reduce the spread of weeds and dieback;
- Dust related impacts will be controlled by the following mitigation measures:
  - Regularly wet down with water cart / truck dust prone unsealed surfaces.
  - Undertake progressive rehabilitation in accordance with the Progressive Rehabilitation Plan (PRP).
  - Undertake dust monitoring as per the Dust Management Plan. Undertake progressive rehabilitation in accordance with the PRP.
  - Implementing additional dust control measures.

In addition to the above, the application was revised during the assessment process. The change included a reduction in the size of the application area from 31.18 ha to 10.7 ha.

The applicant has also proposed to replace hollows of suitable size for black cockatoos with artificial hollows within an area that will be protected in perpetuity under a conservation covenant.

#### **3.2. Assessment of environmental impacts**

In assessing the application in accordance with section 51O of the EP Act, the Delegated Officer has examined the application and site characteristics (Appendix C) and considered whether the clearing poses a risk to environmental values. The assessment against the Clearing Principles is contained in Appendix D.

This assessment identified that the clearing may pose a risk to the environmental values of the vegetation proposed to be cleared, and that these required further consideration. The detailed consideration and assessment of the clearing impacts against the specific environmental values is provided below. Where the assessment found that the clearing presents a risk to environmental values, conditions aimed at controlling and/or ameliorating the impacts have been imposed under sections 51H and 51I of the EP Act. These are also identified below.

##### **3.2.1. Environmental value: biological values (flora) – Clearing Principle (a)**

Assessment: Flora and vegetation surveys have been conducted by AECOM Australia Pty Ltd (AECOM, 2017) within Holcim's maximum development area for the Gosnells Quarry (Quarry area), which encompasses the

application area. A total of 319 vascular flora species from 50 plant families and 150 genera were recorded within the Quarry area, including 305 native species and 14 weed species (AECOM, 2017).

The surveys recorded five flora species of conservation significance within the Quarry area (AECOM, 2017):

- *Acacia horridula* (Priority 3);
- *Asteridea gracilis* (Priority 3);
- *Beaufortia purpurea* (Priority 3);
- *Lasiopetalum glutinosum* subsp. *glutinosum* (Priority 3); and
- *Acacia oncinophylla* subsp. *patulifolia* (Priority 4).

*Acacia horridula* occurs in gravelly soils over granite, sand and rocky hillslides (WAH, 1998-). This species was recorded at one location within the Quarry area comprising six individuals (AECOM, 2017). The population was recorded in vegetation community CcCrTc, under a thicket of *Calothamnus rupestris*. The application area does not include this vegetation community, and no individuals were recorded within the application area. Due to the extensive searches undertaken for this species during the surveys and the absence of it within the application area, the proposed clearing is not likely to have a significant impact to this species on a local or regional scale.

*Asteridea gracilis* is known to occur in sand, clay and gravelly soils (WAH, 1998-). Two distinct populations of this species were recorded within the Quarry area, one south and one northwest of the existing pit. The northern population followed the *Eucalyptus wandoo* (EwHhSa) vegetation community, extending slightly into adjacent heath. The southern population was recorded in community HeSb, also associated with *Eucalyptus wandoo*. This species appears to prefer a more open shrubland under a canopy of trees rather than the dense heath on granite (AECOM, 2017). While vegetation community HeSb is found within the application area, no individuals were recorded. However, it was noted that this species is small and could have been overlooked or hidden under foliage cover from other species. There are five populations of *A. gracilis* within 10 kilometres of the Quarry area, and due to its small size it may be under-sampled in the local area. The proposed clearing is not considered likely to have a significant impact to *A. gracilis* on a local or regional scale.

*Beaufortia purpurea* grows in lateritic or granitic soils and rocky slopes (WAH, 1998-). An estimated 17,198 individuals occur within three distinct populations in the Quarry area (AECOM, 2017). This species was recorded in heath communities including BpSe, and some of VaBs and HeSb, with some isolated occurrences in adjacent woodlands of EmKaLm and EmBsBd. *B. purpurea* was found to be common within the vegetation community BpSe, but not considered to be locally or regionally common, shown by the lack of database records (AECOM, 2017). The application area contains most of the vegetation communities *B. purpurea* were recorded in except for BpSe, however no individuals were recorded within the application area. Due to absence of community BpSe and no records of this species within the application area, it is not likely that the proposed clearing will have a significant impact to *B. purpurea* on a local or regional scale.

*Lasiopetalum glutinosum* subsp. *glutinosum* has previously been recorded in various soil types including lateritic gravel and clay or brown, clayey sand with laterite (WAH, 1998-). Six populations comprising 313 individuals were recorded in the Quarry area (AECOM, 2017). This species was recorded in heath communities associated with granite outcrops including VaBs, HeSb and BpSe. The application area includes communities VaBs and HeSb, however, surveys did not identify this species within the application area. The proposed clearing is therefore not likely to have a significant impact to this species on a local or regional scale.

*Acacia oncinophylla* subsp. *patulifolia* occurs in granitic soils, occasionally on laterite (WAH, 1998-). This species was recorded extensively in VaBs and IdBc, both associated with granite outcrops on upper slopes. Five populations were recorded, comprising a minimum 3,533 individuals (AECOM, 2017). This species is considered locally common within the Quarry area. Considering this and that the surveys did not identify this species within the application area, the proposed clearing is not likely to have a significant impact to this species on a local or regional scale.

A desktop assessment found that *Calothamnus graniticus* subsp. *leptophyllus* (Priority 4) was previously recorded in a rehabilitated area within the Gosnells Quarry boundary in 2004, which has now been cleared. This species is known to occur in clay over granite, lateritic soils and hillsides (WAH, 1998-). Due to the absence of this species within the application area during surveys and availability of suitable habitat within the local area, the proposed clearing is not likely to have a significant impact to this species on a local or regional scale.

No threatened or priority ecological communities were identified within or adjacent to the application area (AECOM, 2017).



**Outcome:** Based on the above assessment, the Delegated Officer has determined that the proposed clearing is not likely to significantly impact priority flora. However it is recognised that the proposed clearing may pose a risk to the adjacent vegetation where priority flora may occur. Hygiene management practices will likely ameliorate this risk.

**Conditions:** To address the above impacts, weed and dieback hygiene management measures will be required as a condition on the clearing permit.

### **3.2.2. Environmental value: biological values (fauna) – Clearing Principle (b)**

**Assessment:** A fauna assessment was conducted by Bamford Consulting Ecologists (Bamford, 2017) within the Quarry area, which encompasses the application area. The assessment included a desktop review, site inspection and targeted fauna surveys. The targeted fauna surveys focussed on species of conservation significance, particularly three species of black cockatoos *Calyptorhynchus baudinii* (Baudin's Black-Cockatoo), *Calyptorhynchus latirostris* (Carnaby's Black-Cockatoo) and *Calyptorhynchus banksii naso* (Forest Red-tailed Black-Cockatoo).

The desktop review identified 194 vertebrate fauna species as potentially occurring in the Quarry area, including 13 frogs, 42 reptiles, 106 birds, 23 native and 10 introduced mammals. Of these species, 11 are considered to be conservation significant and expected to occur in the Quarry area (Appendix C, Section 2). These species are discussed below.

#### **Calyptorhynchus baudinii (Baudin's Black-Cockatoo) (Endangered)**

Baudin's black cockatoo is endemic to a 2,000 kilometre area of the humid and sub-humid zones of southwest Western Australia and is generally contained within the 750 millimetre isohyet of average annual rainfall. This species moves away from the breeding area at the end of the breeding season (January) and form flocks that move in response to changing food resources (DEC, 2008).

Baudin's black cockatoo mainly feeds on the seeds of marri and nest in mature trees such as Marri, Karri, Jarrah and Wandoo in the lower southwest of Western Australia (DEC, 2008).

The range of this species has declined by more than 50 per cent over the past 50 years (Garnett and Crowley, 2000). The principal cause of the decline in range was clearing of the eastern margins of the forests for agriculture and the current primary threat to the population is illegal shooting (DEC, 2008). The main identified threats to the Baudin's cockatoo are illegal shooting, habitat loss through land clearing, nest hollow shortage and competition from other species (DEC, 2008).

