GOVERNMENT OF
WESTERN AUSTRALIA

CLEARING PERMIT

Granted under section 51E of the Environmental Protection Act 1986

Purpose Permit number:	CPS 9179/1
Permit Holder:	Commissioner of Main Roads Western Australia
Duration of Permit:	From 1 December 2021 to 1 December 2036

ADVICE NOTE
The funds referred to in condition 15 of this Permit are intended for contributing towards the purchase of 65 hectares of native vegetation with habitat for western ringtail possum (*Pseudocheirus occidentalis*), 29.6 hectares of native vegetation with foraging habitat for *black cockatoo species* and 22.2 hectares of native vegetation with habitat for south-western brush-tailed phascogale (*Phascogale tapoatafa wambenger*).

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 purpose of constructing stages 2 and 3b of the Albany Ring Road project.

2. Land on which clearing is to be done

The Permit Holder is authorised to clear *native vegetation* within the properties described in Table 3 of Schedule 1 of this Permit.

3. Clearing authorised

The Permit Holder must not clear more than 15.67 hectares of *native vegetation* within the areas cross-hatched yellow in Figure 1(a), Figure 1(b), Figure 1(c) and Figure 1(d) of Schedule 2 of this Permit.

4. Type of clearing authorised

This Permit authorises the Permit Holder to clear *native vegetation* for the activities described in condition 1 of this Permit to the extent that the Permit Holder has the power to carry out work involving clearing for those activities under the *Main Roads Act 1930* or any other written law.

5. Period during which clearing is authorised

The Permit Holder must not clear any *native vegetation* after 1 December 2026.

PART II – MANAGEMENT CONDITIONS

6. 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 by implementing:

7. 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;

(c) restrict the movement of machines and other vehicles to the limits of the areas to be cleared.

8. Direction of Clearing

The Permit Holder must:

(a) Conduct clearing authorised under this Permit in one direction towards adjacent native vegetation; and

(b) allow a reasonable time for fauna present within the area being cleared to move into adjacent native vegetation ahead of the clearing activity.

9. Fauna management – black cockatoo habitat

(a) Within 72 hours prior to undertaking any clearing authorised under this Permit, the Permit Holder must engage a *fauna specialist* to inspect all *black cockatoo habitat tree/s* identified in the Albany Ring Road Black Cockatoo Habitat Assessment (Biota Environmental Sciences, October 2019) for *evidence* of current or past breeding use by *black cockatoo species*.

(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 9(a), that tree must only be cleared within 72 hours after the inspection.

(c) Where a *black cockatoo habitat tree* shows *evidence* of current or past breeding use by *black cockatoo species* under condition 9(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 habitat 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 9(c).

(e) For each suitably sized black cockatoo nesting hollow that cannot be avoided, the Permit Holder must install one artificial black cockatoo nesting hollow.

(f) Each artificial black cockatoo nesting hollow required by condition 9(e) must be installed prior to commencement of the next black cockatoo breeding season following clearing of the related *black cockatoo habitat tree(s)*.

(g) The artificial black cockatoo nest hollow(s) required by condition 9(e) of this Permit must:

(i) be installed at a location identified by the Department of Biodiversity, Conservation and Attractions within 20 kilometres of Albany;

(ii) be designed and placed in accordance with the specifications details in Schedule 3 of this Permit; and

(iii) be monitored and maintained in accordance with the specifications detailed in Schedule 4 of this Permit, for a period of at least 10 years.

(h) Within two months of undertaking clearing authorised under this Permit, the Permit Holder must provide the results of the *fauna specialist's* inspection in a report to the *CEO*.

(i) The *fauna specialist's* inspection report must include the following;

(i) the time(s) and date(s) of inspection(s) by the *fauna specialist*;
(ii) a description of the *fauna specialist* inspection methods used;
(iii) the location of any fauna species listed in condition 9(a), if identified, recorded using a GPS unit set to GDA94, expressing the geographical coordinates in Eastings and Northings or decimal degrees;
(iv) the name and number of each fauna species identified;
(v) whether the *black cockatoo habitat tree/s* identified show current or past use by *black cockatoo species;*
(vi) a photo of the *black cockatoo habitat tree(s)* identified;
(vii) a description of the *black cockatoo habitat tree(s)* identified, including the:
(A) species of *black cockatoo habitat tree(s)*; and
(B) condition of the *black cockatoo habitat tree(s)*
(viii) the time and date each *black cockatoo habitat tree* with evidence of current or past breeding use was cleared; and
(ix) the location of the artificial black cockatoo nesting hollow installed.

10. Fauna management – western ringtail possums

(a) In relation to the areas authorised to clear under this Permit, the Permit Holder must engage a *western ringtail possum specialist* to inspect those areas immediately prior to, and for the duration of clearing activities, for the presence of western ringtail possum(s) (*Pseudocheirus occidentalis*).

(b) Clearing activities must cease in any areas inspected under Condition 10(a) where western ringtail possum(s) are identified until either:

(i) the western ringtail possum(s) individual has moved on from that area to adjoining *suitable habitat*; or
(ii) the western ringtail possum(s) individual has been removed by a *western ringtail possum specialist*.

(c) Any western ringtail possum(s) individual removed in accordance with condition 10(b)(ii) must be relocated by a *western ringtail possum specialist* to an area of *suitable habitat*.

(d) Where western ringtail possum(s) are identified under condition 10(a), the Permit Holder must within two months of undertaking clearing authorised under this Permit, 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 1994 (GDA94), 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 *western ringtail possum 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. Ecological linkage management – rope bridge

(a) Within 24 months of commencing clearing authorised under this Permit, in consultation with the Department of Biodiversity, Conservation and Attractions, the Permit Holder must install a western ringtail possum (*Pseudocheirus occidentalis*) rope bridge within the area cross-hatched red in Figure 1(e) of Schedule 2 to allow the safe movement of western ringtail possum(s) (*Pseudocheirus occidentalis*) between remnants of native vegetation.

(b) The Permit Holder must maintain the rope bridge installed under condition 11(a) for the remaining term of this Permit.

