GOVERNMENT OF
ermit WESTERN AUSTRALIA

CLEARING PERMIT

Granted under section 51E of the Environmental Protection Act 1986

PERMIT DETAILS

Area Permit Number: CPS 10333/1

File Number: DWERVT13636

Duration of Permit: From 19 July 2024 to 19 July 2036

PERMIT HOLDER

Shire of Dardanup

LAND ON WHICH CLEARING IS TO BE DONE

Ferguson Road reserve (PIN 1321426), Henty

AUTHORISED ACTIVITY

The permit holder must not clear more than 0.07 hectares of *native vegetation* within the area cross-hatched yellow in Figure 1 of Schedule 1.

CONDITIONS

1. Period during which clearing is authorised

The permit holder must not clear any *native vegetation* after 19 July 2026.

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

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

(a) avoid the clearing of *native vegetation*;

(b) minimise the amount of *native vegetation* to be cleared; and

(c) reduce the impact of clearing on any environmental value.

3. Weed and dieback management

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

(a) clean earth-moving machinery of soil and vegetation prior to entering and leaving the area to be cleared;

(b) ensure that no known *dieback* or *weed*-affected soil, *mulch*, *fill*, or other material is brought into the area to be cleared; and

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

4. Directional clearing

The permit holder must:

(a) conduct clearing authorised under this permit in one direction from West to East towards adjacent *native vegetation;* and;

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

5. Fauna management – western ringtail possums and south-western brush-tailed phascogale

(a) In relation to the area cross-hatched yellow in Figure 1 of Schedule 1, the permit holder must engage a *fauna specialist* to inspect that area immediately prior to, and for the duration of clearing activities, for the presence of western ringtail possum(s) (*Pseudocheirus occidentalis*) and south-western brush-tailed phascogale(s), (*Phascogale tapoatafa wambenger*)

(b) Clearing activities must cease in any area where fauna referred to in condition 5(a) are identified until either:

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

(ii) the western ringtail possum individual(s) has/have been removed by a *western ringtail possum specialist* and/or south-western brush-tailed phascogale individual(s) has/have been removed by a *fauna specialist*.

(c) Any western ringtail possum individual(s) removed in accordance with condition 5(b)(ii) must be relocated by a *western ringtail possum specialist* to a *suitable habitat.*

(d) Any south-western brush-tailed phascogale individual(s) removed in accordance with condition 5(b)(ii) must be relocated by a *fauna specialist* to a *suitable habitat*

(e) Where fauna is identified under condition 5(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 (GDA2020), 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* and/or *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 GDA2020, 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.

6. Fauna management – black cockatoo habitat

(a) Within 72 hours prior to undertaking any clearing authorised under this permit within the areas cross-hatched yellow on Figure 1 of Schedule 1, the permit holder must engage a *fauna specialist* to conduct a *fauna survey* of the permit area to identify *black cockatoo habitat tree/s* being utilised by *black cockatoo species.*

(b) Where a black cockatoo habitat tree(s) with no *evidence* of current or past use by black cockatoo species is identified in accordance with condition 6(a), that tree must only be cleared 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 6(a), and clearing of that tree cannot be avoided, that tree must be monitored by a *fauna specialist* to determine when it is no longer in use for that breeding season.

(d) Any black cockatoo habitat tree(s) with *evidence* of current breeding use by black cockatoo species must not be cleared whilst it is in use for that breeding season as determined by the *fauna specialist* under condition 6(c).

(e) For each 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 6(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 6(e) of this Permit must:

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

(ii) be designed and placed in accordance with the specifications details in Schedule 2 of this Permit; and

(iii) be monitored and maintained in accordance with the specifications detailed in Schedule 3 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;

(iv) the time(s) and date(s) of inspection(s) by the *fauna specialist*;

(v) a description of the *fauna specialist* inspection methods used;

(vi) the location of any fauna species listed in condition 6(a), if identified, recorded using a GPS unit set to GDA2020, expressing the geographical coordinates in Eastings and Northings or decimal degrees;

(vii) the name and number of each fauna species identified;

(viii) whether the black cockatoo habitat tree/s identified show current or past use by black cockatoo species;

(ix) a photo of the black cockatoo habitat tree(s) identified;

(x) 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)

(xi) the time and date each black cockatoo habitat tree with evidence of current or past breeding use was cleared; and

(xii) the location of the artificial black cockatoo nesting hollow installed.