Baudin's black cockatoo is expected to be at least an occasional visitor to the Quarry area as it occurs regularly nearby and the area provides suitable foraging habitat (Bamford, 2017). The black cockatoo habitat assessment determined that 4.34 ha of suitable foraging habitat occurs within the application area for black cockatoos with a foraging value of 'negligible to low' to 'moderate', with the majority being moderate. The habitat assessment also identified three potential nesting trees with suitable hollows within the application area. The Recovery Plan for this species identify habitat critical to the species survival as Marri and Jarrah forest (DEC, 2008). Due to the presence of this habitat within the application area, the foraging value it provides, the presence of three potentially suitable nesting trees with hollows and the decline of this species, it is considered that the proposed clearing may have an impact to significant habitat for this species.

#### **Calyptorhynchus latirostris (Carnaby's Black-Cockatoo) (Endangered)**

Carnaby's cockatoo is endemic to the southwest of Western Australia. Breeding takes place between late July and December and occurs mostly in the inland wheatbelt region of its distribution, in areas receiving between 300 and 750 millimetres of annual average rainfall (Saunders, 1974). During the non-breeding season (January to July) the majority of the birds move to the higher rainfall coastal regions of their range including the midwest coast, Swan Coastal Plain and south coast (Saunders, 1980; Saunders, 1990; Berry, 2008; Johnstone et al., 2011). There has been an apparent expansion in the breeding range to include areas further west and south since the middle of last century with a more rapid increase into the Jarrah and Marri forests of the southwest (Johnstone and Storr, 1998; Johnstone et al., 2011). This expansion in breeding range is due to threatening processes such as clearing of breeding habitat and competition for suitable breeding hollows.

Carnaby's cockatoo preferred habitat is remnant native eucalypt woodlands, especially those of Salmon Gum (*Eucalyptus salmonophloia*) and Wandoo (*Eucalyptus wandoo*), and in shrubland or kwongan heathland dominated by plants of the Proteaceae family. It also occurs in forests containing Marri, Jarrah, Karri and Tuart (Parks and Wildlife, 2013).

Carnaby's cockatoo forages on the seeds, flowers and nectar of native proteaceous plant species (e.g. *Banksia*, *Hakea* and *Grevillea* species), eucalypts and *Callistemon* species. The species also forages on seeds of introduced species (e.g. *Pinus* and *Erodium* species, canola and almonds), insects and insect larvae. Carnaby's cockatoo generally forages within six kilometres of a night roost site and, while nesting, within a 12 kilometres radius of their nest site (Commonwealth of Australia, 2012). There are nine confirmed Carnaby's Cockatoo roost areas within 12 kilometres radius of the application area, with the closest areas located approximately 4.37 km and 5.58 km and 7.53 km from the application area.

The black cockatoo habitat assessment determined that foraging value of the application area varied from 'low' to 'moderate', with the majority being moderate.

Carnaby's cockatoo nests in large hollows in tall, living or dead eucalypts. It nests most commonly in smooth-barked Wandoo and Salmon Gum, but has also been recorded breeding in Red Morrel (*Eucalyptus longicornis*), York Gum (*Eucalyptus loxophleba*), Tuart, Flooded Gum (*Eucalyptus rudis*), Swamp Yate (*Eucalyptus occidentalis*), Gimlet (*Eucalyptus salubris*) and Marri, and are said to nest in any species of eucalypt with a suitable hollow (Parks and Wildlife, 2013). As discussed above, the black cockatoo habitat assessment identified three potentially suitable nesting trees with hollows within the application area.

Currently, the overall population trend for Carnaby's cockatoo is one of decline due to the loss and fragmentation of habitat as a result of clearing of native vegetation (Saunders, 1990; Johnstone and Storr, 1998; Saunders and Ingram, 1998; Garnett et al., 2011).

The Carnaby's cockatoo recovery plan summarises habitat critical to the survival of Carnaby's cockatoos as:

- the eucalypt woodlands that provide nest hollows used for breeding, together with nearby vegetation that provides feeding, roosting and watering habitat that supports successful breeding;
- woodland sites known to have supported breeding in the past and which could be used in the future, provided adequate nearby food and/or water resources are available or are re-established; and
- in the non-breeding season the vegetation that provides food resources as well as the sites for nearby watering and night roosting that enable the cockatoos to effectively utilise the available food resources (Parks and Wildlife, 2013).

The recovery plan also states that success in breeding is dependent on the quality and proximity of feeding habitat within 12 kilometres of nesting sites. Along with the trees that provide nest hollows, the protection, management and increase of this feeding habitat that supports the breeding of Carnaby's cockatoo is a critical requirement for the conservation of the species (Parks and Wildlife, 2013).

Due to the presence of 4.34 ha of Carnaby's Cockatoo habitat within the application area, the foraging value it provides, the presence of three potentially suitable nesting trees with hollows, the application area being mapped within confirmed Carnaby's Cockatoo breeding area and confirmed Carnaby's Cockatoo roost areas within 12 kilometres radius of the application area, it is considered that the proposed clearing has an impact to significant habitat for this species that is in decline.

#### *Calyptorhynchus banksii naso* (Forest Red-tailed Black-Cockatoo) (Vulnerable)

The forest red-tailed black cockatoo is endemic to the southwest humid and sub-humid zones of southwest Western Australia and inhabits jarrah, karri and marri forests receiving more than 600 millimetres of annual average rainfall (DEC, 2008).

The forest red-tailed black cockatoo occurs in one population of approximately 15,000 individuals and is known to nest in the large hollows of marri, jarrah and karri (Johnstone and Kirkby, 1999).

The main identified threats to the forest red-tailed black cockatoo are illegal shooting, habitat loss through land clearing, nest hollow shortage and competition from other species (DEC, 2008; DEWHA, 2009a).

Forest Red-tailed black cockatoos are expected to be resident to the Quarry area, with the foraging habitat well-represented due to the presence of preferred native food sources such as Marri and Jarrah (Bamford, 2017). The black cockatoo habitat assessment determined that foraging value of 4.34 ha of the application area varied from 'negligible to low' to 'moderate', with the majority being moderate. Considering the presence of this habitat within the application area and the foraging value it provides, it is considered that the proposed clearing may have an impact to significant habitat for this species.

*Dasyurus geoffroyi* (Chuditch)

Chuditch inhabits a variety of habitats in the region, especially riparian and Jarrah forests, and is known from the region. The Quarry area including the application area comprises suitable habitat for this species (Marri and Jarrah woodland) and therefore may be resident. Habitat for this species are likely to be represented in the adjacent conservation areas and in similar vegetation complexes in the Darling Range. The proposed clearing is not likely to have a significant impact to this species.

*Acanthopis antarcticus* (Southern Death-Adder)

The Southern Death Adder is found in open woodland, heathland and shrubland throughout the Darling Range. This species is considered resident in the Quarry area due to the presence of suitable habitat. Habitat for this species are likely to be represented in the adjacent conservation areas and in similar vegetation complexes in the Darling Range. The proposed clearing is not likely to have a significant impact to this species.

*Ctenotus delli* (Darling Range South-west Ctenotus)

The Darling Range South-west Ctenotus is found only in the Darling Range in Jarrah and Marri woodland. This species was not recorded during surveys, however it is noted that surveys did not include pitfall/funnel trapping or hand searching. The Darling Range South-west Ctenotus is considered resident in the Quarry area due to the presence of suitable habitat. Habitat for this species are likely to be represented in the adjacent conservation areas and in similar vegetation complexes in the Darling Range. The proposed clearing is not likely to have a significant impact to this species.

*Macropus irma* (Western Brush Wallaby)

The Western Brush Wallaby's optimum habitat is open forest or woodland, particularly favouring open, seasonally-wet flats with low grasses and open scrubby thickets. It is also found in some areas of mallee and heath-land (DEC, 2012). The Western Brush Wallaby was recorded on the motion-sensitive cameras in the Quarry area and is likely to be resident in eucalypt woodland in the region. Habitat for this species are likely to be represented in the adjacent conservation areas and in similar vegetation complexes in the Darling Range. The proposed clearing is not likely to have a significant impact to this species.

*Isoodon obesulus* (Quenda)

The Quenda is known to occur in dense shrubland, eucalypt woodland near drainage lines and low-lying areas. Suitable habitat occurs throughout the Quarry area and its presence was confirmed from a recording on the motion-sensitive cameras (Bamford, 2017). Habitat for this species are likely to be represented in the adjacent conservation areas and in similar vegetation complexes in the Darling Range. The proposed clearing is not likely to have a significant impact to this species.