12. Ecological linkage management – fauna underpass

Within 24 months of commencing clearing authorised under this Permit, the Permit Holder must install a fauna underpass within the area cross-hatched red in Figure 1(f) of Schedule 2 to allow the safe movement of fauna between remnants of native vegetation.

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

(a) In relation to the areas authorised to clear under this Permit, the Permit Holder must engage a *fauna specialist* to inspect all suitably sized tree hollows for the presence of south-western brush-tailed phascogale(s) (*Phascogale tapoatafa wambenger*) within 72 hours prior to clearing.

(b) Clearing must not commence in any area where south-western brush-tailed phascogale(s) are identified under Condition 13(a) of this permit until either:

(i) the south-western brush-tailed phascogale(s) has moved on from that area to adjoining *suitable habitat;* or

(ii) the south-western brush-tailed phascogale(s) has been removed by a *fauna specialist.*

(c) Any south-western brush-tailed phascogale individuals removed in accordance with condition 13(b)(ii) of this permit must be relocated by a *fauna specialist* to *suitable habitat*.

(d) Where south-western brush-tailed phascogale(s) are identified under condition 13(b) of this permit, the permit holder must provide the following records to the *CEO* as soon as practicable:

(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 1994 (GDA94), 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.

14. Wind erosion management

The Permit Holder must ensure that road widening and associated activities commence within three months of the authorised clearing being undertaken to reduce the risk of soil erosion by minimising the exposure time of soils prior to construction.

15. Monetary contributions to a fund maintained for the purpose of establishing or maintaining vegetation (offset)

Prior to undertaking any clearing authorised under this Permit and no later than 1 December 2022, the Permit Holder shall provide documentary evidence to the *CEO* that funding of $321,750 has been transferred to the Department of Water and Environmental Regulation to purchase land for the purpose of establishing or maintaining native vegetation.

16. Offset – Rehabilitation

(a) The Permit Holder must *revegetate* and *rehabilitate* 3.56 hectares of native vegetation within the *cleared* or *weed* infested portions of the areas cross-hatched red and green in Figure 1(g) and Figure 1(h) of Schedule 2. The *revegetation* and *rehabilitation* must contain:

(i) 3.56 hectares of suitable *Pseudocheirus occidentalis* (western ringtail possum) habitat, as identified in the *western ringtail possum recovery plan*,

(ii) 3.56 hectares of suitable *black cockatoo species* foraging habitat, as identified in *black cockatoo recovery plan*, and

(iii) 3.56 hectares of *suitable habitat* for *Phascogale tapoatafa wambenger* (south-western brush tailed phascogale).

(b) The *revegetation* and *rehabilitation* required under condition 16(a) of this Permit, must be undertaken in accordance with the *Project Rehabilitation Plan* prepared under condition 17 of this Permit.

(c) Within 24 months of the commencement of clearing authorised under this Permit and no later than 1 December 2026, the Permit Holder must:

(i) give a conservation covenant issued under section 30B of the *Soil and Land Conservation Act 1945*, setting aside the *revegetated* and *rehabilitated* areas cross-hatched green in Figure 1(g) and Figure 1(h) of Schedule 2 for the protection and management of native vegetation in perpetuity; and

(ii) provide to the *CEO* a copy of the executed conservation covenant.

17. Project Rehabilitation Plan

(a) Within 12 months of the commencement of clearing authorised under this Permit, the Permit Holder must submit a *Project Rehabilitation Plan* to the *CEO* for approval for the areas cross-hatched red in Figure 1(g) and Figure 1(h) of Schedule 2, which must be developed in accordance with *A Guide to Preparing Revegetation Plans for Clearing Permits* (*Department*, 2018).

(b) The *Project Rehabilitation Plan* must be prepared by an *environmental specialist.*

(c) The *Project Rehabilitation Plan* must include the following:

(i) *site preparation*

(ii) *weed* control

(iii) a *vegetation establishment period*

(iv) *revegetation* success *completion criteria* which shall include but not be limited to target weed cover, target vegetation condition, target density, species richness, bare ground cover and target structure

(v) *revegetation* success *completion criteria* must be consistent with *reference site(s)* for the *rehabilitation* area required under condition 17(a)(i) of this Permit;

(vi) *regeneration, direct seeding* or *planting,* at an *optimal time* in accordance with a defined species list. Species must include suitable *Pseudocheirus occidentalis* (western ringtail possum) and *Phascogale tapoatafa wambenger* (south-western brush tailed phascogale) habitat, and suitable *black cockatoo species* foraging habitat

(vii) contingency actions to be undertaken if *completion criteria* are not met

(viii) ongoing maintenance and monitoring of the areas required to be *revegetated* and *rehabilitated*

(ix) timeframes for completion of the activities

(x) management commitments that will be achieved

(d) The Permit Holder shall implement the *Project Rehabilitation Plan* as approved by the *CEO.*

PART III - RECORD KEEPING AND REPORTING

18. 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	(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 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings; (c) the date that the area was cleared; (d) the size of the area cleared (in hectares); (e) actions taken to avoid, minimise, and reduce the impacts and extent of clearing in accordance with condition 6 of this Permit; (f) actions taken to minimise the risk of the introduction and spread of *weeds* and *dieback* in accordance with condition 7 of this Permit; (g) actions taken in accordance with condition 8 of this Permit; (h) actions taken to manage impacts to *black cockatoo species*, in accordance with condition 9 of this Permit; (i) actions taken to manage impacts to western ringtail possum(s), in accordance with condition 10 of this Permit; (j) actions taken to manage impacts to south-western brush-tailed phascogale in accordance with condition 13 of this Permit; (k) actions taken to minimise the risk of wind erosion in accordance with condition 14 of this Permit; (l) actions taken in accordance with condition 15 of this Permit;
2.	In relation to rehabilitation pursuant to condition 16	(a) a description of the *revegetation* and *rehabilitation* activities undertaken each year, once commenced, outlined in a report produced by an *environmental specialist*; (b) the location and size of the areas *revegetated* and *rehabilitated* (in hectares) recorded using a GPS unit set to GDA94, expressing the geographical coordinates in Eastings and Northings or decimal degrees; (c) the date that *revegetation* and *rehabilitation* works began; (d) at least two photographs of the areas *revegetated/ rehabilitated* recorded annually at the same location each year; (e) the species composition, structure, density of the areas *revegetated/rehabilitated* recorded annually; (f) a description of the extent of bare ground cover, weed cover and vegetation condition of the areas *revegetated/ rehabilitated*, recorded annually; (g) a species list identifying those species *planted* or *direct seeded*; (h) a description of any remediation works undertaken; and (i) a copy of the *environmental specialist* report and activities undertaken during monitoring.