7. Offset – Revegetation and rehabilitation

(a) Within 12 months of the commencement of clearing authorised under this permit and no later than 19 July 2027, the permit holder must implement the 'Revegetation Management Plan: Shire of Dardanup' (dated April 2024) - for Depiazzi Road Reserve and Banksia Road Reserve by revegetating and rehabilitating a total 0.706 hectares within the combined areas cross-hatched red in Figures 2, 3 and 4 of Schedule 1, with:

(i) species which provide *suitable habitat* for western ringtail possums,

(ii) species which provide suitable foraging habitat for *black cockatoo species,* and

(iii) species that are representative of the *Cartis complex*.

(b) The *revegetation* and *rehabilitation* required under condition 7(a) of this permit must be undertaken in accordance with the 'Revegetation Management Plan: Shire of Dardanup (dated April 2024) including but not limited to the following actions:

(i) ensure only *local provenance* seeds and propagating material is used to *revegetate* and *rehabilitate*;

(ii) undertake *revegetation* and *rehabilitation* activities at an *optimal time* with *native vegetation*;

(iii) undertake *weed* control activities and watering to achieve the minimum completion criteria specified in Table 3 of Schedule 4;

(iv) establish at least two 10 x 10 metre quadrats within the *revegetation* and *rehabilitation* areas, in the area cross-hatched red in Figures 2,3 and 4 of Schedule 1;

(v) engage an *environmental specialist* to monitor quadrats specified in condition 7(b)(iv) annually until the completion criteria, outlined in Table 3 of Schedule 4, have been met and maintained for a minimum of two years.

(c) If the monitoring required under condition 7(b)(v) indicates that the completion criteria outlined in Table 3 of Schedule 4 have not been met, undertake remedial actions for *revegetation* and *rehabilitation* including:

(i) deliberately *planting native vegetation* within the area cross-hatched red in Figures 2, 3 and 4 of Schedule 1, that will result in the completion criteria specified in Table 3 of Schedule 4 being met, ensuring only *local provenance* seeds and propagating material are used;

(ii) undertake additional *weed* control activities;

(iii) continue the annual monitoring of *revegetation* and *rehabilitation* areas, in the area cross-hatched red in Figures 2, 3 and 4 of Schedule 1, by an *environmental specialist* until the completion criteria outlined in Table 3 of Schedule 2, are met.

(d) Where remedial actions have been undertaken in accordance with condition 7(b)(vi) of this permit, the permit holder must repeat the activities required by condition 7(a) and 7(b) of this permit.

(e) Where an *environmental specialist* has determined that the completion criteria outlined in Table 3 of Schedule 4 have been met, that report is to be provided to the *CEO*.

(f) If the *CEO* does not agree with the determinations made by an *environmental specialist* under condition 7(b) of this permit, the *CEO* may require the permit holder to repeat the required actions under conditions 7(a) and 7(b) of this permit.

8. Records that must be kept

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

Table 1: Records that must be kept

No.	Relevant matter	Specifications
1.	In relation to the authorised clearing activities generally	(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 GDA2020, expressing the geographical coordinates in Eastings and Northings; (c) the date that the area was cleared;

No.	Relevant matter	Specifications
		(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 2; and (f) actions taken to minimise the risk of the introduction and spread of *weeds* and *dieback* in accordance with condition 3; and (g) actions taken accordance with condition 4. (h) actions taken to manage and mitigate impacts to western ringtail possums and south western brush-tailed phascogale in accordance with condition 5.
2.	In relation to black cockatoo fauna management pursuant to condition 6	(a) the time(s) and date(s) of inspection(s) of the suitable *black cockatoo habitat tree* by the *fauna specialist*; (b) a description of the inspection methodology employed by the *fauna specialist*; (c) the species name of any fauna determined by the *fauna specialist* to be occupying the suitable *black cockatoo habitat tree*; (d) where the suitable *black cockatoo habitat tree* is determined by the *fauna specialist* to be occupied by black cockatoo species: (i) the time and date that it was determined to be no longer occupied; and (ii) a description of the evidence by which it was determined to be no longer occupied; and (e) the time and date that the suitable *black cockatoo habitat tree* was cleared.
3.	In relation to *revegetation* and *rehabilitation* pursuant to condition 7	(a) the date(s) that *revegetation* and *rehabilitation* occurred; (b) the boundaries of the area(s) *revegetated* and *rehabilitated* (recorded digitally as a shapefile); (c) description of the *revegetation* and *rehabilitation* activities undertaken, including actions taken to implement watering and *weed* control; (d) a list of the *native vegetation* species planted; (e) a description of any remediation works undertaken pursuant to condition 7(b)(vi); (f) the date that completion criteria were considered to be met, and (g) a copy of the *environmental specialist*'s monitoring report and determination, pursuant to condition 7(d).