*Falsistrellus mackenziei* (Western False Pipistrelle)

The Western False Pipistrelle occurs in Jarrah and Marri woodland and roosts in tree hollows. This species is a known resident in the region and may utilise parts of the quarry area for foraging or roosting (Bamford, 2017). Presence of this species was confirmed in the Quarry area during 2015 surveys. The conservation areas within the local area are likely to provide this species with suitable habitat. The proposed clearing is not likely to have a significant impact to this species.

*Phascogale tapoatafa tapoatafa* (Brush-tailed Phascogale)

The Brush-tailed Phascogale inhabits Jarrah forests in the region, this habitat occurs in the Quarry area and this species was recorded with a motion-sensitive camera (Bamford, 2017). Habitat for this species are likely to be represented in the adjacent conservation areas and in similar vegetation complexes in the Darling Range. The proposed clearing is not likely to have a significant impact to this species.

*Falco peregrinus* (Peregrine Falcon)

The Peregrine Falcon is found in a wide variety of habitats, with its distribution linked to the abundance of prey. Suitable habitat exists for this species in the region and Quarry area. It nests on cliffs or in very large trees and has the potential to nest in the Quarry area (Bamford, 2017). Due to the variety of habitats this species occurs in and its distribution, the proposed clearing is not likely to have a significant impact to this species.

### *Ninox connivens connivens* (Barking Owl) and *Tyto novaehollandiae* (Masked Owl)

These species are patchily distributed in the Darling Range and may be resident in the Quarry area where they may breed in hollows in the larger trees within Jarrah, Marri and Wandoo woodland (Bamford, 2017). Habitat for these species are likely to be represented in the adjacent conservation areas and in similar vegetation complexes in the Darling Range. The proposed clearing is therefore not likely to have a significant impact to these species.

Outcome: Based on the above assessment, the Delegated Officer has determined that subject to relevant conditions (see below), the proposed clearing is not likely to have a significant impact to this environmental value.

#### Conditions:

To address the above impacts, the following conditions will be added to the permit:

- Slow, progressive one directional clearing (e.g. west to east) to allow fauna to move into adjacent habitat ahead of clearing activity
- Black cockatoo habitat tree inspection prior to clearing to ensure tree is not in use, clearing of tree to not occur if in use.
- Artificial hollow installation within the vicinity of the application area within Lot 3, to replace suitable black cockatoo habitat trees. The 0.85 ha area will be protected in perpetuity under a conservation covenant.
- Offset condition to counterbalance the residual impact to black cockatoo habitat.

### **3.2.3. Environmental value: conservation areas – Clearing Principle (h)**

Assessment: There are a number of conservation areas within the local area, including the following:

- Banyowla Regional Park, to the north, east and south of the application area. The application area is approximately 80 metres from Banyowla Regional Park at its closest point;
- Korung National Park, approximately one kilometre east of the application area;
- Jarrahdale State Forest, approximately five kilometres east of the application area; and
- Stinton Cascades Nature reserve, approximately seven kilometres southeast of the application area.

Due to the application area's proximity to Banyowla Regional Park and Korung National Park, the proposed clearing has the potential to impact these conservation areas through weed and dieback invasion.

Outcome: Based on the above assessment, the Delegated Officer has determined that subject to relevant conditions (see below), the proposed clearing is not likely to have a significant impact to this environmental value.

#### Conditions:

To address the above impacts, weed and dieback management condition will be added to the permit to assist in minimising the risk of the proposed clearing resulting in the spread of weeds and dieback into adjacent conservation areas.

### **3.3. Relevant planning instruments and other matters**

Other relevant authorisations required and have been obtained for the proposed land use include:

- Development Approval under the Metropolitan Region Scheme and *Town Planning and Development Act 1928* (issued by the MRPA and the City of Gosnells in 1984), following the submission of Environmental Review and Management Programme (ERMP) to the Environmental Protection Authority (EPA) by Readymix in 1982 under the *Environmental Protection Act 1971* (EP Act 1971) (Readymix, 1982; EPA Bulletin 120).
- Extractive Industry Licence (issued by the City of Gosnells).
- Works approval / licence issued under Part V Division 3 of the EP Act.

The clearing is consistent with the EIL issued by the City of Gosnells, therefore does not require further local government approvals.

It is the permit holder's responsibility to comply with the *Aboriginal Heritage Act 1972* (WA) and ensure that no Aboriginal Sites of Significance are damaged through the clearing process.

## **4. Suitability of offset**

Through the detailed assessment outlined in Section 3.2 above, the Delegated Officer has determined that the following significant residual impacts remain after the application of the avoidance and mitigation measures summarised in Section 3.1:



- The proposed clearing of 4.34 ha of black cockatoo habitat, containing foraging habitat and potential breeding and roosting trees.

As part of the Gosnell's Quarry Development Approval issued by the Metropolitan Regional Planning Authority (MRPA) and the City of Gosnells in 1984, a land swap involving 236.8 ha owned by Holcim (previously trading as Readymix) for 143 ha of land owned by the State of Western Australia occurred. DWER proposed this land swap area as an offset to counterbalance the residual impacts of the proposed clearing.

Following discussions between DWER and the applicant during the assessment process, the applicant proposed a monetary contribution to the WA Offset fund as an offset for the proposed clearing. The offset involves the monetary contribution of \$159,172 to purchase 30.61 hectares of native vegetation with very good condition habitat for Carnaby's cockatoo (*Calyptorhynchus latirostris*), Baudin's cockatoo (*Calyptorhynchus baudinii*) and Forest Red-tailed black cockatoo (*Calyptorhynchus banksii naso*) to be protected in perpetuity.

The applicant will also be required to install an artificial hollow for each potential black cockatoo breeding tree cleared within an 0.85 ha area that within Lot 3, which will be protected in perpetuity under a conservation covenant.

In assessing whether the proposed offset is adequately proportionate to the significance of the environmental values being impacted, DWER undertook a calculation using the Department of Agriculture, Water and Environment (DAWE) Offsets Assessment Guide 'calculator'. The calculator indicated that the land acquisition of 30.61 ha of Very Good condition vegetation to be protected in perpetuity, is adequate to counterbalance the significant residual impacts of the proposed clearing.

The justification for the values used in the offset calculation is provided in Appendix F.

## Appendix A – Additional information provided by applicant

| Summary of comments  | Consideration of comment   |
|--|--|
| Changes to application area: a reduction from 31.18 ha to 10.7 ha to align with approved EIL by the City of Gosnells.  | Application was re-advertised for 14 days to reflect the reduction in application area.  |
| Briefing note providing the chronological history and steps leading to the development of the preferred project presented in the ERMP and the clearing considerations in relation to the Development Approval granted for Gosnells Quarry. | The intent of the Development Approval following submission of the ERMP was reviewed by DWER, resulting in DWER's consideration of the land swap area as an environmental offset for this application. |

## Appendix B – Details of public submission

The clearing permit application was first advertised on the DWER website on 1 August 2019 with a 21 day submission period. One submission was received in relation to this application during this submission period (Submission, 2019). Matters raised in the submission are summarised in the table below.

The clearing permit application was re-advertised on 24 April 2020 with a 14 day submission period, due to a reduction of the application area. No public submissions were received during this submission period.

| Summary of comments   | Consideration of comment   |
|---|--|
| A survey of an adjacent reserve found a high level of diversity, it is likely the proposed area of clearing for the pit would be similar. Proposed pit area also provides habitat for the Threatened black cockatoo species.  | Considered in the assessment against the Clearing Principles (Appendix D) and of impacts to environmental values (refer to Section 3.2). No conservation significant flora or ecological communities likely to be impacted by the clearing. Impacts to black cockatoos discussed in Section 3.2.2. |
| The development will involve a net removal of habitat for the Threatened black cockatoo species. The land swap does not create new habitat for the black cockatoos, the impacts of the proposed clearing are not sufficiently mitigated by the land swap.                           | Considered in the assessment of suitability of offset (refer to Section 4).  |
| There is 32.4% of the West Darling 4 vegetation association remaining, close to the threshold for clearing to be considered significant. The benefit of the development relative to the retention a vegetation association close to being extensively cleared should be considered. | Due to the revised application area during the assessment process, the proposed clearing does not include the West Darling 4 vegetation association and will therefore not be impacted.  |
| Compliance with the applicant's EMP should be checked and improvements to EMP made.   | Comment has been acknowledged but not within the scope of this assessment. The assessment and approval of the EMP is undertaken by the City of Gosnells and compliance of the EMP is a requirement under the EIL.  |

## Appendix C – Site characteristics

The information provided below describes the key characteristics of the area proposed to be cleared and is based on the best information available to DWER at the time of this assessment. This information was used to inform the assessment of the clearing against the Clearing Principles, contained in Appendix D.