19. Reporting

(a) The Permit Holder must provide to the *CEO* on or before 30 June of each year, a written report:

(i) of records required under condition 18 of this Permit; and

(ii) concerning activities done by the Permit Holder under this Permit between 1 January and 31 December of the preceding calendar year.

(b) If no clearing authorised under this Permit was undertaken between 1 January to 31 December of the preceding calendar year, a written report confirming that no clearing under this Permit has been carried out, must be provided to the *CEO* on or before 30 June of each year.

(c) Prior to 1 December 2036, the Permit holder must provide to the *CEO* a written report of records required under condition 18 of this Permit, where these records have not already been provided under condition 19(a) of this Permit.

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 over bark at 130 centimetres from the base of the tree of 50 centimetres or greater (or 30 centimetres or greater for *Eucalyptus salmonophloia* or *Eucalyptus wandoo*) that contain hollows suitable for breeding by *black cockatoo species*.
Black cockatoo recovery plan	means: a) A recovery plan prepared by Department of Environment and Conservation (2008) for Forest Black Cockatoo (Baudin's Cockatoo *Calyptorhynchus baudinii* and Forest Red tailed Black Cockatoo *Calyptorhynchus banksii naso*) b) A recovery plan prepared by Department of Parks and Wildlife (2013) for Carnaby's cockatoo (Calyptorhynchus latirostris)
Black cockatoo species	means one or more of the following species: a) *Calyptorhynchus latirostris* (Carnaby's cockatoo); b) *Calyptorhynchus baudinii* (Baudin's cockatoo); and/or c) *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo).
CEO	Chief Executive Officer of the department or his/her delegates responsible for the administration of the clearing provisions under the *Environmental Protection Act 1986*.
Clearing	has the meaning given under section 3(1) of the EP Act.
Completion criteria	means a measurable outcome based on suitable *reference sites,* used to determine revegetation*/rehabilitation* success
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 *Public Sector Management Act 1994* (WA) and designated as responsible for the administration of the EP Act, which includes Part V Division 3.
Dieback	means the effect of *Phytophthora* species on native vegetation.
Direct seeding	means a method of re-establishing vegetation through establishment of a seed bed and the introduction of seeds of the desired plant species.
Environmental specialist	means a person who holds a tertiary qualification in environmental science or equivalent and has experience relevant to the type of environmental advice that an environmental specialist is required to provide under this Permit, or who is approved by the *CEO* as a suitable environmental specialist.
EP act	*Environmental Protection Act 1986* (WA)
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 *Biodiversity Conservation Act 2016*.
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 100 kilometres and the same Interim Biogeographic Regionalisation for Australia (IBRA) subregion of the area cleared.

Term	Definition
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.
Optimal time	means the optimal time for undertaking direct seeding and planting for that region.
Planting	means the re-establishment of vegetation by creating favourable soil conditions and planting seedlings of the desired species.
Project Rehabilitation Plan	Means plans developed by the Permit Holder for the *revegetation* and *rehabilitation* of a site in accordance with condition 16 of this Permit:
Reference site(s)	means nearby sites used to provide baseline data for planning a revegetation project. Measurements from fixed reference points or plots where biodiversity components are measured are used to set measurable completion criteria for revegetation projects. The reference sites must contain native vegetation which provides the following values: • provides suitable *Pseudocheirus occidentalis* (western ringtail possum) habitat • provides suitable *Calyptorhynchus latirostris* (Carnaby's cockatoo), *Calyptorhynchus banksia* subsp. *na*so (forest red-tailed black cockatoo) and *Calyptorhynchus baudinii* (Baudin's cockatoo) foraging habitat • provides suitable *Phascogale tapoatafa wambenger* (south-western brush-tailed phascogale) habitat • is in good (Keighery, 1994) or better condition
Regenerate/ed/ion	means revegetation that can be established from in situ seed banks contained either within the topsoil or seed-bearing mulch.
Rehabilitate/ed/ion	means actively managing an area containing native vegetation in order to improve the ecological function of that area using methods such as natural *regeneration*, *direct seeding* and/or *planting*, so that the species composition, structure and density is similar to pre-clearing vegetation types in that area.
Revegetate/ed/ion	means the re-establishment of a cover of local provenance native vegetation in an area using methods such as natural regeneration, direct seeding and/or planting, so that the species composition, structure and density is similar to pre-clearing vegetation types in that area
Site preparation	means management of existing site topsoil and preparation of the finished soil surface for revegetation, for example by ripping or tilling the soil surface and respreading site topsoil and chipped native vegetation
Suitable habitat (western ringtail possum)	Means habitat known to support western ringtail possums (*Pseudocheirus occidentalis*) within the known current distribution of the species, typically characterised by abundant foliage, presence of suitable nesting structures such as tree hollows, as well as high canopy cover and continuity. Known habitat includes peppermint (*Agonis flexuosa*) dominated woodlands, jarrah (*Eucalyptus marginata*) and marri (*Corymbia calophylla*) forests, riparian vegetation with a canopy of Bullich (*Eucalyptus megacarpa*) or flooded gum (*Eucalyptus rudis*), karri (*Eucalyptus diversicolor*) forests, sheoak (*Allocasuarina fraseriana*) dominated woodlands, and other stands of myrtaceous trees growing near swamps, watercourses or floodplains
Suitable habitat (south-western brush-tailed phascogale)	means habitat known to support *Phascogale tapoatafa wambenger* (south-western brush-tailed phascogales), within the known current distribution of the species, typically characterised by abundant foliage, presence of suitable nesting structures such as tree hollows, as well as high canopy cover and continuity
Vegetation condition	means the rating given to native vegetation which refers to the impact of disturbance on each of the layers and the ability of the community to regenerate (Keighery 1994)
Vegetation establishment period	means a period of at least two summers after the revegetation during which time replacement and infill revegetation works may be required for areas in which revegetation has been unsuccessful, and involves regular inspections of revegetation sites to monitor the success of revegetation
Weeds	means any plant – (a) that is a declared pest under section 22 of the *Biosecurity and Agriculture Management Act 2007*; or (b) published in a Department of Biodiversity, Conservation and Attractions

