



CLEARING PERMIT

Granted under section 51E of the Environmental Protection Act 1986

Purpose Permit number:	CPS 9105/2
Permit Holder:	BHP Nickel West Pty Ltd
Duration of Permit:	From 19 June 2022 to 19 June 2042

The permit holder is authorised to clear *native vegetation* subject to the following conditions of this permit.

PART I – CLEARING AUTHORISED

1. Clearing authorised (purpose)

The permit holder is authorised to clear *native vegetation* for the purposes of:

- facilitating processing, maintenance, providing access to and associated facilities development within the Kwinana areas;
- associated pipelines and maintenance for access and bores within the Baldivis areas; and
- only for the operation and maintenance of existing infrastructure within the East Rockingham area.

2. Land on which clearing is to be done

Lot 819 On Deposited Plan 77252, Baldivis
Lot 820 On Deposited Plan 77252, Baldivis
Lot 913 On Deposited Plan 77252, Baldivis
Lot 914 On Deposited Plan 77252, Baldivis
Lot 915 On Deposited Plan 77252, Baldivis
Lot 4639 On Deposited Plan 27786, Baldivis
Charles Street Road Reserve (Pin 1193189), East Rockingham
Lot 1 On Diagram 62220, East Rockingham
Lot 30 On Deposited Plan 68599, East Rockingham
Lot 50 On Plan 8163, East Rockingham
Lot 51 On Diagram 57664, East Rockingham
Lot 51 On Plan 8163, East Rockingham
Lot 52 On Plan 8163, East Rockingham

Lot 54 On Plan 8163, East Rockingham
Lot 55 On Plan 8163, East Rockingham
Lot 89 On Deposited Plan 411084
Lot 105 On Deposited Plan 48637
Lot 149 On Deposited Plan 68599
Lot 153 On Deposited Plan 245392
Lot 622 On Deposited Plan 117585
Lot 1634 On Deposited Plan 27291
Lot 1728 On Deposited Plan 166742, East Rockingham
Lot 4220 On Deposited Plan 192602, East Rockingham
Lot 4332 On Plan 10534, East Rockingham
Lot 4333 On Plan 10534, East Rockingham
Lot 4641 On Deposited Plan 27775, East Rockingham
Lot 4662 On Deposited Plan 95174, East Rockingham
Lot 123 On Deposited Plan 69112, Leda
Lot 310 On Deposited Plan 244038, Leda
Lot 396 On Deposited Plan 219858, Leda
Lot 479 On Deposited Plan 27773, Leda
Lot 502 On Deposited Plan 56798, Leda
Lot 504 On Deposited Plan 56798, Leda
Lot 777 On Plan 3893, Leda
Lot 4335 On Plan 11170, Leda
Unallocated Crown Land (Pin 1192771), Leda
Unallocated Crown Land (Pin 1192772), Leda
Unallocated Crown Land (Pin 11433799), Leda

3. Clearing authorised

The permit holder must not clear more than 10 hectares of *native vegetation* within the area cross-hatched yellow in Figures 1-5 of Schedule 1.

4. Period during which clearing is authorised

The permit holder must not clear any *native vegetation* after 19 June 2032

PART II – MANAGEMENT CONDITIONS

5. 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.

6. 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.

7. Revegetation and rehabilitation (temporary works)

The permit holder must:

- (a) retain the vegetative material and topsoil removed by clearing authorised under this permit and stockpile the vegetative material and topsoil in an area that has already been cleared;
- (b) *revegetate* and *rehabilitate* areas cleared for *temporary works* within six months of the area no longer being required for the purpose for which it was cleared by:
 - (i) ripping the ground on the contour to remove soil compaction;
 - (ii) laying the vegetative material and topsoil retained under condition 7(a) on the cleared area(s); and
 - (iii) undertake additional planting as required, ensuring only *local provenance* propagating materials are used to *revegetate* and *rehabilitate* the area(s).

8. Trees not authorised to clear

- (a) Prior to undertaking any clearing authorised under this Permit, the permit holder must identify, record, and photograph all Tuart trees (*Eucalypts gomphocephala*) trees with a diameter at breast height of 15 centimetres or greater within the area cross-hatched red in Figures 6-9 of Schedule 1.
- (b) The permit holder must retain all Tuart trees (*Eucalypts gomphocephala*) trees with a diameter at breast height of 15 centimetres or greater as identified in condition 8(a).
- (c) On completion of clearing authorised under this Permit, the permit holder must identify, record, and photograph all Tuart trees (*Eucalypts gomphocephala*) trees retained in accordance with condition 8(b).

9. Clearing area limited (areas and activities within TEC patches)

The permit holder is limited to the following restricted activities and amounts of clearing within patches of Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain Community:

- (a) Within the areas crossed-hatched red in Figures 6-8 of Schedule 1, restricting activities to those required for the maintenance of existing infrastructure.
- (b) Within the areas crossed-hatched red in Figure 9 of Schedule 1, restricting activities to those required for the maintenance of existing infrastructure (groundwater monitoring bores and access tracks).
- (c) Within the areas crossed-hatched red in Figure 6 of Schedule 1, the permit holder must not clear an area greater than 0.6 hectares.
- (d) Within the areas crossed-hatched red in Figure 9 of Schedule 1, the permit holder must not clear an area greater than 0.53 hectares.

10. Fauna management – south-western brush-tailed phascogale

- (a) In relation to the area cross-hatched yellow in Figures 10-16 of Schedule 1, the permit holder must engage a *fauna specialist* to inspect that area within 24 hours prior to, and for the duration of clearing activities, for the presence of south-western brush-tailed phascogale (*Phascogale tapoatafa wambenger*).
- (b) Clearing activities must cease in any area where fauna referred to in condition 10(a) are identified until either:
 - (i) the south-western brush-tailed phascogale (s) individual has moved on from that area to adjoining *suitable habitat*; or
 - (ii) the south-western brush-tailed phascogale (s) individual has been removed by a *fauna specialist*.
- (c) Any south-western brush-tailed phascogale(s) individual removed in accordance with condition 10(b)(ii) must be relocated by a *fauna specialist* to an area of *suitable habitat*.
- (d) Where fauna is identified under condition 10(a), the permit holder must within 14 calendar days provide the following records to the *CEO*:
 - (i) the number of individuals identified;
 - (ii) the date each individual was identified;
 - (iii) the location where each individual was identified recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 2020, expressing the geographical coordinates in Eastings and Northings or decimal degrees;
 - (iv) the number of individuals removed and relocated;
 - (v) the relevant qualifications of the *fauna specialist* undertaking removal and relocation;
 - (vi) the date each individual was removed;
 - (vii) the method of removal;
 - (viii) the date each individual was relocated;
 - (ix) the location where each individual was relocated to, recorded using a GPS unit set to GDA94, expressing the geographical coordinates in Eastings and Northings or decimal degrees; and
 - (x) details pertaining to the circumstances of any death of, or injury sustained by, an individual.

11. Fauna management – black cockatoo habitat

- (a) Within 72 hours prior to undertaking any clearing authorised under this permit within the combined areas cross-hatched red in Figures 10-16 of Schedule 1, the permit holder must engage a *fauna specialist* to inspect all *black cockatoo habitat trees and potential black cockatoo habitat trees* identified in the report ‘Kwinana Nickel Refinery, Targeted Flora Survey and Black Cockatoo Assessment (Biologic, January 2022)’ for evidence of current or past breeding use by *black cockatoo species* listed below:
 - (i) *Zanda latirostris* (Carnaby’s cockatoo);
 - (ii) *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo); and
 - (iii) *Zanda Calyptorhynchus* (Baudin’s cockatoo).
- (b) Where a *black cockatoo habitat tree* which contains breeding hollow(s) with *evidence* of current or past breeding use by black cockatoo species is identified within the combined areas cross-hatched red in Figures 10-16 of Schedule, then that tree must be retained from clearing.
- (c) Each *black cockatoo habitat tree* with no *evidence* of current or past breeding use by black cockatoo species and each *potential black cockatoo habitat tree* within the combined areas cross hatched red in Figures 10-16 of Schedule 1, must be retained from clearing. If it cannot be retained, the permit holder must provide notification to the *CEO* for consideration 21 days prior to clearing.
- (d) For each *black cockatoo habitat tree* with no *evidence* of current or past breeding use by *black cockatoo species* and for each *potential black cockatoo habitat tree* that cannot be retained, the permit holder must install an artificial black cockatoo nest hollow, in accordance with condition 11(f).
- (e) Each artificial black cockatoo nesting hollow required by condition 11(d) must be installed prior to commencement of any clearing activities otherwise authorised under this permit.
- (f) The artificial black cockatoo nest hollow(s) required by condition 11(d) of this permit must:
 - (i) be installed at a location identified by the Department of Biodiversity, Conservation and Attractions and in accordance with the location specifications detailed in Schedule 2;
 - (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 2, for a period of at least ten years.
- (g) The permit holder must provide details and locations of any artificial black cockatoo nest hollow(s) installed in accordance with condition 11(f) to the *CEO* within 6 months of installation.
- (h) Within two months of completing the clearing authorised under this permit within the combined areas cross-hatched red on Figures 10-16 of Schedule 1, the permit holder must provide the results of the *fauna specialist’s* inspection findings in a report to the *CEO*.

12. Priority flora management

- (a) Prior to undertaking any clearing authorised under this Permit, the permit holder must demarcate the priority flora (*Pimelea calcicola*) identified within the report 'Kwinana Nickel Refinery, Targeted Flora Survey and Black Cockatoo Assessment (Biologic, January 2022)' at the locations in Table 1 below:

Table 1: Priority flora locations

Species name	Conservation status	No. of individual plants	Latitude	Longitude
<i>Pimelea calcicola</i>	P3	1	-32.267871939	115.7840582
<i>Pimelea calcicola</i>	P3	1	-32.268019920	115.7840427
<i>Pimelea calcicola</i>	P3	1	-32.268076059	115.7840572

- (b) The permit holder shall not cause or allow the clearing of all *Pimelea calcicola* individuals identified at the locations specified in Table 1 of condition 12(a).

13. Offset

- (a) Prior to clearing of any black cockatoo breeding and foraging habitat within the areas authorised for clearing under this permit, the permit holder must provide to the CEO an *offset proposal* for approval, prepared in accordance with the *WA Environmental Offsets Policy* (2011) and *WA Environmental Offsets Guidelines* (2014), using the *WA Environment Offsets calculator*.
- (b) The *offset proposal* must counterbalance the significant residual impacts (SRI) of the proposed clearing of *black cockatoo* breeding and foraging habitat by hundred percent.
- (c) The *offset proposal* must be prepared by an *environmental specialist*.
- (d) If it is necessary to modify the *offset proposal* approved by the CEO, then the permit holder must provide that modified *offset proposal* to the CEO for the CEO's approval, prior to implementing the modified *offset proposal*.
- (e) The permit holder must implement the latest version of the *offset proposal* approved by the CEO.

PART III - RECORD KEEPING AND REPORTING

14. 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 2.