## 1. Site characteristics

| Site characteristic    | Details   |
|------------------------|---|
| Local context          | The proposed clearing area is part of an expansive tract of native vegetation. It is surrounded by woodland and heath communities. Spatial data indicates the local area (10 km radius of the proposed clearing area) retains approximately 41.6% of the original native vegetation cover.  |
| Vegetation description | <p>Vegetation surveys (AECOM, 2017) indicate the vegetation within the proposed clearing area consists of two heath communities, three forest/woodland communities and planted/rehabilitated vegetation.</p> <p>The full survey descriptions and mapping are available in Appendix G.</p> <p>This is consistent with the Heddlé et al. (1980) mapped vegetation complexes:</p> <ul style="list-style-type: none"> <li>• Darling Scarp complex, which is described as a wide range of vegetation from bare rock and lichen-fields through shrublands to woodlands of Marri (<i>Corymbia calophylla</i>), Wandoo (<i>Eucalyptus wandoo</i>), Butter-bark (<i>E. laeliae</i>), Rock Sheoak (<i>Allocasuarina huegeliana</i>) and Mountain Marri (<i>C. haematoxylon</i>); and</li> <li>• Dwellingup complex, which is described as predominantly consisting of open forest of Jarrah-Marri (<i>Eucalyptus marginata-Corymbia calophylla</i>).</li> </ul>                 |
| Vegetation condition   | <p>Vegetation surveys (AECOM, 2017) indicate the vegetation within the proposed clearing area is in Excellent to Completely Degraded (Keighery, 1994) condition.</p> <p>The full Keighery condition rating scale is provided in Appendix E. The full survey descriptions and mapping are available in Appendix G.</p>   |
| Soil description       | <p>The soil is mapped as:</p> <ul style="list-style-type: none"> <li>• <b>Darling Scarp 1 Phase:</b> Gentle to moderate upper slopes (5-30%). Variable moderately well to well drained duplex and gradational soils. Common rock outcrop.</li> <li>• <b>Dwellingup 2 Phase:</b> Very gently to gently undulating terrain (&lt;10%) with well drained, shallow to moderately deep gravelly brownish sands, pale brown sands and earthy sands overlying lateritic duricrust.</li> <li>• <b>Mambup 1 Phase:</b> Gently undulating ridge crests and benches with slopes &lt;20%. Shallow to moderately deep duplex and gradational soils prevail.</li> <li>• <b>Myara 1 Phase:</b> Gentle to steep valley sideslopes (5-35%) and narrow incised valley floors. Variable well drained duplex and gradational soils. Common rock outcrop. <i>E. wandoo</i>, <i>E. accedens</i> and <i>E. marginata</i> on sandy gravels and <i>Acacia</i> spp. On shallow soils.</li> </ul> |
| Land degradation risk  | There is relatively low risk of salinity, wind and water erosion over majority of the application area.   |
| Waterbodies            | The desktop assessment and aerial imagery indicated that one minor, non-perennial watercourse transect a section of the eastern aspect of the application area.   |
| Conservation areas     | Gosnells Quarry is surrounded by neighbouring intact remnant vegetation, much of which is associated with Banyowla Regional Park. The application area is approximately 80 metres from Banyowla Regional Park at its closest point.   |
| Climate and landform   | <p>The Perth region has a warm Mediterranean climate, characterised by hot dry summers and cool to mild wet winters. Gosnells City has experienced an average annual rainfall of 825 mm since 1961, with the majority of rainfall occurring between May and August (BoM, 2015).</p> <p>The Quarry is located on the eastern edge of the Darling Scarp. The surface geology of the entire Quarry area consists of igneous felsic intrusives, which are described as</p>  |

| Site characteristic | Details   |
|---------------------|---|
|                     | undifferentiated felsic intrusive rocks, including monzogranite, granodiorite, granite, tonalite, quartz monzonite, syenogranite, diorite, monzodiorite, and pegmatite. Locally metamorphosed, foliated gneissic, local abundant mafic and ultramafic inclusions (Geological Survey of Western Australia and Geoscience, 2008). |

## 2. Flora, fauna and ecosystem analysis

With consideration for the site characteristics set out above, relevant datasets (see Appendix G), and biological survey information, the following conservation significant flora and fauna species, and ecological communities may be impacted by the clearing.

| Species / Ecological Community   | Conservation status | Distance of closest record to application area (kilometres) | Suitable soil type? (flora, ecological community) | Suitable habitat features (fauna) | Are surveys adequate to identify? (Y, N, N/A) |
|--|---------------------|---|---|-----------------------------------|---|
| <b>Flora</b>   |                     |   |   |                                   |   |
| <i>Beaufortia purpurea</i>   | P3                  | 0.07  | Y   | N/A                               | Y   |
| <i>Acacia horridula</i>  | P3                  | 0.04  | Y   | N/A                               | Y   |
| <i>Asteridea gracilis</i>  | P3                  | 0.10  | Y   | N/A                               | Y   |
| <i>Lasiopetalum glutinosum</i> subsp. <i>glutinosum</i>                | P3                  | 0.30  | Y   | N/A                               | Y   |
| <i>Acacia oncinophylla</i> subsp. <i>patulifolia</i>                   | P4                  | 0.10  | Y   | N/A                               | Y   |
| <i>Calothamnus graniticus</i> subsp. <i>leptophyllus</i>               | P4                  | 0.04 (historic record)                                      | Y   | N/A                               | Y   |
| <b>Fauna</b>   |                     |   |   |                                   |   |
| <i>Calyptorhynchus banksii naso</i> (Forest Red-tailed Black-Cockatoo) | VU                  | Recorded within Quarry area                                 | N/A   | Y                                 | Y   |
| <i>Calyptorhynchus baudinii</i> (Baudin's Black-Cockatoo)              | EN                  | <10   | N/A   | Y                                 | Y   |
| <i>Calyptorhynchus latirostris</i> (Carnaby's Black-Cockatoo)          | EN                  | <10   | N/A   | Y                                 | Y   |
| <i>Dasyurus geoffroyi</i> (Chuditch)                                   | VU                  | <10   | N/A   | Y                                 | Y   |
| <i>Phascogale tapoatafa tapoatafa</i> (Brush-tailed Phascogale)        | CD                  | Recorded within Quarry area                                 | N/A   | Y                                 | Y   |
| <i>Ninox connivens connivens</i> (Barking Owl)                         | P3                  | <10   | N/A   | Y                                 | Y   |
| <i>Tyto novaehollandiae</i> (Masked Owl)                               | P3                  | <10   | N/A   | Y                                 | Y   |



| Species / Ecological Community                              | Conservation status | Distance of closest record to application area (kilometres) | Suitable soil type? (flora, ecological community) | Suitable habitat features (fauna) | Are surveys adequate to identify? (Y, N, N/A) |
|---|---------------------|---|---|-----------------------------------|---|
| <i>Acanthophis antarcticus</i> (Southern Death-Adder)       | P3                  | <10   | N/A   | Y                                 | Y   |
| <i>Macropus Irma</i> (Brush Wallaby)                        | P4                  | Recorded within Quarry area                                 | N/A   | Y                                 | Y   |
| <i>Isodon obesulus</i> (Quenda)                             | P4                  | Recorded within Quarry area                                 | N/A   | Y                                 | Y   |
| <i>Ctenotus delli</i> (Darling Range South-west Ctenotus)   | P4                  | <10   | N/A   | Y                                 | N   |
| <i>Falsistrellus mackenziei</i> (Western False Pipistrelle) | P4                  | Recorded within Quarry area                                 | N/A   | Y                                 | Y   |
| <i>Falco peregrinus</i> (Peregrine Falcon)                  | OS                  | Recorded within Quarry area                                 | N/A   | Y                                 | Y   |
| <b>Ecological community</b>                                 |                     |   |   |                                   |   |
| Central Northern Darling Scarp Granite Shrubland Community  | P4                  | 0.19  | Y   | N/A                               | Y   |