Term	Definition
	species-led ecological impact and invasiveness ranking summary, regardless of ranking; or (c) not indigenous to the area concerned.
Western ringtail possum recovery plan	means a plan prepared by Department of Parks and Wildlife (2017) to guide recovery actions for the western ringtail possum for the next 10 years.
Western ringtail possum specialist	means a fauna specialist who holds a tertiary qualification specialising in environmental science or equivalent, has a minimum of two years of work experience in western ringtail possum (*Pseudocheirus occidentalis*) identification, surveys of western ringtail possums and capture and handling of western ringtail possums, and holds a valid fauna licence issued under the Biodiversity Conservation Act 2016.

REFERENCES

Department of Environment and Conservation (2008). Forest Black Cockatoo (Baudin's Cockatoo *Calyptorhynchus baudinii* and Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso*) Recovery Plan. Department of Environment and Conservation, Pert, Western Australia.

Department of Parks and Wildlife (2013). Carnaby's cockatoo (*Calyptorhynchus latirostris*) Recovery Plan. Department of Parks and Wildlife, Perth, Western Australia

Department of Parks and Wildlife (2017). Western Ringtail Possum (*Pseudocheirus occidentalis*) Recovery Plan. Wildlife Management Program No. 58. Department of Parks and Wildlife, Perth, WA.

Keighery, B.J. (1994) *Bushland Plant Survey: A Guide to Plant Community Survey for the Community*. Wildflower Society of WA (Inc). Nedlands, Western Australia.

END OF CONDITIONS

Meenu Vitarana
A/MANAGER
NATIVE VEGETATION REGULATION

Officer delegated under Section 20
of the Environmental Protection Act 1986

8 November 2021

Schedule 1

Table 3: List of properties within which the clearing is authorised in accordance with conditions of this Permit.

Property	PIN	Locality
CHARLES STREET ROAD RESERVE	1274126	GLEDHOW
CHARLES STREET ROAD RESERVE	1279763	GLEDHOW
CROWN RESERVE 16969	592360	GLEDHOW
CROWN RESERVE 16969	583746	GLEDHOW
CROWN RESERVE 16969	1150024	GLEDHOW
DEPOSITED PLAN 60651	11761510	GLEDHOW
FREDERICK STREET ROAD RESERVE	1274124	GLEDHOW
FREDERICK STREET ROAD RESERVE	11748440	GLEDHOW
GEORGE STREET ROAD RESERVE	1274125	GLEDHOW
GEORGE STREET ROAD RESERVE	1274130	GLEDHOW
LOT 0 ON PLAN 3652	1311720	GLEDHOW
LOT 1 ON DIAGRAM 17588	583777	GLEDHOW
LOT 1 ON PLAN 3823	587879	GLEDHOW
LOT 2 ON DIAGRAM 25653	587875	GLEDHOW
LOT 2 ON PLAN 3823	587880	GLEDHOW
LOT 3 ON PLAN 3823	587881	GLEDHOW
LOT 4 ON PLAN 3823	587882	GLEDHOW
LOT 5 ON DIAGRAM 17588	583781	GLEDHOW
LOT 5 ON PLAN 3823	587884	GLEDHOW
LOT 6 ON DIAGRAM 17588	583782	GLEDHOW
LOT 6 ON PLAN 3823	587885	GLEDHOW
LOT 7 ON DIAGRAM 17588	583785	GLEDHOW
LOT 7 ON PLAN 3823	587887	GLEDHOW
LOT 8 ON DIAGRAM 17589	583786	GLEDHOW
LOT 8 ON DIAGRAM 63786	587860	GLEDHOW
LOT 9 ON DIAGRAM 17589	583787	GLEDHOW
LOT 9 ON DIAGRAM 82973	1214930	GLEDHOW
LOT 10 ON DIAGRAM 17589	583788	GLEDHOW
LOT 13 ON DIAGRAM 26990	583779	GLEDHOW
LOT 14 ON DIAGRAM 25399	583780	GLEDHOW
LOT 14 ON DIAGRAM 67339	587833	GLEDHOW
LOT 15 ON DIAGRAM 73169	587862	GLEDHOW
LOT 16 ON DIAGRAM 73169	587864	GLEDHOW
LOT 16 ON DIAGRAM 84015	1078753	GLEDHOW
LOT 17 ON DIAGRAM 66433	583789	GLEDHOW
LOT 17 ON DIAGRAM 73169	587871	GLEDHOW
LOT 20 ON PLAN 2012	583751	GLEDHOW
LOT 36 ON PLAN 3569	587918	GLEDHOW
LOT 50 ON DIAGRAM 6189	11560283	GLEDHOW
LOT 52 ON DEPOSITED PLAN 22501	587846	GLEDHOW
LOT 53 ON DEPOSITED PLAN 22501	587845	GLEDHOW
LOT 54 ON DEPOSITED PLAN 22501	587844	GLEDHOW
LOT 55 ON DEPOSITED PLAN 22501	587843	GLEDHOW
LOT 63 ON DEPOSITED PLAN 222501	592499	GLEDHOW
LOT 64 ON DEPOSITED PLAN 22501	587859	GLEDHOW
LOT 65 ON DEPOSITED PLAN 22501	587863	GLEDHOW
LOT 78 ON DEPOSITED PLAN 222501	592497	GLEDHOW
LOT 95 ON DEPOSITED PLAN 195537 (CROWN RESERVE 28465)	592488	GLEDHOW
LOT 96 ON DEPOSITED PLAN 195537 (CROWN RESERVE 28466)	592487	GLEDHOW
LOT 105 ON DEPOSITED PLAN 92240 (CROWN RESERVE 32422)	592500	GLEDHOW
LOT 110 ON DEPOSITED PLAN 34605	11106020	GLEDHOW
LOT 127 ON DEPOSITED PLAN 218176 (CROWN RESERVE 30599)	1196283	GLEDHOW
LOT 127 ON DEPOSITED PLAN 218176 (CROWN RESERVE 30599)	1196284	GLEDHOW
LOT 150 ON DEPOSITED PLAN 63836	11825319	GLEDHOW
LOT 300 ON DEPOSITED PLAN 63836	11825318	GLEDHOW
LOT 7769 ON DEPOSITED PLAN 218550 (CROWN RESERVE 38132)	583783	GLEDHOW
LOWANNA DRIVE ROAD RESERVE	1274127	GLEDHOW
LOWANNA DRIVE ROAD RESERVE	1274131	GLEDHOW
OLD ELLEKER ROAD RESERVE	1279749	GLEDHOW
OLD ELLEKER ROAD RESERVE	1279751	GLEDHOW
OLD ELLEKER ROAD RESERVE	1279752	GLEDHOW
OLD ELLEKER ROAD RESERVE	1279765	GLEDHOW
OLD ELLEKER ROAD RESERVE	1279875	GLEDHOW
OLD ELLEKER ROAD RESERVE	1279876	GLEDHOW
OLD ELLEKER ROAD RESERVE	1279877	GLEDHOW