Table 2: Records that must be kept

No.	Relevant matter	Specifications
1.	In relation to the authorised clearing activities generally	(a) the species composition, structure, and density of the cleared area; (b) the location where the clearing occurred, recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 2020, expressing the geographical coordinates

No.	Relevant matter	Specifications
		<p>in Eastings and Northings;</p> <p>(c) the date that the area was cleared;</p> <p>(d) the size of the area cleared (in hectares);</p> <p>(e) actions taken to avoid, minimise, and reduce the impacts and extent of clearing in accordance with condition 5; and</p> <p>(f) actions taken to minimise the risk of the introduction and spread of <i>weeds</i> and <i>dieback</i> in accordance with condition 6;</p> <p>(g) actions taken to manage and mitigate impacts to south-west brush-tailed phascogales in accordance with condition 10.</p>
2.	In relation to the <i>revegetation</i> and <i>rehabilitation</i> of areas pursuant to condition 7	<p>(a) the size of the area <i>revegetated</i> and <i>rehabilitated</i>;</p> <p>(b) the date(s) on which the area <i>revegetation</i> and <i>rehabilitation</i> was undertaken; and</p> <p>(c) the boundaries of the area <i>revegetated</i> and <i>rehabilitated</i> (recorded digitally as a shapefile).</p> <p>(d) a description of the <i>revegetation</i> and <i>rehabilitation</i> activities undertaken;</p>
3.	In relation to condition 8	<p>(a) the location of all Tuart tree (<i>Eucalyptus gomphocephala</i>) trees with a diameter at breast height of 15 centimeters or greater identified and retained, recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 2020, expressing the geographical coordinates in Eastings and Northings;</p> <p>(b) photographs of all Tuart trees identified, taken prior to clearing; and</p> <p>(c) photographs of all Tuart trees retained, taken after clearing.</p>
4.	In relation to condition 9	<p>(a) the size of the area cleared (in hectares) specific to the requirements of condition 9 (c) and (d)</p> <p>(b) A record of the activities carried out in accordance with condition 9 (a) and (b)</p>
5.	In relation to black cockatoo fauna management pursuant to conditions 11	<p>(a) the time(s) and date(s) of inspection(s) of all <i>black cockatoo habitat trees</i> and <i>potential black cockatoo habitat trees</i> by the <i>fauna specialist</i>;</p> <p>(b) a description of the inspection methodology employed by the <i>fauna specialist</i>;</p> <p>(c) details and locations of any hollows installed, recorded using a Global Positioning System (GPS) unit set to</p>

No.	Relevant matter	Specifications
		Geocentric Datum Australia 2020, expressing the geographical coordinates in Eastings and Northings.
6.	In relation to flora management pursuant to condition 12	(a) actions taken to demarcate each priority flora species recorded and their relevant buffers; and (b) actions taken to avoid the clearing of priority flora species.
7.	In relation to each offset implemented pursuant to condition 13	(a) a copy of the <i>offset proposal</i> approved by the <i>CEO</i> ; (b) the location of any offset implemented; (c) the boundaries of the area of offset required for project activities recorded as a shapefile; (d) a description of activities undertaken to implement each approved <i>offset proposal</i> ; (e) the size of the area of each offset (in hectares); and (f) the results of the monitoring against the compliance with the relevant approved <i>offset proposal</i> .

15. Reporting

- (a) The permit holder must provide to the *CEO*, on or before 31 December of each calendar year, a written report containing:
- (i) the records required to be kept under condition 14; and
 - (ii) records of activities done by the permit holder under this permit between 1 July of the preceding calendar year and 30 June of the current calendar year.
- (b) If no clearing authorised under this permit has been undertaken, a written report confirming that no clearing under this permit has been undertaken, must be provided to the *CEO* on or before 31 December of each calendar year.
- (c) The permit holder must provide to the *CEO*, no later than 90 calendar days prior to the expiry date of the permit, a written report of records required under condition 15, where these records have not already been provided under condition 15(a).

DEFINITIONS

In this permit, the terms in Table 3 have the meanings defined.

Table 3: 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.
potential 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 potentially suitable hollows for breeding by black cockatoo species.
black cockatoo species	means one or more of the following species: (a) <i>Zanda latirostris</i> (Carnaby's cockatoo); (b) <i>Zanda Calyptorhynchus</i> (Baudin's cockatoo); and/or (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.
condition	a condition to which this clearing permit is subject under section 51H of the EP Act.
department	means the department established under section 35 of the <i>Public Sector Management Act 1994</i> (WA) and designated as responsible for the administration of the EP Act, which includes Part V Division 3.
dieback	means the effect of <i>Phytophthora</i> species on native vegetation.
Environmental specialist	a person who is engaged by the permit holder for the purpose of providing environmental advice, who holds a tertiary qualification in environmental science or equivalent and has experience relevant to the type of environmental advice that is required under the clearing permit and offset proposal.
EP Act	<i>Environmental Protection Act 1986</i> (WA)
evidence	means showing chew marks or scratchings on the habitat tree representative of the species being surveyed, the presence of the species entering or leaving the habitat tree, and/or the presence of chicks/young.
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.
Local provenance	means native vegetation seeds and propagating material from natural sources within 50 kilometres and the same IBRA subregion of the area cleared.
mulch	means the use of organic matter, wood chips or rocks to slow the movement of water across the soil surface and to reduce evaporation.
native vegetation	has the meaning given under section 3(1) and section 51A of the EP Act.

Term	Definition
offset	means a direct offset as described in the Government of Western Australia, WA Environmental Offsets Policy, September 2011.
offset proposal	means a documented plan that addresses the principles outlined in the Government of Western Australia, WA Environmental Offsets Policy, September 2011.
priority flora	means those plant taxa described as priority flora classes 1, 2, 3, or 4 in the Department of Biodiversity, Conservation and Attractions <i>Threatened and Priority Flora List for Western Australia</i> (as amended from time to time).
rehabilitate/ rehabilitated/ rehabilitation	means actively managing an area containing native vegetation in order to improve the ecological function of that area.
suitable habitat (<i>Phascogale tapoatafa wambenger</i>)	means habitat known to support south-western brush-tailed phascogale within the known current distribution of the species. This often includes open woodlands that contain hollow-bearing trees but a sparse ground cover.
temporary works	means access tracks, spoil areas, side tracks, site offices, storage areas, laydown areas, extraction sites, camps, project surveys, pre-construction activities, and similar works associated with a project activity that are temporary in nature.
weeds	means any plant – <ul style="list-style-type: none"> (a) that is a declared pest under section 22 of the <i>Biosecurity and Agriculture Management Act 2007</i>; or (b) published in a Department of Biodiversity, Conservation and Attractions species-led ecological impact and invasiveness ranking summary, regardless of ranking; or (c) not indigenous to the area concerned.

END OF CONDITIONS



Meenu Vitarana
MANAGER
NATIVE VEGETATION REGULATION

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

7 July 2023

Schedule 1

The boundary of the area authorised to be cleared is shown in Figures 1 to 5 and areas subject to conditions are shown in Figures 6-16.