### 3. Vegetation extent

|                     | Pre-European extent (ha) | Current extent (ha) | % remaining | Current extent in all DBCA managed land (ha) | % current extent in all DBCA managed land (proportion of pre-European extent) |
|---------------------|--------------------------|---------------------|-------------|--|---|
| IBRA bioregion      |                          |                     |             |  |   |
| Jarrah Forest       | 4,506,660.25             | 2,399,838.15        | 53.25       | 1,673,614.25                                 | 37.14   |
| Vegetation complex  |                          |                     |             |  |   |
| Darling Scarp (DS2) | 32,448.29                | 13,586.40           | 41.87       | 3,287.66                                     | 10.13   |
| Dwellingup (D2)     | 86,128.33                | 71,055.96           | 82.50       | 58,975.34                                    | 68.47   |

## Appendix D – Assessment against the Clearing Principles

| Assessment against the Clearing Principles   | Variance level               | Is further consideration required?   |
|--|------------------------------|--------------------------------------|
| <b>Environmental value: biological values</b>  |                              |                                      |
| <p><u>Principle (a):</u> <i>“Native vegetation should not be cleared if it comprises a high level of biodiversity.”</i></p> <p><u>Assessment:</u></p> <p>The application area does not contain conservation significant flora, ecological communities or higher diversity compared to the local area. However, it contains suitable habitat for conservation significant fauna.</p>  | Not likely to be at variance | Yes<br>Refer to Section 3.2.2 above. |
| <p><u>Principle (b):</u> <i>“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.”</i></p> <p><u>Assessment:</u></p> <p>The application area contains foraging, potential roosting and breeding habitat for conservation significant fauna.</p>  | Is at variance               | Yes<br>Refer to Section 3.2.2 above. |
| <p><u>Principle (c):</u> <i>“Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora.”</i></p> <p><u>Assessment:</u></p> <p>The application area is unlikely to contain habitat for flora species listed under the BC Act.</p>  | Not likely to be at variance | No                                   |
| <p><u>Principle (d):</u> <i>“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.”</i></p> <p><u>Assessment:</u></p> <p>The application area does not contain species that indicate a threatened ecological community.</p>  | Not likely to be at variance | No                                   |
| <b>Environmental values: significant remnant vegetation and conservation areas</b>   |                              |                                      |
| <p><u>Principle (e):</u> <i>“Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.”</i></p> <p><u>Assessment:</u></p> <p>The extent of the mapped vegetation type and native vegetation in the local area is consistent with the national objectives and targets for biodiversity conservation in Australia. Vegetation in the proposed clearing area is not considered to be part of a significant ecological linkage in the local area.</p> | Not likely to be at variance | No                                   |
| <p><u>Principle (h):</u> <i>“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.”</i></p> <p><u>Assessment:</u></p> <p>Given the distance to the nearest conservation area, the proposed clearing may have an impact on the environmental values of nearby conservation areas.</p>  | May be at variance           | Yes<br>Refer to Section 3.2.2 above. |

| Assessment against the Clearing Principles   | Variance level               | Is further consideration required? |
|--|------------------------------|------------------------------------|
| <b>Environmental values: land and water resources</b>  |                              |                                    |
| <p><u>Principle (f):</u> <i>“Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.”</i></p> <p><u>Assessment:</u></p> <p>One minor, non-perennial watercourse transects a section of the eastern aspect of the application area, however no vegetation associated with a watercourse was identified from the surveys. Proposed clearing is not likely to impact vegetation associated with this watercourse.</p> | Not likely to be at variance | No                                 |
| <p><u>Principle (g):</u> <i>“Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.”</i></p> <p><u>Assessment:</u></p> <p>The mapped soils are not susceptible to wind / water erosion, nutrient export, salinity. Noting the extent of the application area and mitigation measures that will be implemented by the applicant, the proposed clearing is not likely to have an appreciable impact on land degradation.</p>           | Not likely to be at variance | No                                 |
| <p><u>Principle (i):</u> <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.”</i></p> <p><u>Assessment:</u></p> <p>Given no water courses / wetlands / Public Drinking Water Sources Areas are recorded within the application area, the clearing is unlikely to impact surface or ground water quality.</p>  | Not likely to be at variance | No                                 |
| <p><u>Principle (j):</u> <i>“Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.”</i></p> <p><u>Assessment:</u></p> <p>The surveyed soils and topographic contours in the surrounding area do not indicate the proposed clearing is likely to contribute to increased incidence or intensity of flooding.</p>   | Not likely to be at variance | No                                 |

### Appendix E – Vegetation condition rating scale

Vegetation condition is a rating given to a defined area of vegetation to categorise and rank disturbance related to human activities. The rating refers to the degree of change in the vegetation structure, density and species present in relation to undisturbed vegetation of the same type. The degree of disturbance impacts upon the vegetation's ability to regenerate. Disturbance at a site can be a cumulative effect from a number of interacting disturbance types.

| Condition | Description  |
|-----------|--|
| Pristine  | Pristine or nearly so, no obvious signs of disturbance.  |
| Excellent | Vegetation structure intact, with disturbance affecting individual species; weeds are non-aggressive species.  |
| Very Good | Vegetation structure altered, with obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and/or grazing. |

|                     |  |
|---------------------|--|
| Good                | Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and/or grazing. |
| Degraded            | Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and/or grazing.                 |
| Completely Degraded | The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.   |

### Appendix F – Offset calculator value justification - land acquisition



| Field Name  | Description   | Justification for value used   |
|---|---|--|
| <i>IUCN Criteria</i>  | The IUCN criteria for the value being impacted  | 1.2% - Carnaby's cockatoos listed as Endangered  |
| <i>Area of impact (habitat/community) or Quantum of impact (features/individuals)</i>           | The area of habitat/community impacted or number of features/individuals impacted   | 4.34 hectares - area of black cockatoo habitat within application area   |
| <i>Quality of impacted area (habitat/community)</i>   | The quality score for area of habitat/community being impacted - a measure of how well a particular site supports a particular threatened species or ecological community and contributes to its ongoing viability. | 7 - vegetation considered to be very good to excellent condition that contains foraging habitat as well as potential breeding hollows. |
| <i>Time over which loss is averted (habitat/community)</i>                                      | This describes the timeframe over which changes in the level of risk to the proposed offset site can be considered and quantified   | 20 years is the maximum figure attributed to the DAWE calculator. The expectation is that offset sites are protected in perpetuity.    |
| <i>Time until ecological benefit (habitat/community) or Time horizon (features/individuals)</i> | This describes the estimated time (in years) that it will take for the main benefit of the quality (habitat/community) or value (features/individuals) improvement of the proposed offset to be realised            | 1 year - provides for up to 12 months to identify a suitable land parcel for purchase.   |
| <i>Start area (habitat/community) or Start value (features/individuals)</i>                     | The area of habitat/community or number of features/individuals proposed to offset the impacts  | 30.61 hectares - reverse-calculated using the 'what if' function to achieve 100% offset based on assumptions.                          |
| <i>Start quality (habitat/community)</i>  | The quality score for the area of habitat/community proposed as an offset - a measure of how well a particular site supports a particular threatened species or ecological community and                            | 7 - vegetation within offset area considered to be in very good condition that contains black cockatoo habitat.                        |





| <b>Field Name</b>   | <b>Description</b>   | <b>Justification for value used</b>  |
|---|--|--|
|   | contributes to its ongoing viability   |  |
| <i>Future quality without offset (habitat/community) or Future value without offset (features/individuals)</i>    | The predicted future quality score (habitat/community) or value (features/individuals) of the proposed offset site without the offset  | 7 - the condition of the vegetation is unlikely to change in the presence of a change in land tenure.  |
| <i>Future quality with offset (habitat/community) or Future value with offset (features/individuals)</i>          | The predicted future quality score (habitat/community) or value (features/individuals) of the proposed offset site with the offset   | 7 - it is expected that over the foreseeable future, the current condition of the site will not deteriorate in the absence of a change in land tenure. |
| <i>Risk of loss (%) without offset (habitat/community)</i>  | This describes the chance that the habitat/community on the proposed offset site will be completely lost (i.e. no longer hold any value for the protected matter of concern) over the foreseeable future without an offset | 30% - assumed as site unknown. 30% is standard value used for rural zoned land.  |
| <i>Risk of loss (%) with offset (habitat/community)</i>   | This describes the chance that the habitat/community on the proposed offset site will be completely lost (i.e. no longer hold any value for the protected matter of concern) over the foreseeable future with an offset    | 10% - It is considered that the risk of development will be reduced with the proposed change of reserve purpose to 'conservation'.                     |
| <i>Confidence in result (%) – risk of loss (habitat/community)</i>  | The capacity of measures to mitigate risk of loss of the proposed offset site  | 90% - It is considered that there is a high level of confidence the measure will be successful in mitigating the risk of loss of the site.             |
| <i>Confidence in result (%) – Change in quality (habitat/community) or Change in value (features/individuals)</i> | The level of certainty about the successful achievement of the proposed change in quality (habitat/community) or value (features/individuals)  | 90% - there is a high level of confidence that the offset will not change in quality.  |
| <i>% of impact offset</i>   | % of the significant residual impact that would be offset by the proposed offset (note: the offset calculations combined should equate to 100% for each residual impact)   | 100% - to achieve 100% offset based on assumptions.  |