ROUNDHAY STREET ROAD RESERVE	1150021	GLEDHOW
ROUNDHAY STREET ROAD RESERVE	1270602	GLEDHOW
SOUTH COAST HIGHWAY ROAD RESERVE	1274134	GLEDHOW
SOUTH COAST HIGHWAY ROAD RESERVE	1274135	GLEDHOW
SOUTH COAST HIGHWAY ROAD RESERVE	1274142	GLEDHOW
WALMSLEY ROAD RESERVE	1279753	GLEDHOW
UNNAMED ROAD RESERVE	1279745	GLEDHOW
UNNAMED ROAD RESERVE	11398175	GLEDHOW
LOT 520 ON DEPOSITED PLAN 408468	12242132	GLEDHOW
LOT 521 ON DEPOSITED PLAN 408468	12242131	GLEDHOW
LOT 525 ON DEPOSITED PLAN 408472	12242149	GLEDHOW
LOT 125 ON PLAN 16119	592382	MARBELLUP
SOUTH COAST HIGHWAY ROAD RESERVE	1274169	MARBELLUP
CROWN RESERVE 16969	583742	MOUNT ELPHINSTONE
FRENCHMAN BAY ROAD RESERVE	1270616	MOUNT ELPHINSTONE
FRENCHMAN BAY ROAD RESERVE	1270617	MOUNT ELPHINSTONE
HANRAHAN ROAD RESERVE	1150041	MOUNT ELPHINSTONE
HANRAHAN ROAD RESERVE	1279871	MOUNT ELPHINSTONE
HANRAHAN ROAD RESERVE	1279872	MOUNT ELPHINSTONE
LOT 6 ON DIAGRAM 25262	583722	MOUNT ELPHINSTONE
LOT 7 ON DIAGRAM 80093	1052161	MOUNT ELPHINSTONE
LOT 9 ON DIAGRAM 36714	583723	MOUNT ELPHINSTONE
LOT 10 ON DIAGRAM 53535	583728	MOUNT ELPHINSTONE
LOT 11 ON DIAGRAM 53535	583840	MOUNT ELPHINSTONE
LOT 30 ON PLAN 3571	583730	MOUNT ELPHINSTONE
LOT 44 ON DEPOSITED PLAN 171141	11786504	MOUNT ELPHINSTONE
LOT 52 ON PLAN 3571	583584	MOUNT ELPHINSTONE
LOT 53 ON PLAN 3571	583595	MOUNT ELPHINSTONE
LOT 54 ON PLAN 3571	583583	MOUNT ELPHINSTONE
LOT 58 ON PLAN 3571	583592	MOUNT ELPHINSTONE
LOT 76 ON DEPOSITED PLAN 26132	1364950	MOUNT ELPHINSTONE
LOT 76 ON DEPOSITED PLAN 26132	1364952	MOUNT ELPHINSTONE
LOT 140 ON DEPOSITED PLAN 27076	583842	MOUNT ELPHINSTONE
LOT 141 ON DEPOSITED PLAN 27076	583841	MOUNT ELPHINSTONE
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LOT 153 ON DEPOSITED PLAN 48569	11569667	MOUNT ELPHINSTONE
LOT 157 ON DEPOSITED PLAN 28987	1375962	MOUNT ELPHINSTONE
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LOT 201 ON DEPOSITED PLAN 30388	11009636	MOUNT ELPHINSTONE
LOT 202 ON DEPOSITED PLAN 30388	11009633	MOUNT ELPHINSTONE
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LOT 529 ON DEPOSITED PLAN 408473	12242156	MOUNT ELPHINSTONE
LOT 530 ON DEPOSITED PLAN 408473	12242163	MOUNT ELPHINSTONE
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LOT 1157 ON DEPOSITED PLAN 171141	583846	MOUNT ELPHINSTONE
LOT 1350 ON DEPOSITED PLAN 184224	583850	MOUNT ELPHINSTONE
LOWER DENMARK ROAD RESERVE	1270618	MOUNT ELPHINSTONE
LOWER DENMARK ROAD RESERVE	1286900	MOUNT ELPHINSTONE
PRINCESS ROYAL DRIVE ROAD RESERVE	1286899	MOUNT ELPHINSTONE
RAILWAY	583849	MOUNT ELPHINSTONE
UNALLOCATED CROWN LAND	583845	MOUNT ELPHINSTONE
UNNAMED ROAD RESERVE	1270615	MOUNT ELPHINSTONE
UNNAMED ROAD RESERVE	1270619	MOUNT ELPHINSTONE
WARE ROAD RESERVE	1270701	MOUNT ELPHINSTONE
CARLISLE STREET ROAD RESERVE	1277641	MOUNT MELVILLE
CARLISLE STREET ROAD RESERVE	1286874	MOUNT MELVILLE
CARLISLE STREET ROAD RESERVE	1286875	MOUNT MELVILLE
CARLISLE STREET ROAD RESERVE	1286903	MOUNT MELVILLE
CARLISLE STREET ROAD RESERVE	1299845	MOUNT MELVILLE
DEPOSITED PLAN 76615	12038208	MOUNT MELVILLE
FESTING STREET ROAD RESERVE	1277635	MOUNT MELVILLE
FESTING STREET ROAD RESERVE	1277636	MOUNT MELVILLE
FESTING STREET ROAD RESERVE	1277638	MOUNT MELVILLE
HANRAHAN ROAD RESERVE	1279871	MOUNT MELVILLE
HANRAHAN ROAD RESERVE	1279872	MOUNT MELVILLE
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LOT 572 ON DEPOSITED PLAN 222009	583883	MOUNT MELVILLE