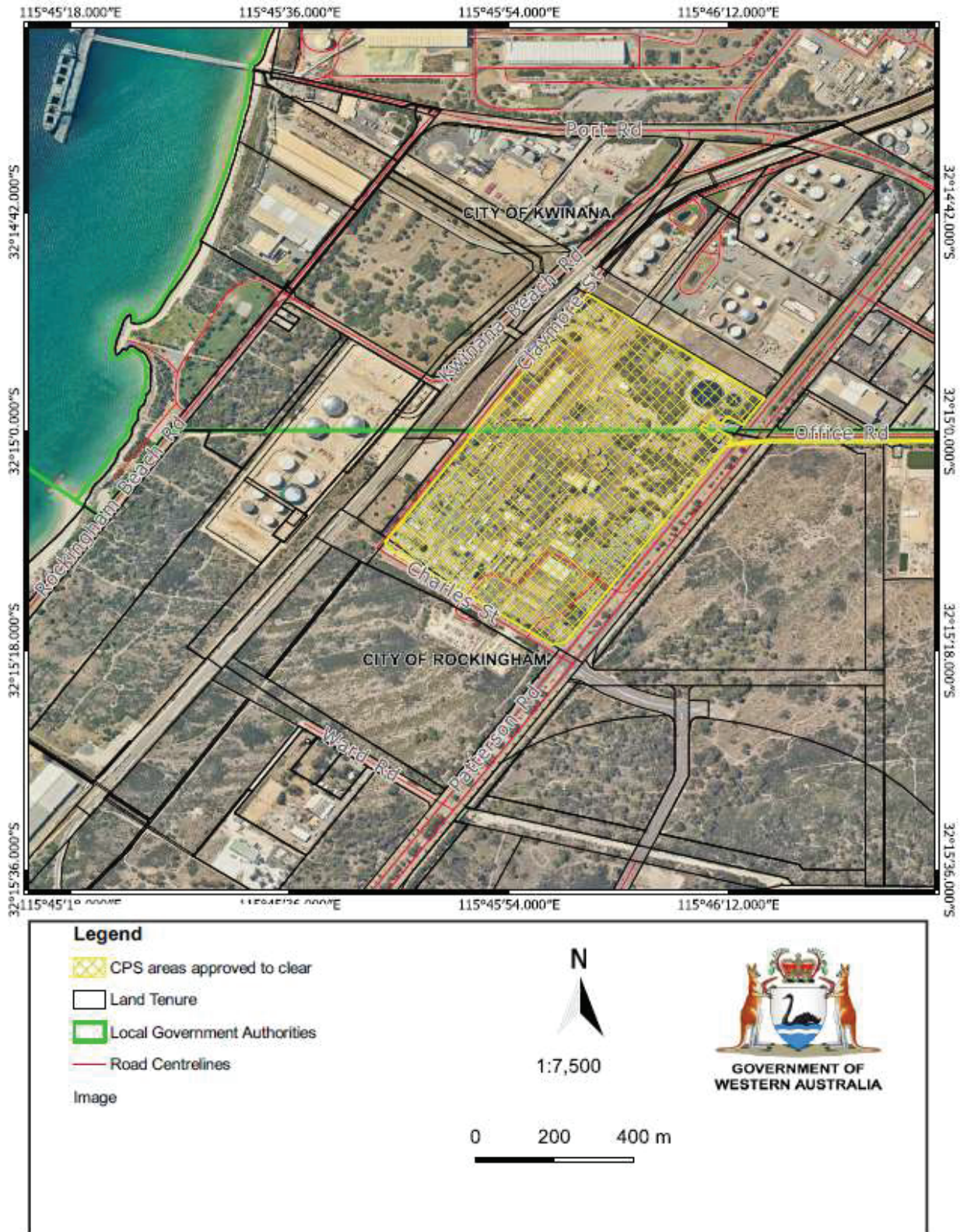


Figure 1: Map of the boundary of the area within which clearing may occur

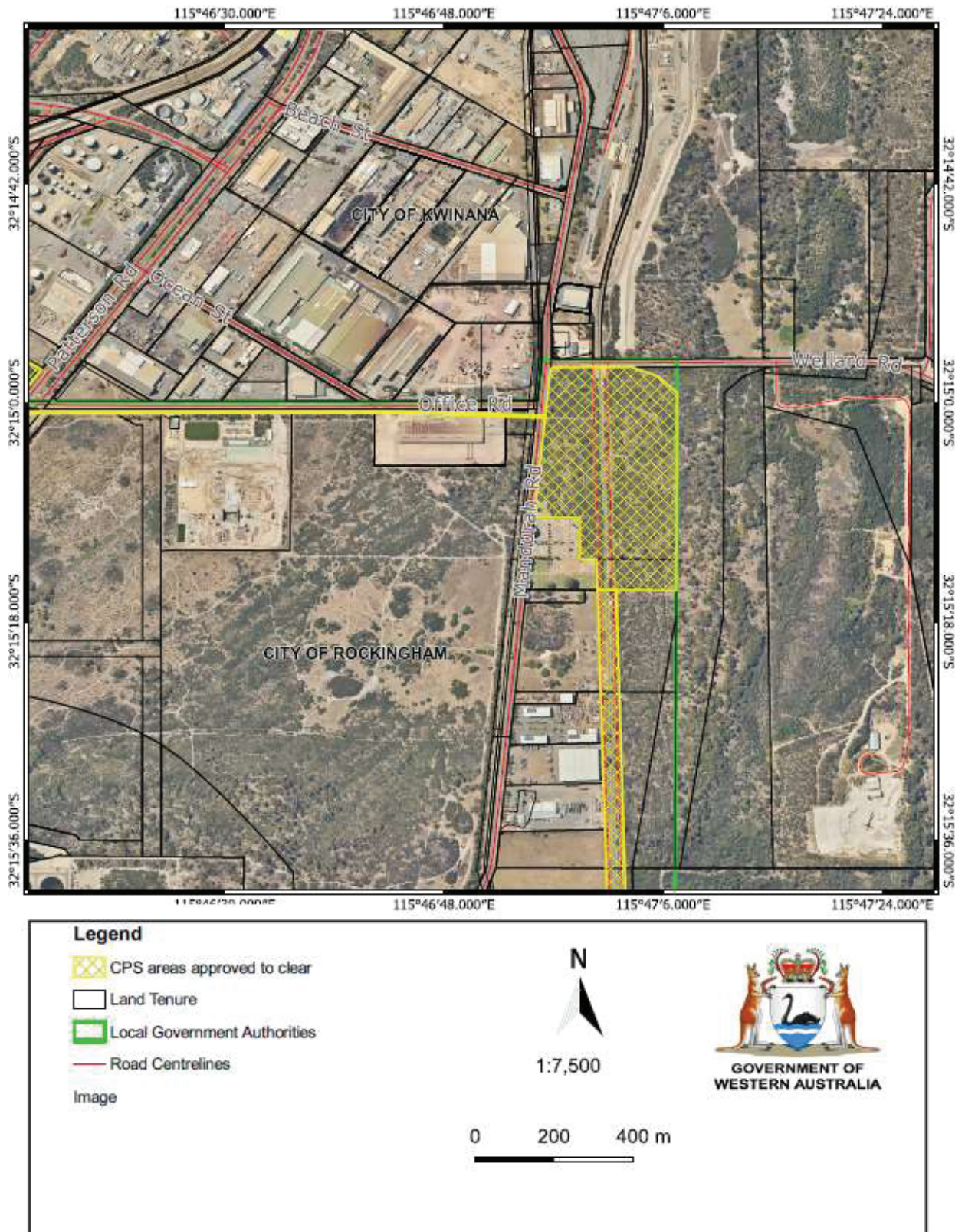


Figure 2: Map of the boundary of the area within which clearing may occur

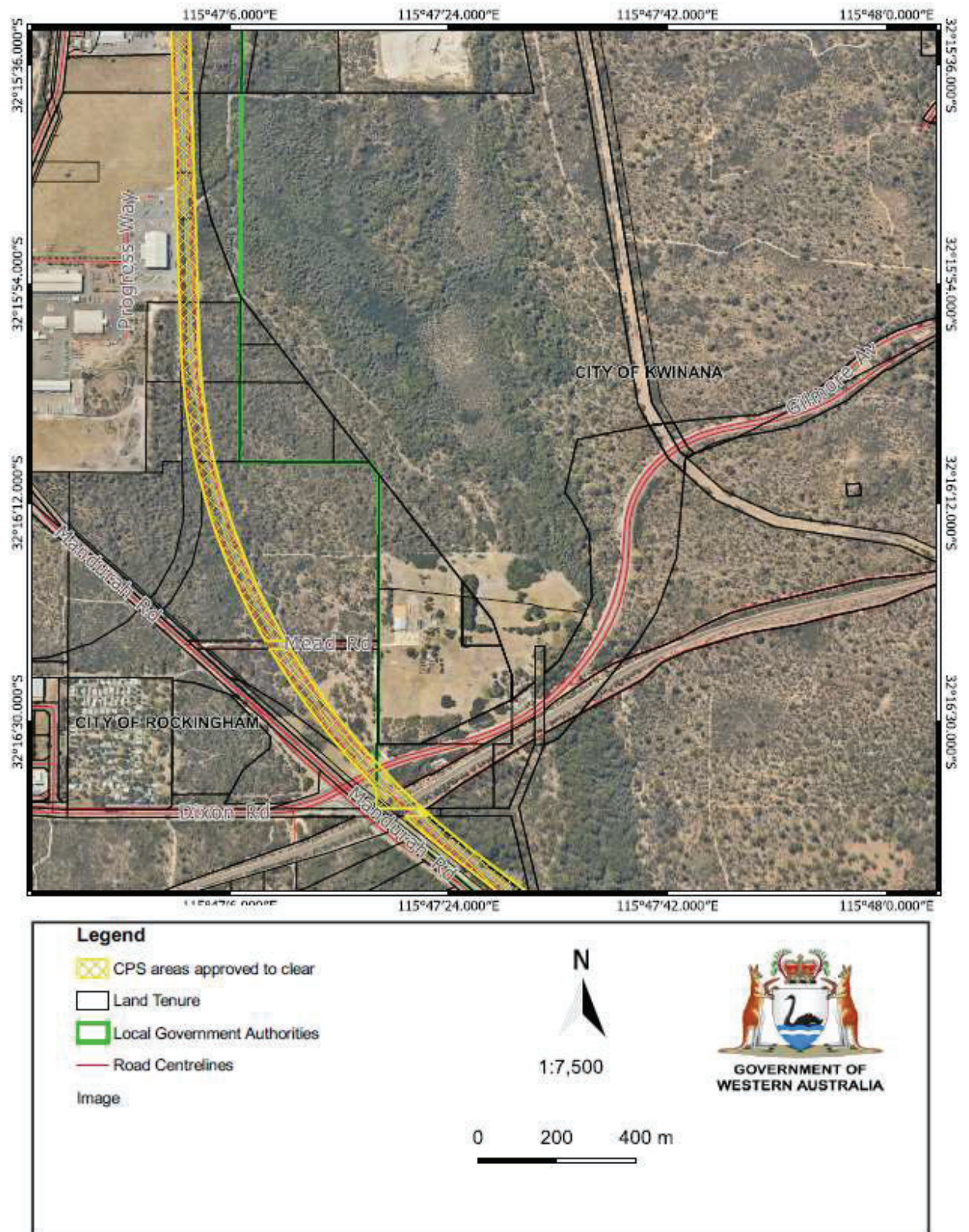


Figure 3 : Map of the boundary of the area within which clearing may occur

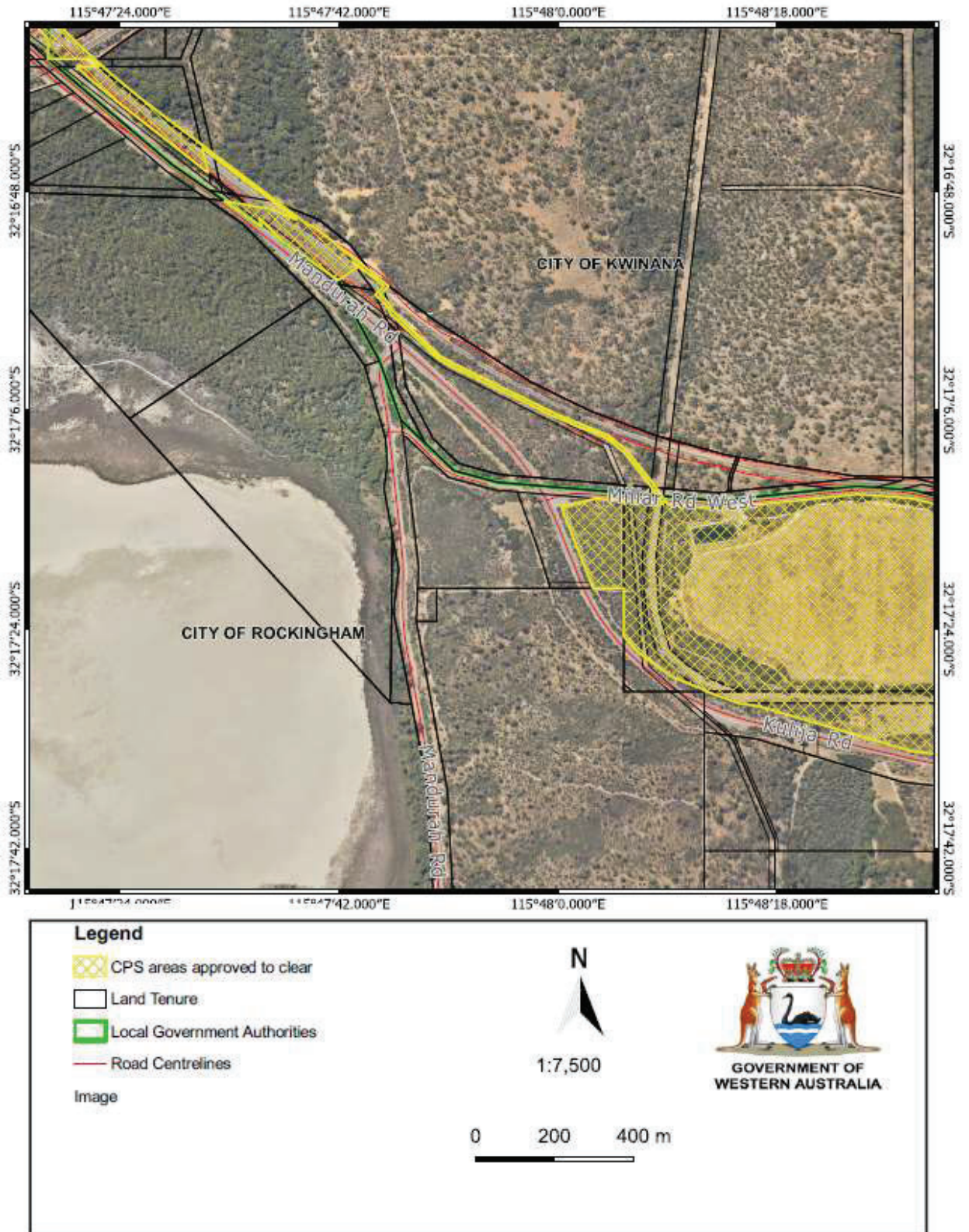


Figure 4: Map of the boundary of the area within which clearing may occur

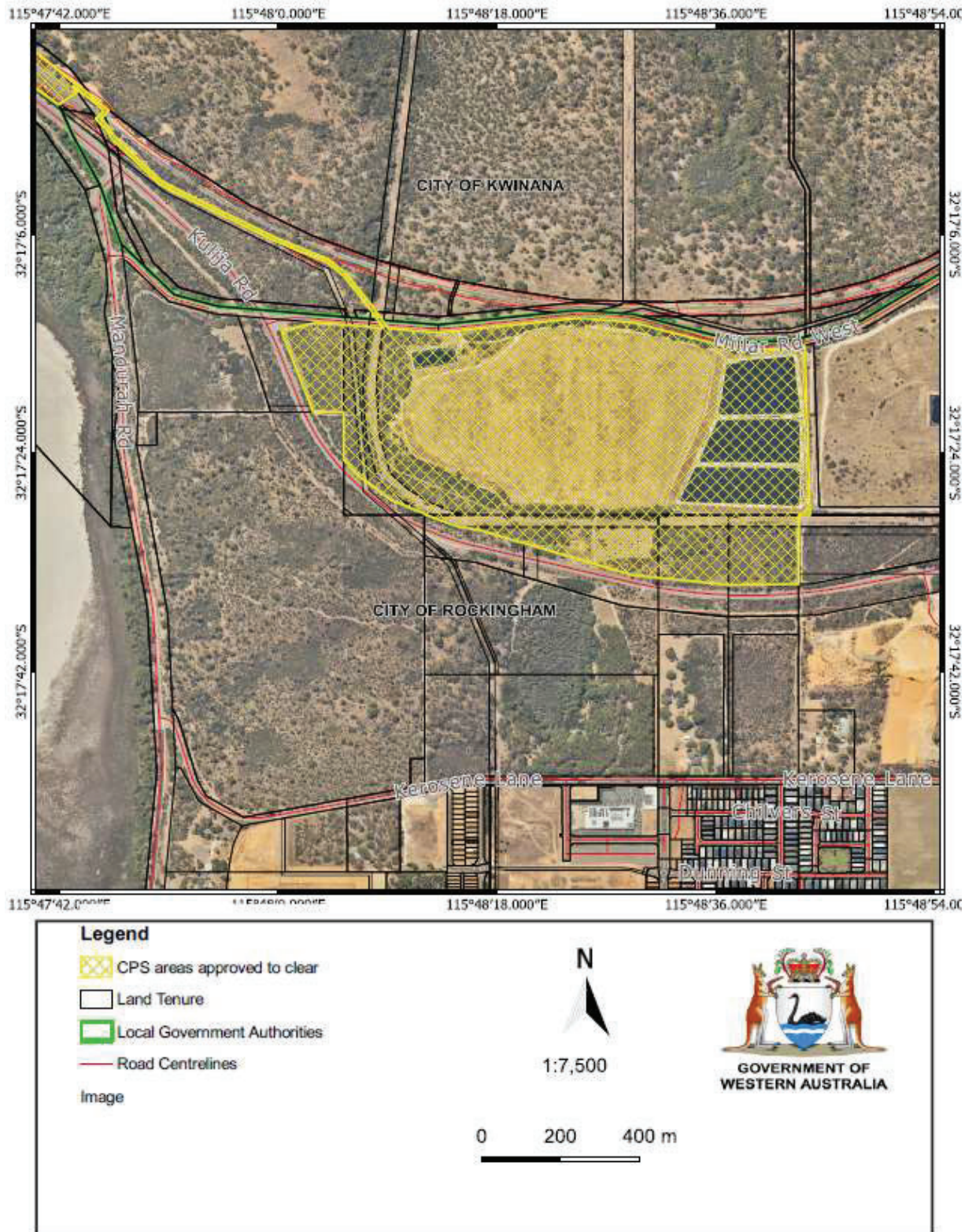


Figure 5: Map of the boundary of the area within which clearing may occur



Figure 7: Area of intersection with Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain subject to conditions