9. Reporting

(a) The permit holder must provide to the *CEO*, on or before 30 June of each calendar year, a written report containing:
  (i) the records required to be kept under condition 8; and
  (ii) records of 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 has been undertaken, a written report confirming that no *clearing* under this permit has been undertaken must be provided to the *CEO* on or before 30 June of each 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 8, where these records have not already been provided under condition 9(a).

DEFINITIONS

In this permit, the terms in Table 2 have the meanings defined.

Table 2: Definitions

Term	Definition
black cockatoo habitat trees	means trees that have a diameter, measured at 130 centimetres from the base of the tree, of 50 centimetres or greater (or 30 centimetres or greater for *Eucalyptus salmonophloia* or *Eucalyptus wandoo*) that contain hollows suitable for breeding by black cockatoo species.
black cockatoo species	means one or more of the following species: (a) *Calyptorhynchus lateriosis* (Carnaby's cockatoo); (b) *Calyptorhynchus baudinii* (Baudin's cockatoo); and/or (c) *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo).
Cartis complex	described as low open forest to open forest of Eucalyptus marginata (Jarrah), Corymbia calophylla (Marri) and Corymbia haematoxylon (Mountain Marri) with definite second storey of Banksia species
CEO	Chief Executive Officer of the department 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.
condition	a condition to which this clearing permit is subject under section 51H of the EP Act.
dieback	means the effect of *Phytophthora* species on native vegetation.
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.
EP Act	*Environmental Protection Act 1986* (WA)
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

Term	Definition
	environmental specialist.
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 *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 50 kilometres and the same Interim Biogeographic Regionalisation for Australia (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.
optimal time	means the period from May to June for undertaking planting and seeding.
planting	means the re-establishment of vegetation by creating favourable soil conditions and planting seedlings of the desired species.
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.
suitable habitat (southwestern brush-tailed phascogale)	means habitat known to support south-western brush-tailed phascogale within the known current distribution of the species. This often includes dry sclerophyll forests and open woodlands, with hollow-bearing trees (usually eucalypts) and sparse understorey.
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.

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

END OF CONDITIONS

Meenu Vitarana
MANAGER
NATIVE VEGETATION REGULATION

Officer delegated under Section 20
of the Environmental Protection Act 1986

26 June 2024

SCHEDULE 1

The boundary of the area authorised to be cleared is shown in the map below (Figure 1) and the boundary of the areas within which condition 7 applies is shown in Figures 2 to 4.