LOT 573 ON DEPOSITED PLAN 222009	583882	MOUNT MELVILLE
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LOT 617 ON DEPOSITED PLAN 222009	583864	MOUNT MELVILLE
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LOT 620 ON DEPOSITED PLAN 222009	583858	MOUNT MELVILLE
LOT 621 ON DEPOSITED PLAN 222009	1227189	MOUNT MELVILLE
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LOT 1223 ON DEPOSITED PLAN 195498	583897	MOUNT MELVILLE
LOT 1324 ON DEPOSITED PLAN 183218 (CROWN RESERVE 36047)	583857	MOUNT MELVILLE
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LOT 1454 ON DEPOSITED PLAN 193311	1211540	MOUNT MELVILLE
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PRINCESS ROYAL DRIVE ROAD RESERVE	1286901	MOUNT MELVILLE
RAILWAY	583849	MOUNT MELVILLE
UNNAMED ROAD RESERVE	1277636	MOUNT MELVILLE
UNNAMED ROAD RESERVE	1277637	MOUNT MELVILLE
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UNNAMED ROAD RESERVE	1286873	MOUNT MELVILLE
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UNNAMED ROAD RESERVE	1286880	MOUNT MELVILLE
UNNAMED ROAD RESERVE	1286881	MOUNT MELVILLE
UNNAMED ROAD RESERVE	1286882	MOUNT MELVILLE
WOOLSTORES PLACE ROAD RESERVE	1286897	MOUNT MELVILLE
CROWN RESERVE 16969	583746	ROBINSON
CROWN RESERVE 16969	1150024	ROBINSON
LOT 52 ON DIAGRAM 52007	583635	ROBINSON
LOWER DENMARK ROAD RESERVE	1270693	ROBINSON
LOWER DENMARK ROAD RESERVE	1270598	ROBINSON
LOWER DENMARK ROAD RESERVE	1270600	ROBINSON
LOWER DENMARK ROAD RESERVE	1270601	ROBINSON
LOWER DENMARK ROAD RESERVE	1270695	ROBINSON
LOWER DENMARK ROAD RESERVE	1270696	ROBINSON
ROUNDHAY STREET ROAD RESERVE	1150021	ROBINSON

Schedule 2

The boundary of the area authorised to be cleared is shown in Figured 1a – 1d below. Figures 1e-1h relate to areas subject to management and offset action requirements under the conditions of this Permit.

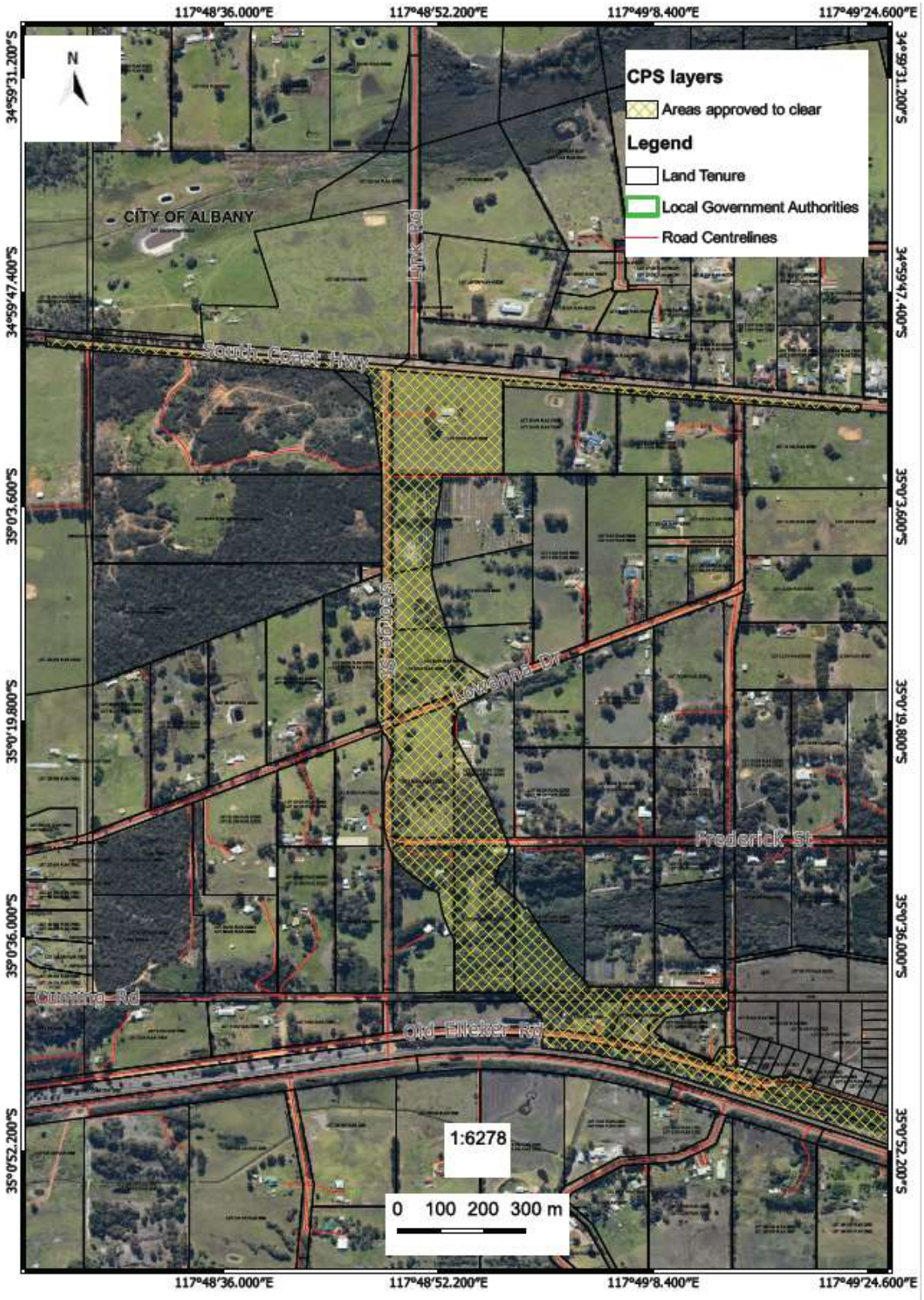

Figure 1a: Map of the boundary of the area (cross-hatched yellow) within which clearing may occur.