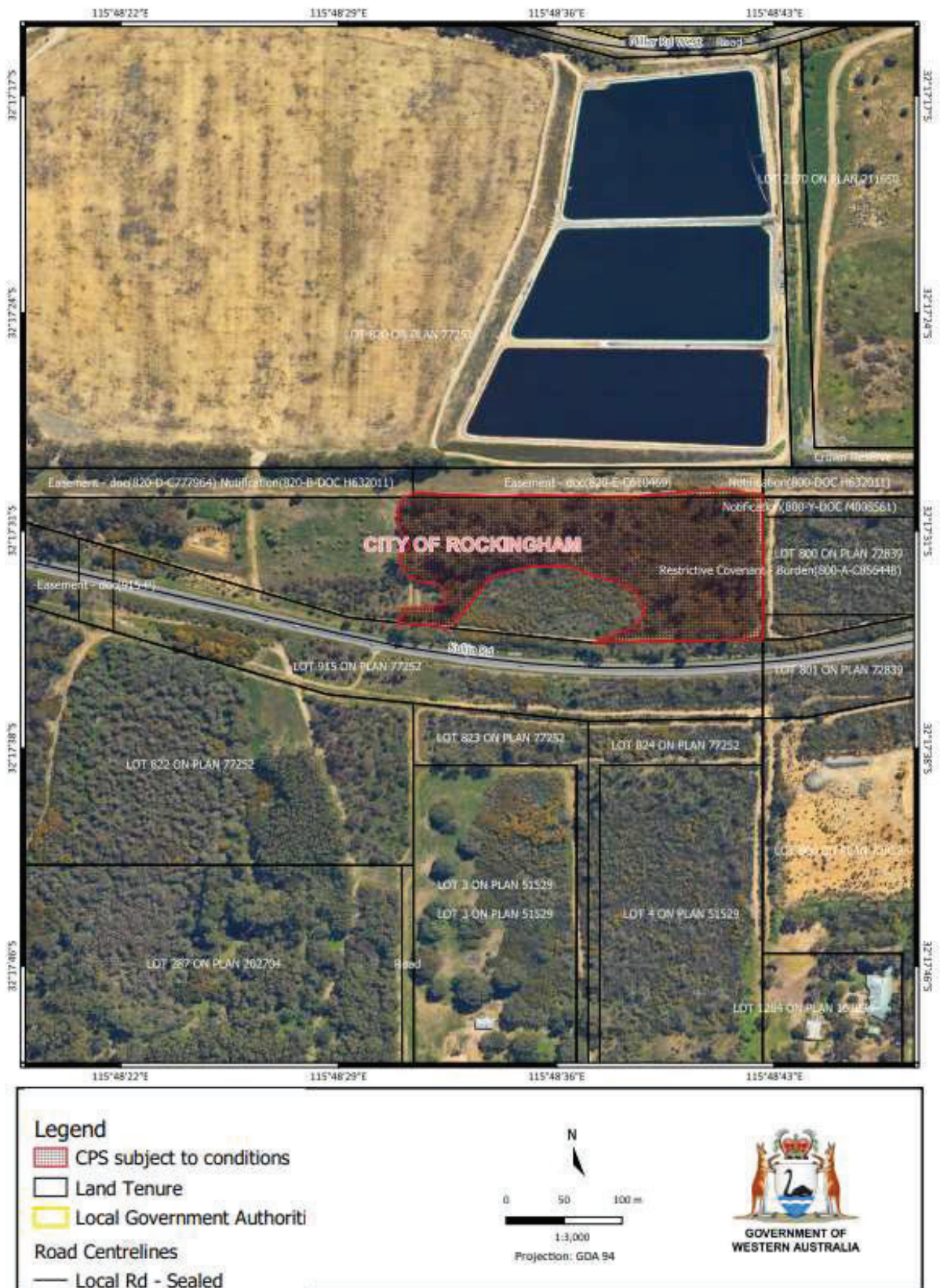


Figure 9: Area of intersection with Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain subject to conditions