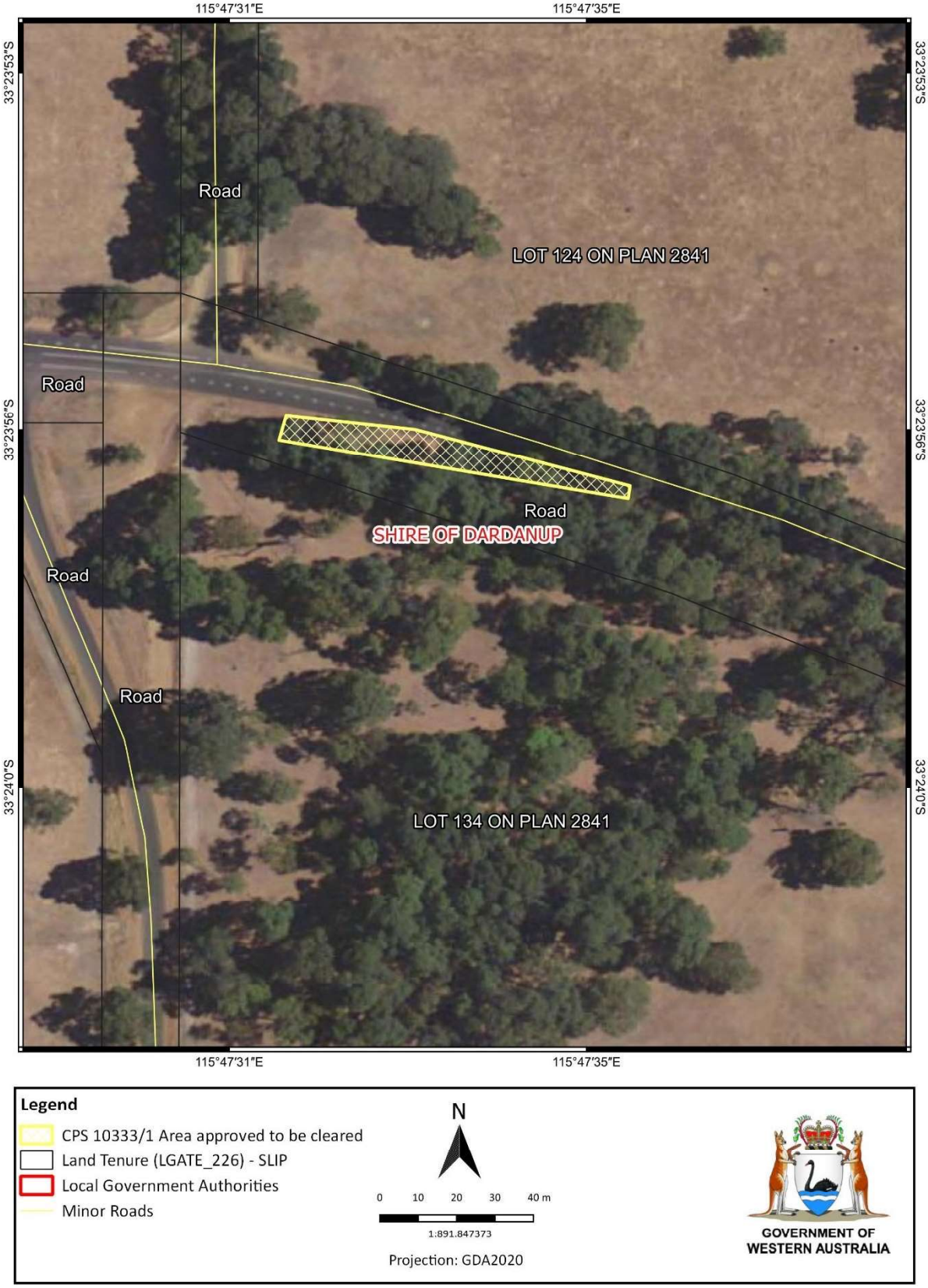

Figure 1: Map of the boundary of the area within which clearing may occur

Figure 2: Map of the boundary areas (cross-hatched red) within which condition 7 applies.