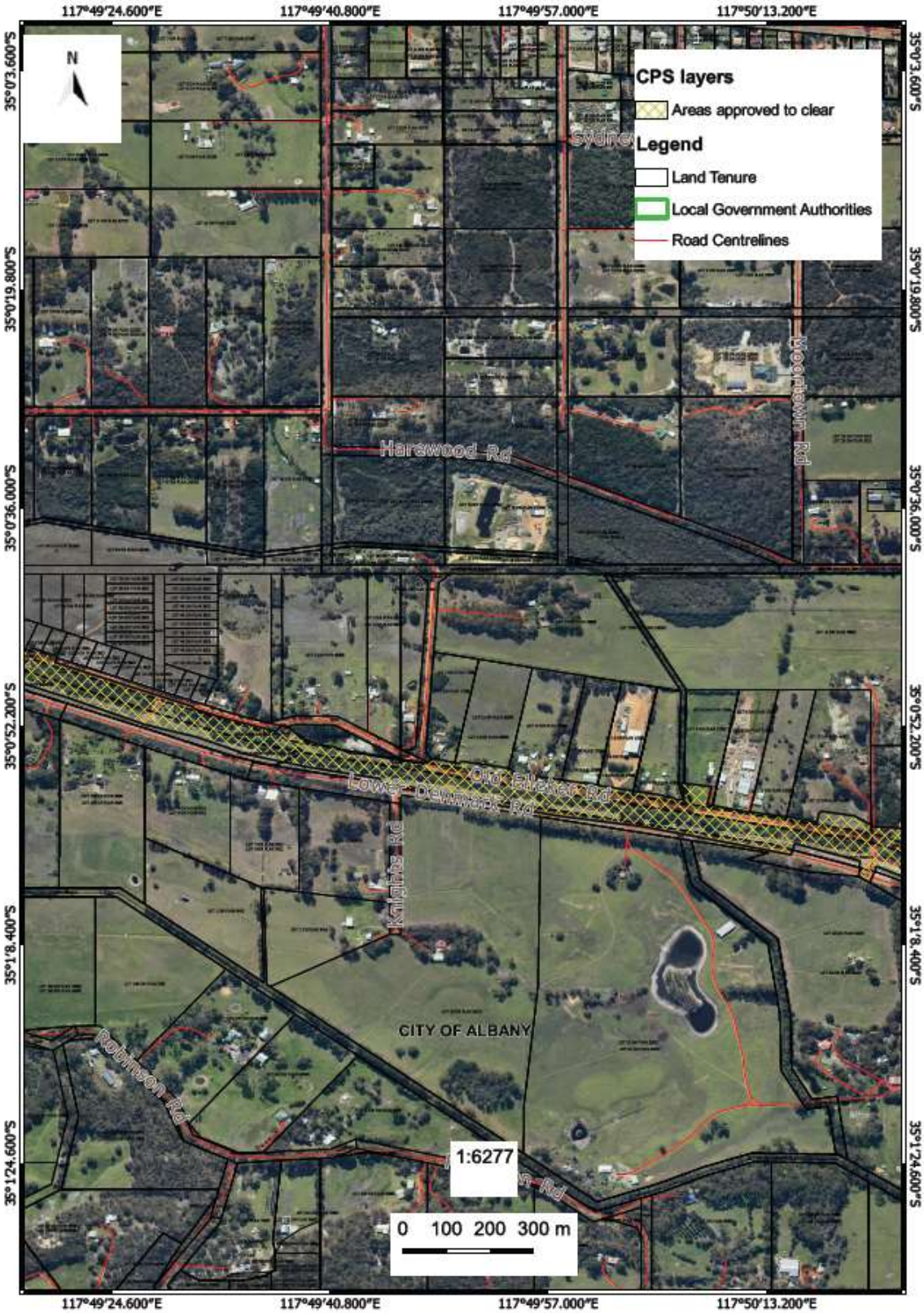

Figure 1b: Map of the boundary of the area (cross-hatched yellow) within which clearing may occur.