## Appendix G – Biological survey information excerpts / photographs of the vegetation



### Vegetation associations within the Quarry area (AECOM 2017)

| Code | Description   | Comments   | Photograph   |
|------|---|--|--|
| BpSr | <p><i>Beaufortia purpurea</i>, <i>Hakea uncinata</i>, <i>Verticordia acerosa</i> var. <i>acerosa</i>, <i>Petrophile squamata</i> subsp. <i>squamata</i> and <i>Allocasuarina humilis</i> mid shrubland over <i>Beaufortia macrostemon</i>, <i>Banksia armata</i> var. <i>armata</i>, <i>Astroloma glaucescens</i>, <i>Babingtonia pelloeae</i> and <i>Hibbertia hypericoides</i> low open shrubland over <i>Stylidium repens</i>, <i>Thysanotus manglesianus</i>, <i>Goodenia coerulea</i> and <i>Stylidium bulbiferum</i> low sparse forbland.</p> <p>Supports populations of <i>Beaufortia purpurea</i> (P3) and <i>Lasiopetalum glutinosum</i> subsp. <i>glutinosum</i> (P3). These are further discussed in Section 6.3.1.</p>  | <p>Species richness: 52 native species.</p> <p>Survey effort: CK3, HO28, HO29.</p> <p>Area: 4.43 ha</p>                                  |   |
| HeSb | <p><i>Eucalyptus wandoo</i> low isolated trees over <i>Hakea erinacea</i>, <i>Verticordia acerosa</i> var. <i>acerosa</i>, <i>Leucopogon sprengeioides</i>, <i>Melaleuca radula</i> and <i>Xanthorrhoea drummondii</i> mid shrubland over <i>Hibbertia hypericoides</i>, <i>Melaleuca parviceps</i>, <i>Babingtonia camphorosmae</i>, <i>Beaufortia purpurea</i> and <i>Hakea incrassata</i> low shrubland over <i>Stylidium bulbiferum</i>, <i>Stylidium calcaratum</i>, <i>Cassytha racemosa</i> forma <i>racemosa</i>, <i>Stylidium eriopodum</i> and <i>Drosera glanduligera</i> low sparse forbland.</p> <p>Predominantly heathland with some mallee form <i>Eucalyptus wandoo</i> and <i>Corymbia calophylla</i> as an ecotone to adjacent forest. Variable in density of <i>Hakea erinacea</i>.</p> <p>Supports populations of <i>Asteridea gracilis</i> (P3), <i>Beaufortia purpurea</i> (P3) and <i>Lasiopetalum glutinosum</i> subsp. <i>glutinosum</i> (P3). These are further discussed in Section 6.3.1.</p> | <p>Species richness: 122 native species, four weed species.</p> <p>Survey effort: HO1, HO17, HO26, HO30, HO31.</p> <p>Area: 10.11 ha</p> |  |





| Code | Description  | Comments   | Photograph   |
|------|--|--|--|
| IdBc | <p><i>Acacia oncinophylla</i> subsp. <i>patulifolia</i> and <i>Xanthorrhoea drummondii</i> tall open shrubland over <i>Isopogon dubius</i>, <i>Verticordia acerosa</i> var. <i>acerosa</i>, <i>Hakea erinacea</i>, <i>Melaleuca holosericea</i> and <i>Allocasuarina humilis</i> medium shrubland over <i>Astroloma glaucescens</i>, <i>Cryptandra pungens</i>, <i>Hibbertia subvaginata</i>, <i>Melaleuca parviceps</i>, <i>Hakea undulata</i> and <i>Hibbertia hypericoides</i> low shrubland with <i>Borya constricta</i>, <i>Stylidium eriopodum</i>, <i>Pterochaeta paniculata</i>, <i>Stylidium brunonianum</i>, and <i>Thysanotus scaber</i> low sparse forbland.</p> <p>Dominated by <i>A. oncinophylla</i> subsp. <i>patulifolia</i> (P4) throughout most of the community with the exception of HO21 and HO25. This is further discussed in Section 6.3.1.</p> | <p>Species richness: 87 native species.</p> <p>Survey effort: HO4, HO14r, HO21, HO22, HO25.</p> <p>Area: 3.32 ha</p>                     |   |
| VaBs | <p><i>Acacia oncinophylla</i> subsp. <i>patulifolia</i> and <i>Melaleuca holosericea</i> tall sparse shrubs over <i>Verticordia acerosa</i> var. <i>acerosa</i>, <i>Verticordia insignis</i> subsp. <i>insignis</i>, <i>Verticordia plumosa</i> var. <i>plumosa</i> and <i>Hakea erinacea</i> mid shrubland over <i>Borya sphaerocephala</i>, <i>Stylidium bulbiferum</i>, <i>Drosera gigantea</i>, <i>Glischrocaryon aureum</i> and <i>Pterochaeta paniculata</i> low open forbland.</p> <p>Supports populations of <i>Acacia oncinophylla</i> subsp. <i>patulifolia</i> (P4), <i>Beaufortia purpurea</i> (P3) and <i>Lasiopetalum glutinosum</i> subsp. <i>glutinosum</i> (P3). These are further discussed in Section 6.3.1.</p>  | <p>Species richness: 75 native species, eight weed species.</p> <p>Survey effort: CK4, CK5, CK10, HO13r, HO27.</p> <p>Area: 15.18 ha</p> |  |




| Code                        | Description  | Comments   | Photograph   |
|-----------------------------|--|--|--|
| <b>Thicket</b>              |  |  |  |
| CcCrTc                      | <p><i>Corymbia calophylla</i> mid isolated trees over <i>Calothamnus rupestris</i>, <i>Xanthorrhoea preissii</i> and <i>Hakea undulata</i> tall closed shrubland over <i>Hibbertia hypericoides</i>, <i>Banksia dallanneyi</i> var. <i>dallanneyi</i>, <i>Gompholobium tomentosum</i>, <i>Synaphea acutiloba</i> and <i>Hakea amplexicaulis</i> low sparse shrubland with <i>Tetraria capillaris</i> and <i>Tetraria octandra</i> low sparse sedgeland with <i>Stylidium piliferum</i>, <i>Stylidium bulbiferum</i>, <i>Trichocline spathulata</i>, <i>Dampiera alata</i> and <i>Patersonia occidentalis</i> low sparse forbland.</p> <p>Supports population of <i>Acacia horridula</i> (P3), discussed in Section 6.3.1.</p>      | <p>Species richness: 46 native species.</p> <p>Survey effort: HO8r, HO15, HO19.</p> <p>Area: 3.29 ha</p>                                   |   |
| <b>Forest and Woodlands</b> |  |  |  |
| CcHtHh                      | <p><i>Corymbia calophylla</i> and <i>Eucalyptus marginata</i> subsp. <i>marginata</i> mid open forest over <i>Hakea trifurcata</i>, <i>Xanthorrhoea preissii</i>, <i>Hakea undulata</i>, and <i>Hakea prostrata</i> mid to tall shrubland over <i>Hibbertia hypericoides</i>, <i>Hibbertia commutata</i>, <i>Banksia dallanneyi</i> var. <i>dallanneyi</i>, <i>Hibbertia huegelii</i> and <i>Bossiaea ornata</i> low open shrubland with <i>Lepidosperma leptostachyum</i> and <i>Cyathochaeta avenacea</i> mid open sedgeland with <i>Scaevola calliptera</i>, <i>Cassytha racemosa</i>, <i>Pentapeltis peltigera</i>, <i>Xanthosia candida</i>, <i>Conostylis setosa</i> and <i>Burchardia congesta</i> mid sparse forbland.</p> | <p>Species richness: 96 native species, one weed species.</p> <p>Survey effort: Ck6, CK7, CK9, HO3, HO12r, HO32.</p> <p>Area: 32.31 ha</p> |  |