Figure 10: Area subject to fauna management conditions

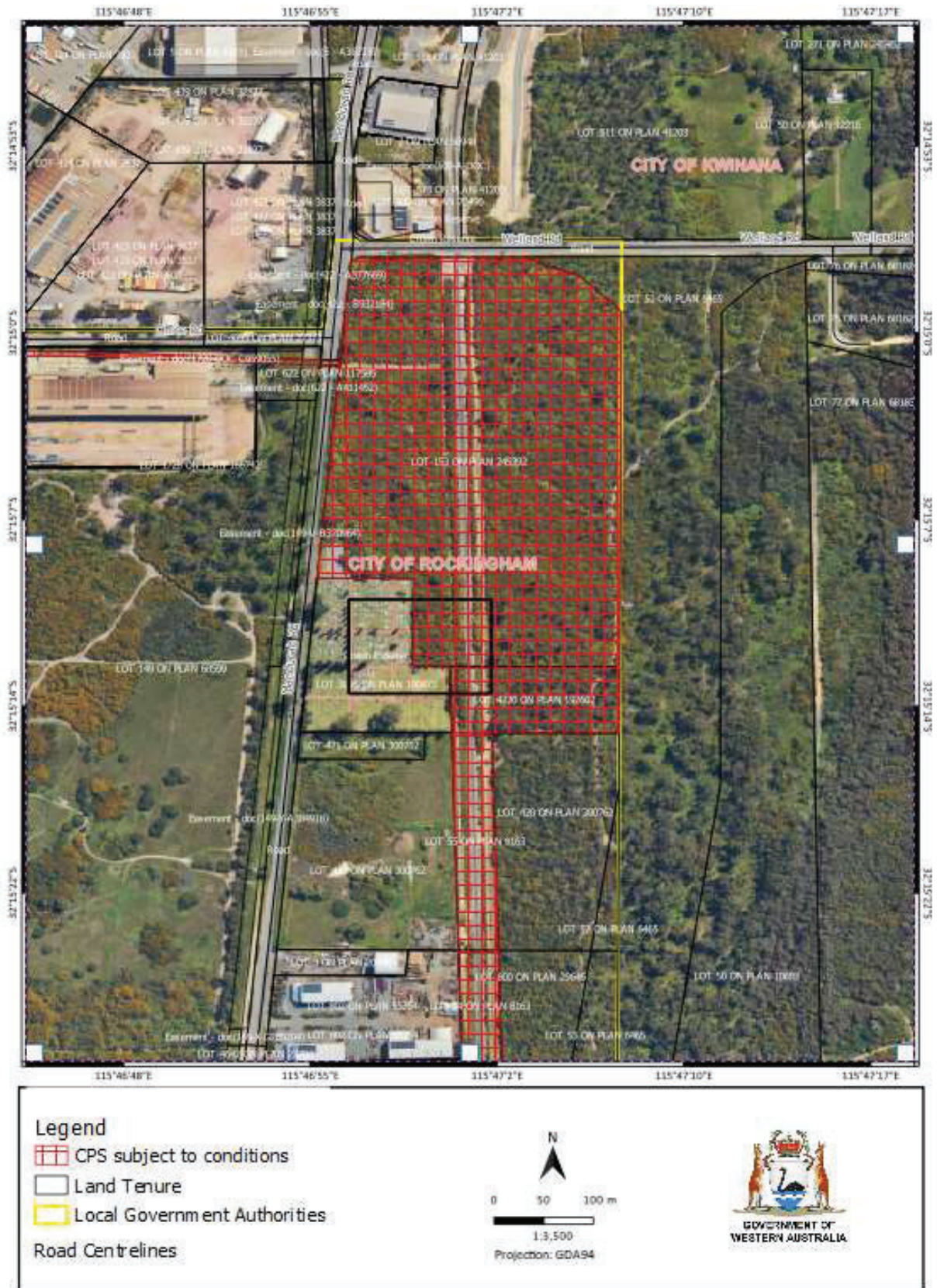


Figure 11: Area subject to fauna management conditions

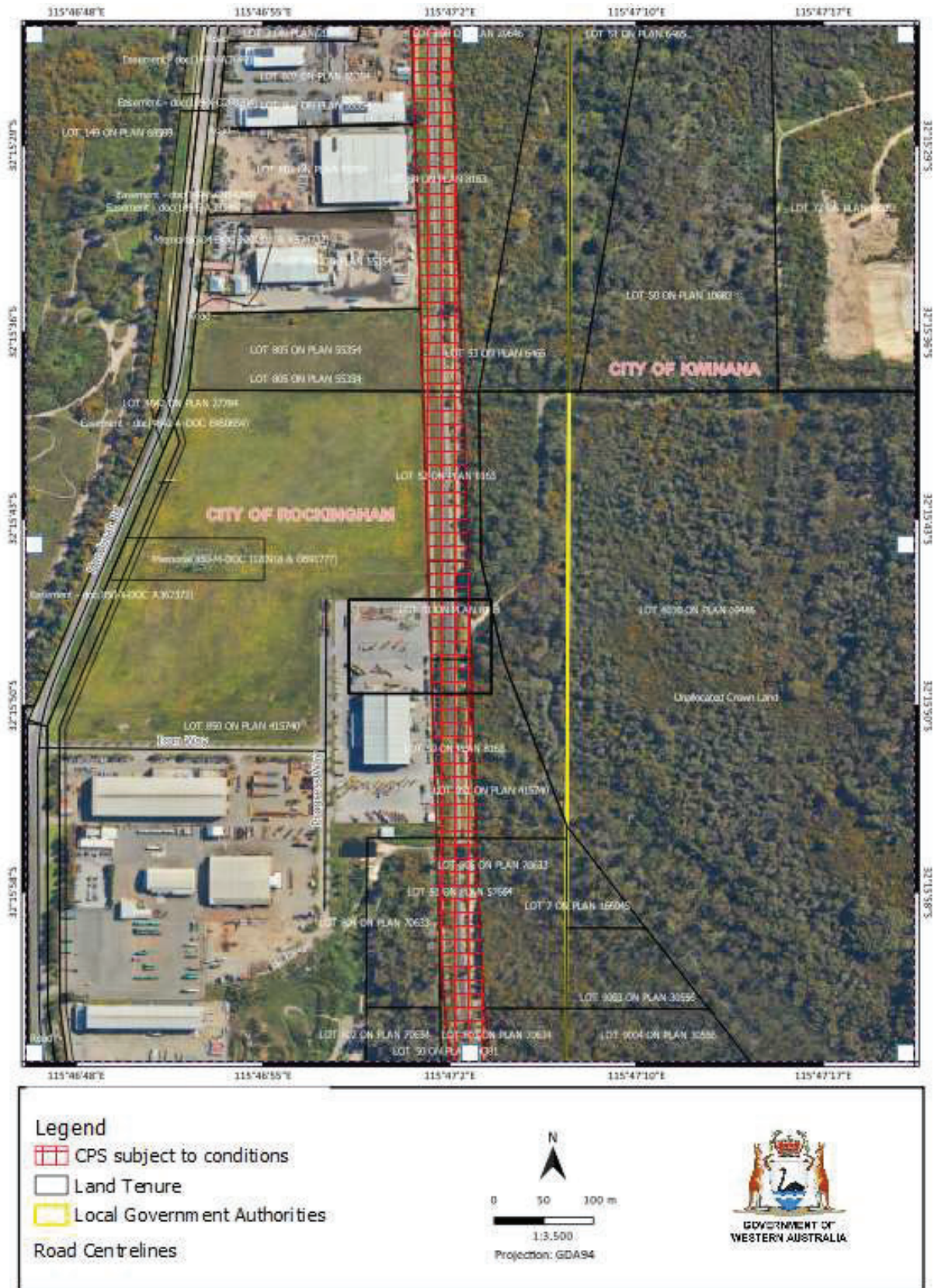


Figure 12: Area subject to fauna management conditions

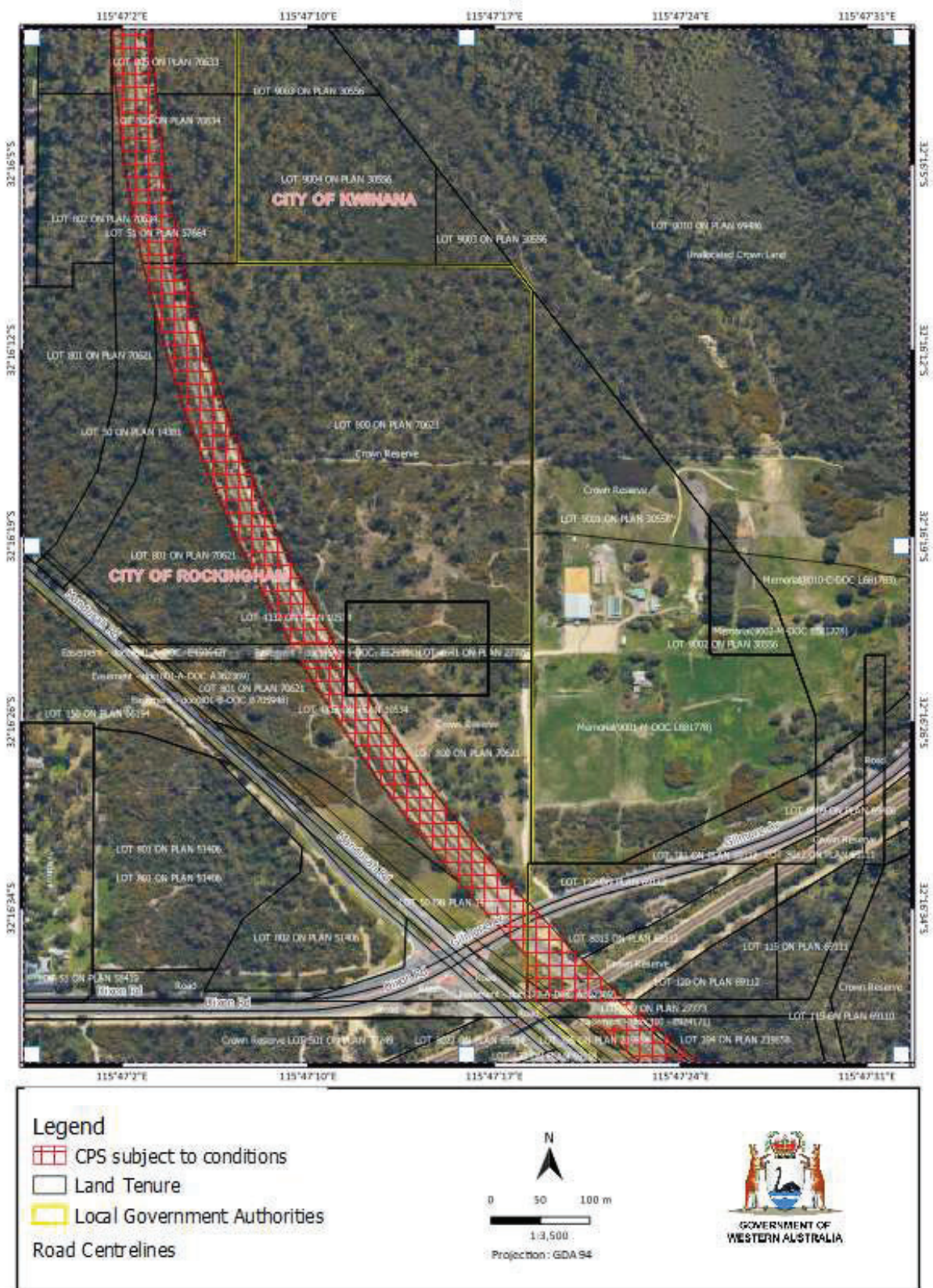


Figure 13: Area subject to fauna management conditions



Figure 14: Area subject to fauna management conditions



Figure 15: Area subject to fauna management conditions

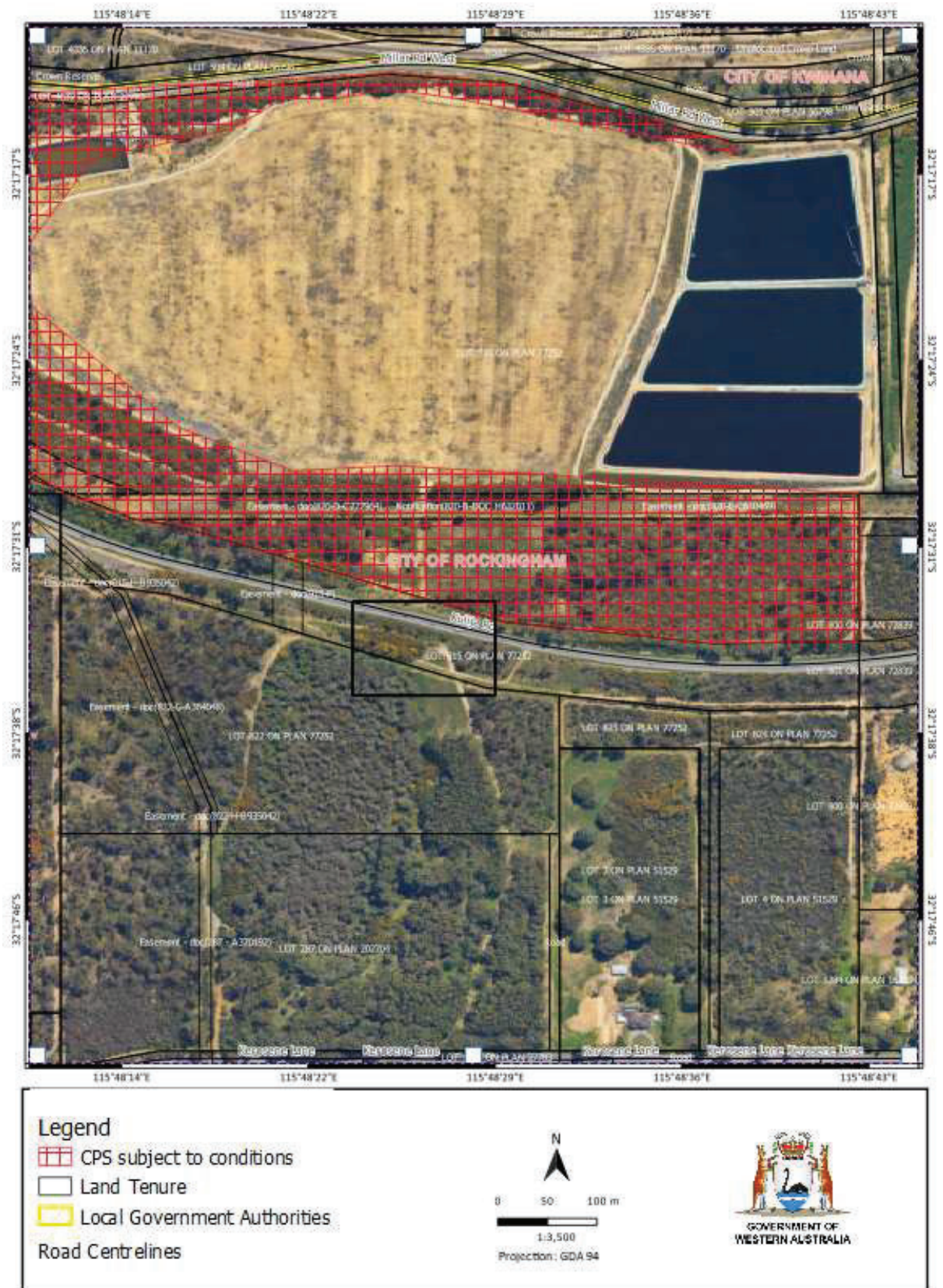


Figure 16: Area subject to fauna management conditions

Schedule 2
Artificial hollows for black cockatoos

Artificial Hollows for Black Cockatoos

There are three species of threatened black cockatoos in the southwest of Western Australia (WA): Baudin's cockatoo *Zanda baudinii* (previously *Calyptorhynchus baudinii*), Carnaby's cockatoo *Zanda latirostris* (previously *Calyptorhynchus latirostris*) and forest red-tailed black cockatoo *Calyptorhynchus banksii naso*. Some of the main threats to the three species include nest hollow shortages due to ongoing and extensive habitat loss and degradation, lack of recruitment of new hollow bearing trees, and competition with galahs, corellas, and feral European honey bees.

Artificial hollows can be used to help conserve these threatened black cockatoos by enabling them to breed in areas where natural hollows are limited. This Fauna Note provides advice on how to select an appropriate site, guidelines on how to design and place artificial hollows, and advice on how to maintain and monitor artificial hollows. The information presented here is based on experience with Carnaby's cockatoo which have many examples of successful use of artificial hollows and forest red-tailed black cockatoo which have a few known examples of use. However, to date there are no records of Baudin's cockatoo using artificial nest hollows.

Sometimes a site may not be suitable for artificial hollows. This Fauna Note includes options for alternative conservation actions that are important to the conservation of black cockatoos and can also be used to complement the placement of artificial hollows.

It is important to remember that the retention of both old and dead trees (stags) that have suitable hollows for black cockatoos is crucial for breeding, and natural replacement of hollow bearing trees for future breeding is vital for the long-term survival of the species. The installation of artificial hollows should not be used to justify the removal of natural hollow-bearing trees.

It is important to remember that the retention of both old and dead trees (stags) that have suitable hollows for black cockatoos is crucial for breeding, and natural replacement of hollow bearing trees for future breeding is vital for the long-term survival of the species. The installation of artificial hollows should not be used to justify the removal of natural hollow-bearing trees.

When to Use Artificial Hollows

Artificial hollows may be useful at sites where natural hollows are a limiting resource. However, cockatoos may not always use artificial hollows, for example if provided in non-traditional nesting areas. Artificial hollows that are installed within 2 km of current breeding sites are regularly taken up. There are ways to select sites for artificial hollows that will increase the chance that they will be used and that birds will be able to successfully raise chicks.

Where do black cockatoos nest?

Black cockatoos nest in the hollows of mature trees in uncleared or remnant Eucalypt woodland or forest, as well as in remnant paddock trees. Trees may take more than 120 years to develop hollows that are a suitable size, and cockatoos use hollows in both living and dead trees. Refer to the maps at the end of this document for the known breeding range of the three species of black cockatoo.

Carnaby's cockatoos generally breed in Wandoo and Salmon Gum in the Wheatbelt, Marri in forested areas, and Tuart along the Swan Coastal Plain. They are also known to nest in Jarrah, Flooded Gum, York Gum, Gimlet, Powderbark Wandoo, and Karri.

Baudin's cockatoos generally nest in Jarrah, Marri, and Karri in densely forested areas. They are also known to nest in hollows in Wandoo and Tuart.



Carnaby's cockatoo nestlings in an artificial hollow. Note this chewing post will require replacement following breeding.