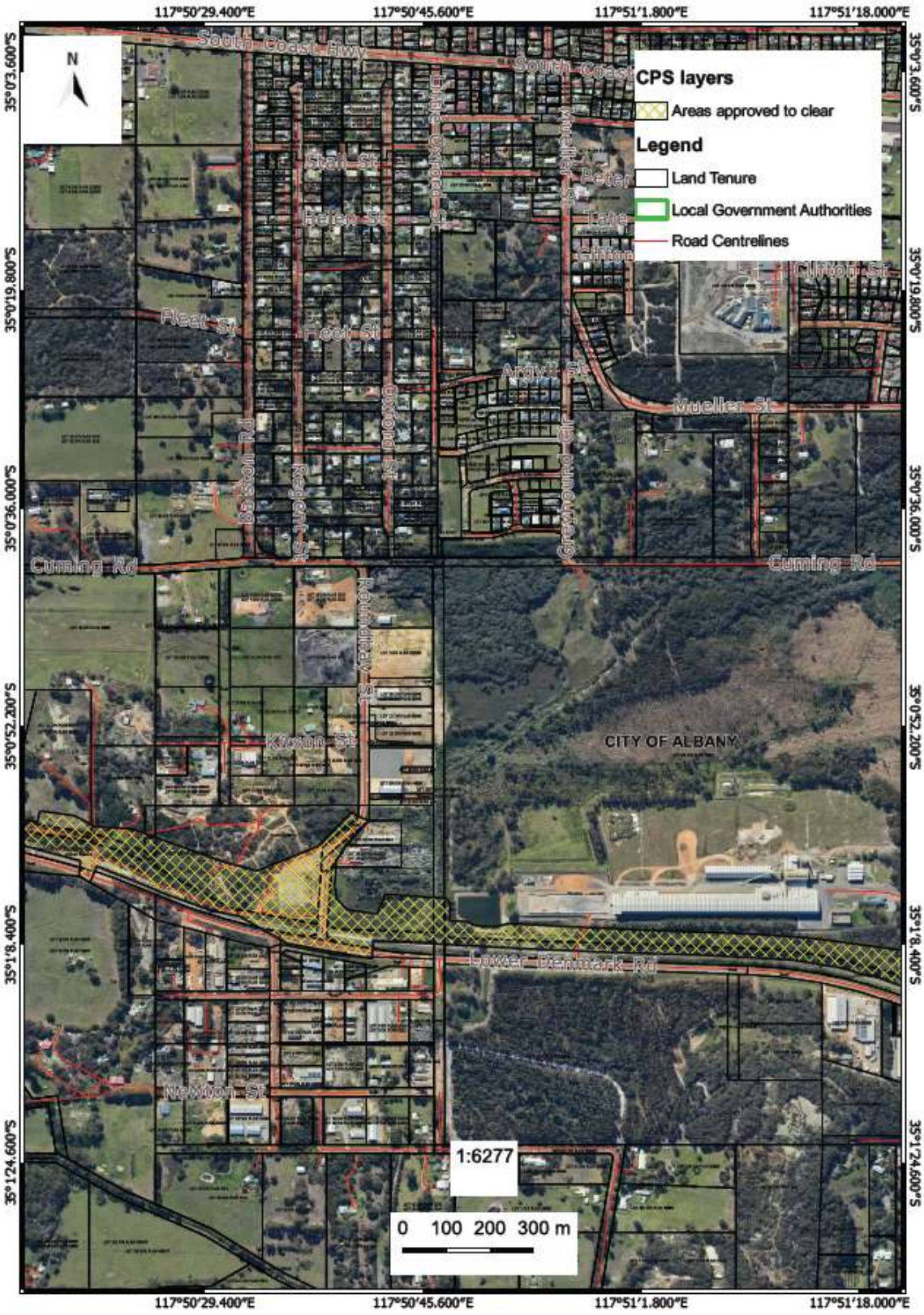

Figure 1c: Map of the boundary of the area (cross-hatched yellow) within which clearing may occur.

Figure 1d: Map of the boundary of the area (cross-hatched yellow) within which clearing may occur.

Figure 1e: Map of the boundary of the area (cross-hatched red) within which a rope bridge must be installed.

Figure 1f: Map of the boundary of the area (cross-hatched red) within which a fauna underpass must be installed.

Figure 1g: Map of the boundary of the area (cross-hatched red) within which rehabilitation must be undertaken.

Figure 1h: Map of the boundary of the area (cross-hatched red) within which rehabilitation must be undertaken.

Schedule 3 – How to design and place artificial hollows for Carnaby's cockatoo






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

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

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

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

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



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

Walls

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

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

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

Base

The base of the artificial hollow must be;

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

  ***Do not use*:**

  - Saw dust or fibre products that will retain moisture.

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

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

Entrance

The entrance of the artificial hollow must;

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

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

Ladder

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

The ladder must be;

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

Do not use:

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

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

Sacrificial chewing posts

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

The sacrificial chewing posts must:

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

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

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

Photo by Rick Dawson

Mountings

The artificial hollows must be mounted such that:

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

Placement

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

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

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

Artificial hollows to be placed in trees require:

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

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

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

Safety

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

Maintenance and monitoring

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

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

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

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

Example fixing for artificial hollow
Photo by Christine Groom

Acknowledgements

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

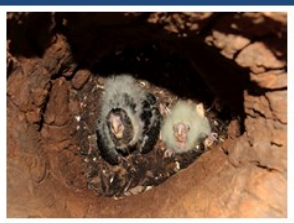
Other information sheets in the series: Artificial hollows for Carnaby's cockatoo

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

Information sheets available on the *Saving Carnaby's cockatoo* webpage:
http://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-animals/208-saving-carnaby-s-cockatoo

Schedule 4 - How to monitor and maintain artificial hollows for Carnaby's cockatoo



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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 (wildlifelicensing@dpaw.wa.gov.au).

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

Looking for signs of use

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

Observing parent behaviour around the hollow

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

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

Observing feeding flocks

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

Tapping

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

Observing insect activity around nest

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

Listening for nestlings

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

Looking inside the nest

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

How often should I monitor artificial hollows?

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

How do I maintain artificial hollows?

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

Maintenance checks should assess the following as a minimum:

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

Artificial hollow base needing repair.
Photo by Christine Groom

Repairing hollows

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

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

Monitoring of artificial hollows:

Monitoring aim	Frequency of visits	Monitoring techniques
To determine possible use by Carnaby's cockatoo	At least once during peak breeding season (i.e. between September and December)	• Observing behaviour of adults around hollow • Tapping to see if female will flush from hollow (best undertaken between 10am and 3pm when females most likely to be sitting) • Listening for nestlings • Looking for evidence of chewing • Looking inside nest
To confirm use by Carnaby's cockatoo	At least two visits during peak breeding season (i.e. between September and December)	To observe at least two of the following: • Breeding behaviour of adults around hollow or evidence of chewing • Female flushed from hollow • Noises from nestlings in hollow Or to observe: • Nestlings or eggs in nest
To determine nesting success by Carnaby's cockatoo	The more visits, the better. Preferably fortnightly visits between July and December. As a minimum, at least 3 visits spread throughout breeding season.	• Looking inside nest to observe eggs or nestlings.
To determine use by any species	As often as possible.	• Inspection from ground as a minimum. • Looking inside nest for detailed observations.
To determine maintenance requirements	At least every two years and preferably annually if hollow fitted with sacrificial chewing posts, can be longer if without.	• A basic maintenance check can be undertaken from the ground. A ladder or elevated work platform will be required for a comprehensive check and to replace sacrificial chewing posts

Acknowledgements

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