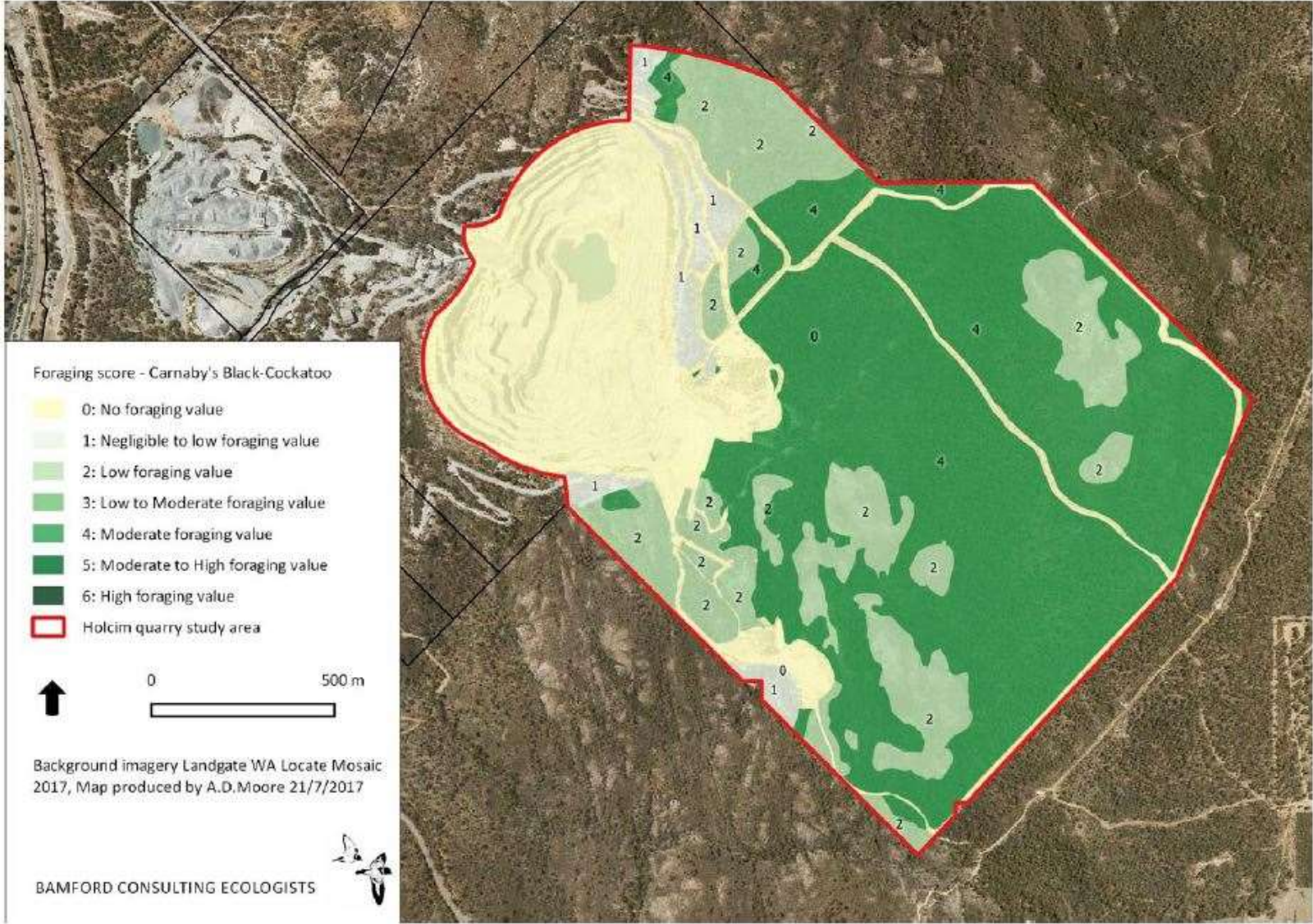
| Code   | Description   | Comments   | Photograph   |
|--------|---|--|--|
| EmBsBd | <p><i>Eucalyptus marginata</i> subsp. <i>marginata</i>, <i>Corymbia calophylla</i> and <i>Allocasuarina fraseriana</i> mid open forest over <i>Banksia sessilis</i> var. <i>sessilis</i>, <i>Xanthorrhoea preissii</i> and <i>Hakea undulata</i> tall shrubland over <i>Banksia dallaneyi</i> var. <i>dallaneyi</i>, <i>Hibbertia hypericoides</i>, <i>Bossiaea ornata</i>, <i>Hibbertia commutata</i> and <i>Hypocalymma robustum</i> low shrubland with <i>Lepidosperma leptostachyum</i>, <i>Tetraria capillaris</i> and <i>Lepidosperma pubisquamum</i> mid sparse sedgeland with <i>Orthrosanthus laxus</i> var. <i>laxus</i>, <i>Conostylis setosa</i>, <i>Lomandra caespitosa</i>, <i>Burchardia congesta</i>, <i>Pentapeltis peltigera</i>, and <i>Thysanotus manglesianus</i> low sparse forbland.</p> <p>Isolated occurrence of <i>Beaufortia purpurea</i> (P3) recorded in this community.</p> | <p>Species richness: 137 native species, two weed species.</p> <p>Survey effort: CK1, CK2, CK8, HO2, HO5, HO6, HO9r, HO33.</p> <p>Area: 53.50 ha</p> |   |
| EwHhSa | <p><i>Eucalyptus wandoo</i> subsp. <i>wandoo</i>, <i>Corymbia calophylla</i> and <i>Eucalyptus marginata</i> subsp. <i>marginata</i> medium open forest over <i>Xanthorrhoea preissii</i> and occasional <i>Xanthorrhoea drummondii</i> tall open shrubland over <i>Macrozamia riedlei</i>, <i>Hibbertia hypericoides</i>, <i>Acacia pulchella</i> var. <i>pulchella</i>, <i>Boronia ovata</i>, <i>Hakea lissocarpa</i> and <i>Hakea stenocarpa</i> low shrubland over <i>Stylidium affine</i>, <i>Acanthocarpus canaliculatus</i>, <i>Conostylis setosa</i>, <i>Lagenophora huegelii</i> and <i>Trichocline spathulata</i> low sparse forbland.</p> <p>Supports populations of <i>Asteridea gracilis</i> (P3), discussed in Section 5.1.</p>   | <p>Species richness: 92 native species, three weed species.</p> <p>Survey effort: HO10, HO11, HO23, HO24.</p> <p>Area: 5.10 ha</p>                   |  |