Photo: Rick Dawson

FAUNA NOTES – Artificial Hollows for Black Cockatoos

The breeding habitat for forest red-tailed black cockatoos is in uncleared forest or remnant patches of old Marri. They are also known to nest in Karri, Wandoo, Bullich, Blackbutt, Tuart, and Jarrah.

Is my site suitable for artificial hollows?

It is recommended that artificial hollows be used in known nesting areas where there has been a decrease in the availability of natural nesting hollows. Trials have shown that Carnaby’s cockatoo and forest red-tailed black cockatoos will nest in artificial hollows if installed in suitable areas and are of a satisfactory design. However, putting up artificial hollows may not be the best way to help black cockatoos in your area.

Indeed, attracting birds to attempt to breed in unsuitable areas may result in increased risk of harm to adult birds or their chicks. The installation of artificial hollows in built up and urbanized areas of the metropolitan Perth and Peel regions, and other urban centres in the southwest is not recommended and should not be undertaken. This is due to the increased risk in this area, including car strike to young inexperienced birds, attack by predators such as Australian ravens and pets, and in highly urbanised and cleared areas there may not be sufficient food resource for the adults to successfully raise chicks).

To decide if your site is suitable for artificial hollows you need to consider five essential criteria (Table 1). If your site does not match all criteria, you may wish to consider alternative conservation actions including:

- protecting habitat by fencing and/or rabbit and stock control to encourage regeneration of native vegetation;
- controlling competitive species such as galahs, corellas and feral bees that may occupy hollows;
- repairing old and damaged natural nesting hollows;
- providing access to fresh water;
- revegetating with preferred food species and nesting trees; and/or
- creating linkages of vegetation between nesting and feeding areas.

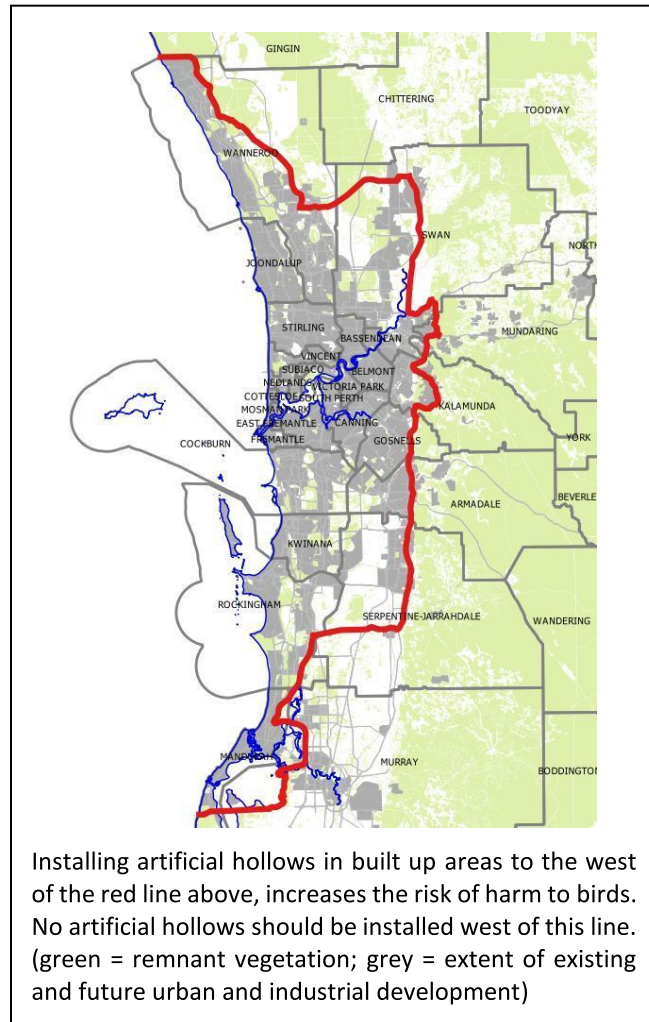


Table 1: Essential criteria for a site to be considered suitable for installation of artificial hollows, with alternative conservation actions suggested for each criterion that is not met.

1.	The site is Eucalypt woodland or forest within the known breeding range of the species	
	<i>Important consideration</i>	Carnaby’s cockatoos tend to nest in Wandoo and Salmon Gum in the Wheatbelt, Marri in forested area and Tuart along the Swan Coastal Plain. Baudin’s cockatoos generally nest in Jarrah, Marri, and Karri and forest red-tailed black cockatoos usually nest in Marri.
	<i>Alternative conservation actions</i>	If the site is not within the known current breeding range of black cockatoos, then it is unlikely that the installation of artificial hollows will attract the birds to the site. However, black cockatoos are highly mobile species that also require habitat for feeding and roosting which means that it is important to protect and manage habitat visited by the cockatoos by fencing, and carrying out other management, such as rabbit and stock control, to retain existing habitat, and to encourage regeneration of native vegetation. It is also important to revegetate areas within the breeding and non-breeding areas with preferred food species, and to create linkages of vegetation to assist the movement of the birds through the landscape.
2.	Breeding by Black cockatoos is known or suspected at the site. There must also be evidence that a lack of suitable available tree hollows is preventing breeding that would otherwise occur in the area.	

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	<i>Important consideration</i>	If the lack of available hollows is due to nest competitors such as galahs, western long-billed corellas or feral bees then any attempt to install artificial hollows must be accompanied by efforts to deter or control these competitors. Alternatively, successful control of competitors may mean that artificial hollows are not needed.
	<i>Alternative conservation actions</i>	<p>If sufficient suitable natural hollows are available in an area, then there is no need to install artificial hollows. This overcomes the need for ongoing maintenance of unnecessary artificial hollows.</p> <p>If breeding is already occurring at the site and there are plenty of available hollows, efforts can be redirected towards caring for existing or future nesting hollows. This may involve repairing old or damaged nesting hollows by covering cracks, removing debris blocking access to hollows or replacing rotted wood in the hollow so that the depth of the nest floor is manageable for the birds. Future hollows can be protected by preventing compaction of ground around trees, fencing and/or rabbit and stock control to encourage regeneration to produce future nesting trees, fire management, and the strategic pruning of limbs to prevent limbs breaking and tearing open hollows. Efforts can also be aimed at enhancing the success of existing breeding by revegetating with preferred food and nesting species, as well as creating linkages of suitable vegetation and fresh water between nesting and feeding areas.</p> <p>If breeding is not occurring at the site despite hollows being available, then there may be a range of factors making the site unsuitable for breeding. These factors must be identified and addressed before breeding can resume in the area (if at all possible). Lack of sufficient food could be the cause, and this can be addressed by revegetating with preferred food species and increasing connectivity in the landscape.</p> <p>To compile a list of plant species suitable for revegetation at your site, refer to the document Plants Used by Carnaby's Black Cockatoo available on the Department of Biodiversity, Conservation and Attractions (DBCA) black cockatoo webpage.</p>
3.	The artificial hollows can be located in close proximity to adequate feeding areas – within a 12 km radius.	
	<i>Important consideration</i>	Feeding areas commonly contain proteaceous species such as banksias (including dryandras) and hakeas. A list of food plants can be obtained by use of the document Plants Used by Carnaby's Black Cockatoo .
	<i>Alternative conservation actions</i>	If the site is not close to adequate food, then the black cockatoos will not be able to successfully raise young. Cockatoos require sufficient food close to nesting areas in order to be able to forage during the day and return to feed nestlings. Existing feeding habitat close (within 12km) to breeding areas can be protected by fencing and/or undertaking rabbit and stock control to encourage regeneration of native vegetation. The amount of feeding habitat in an area can be increased by planting or revegetating with preferred food species.
4.	The hollows are placed in secure locations and the owner/manager of these areas is supportive and willing to provide the necessary long-term security and annual maintenance for the entire time that the artificial hollow will be in place.	
	<i>Important consideration</i>	For advice on the monitoring and maintenance requirements, please refer to the section on how to monitor and maintain artificial hollows.
	<i>Alternative conservation actions</i>	Artificial hollows can be subject to nest robbing and vandalism. It is highly recommended that artificial hollows are not put in exposed or easily accessible areas such as road verges unless they are above 8m and placed on the side of trees away from roads. If the site is considered at high risk of nest robbing or vandalism then alternative actions to assist the conservation of the species are recommended including: revegetation, fencing, repairing old or damaged natural nesting hollows and planting vegetation linkages to connect nesting and feeding areas.
5.	A suitable artificial hollow design is used.	
	<i>Important consideration</i>	For greatest chance of success, please refer to the sections below on how to design and place artificial hollows.
	<i>Alternative conservation actions</i>	If an alternative design is proposed, it is recommended that Department of Biodiversity, Conservation and Attractions, BirdLife Australia, or WA Museum are contacted to discuss and approve design.

How to Design and Place Artificial Hollows

A wide variety of artificial hollow designs have been previously used with mixed success. Evidence suggests that, while artificial hollows 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.

Successful artificial hollows have been constructed from sections of salvaged natural hollows, or black and white industrial pipe. Research results show that the most effective artificial hollows are made of plastic culvert pipe which is readily available, durable, light, cheap, and easy to install and maintain (see right picture below). When using non-natural materials care must be taken to ensure there are no toxic residues, and that the materials are safe to ingest.

Below are three examples of successful artificial hollows that have been used by black cockatoos for nesting:

- natural log with cut side entrance (left);
- white industrial pipe with top entrance (centre); and
- DBCA recommended polypropylene pipe design (right)



Photo: Christine Groom (left), Rick Dawson (centre and right)

The notes below provides general guidance on design and construction of artificial hollows for black cockatoos. Additional specifications are provided at the end of this Fauna Note which outline current best practice and may be considered recommendations for minimum requirements.

Walls, size, base, and entrance design

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

- durable enough to withstand exposure to elements for at least 20 years; and
- able to simulate the thermal properties of a natural tree hollow.

Artificial hollows should be:

- not less than 375 mm in internal diameter; and
- preferably 1200 mm deep overall with 200 mm of substrate/nesting material covering the base.

The base of the artificial hollow must be:

- securely fixed to the walls and able to support the weight of an adult and nestling(s);
- durable enough to last the life of the nest, and survive chewing by cockatoos;
- free draining;

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- at least 375 mm in diameter; and
- covered with 200 mm of sterile, dry, free draining substrate/nesting 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 hard plastic, thick hardwood timber slab or marine ply (not chipboard or MDF). The base material must be cut to fit internally with sharp or rough edges ground away or curled inwards, be fixed securely to the walls and have small drainage holes.

The entrance of the artificial hollow:

- must have a diameter of at least 375 mm; and
- preferably be top entry which will minimise use by non-target species.

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

Adding ladders and sacrificial chewing posts

For artificial hollows made of non-natural materials, or of processed boards, it is necessary to provide a ladder to enable the birds access to the hollow, and sacrificial chewing posts so that birds can chew material, and so that non-target species can exit the hollow. The post can also assist in providing further material to the substrate, however research has shown that not all posts are heavily chewed.

The ladder must be:

- securely mounted to the inside of the hollow;
- made from an open heavy wire mesh with a mesh size of 30 - 50 mm (such as WeldMesh™); or heavy chain; and
- reach to, or below the level of substrate/nesting material.

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.

Do not use material for ladders that the birds can chew, including galvanised metal because the birds may grip or chew the ladder, and ingest harmful compounds.

The sacrificial chewing posts must be:

- made of untreated hardwood such as Jarrah, Marri or Wandoo;
- thick enough to satisfy the birds' needs between maintenance visits;
- extended beyond the top of the hollow as an aid to see whether the nest is being used and reach to the floor of the hollow;
- placed on the inside of the hollow; and
- attached in such a way that they are easy to replace (e.g. a 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 one chewing post is provided. Posts 70 x 50 mm have been used but require monitoring at least every second breeding season when the nest is active and replacing when found to be no longer reaching the nesting material or otherwise significantly chewed. Birds do vary in their chewing habits, and therefore the frequency at which the chewing posts require replacement will also vary.