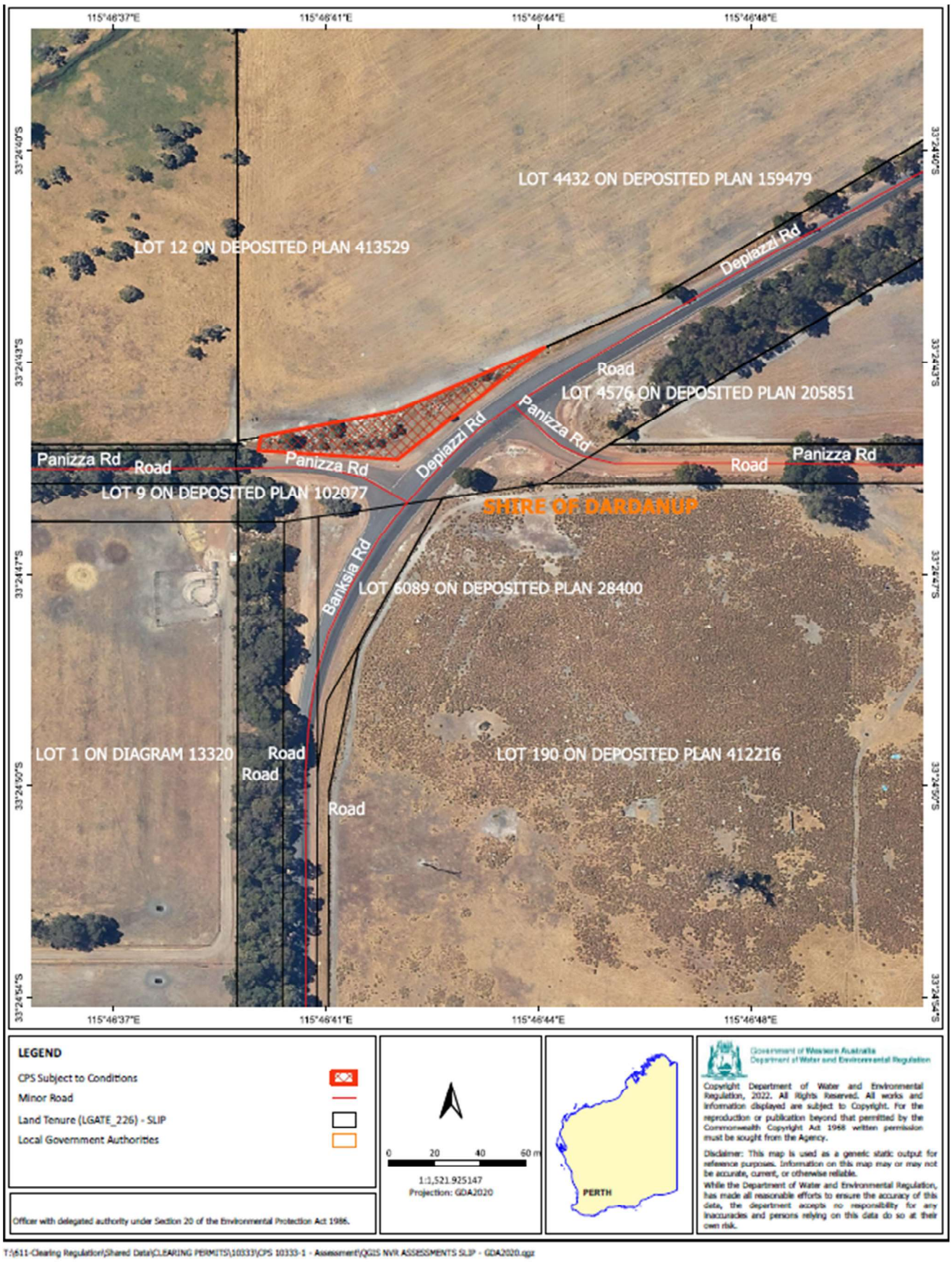

Figure 3: Map of the boundary areas (cross-hatched red) within which condition 7 applies.

Figure 4: Map of the boundary areas (cross-hatched red) within which condition 7 applies.

SCHEDULE 2

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

Department of Parks and Wildlife

Fauna notes

Artificial hollows for Carnaby's cockatoo






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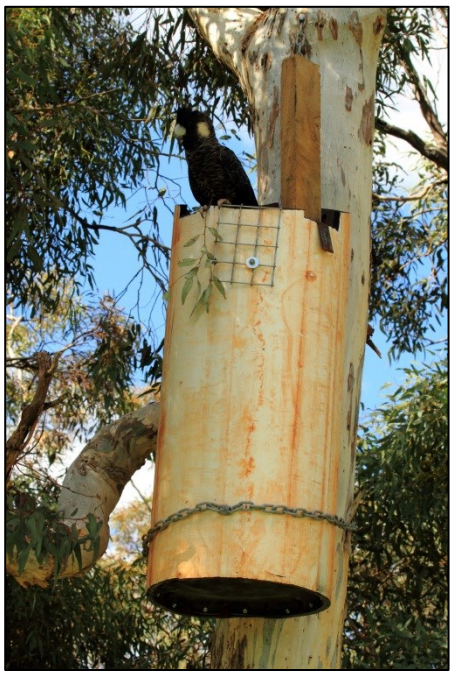
How to design and place artificial hollows for Carnaby's cockatoo