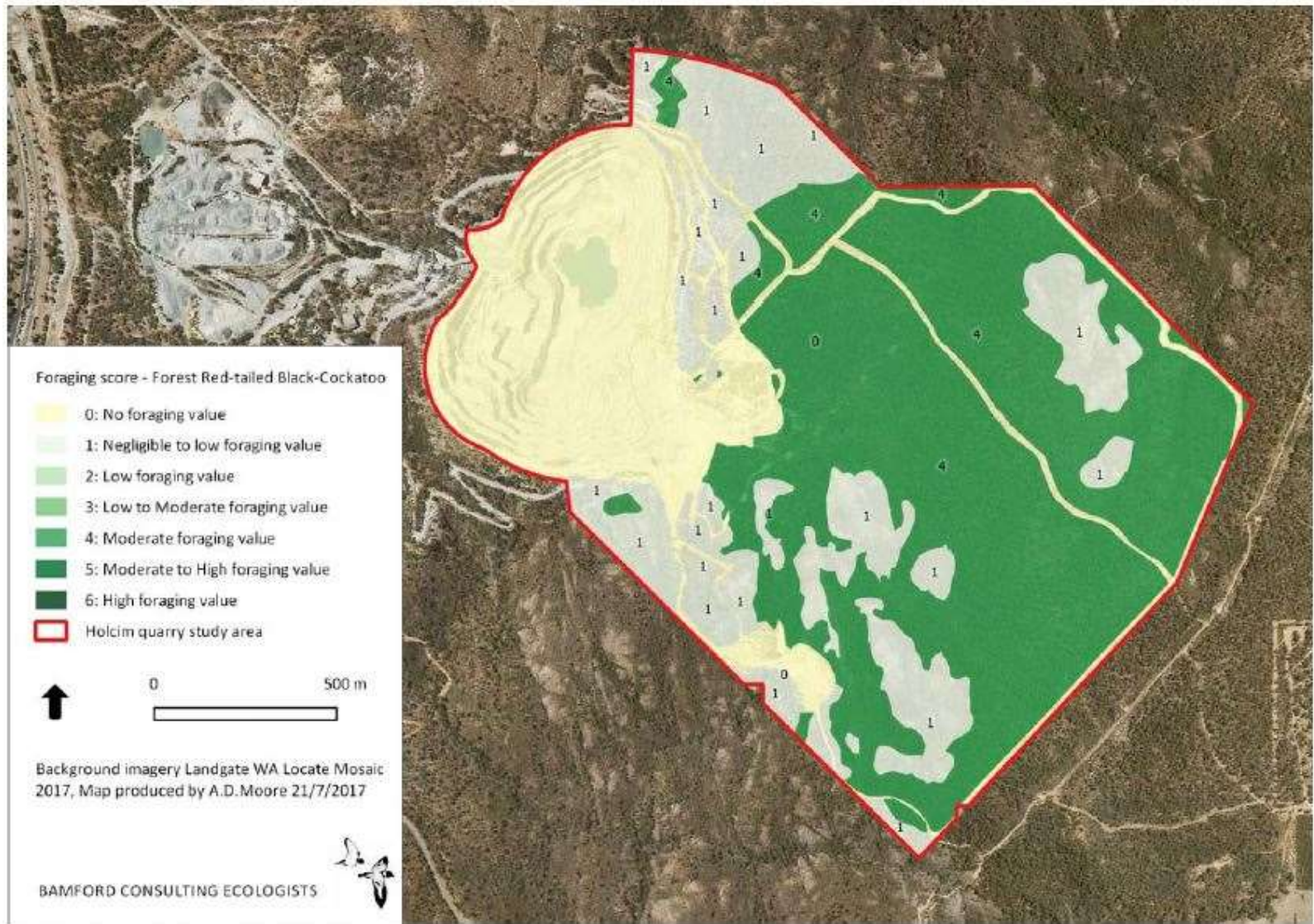
| Code   | Description  | Comments   | Photograph   |
|--------|--|--|--|
| EmKaLm | <p><i>Eucalyptus marginata</i> subsp. <i>marginata</i> and <i>Corymbia calophylla</i> mid open woodland over <i>Kingia australis</i> and <i>Xanthorrhoea drummondii</i> tall open shrubland over <i>Lambertia multiflora</i> var. <i>darlingensis</i>, <i>Beaufortia macrostemon</i>, <i>Hibbertia hypericoides</i>, <i>Paragonis grandiflora</i> and <i>Banksia armata</i> var. <i>armata</i> low shrubland with <i>Mesomelaena tetragona</i> and <i>Lepidosperma leptostachyum</i> mid sparse sedgeland over <i>Patersonia occidentalis</i>, <i>Lomandra effusa</i>, <i>Stylidium brunonianum</i>, <i>Dampiera linearis</i> and <i>Drosera glanduligera</i> low sparse forbland.</p> <p>Isolated occurrence of <i>Beaufortia purpurea</i> (P3) recorded in this community.</p> | <p>Species richness: 83 native species.</p> <p>Survey effort: HO7, HO18, HO20.</p> <p>Area: 10.54 ha</p> |  |



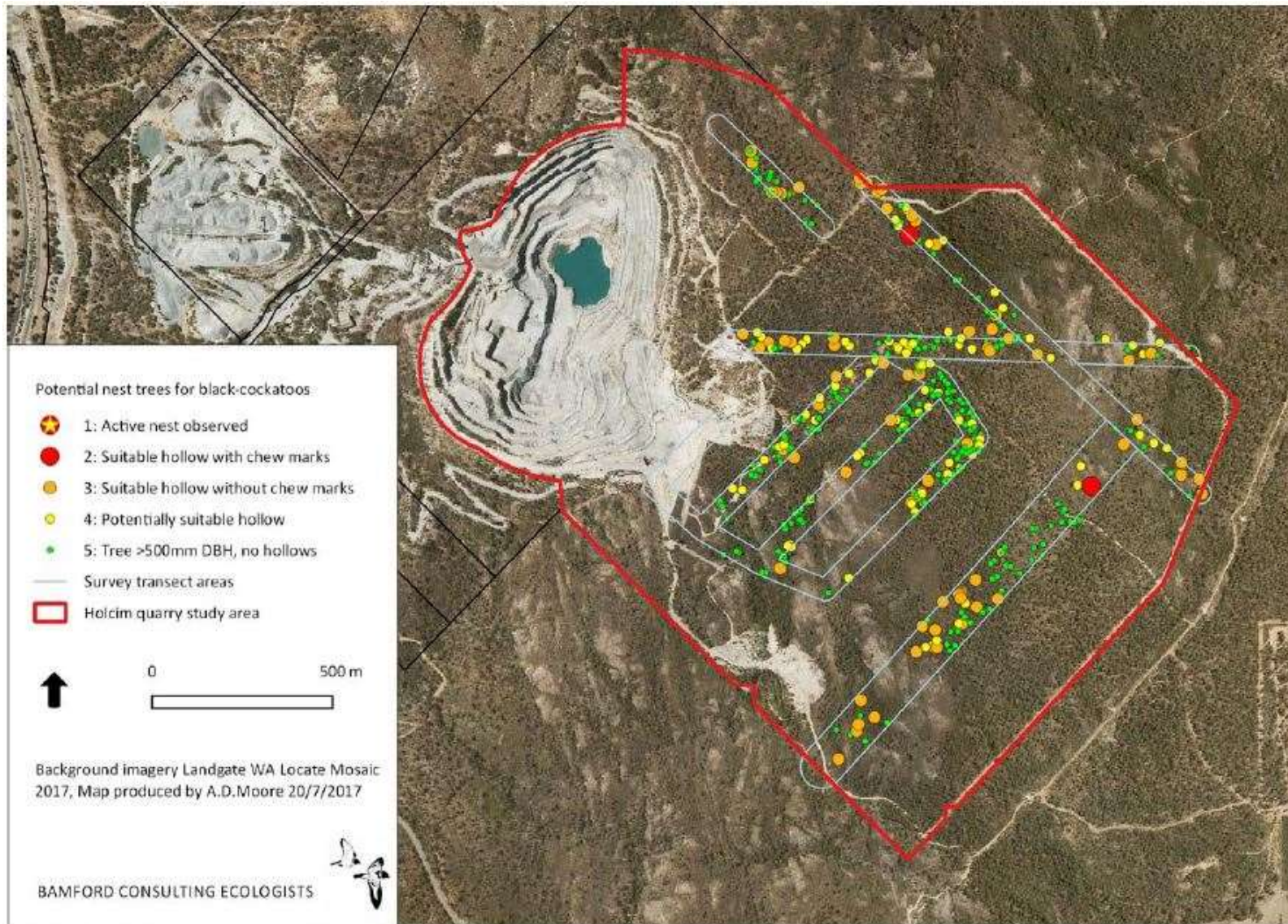
**Black cockatoo habitat values within Quarry area (Bamford 2017)**













## Appendix H – References and databases

### 1. GIS datasets

Publicly available GIS Databases used (sourced from [www.data.wa.gov.au](http://www.data.wa.gov.au)):

- Aboriginal Heritage Places (DPLH-001)
- Cadastre Address (LGATE-002)
- Contours (DPIRD-073)
- DBCA – Lands of Interest (DBCA-012)
- DBCA Legislated Lands and Waters (DBCA-011)
- Directory of Important Wetlands in Australia – Western Australia (DBCA-045)
- Environmentally Sensitive Areas (DWER-046)
- Flood Risk (DPIRD-007)
- Groundwater Salinity Statewide (DWER-026)
- IBRA Vegetation Statistics
- Local Planning Scheme – Zones and Reserves (DPLH-071)
- Regional Parks (DBCA-026)
- Soil and Landscape Mapping – Best Available

Restricted GIS Databases used:

- ICMS (Incident Complaints Management System) – Points and Polygons
- Threatened Flora (TPFL)
- Threatened Flora (WAHerb)
- Threatened Fauna
- Threatened Ecological Communities and Priority Ecological Communities
- Threatened Ecological Communities and Priority Ecological Communities (Buffers)
- Black cockatoo roost sites
- Carnaby's Cockatoos Roost Area confirmed
- Carnaby's Cockatoo Confirmed Breeding areas within the Swan Coastal Plain and Jarrah Forest IBRA regions

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