Mounting and placement

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

The height at which artificial hollows should be placed is variable, between 4 - 8m for Carnaby's cockatoo, and the average height of natural hollows in dominant tree species in the area is a good guide. If located in an area that the general public cannot access, such as a private property, the hollows can be placed as low as 4 m from the ground so that they are easily accessible by ladder. If located in an area where the general public are allowed access, hollows should be placed at least 8 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.

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Black cockatoos 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; and
- fitted on the side where the most shade can be obtained.

Artificial hollows must be mounted such that:

- the fixings used will last the duration of the nest e.g. galvanized bracket or chain and fixed with galvanized coach screws;
- it is secured by more than one anchor for security and stability;
- it is positioned vertically or near vertically; and
- where possible living trees are to be used to provide shade.

Artificial hollows should not be placed in the open on poles, as this may result in excessive exposure to sun during very hot weather.

Safety

Care needs to be taken when placing artificial hollows to ensure human safety is paramount.

Monitoring and Maintaining Artificial Hollows

It is important to monitor and maintain artificial hollows after they have been erected to ensure their effectiveness and so that problems with pest species or maintenance requirements can be identified and resolved. This will ensure the artificial hollow continues to provide opportunities to be used and that birds will be able to successfully raise chicks

Without regular maintenance, artificial hollows are likely to fail to achieve their objective to provide safe nesting opportunities for threatened black cockatoos. Therefore, it is important to continue a regime of regular maintenance for however long the artificial hollow is required. It may be several (to many) decades until a natural replacement hollow is available. Artificial hollows erected as a condition of development to offset the loss of natural hollows may be required to be available and maintained for the life of the development approval.

How do I monitor artificial hollows?

Before undertaking monitoring of artificial hollows for black cockatoos, it is recommended that you seek advice from the Department of Biodiversity, Conservation and Attractions, BirdLife Australia, or the WA Museum. It is also important to contact the Department's Wildlife Licensing Section, to determine if a lawful authority required (<https://www.dbca.wa.gov.au/licences-permits>).

Monitoring artificial hollows requires keen observation, and naturalist skills. It is often not possible to observe direct evidence of breeding (i.e. nestlings or eggs) and therefore inferences must be made based on other observations. It is also important to limit disturbance to breeding birds. There are many techniques available to monitor artificial hollows, and a combination of several is likely to achieve the best results (**Table 2**).

Monitoring of artificial hollows should consider and record:

- the condition of the tree, hollow fixings and general hollow condition;
- condition and connection of sacrificial chewing posts, ladder and substrate/nesting material inside hollow;
- any use by black cockatoos and nature of activity (adult birds, chewing, eggs, chicks etc.)
- details of use by non-target species (native or pest);
- identify any problems with pest species or maintenance requirements; and
- maintenance actions undertaken to resolve any problems.

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

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frequently monitoring a larger number of artificial hollows, you can put the details into a spreadsheet or use the black cockatoo monitoring forms available on the [DBCA website](http://www.dbca.wa.gov.au). Records should be submitted to the Department by emailing fauna.data@dbca.wa.gov.au. The Department will put the records into the Threatened and Priority Fauna Database, and it will be used to inform conservation and management decisions. Any other opportunistic sightings of Threatened and Priority species can also be reported via the same email.

Table 2: Techniques for monitoring artificial hollows

Technique	Description of Technique								
Looking for signs of use	Cobwebs covering the entrance to the hollow will indicate that the hollow has not been used recently. This would also apply to other light debris that may have fallen to cover the opening partially. Signs of recent use or interest in the hollow include evidence of chewing.								
Observing parent behaviour around a hollow	The behaviour of parent birds around a hollow can indicate an approximate age of young in the nest.								
	<table border="1"> <thead> <tr> <th>Parent Behaviour</th> <th>Approximate Stage and Age of Young</th> </tr> </thead> <tbody> <tr> <td>Prospecting for hollow</td> <td>Unborn</td> </tr> <tr> <td>Male only seen out of hollow</td> <td>Egg or very young nestling (< 3 - 4 weeks)</td> </tr> <tr> <td>Both parents seen entering/exiting the hollow</td> <td>Nestling(s) has hatched (> 3 - 4 weeks)</td> </tr> </tbody> </table>	Parent Behaviour	Approximate Stage and Age of Young	Prospecting for hollow	Unborn	Male only seen out of hollow	Egg or very young nestling (< 3 - 4 weeks)	Both parents seen entering/exiting the hollow	Nestling(s) has hatched (> 3 - 4 weeks)
	Parent Behaviour	Approximate Stage and Age of Young							
	Prospecting for hollow	Unborn							
Male only seen out of hollow	Egg or very young nestling (< 3 - 4 weeks)								
Both parents seen entering/exiting the hollow	Nestling(s) has hatched (> 3 - 4 weeks)								
Observing feeding flocks	Flocks of all male birds can indicate that females are incubating eggs. When flocks are mixed it suggests the birds have either not laid yet or that the nestlings have hatched and no longer require brooding (approximately 3 - 4 weeks old).								
Tapping to flush female	When females are sitting on eggs they will usually respond to tapping or scraping at the base of their tree by appearing at the entrance or flying from the hollow opening. This is not a guarantee of breeding activity, but an indication that breeding is possibly occurring in the hollow. Tapping or scraping is best undertaken between 10 am - 3 pm when females will most likely to be sitting.								
Observing insect activity around a nest	Faecal matter produced by nestlings attracts insects, especially flies and ants. The type and number of these insects will help to 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 the entrance of a nest usually indicate that a death has occurred.								
Listening for nestling	With experience it is possible to determine if nestlings are present, and a broad estimate of age based on the type and volume of noises they make.								
Looking inside a 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 organize. Also keep in mind that it is important to limit disturbance to breeding birds. 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 to reach nests to undertake observations.								

When do 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, frequency, and timing of monitoring (Table 3).

Breeding by the three southwest black cockatoos varies, and the timing of monitoring of artificial hollows should accommodate the breeding of the likely target species. The Commonwealth Department of Climate Change, Energy,

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the Environment and Water (DCCEEW) Species Profile and Threats Database (SPRAT) database records the breeding periods of each of the species as:

- Carnaby's cockatoo - July to November (with peak between August to September)
- Baudin's cockatoo - October to January
- Forest red-tailed black cockatoo - every month, with peaks in April to June and August to October

The age of Carnaby's cockatoo nestlings can be determined by using the following publication:

Saunders, D. A., Dawson, R. and Nicholls, A. O. (2015). Aging nestling Carnaby's cockatoo, *Calyptorhynchus latirostris*, and estimating the timing and length of the breeding season. *Nature Conservation* **12**: 27-42
<http://dx.doi.org/10.3897/natureconservation.12.4863>

This document provides a series of photographs to illustrate changes in size and plumage of nestlings over the 10–11 weeks of the nestling period which can be used to estimate the approximate age of Carnaby's cockatoo nestlings, up to about nine weeks, by comparing appearance with the nestlings illustrated in the photographs.

Any monitoring that involving disturbance or handling of black cockatoos, requires lawful authority (<https://www.dbca.wa.gov.au/licences-permits>). Such activity requires specialist skills and authorisation under the *Biodiversity Conservation Act 2016*.

Table 3: Recommended frequency for monitoring artificial hollows, as determined by the aim of the monitoring

Monitoring Aim	Frequency of Visits	Monitoring Techniques
To determine possible use by black cockatoos	At least once during peak breeding season.	<ul style="list-style-type: none"> • Looking for signs of use (evidence of chewing) • Observing behaviour of adults around a hollow • Tapping or scraping to flush female • Listening for nestlings • Looking inside nest
To confirm use by black cockatoos	At least two visits during peak breeding season.	<ul style="list-style-type: none"> • Looking for signs of use (evidence of chewing) • Observing behaviour of adults around a hollow • Tapping or scraping to flush female • Listening for nestlings • Looking inside a nest <p>Observing breeding evidence from at least two of the techniques confirms use by black cockatoos.</p>
To determine nesting success by black cockatoos	Preferably fortnightly visits between July and December. As a minimum, at least 3 visits spread throughout breeding season.	<ul style="list-style-type: none"> • Observing insect activity around a nest • Listening for nestlings • Looking inside a nest <p>The presence of eggs or nestlings inside a nest will help to determine nesting success.</p>
To determine use by any species	As often as possible.	<p>As a minimum, inspection from the ground:</p> <ul style="list-style-type: none"> • Looking for signs of use <p>To confirm:</p> <ul style="list-style-type: none"> • Looking inside a nest
To determine maintenance requirements	At least every two years and preferably annually.	A basic maintenance check can be undertaken from the ground. Looking inside the nest using a telescopic pole with camera or mirror enables inspection of the sacrificial chewing posts and level of substrate/nesting material. A ladder or elevated work platform will be required for a comprehensive check, and to replace sacrificial chewing posts and carry out other maintenance.

How do I maintain artificial hollows?

Natural hollows used by black cockatoos are typically present for many decades and if artificial hollows are expected to provide a similar role, then they will require maintenance to ensure they continue to function as potential nesting locations for black cockatoos for the long term.

In many cases artificial hollows are required as a condition of development to offset loss of natural hollows, in which case State and Commonwealth offset policy expects that the artificial hollows continue to provide that function for the duration of the impact (or alternatively the expected period of time the natural hollow would have persisted, or the life of the environmental approval). As part of establishing artificial hollows the responsibility and regime for long term monitoring and maintenance should also be established.

Periodic maintenance checks should be undertaken at least every two years, preferably annually, for as long as the artificial hollow is required. Maintenance actions should be completed prior to the breeding season.

Any problems identified during monitoring or maintenance checks should be addressed as soon as possible and will require similar specialist skills and equipment as used in installation. If breeding is currently occurring, maintenance may need to be delayed if it is likely to disturb the parents or nestling. 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. Likely maintenance includes:

- replacement of sacrificial chewing posts (frequently);
- top-up or replacement of nesting substrate to ensure it reaches the ladder and chewing posts (occasionally);
- replacement of nest bases (occasionally);
- repair or replacement of attachment points (infrequently); and/or
- repair of any cracks to wooden hollows (infrequently).

For artificial hollows known to be used, spare chewing posts should be taken into the field when undertaking maintenance checks as these are likely to need replacement.

Artificial hollows are likely to need to be completely replaced after many years, and other circumstances may require the relocation of artificial hollows (e.g. if the tree they are in becomes damaged).

Applying this guidance to forest red-tailed black cockatoo and Baudin's cockatoo

The information presented here is based on experience with Carnaby's cockatoo, for which many examples of successful use of artificial hollows exist, and forest red-tailed black cockatoo for which a few known examples of use exist. However, to date there are no records of Baudin's cockatoo using artificial nest hollows.

A definite reason for this lack of use is not yet known but may relate to the location of artificial hollows installed to date (few or none placed in Baudin's cockatoo breeding sites where breeding is occurring and natural hollows are limiting) or design or installation issues, such as hollows not being installed high enough in tall forest canopy.

Before deciding to install artificial hollows for forest red-tailed black cockatoo or Baudin's cockatoo, it is recommended that you discuss your proposal with, and/or seek advice from, the Department of Biodiversity, Conservation and Attractions, BirdLife Australia, or the WA Museum.



Artificial hollow base needing repair.
Photo by Christine Groom

Maps of Black Cockatoo Breeding Range

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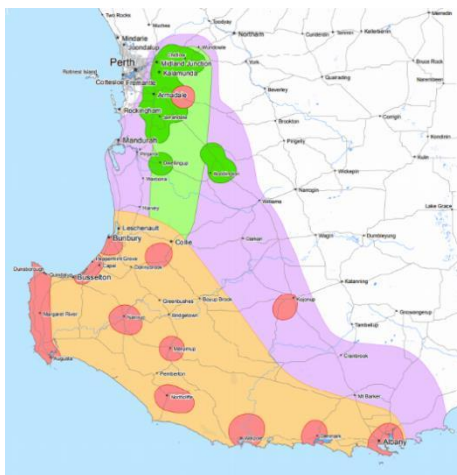


Image: [Commonwealth of Australia, 2011](#)

The maps show the modelled distributions of Carnaby's cockatoo (left), Baudin's cockatoo (centre) and forest red-tailed black cockatoo (right). For Baudin's cockatoo, the breeding range is indicated by the red (known breeding areas) and yellow (predicted breeding range), and for Carnaby's cockatoo, the breeding range is indicated by the orange.