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

Further information **Last updated 28/04/2015**

Contact fauna@dpaw.wa.gov.au or your local office of the Department of Parks and Wildlife

See the department's website for the latest information: www.dpaw.wa.gov.au

SCHEDULE 3

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

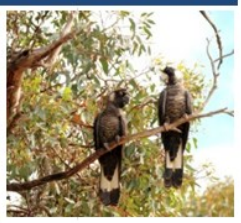
Department of Parks and Wildlife

Fauna notes

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

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

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

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

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

Further information **Last updated 28/04/2015**

Contact fauna@dpaw.wa.gov.au or your local office of the Department of Parks and Wildlife

See the department's website for the latest information: www.dpaw.wa.gov.au

SCHEDULE 4

Table 3: Completion criteria for the revegetation and rehabilitation within the areas cross-hatched red in Figures 2, 3 and 4 of Schedule 1.

Characteristic	Completion criteria	Monitoring
Species richness	Species richness 26 species per site representative of the Cartis Complex, 9 trees per site representative of black cockatoo foraging and western ringtail possum habitat	Annual monitoring by an *environmental specialist*, of species richness within the two monitoring quadrats required by condition 7(b)(iv-v). Completion criteria must be met and maintained for two years.
Species Density	Density of one tree per 10m ^{2}, one shrub per 3m^2 and one ground cover per 1m^2	Annual monitoring by an *environmental specialist*, of species density within the two monitoring quadrats required by condition 7(b)(iv-v). Completion criteria must be met and maintained for two years.
Vegetation cover	The revegetation sites average for bare ground is to be no more than 15%, as recorded at the reference site.	Annual monitoring by an *environmental specialist*, of vegetation cover within the two monitoring quadrats required by condition 7(b)(iv-v). Completion criteria must be met and maintained for two years.
Vegetation condition	Targeted vegetation condition in Good to Very Good (Keighery, 1994), or better condition in the areas required for *revegetation* and *rehabilitation* under condition 7 (a).	Annual monitoring by an *environmental specialist*, of vegetation condition within the two monitoring quadrats required by condition 7(b)(iv-v). Completion criteria must be met and maintained for two years.
Weed Cover	No declared weeds within the areas required for *revegetation* and *rehabilitation* under condition 7(a). Weed cover of less than 15% of total species abundance on site in the areas required for *revegetation* and *rehabilitation* under condition 7(a).	Annually, during spring, monitoring by an *environmental specialist,* of weed cover within two monitoring quadrats required by condition 7(b)(iv-v). Completion criteria must be me and maintained for two years

Government of Western Australia
Department of Water and Environmental Regulation

Clearing Permit Decision Report

1 Application details and outcome

1.1. Permit application details

Permit number:	CPS 10333/1
Permit type:	Area permit
Applicant name:	Shire of Dardanup
Application received:	12 September 2023
Application area:	0.07 hectares of native vegetation
Purpose of clearing:	Road safety upgrades
Method of clearing:	Mechanical
Property:	Ferguson Road Reserve (PIN 1321426)
Location (LGA area/s):	Shire of Dardanup
Localities (suburb/s):	Henty

1.2. Description of clearing activities

The vegetation proposed to be cleared is contained within a single area (see Figure 1, Section 1.5). The application is to selectively clear native vegetation that is impacting sightlines at a busy intersection in Henty, Western Australia. The area proposed for clearing is an approximately 93-meter strip of the road reserve, with a total area of 0.07 hectares.

The size of the area and the amount of clearing proposed were reduced during the assessment (see Appendix A). This resulted in a reduction in the amount of clearing from 0.17 hectares to 0.07 hectares to avoid and minimise the impacts of clearing (see Section 3.1 for further details).

1.3. Decision on application

Decision:	Granted
Decision date:	26 June 2024
Decision area:	0.07 hectares of native vegetation, as depicted in Section 1.5, below.

1.4. Reasons for decision

This clearing permit application was submitted, accepted, assessed and determined in accordance with sections 51E and 51O of the *Environmental Protection Act 1986* (EP Act). The Department of Water and Environmental Regulation (DWER) advertised the application for 21 days and no submissions were received.