Artificial Hollows – best current design and installation specifications

The specifications below outline the most recent detailed specifications for artificial hollow construction installation and maintenance. These would provide for a well-constructed and installed artificial hollow that is most likely to have an adequate lifespan (minimum 50-years). To ensure longevity, regular maintenance will be required on the nesting material, sacrificial post, and removal of debris from the hollow.

It is highly recommended that any artificial hollows installed as a condition of environmental approval (for example where the artificial hollow is expected to provide benefit for a long period), or installed on DBCA managed lands would meet these specifications as a minimum.

Artificial Hollow Construction Specifications

- Dimensions:** internal diameter 375mm (430 mm external), 1200 mm in height, and installed a minimum of 4 m above ground on private property and 8 m on public land.
- Pipe material:** Fifty-year UV rated culvert pipe (polypropylene material used with corrugated outer wall and thin inner sleeve. Recommended brand or similar: The 'Vinidex StormPRO' pipes are twin wall, corrugated, polypropylene pipes for non-pressure stormwater and drainage applications, which meet all the requirements for artificial hollows.
- Chain:** 6 mm galvanised (not zinc plated). The hollows will be attached to the tree by chain and fixed by 4 points.
- Fixings:** Galvanised M10 coach screws four x 75 mm. Two on the weight bearing chain at the top and one each side of the hollow.
- Ladder:** 50 x 50 mm square galvanised weldmesh 4mm thick.
- Chewing posts:** Untreated Jarrah, Marri or Wandoo that meet requirements in "Adding ladders and sacrificial chewing posts" above.

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Artificial hollow design, the fixing method, and the sacrificial chewing post extending above the hollow rim. Left image shows the side chains that are to be at a 30-degree upwards angle to allow the hollow to move up the tree as the tree grows. Right image shows the top weight bearing fixing which is to be 100 mm above the hollow to allow upwards movement.



Left image shows the internal view, including substrate material placed on the floor to line the hollow, and the internal weld mesh ladder. Substrate material must be coarse, hard, wood chips at least 200 mm deep.

Centre image shows one hard wood sacrificial post which is to fit and connect to the rim of the hollow by a hook screwed to the post to ensure it does not come loose, block the hollow or injure the occupants.

Right image shows the hard plastic floor which is to be securely fixed with a minimum of 12 small drainage holes. Larger holes may result in the occupants chewing the base.

Monitoring and Maintaining Artificial Hollows

It is important to continue a regime of regular maintenance for however long the artificial hollow is required. Artificial hollows erected as a condition of development to offset the loss of natural hollows may be required to be available and maintained for the life of the development approval. As part of establishing artificial hollows the responsibility and regime for long term monitoring and maintenance should also be established.

Periodic maintenance checks should be undertaken at least every two years, preferably annually, for as long as the artificial hollow is required. Maintenance actions should be completed prior to the breeding season.

Further Reading

DBCA webpage and fauna profiles: [Black cockatoos](#)

Department information sheets: [Fauna Note – Corellas and other flocking cockatoos](#)

BirdLife Australia webpage and brochure: [Identify your Black cockatoo](#)

Western Australian Museum webpage and fact sheets: [Cockatoo Care](#)

Saunders DA et al. (2022) Artificial nesting hollows for the conservation of Carnaby's cockatoo *Calyptorhynchus latirostris*: definitely not a case of erect and forget. Pacific Conservation Biology [doi:10.1071/PC21061](https://doi.org/10.1071/PC21061)

Acknowledgements

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Last updated: 08 Feb 2023



Clearing Permit Decision Report

1. Application details and outcome

1.1. Permit application details

Permit number:	CPS 9105/2
Permit type:	Purpose permit
Applicant name:	BHP Nickel West Pty Ltd
Purpose of clearing:	<ul style="list-style-type: none">Facilitating processing, maintenance, providing access to and associated facilities development within the Kwinana areas;Associated pipelines and maintenance for access and bores within the Baldivis areas; andOnly for the operation and maintenance of existing infrastructure within the East Rockingham area.
Property:	Lot 819 On Deposited Plan 77252, Baldivis Lot 820 On Deposited Plan 77252, Baldivis Lot 913 On Deposited Plan 77252, Baldivis Lot 914 On Deposited Plan 77252, Baldivis Lot 915 On Deposited Plan 77252, Baldivis Lot 4639 On Deposited Plan 27786, Baldivis Charles Street Road Reserve (Pin 1193189), East Rockingham Lot 1 On Diagram 62220, East Rockingham Lot 30 On Deposited Plan 68599, East Rockingham Lot 50 On Plan 8163, East Rockingham Lot 51 On Diagram 57664, East Rockingham Lot 51 On Plan 8163, East Rockingham Lot 52 On Plan 8163, East Rockingham Lot 54 On Plan 8163, East Rockingham Lot 55 On Plan 8163, East Rockingham Lot 89 On Deposited Plan 411084 Lot 105 On Deposited Plan 48637 Lot 149 On Deposited Plan 68599 Lot 153 On Deposited Plan 245392 Lot 622 On Deposited Plan 117585 Lot 1634 On Deposited Plan 27291 Lot 1728 On Deposited Plan 166742, East Rockingham Lot 4220 On Deposited Plan 192602, East Rockingham Lot 4332 On Plan 10534, East Rockingham Lot 4333 On Plan 10534, East Rockingham Lot 4641 On Deposited Plan 27775, East Rockingham Lot 4662 On Deposited Plan 95174, East Rockingham Lot 123 On Deposited Plan 69112, Leda Lot 310 On Deposited Plan 244038, Leda Lot 396 On Deposited Plan 219858, Leda Lot 479 On Deposited Plan 27773, Leda Lot 502 On Deposited Plan 56798, Leda Lot 504 On Deposited Plan 56798, Leda

	Lot 777 On Plan 3893, Leda Lot 4335 On Plan 11170, Leda Unallocated Crown Land (Pin 1192771), Leda Unallocated Crown Land (Pin 1192772), Leda Unallocated Crown Land (Pin 11433799), Leda
Location (LGA area/s):	City of Kwinana City of Rockingham

1.2. Description of clearing activities

The vegetation proposed to be cleared is up to 10 hectares within a 122-hectare footprint and is distributed across multiple land parcels over approximately eight kilometres. The footprint comprises of both vegetated and non-vegetated areas in varying condition (Keighery, 1994).

Decision on application and key considerations

Decision:	Granted
Decision date:	7 July 2023
Decision area:	10 hectares of native vegetation

1.3. Reasons for decision

On 26 May 2023, the Department of Water and Environmental Regulation (DWER) determined to grant Clearing Permit CPS 9105/1 to authorise the BHP Nickel West Pty Ltd to clear up to 10 hectares of native vegetation for the to facilitate processing, maintenance, access and associated facilities development within Kwinana and associated pipelines, and maintenance for access and bores within Baldivis lots.

One appeal was lodged against the conditions of the clearing permit CPS 9105/1, covering four grounds of appeal.

This clearing permit amendment gives effect to the Minister for Environment (Minister) determination to allow the appeal in part (Appeal number: 017 of 2022). The Minister determined that:

- a new condition be applied to require the retention of all trees which contain breeding hollows with evidence of current or past breeding use by black cockatoos;
- a new condition to require the retention of trees containing potentially suitable or suitable hollows unless they cannot be avoided, in which case notification must be provided to the CEO at least 21 days prior to clearing;
- a new condition requiring that any suitable or potentially suitable hollow that cannot be avoided must be replaced with an artificial hollow and the permit holder must provide details and locations of any hollows installed to the Department within 6 months of installation;
- a new condition be added to require the permit holder to submit an offset proposal, prepared in accordance with the WA Environmental Offsets framework (including the WA Environmental Offsets calculator), and recognising the revised status of Baudin's cockatoo to 'critically endangered' for clearing of black cockatoo habitat, for approval of the CEO of DWER;
- condition one (1) be amended to more clearly define the types of activities permitted within the clearing footprint and specifically the East Rockingham patch being an area of native vegetation with a high concentration of cockatoo breeding hollows, potential night roosts, and foraging resources, to ensure clearing is only to the extent necessary.

Based on the above considerations, the Minister requested that the DWER amend the clearing permit by strengthening the conditions related to black cockatoo breeding and foraging habitat, and the permit be modified in the manner set out in the Appeals Convenor's report.

The Delegated Officer has taken the above into consideration and decided to grant an amended clearing permit in accordance with the Minister's determination. The Delegated Officer added new conditions related to offset

requirements for the clearing of any black cockatoo breeding and foraging habitat into the permit and amended the existing condition one (1) and eleven (11) on the permit to reflect the Minister's recommendations.

The Delegated Officer reviewed the information available at the time of the amendment, noting that the site characteristics and assessment against the clearing principles, as well as planning and other matters have not changed from the Clearing Permit Decision Report CPS 9105/1.

2. Assessment of application

2.1. Assessment

This amendment is the result of an appeal determination made by the Minister for Environment regarding the conditions of Clearing Permit CPS 9105/1. As a result of the appeal determination, new conditions relating to offsetting black cockatoo foraging and breeding habitat have been incorporated into the permit and condition 1 and 11 of the clearing permit has been modified.

The original application assessed the potential for clearing of native vegetation to comprise the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna as being 'at variance' to clearing principal (b). The determination was based on the fact that application area contained foraging and breeding habitat for conservation significant fauna. However, the native vegetation within the application area was not assessed as significant foraging habitat for Carnaby's cockatoos due to the absence of proteaceous plant species within most of the mapped and surveyed vegetation types, and the foraging value was considered low. Based on this, the department did not request for an offset from the permit holder. The original assessment considered that there is an impact to black cockatoo breeding habitat from the clearing and determined that this impact could be managed by conducting inspections for black cockatoo species and to undertake further mitigation actions if breeding habitat is confirmed. Based on this, the DWER elected to only impose conditions on the permit related to black cockatoo breeding habitat and not foraging habitat.

The appellant raised concerns in regard to the conditions on the permit that related to black cockatoos. The appellant was of the view that the vegetation proposed to be cleared is significant foraging and breeding habitat for the three threatened black cockatoo species and requested that the conditions sought for no net loss of habitat for these species.

The Minister agreed with the concerns raised by the appellant and requested that the conditions on the permit be strengthened to better manage the potential risks and impacts to black cockatoo habitat. The minister stated that this includes a requirement to avoid and retain all hollows that have evidence of use by black cockatoos and a requirement to avoid and retain any trees containing potentially suitable or suitable hollows unless they cannot be avoided. In the instance where they cannot be avoided, the Minister suggested that justification must be provided to the CEO prior to clearing and an artificial hollow be installed for all suitable and potentially suitable hollows cleared. The Minister further added that the permit holder should provide details and locations of any hollows installed to the Department within six months of installation, to allow the Department to review the adequacy of the monitoring and maintenance arrangement at that time. Finally, the minister requested that clearing related to this clearing permit should be subject to an offset approved by the Department and the offset proposal to be prepared in accordance with the WA Environmental Offset framework, using the WA Environmental Offsets calculator. It was the minister's view that these amendments will contribute to the protection of breeding opportunities now and into the future and will offset loss of habitat resulting from clearing.

Appendix A - References

Department of Water and Environmental Regulation (DWER) (2022) Purpose permit and decision report: CPS 9105/1 [Index of /permit/9105 \(dwer.wa.gov.au\)](https://www.dwer.wa.gov.au/index.php/permit/9105)

Office of the Appeals Convenor (2023) Report to the Minister for Environment – Appeal objecting to conditions of Clearing Permit CPS 9105/1, various land parcels in Baldy, East Rockingham, and Leda – Clearing Permit CPS 9105/1.