In making this decision, the Delegated Officer had regard for the site characteristics (see Appendix B), relevant datasets (see Appendix G.1), the clearing principles set out in Schedule 5 of the EP Act (see Appendix C), relevant planning instruments and any other matters considered relevant to the assessment (see Section 3). The Delegated Officer also took into consideration the purpose of the clearing is to improve community safety through improving sightlines at a busy intersection and the necessity of the clearing was well justified (see section 3.1).

The assessment identified that the proposed clearing will result in:

- the loss of native vegetation that is:
  - suitable foraging habitat for three species of black cockatoos,
  - suitable western ringtail possum habitat; and
  - representative of a highly cleared vegetation complex (Cartis complex) within an extensively cleared landscape,
- potential land degradation in the form of wind erosion, water repellence subsurface acidification and phosphorus export.

After consideration of the available information, as well as the applicant's minimisation and mitigation measures (see Section 3.1), the Delegated Officer determined the proposed clearing is likely to have long-term adverse impacts on environmental values of fauna within an extensively cleared landscape. The proposed clearing is unlikely to lead to appreciable land degradation (see Section 3.2.3). The applicant has suitably demonstrated avoidance and minimisation measures, and the offset provided counterbalances the impacts to black cockatoo foraging habitat, western ringtail possum habitat and impacts to a highly cleared vegetation complex (see Section 4).

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

- avoid, minimise to reduce the impacts and extent of clearing,
- implement hygiene measures to minimise the risk of introducing and spreading weeds,
- undertake slow, progressive one directional clearing to allow terrestrial fauna to move into adjacent habitat ahead of the clearing activity, and
- undertake revegetation using species suitable for black cockatoo foraging, species suitable for the western ringtail possums and vegetation representative of the Cartis complex.

1.5. Site map

Figure 1: Map of the application area. The area crosshatched yellow indicates the area authorised to be cleared under the granted clearing permit.

2 Legislative context

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

In addition to the matters considered in accordance with section 51O of the EP Act (see Section 1.4), the Delegated Officer has also had regard to the objects and principles under section 4A of the EP Act, particularly:

- the precautionary principle
- the principle of intergenerational equity
- the principle of the conservation of biological diversity and ecological integrity.

Other legislation of relevance for this assessment include:

- *Biodiversity Conservation Act 2016* (WA) (BC Act)
- *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act)

Relevant policies considered during the assessment include:

- *Environmental Offsets Policy* (2011)

The key guidance documents which inform this assessment are:

- *A guide to the assessment of applications to clear native vegetation* (DER, December 2013)
- *Procedure: Native vegetation clearing permits* (DWER, October 2019)
- *Environmental Offsets Guidelines* (August 2014)
- *A Guide to Preparing Revegetation Plans for Clearing Permits* (DWER, March 2018)

3 Detailed assessment of application

3.1. Avoidance and mitigation measures

Evidence was submitted by the applicant, demonstrating that clearing was to the extent necessary to facilitate the safety upgrades.

The Shire advised that they had received several requests from the public to improve the intersection as there have been reports of westbound vehicles on Ferguson Rd having to apply heavy braking to avoid colliding with slow moving trucks which have just exited Depiazzi Rd heading west (Shire of Dardanup, 2023c).

To address these concerns, a Road Safety Inspection was conducted by Shire staff of the intersection to determine what safety issues were present and to provide recommendations to rectify the issues. The report outlined six measures to improve the safety of the Ferguson and Depiazzi road intersection, and the Shire is currently committed to implementing five of these measures: including the clearing to improve sightlines (Shire of Dardanup, 2023c).

Option 2 Improving sightlines along Ferguson Rd, analysed the existing sightlines available from the intersection in comparison to the required sightlines determined by Austroads and Mainroads WA for heavy vehicle configurations, and found that the length of the sightlines were substandard by 77 metres. The recommended action was to apply to clear the native vegetation to provide the required sightlines.

“Sightline requirements are bases on the speed that approaching vehicles are travelling, so in a situation where the road intersection is established, there are only two methods of improving any substandard sightlines. Firstly by removing the vegetation that is blocking the sightlines along the road verge, or by reducing the speed of the approaching vehicles” (Shire of Dardanup, 2023c).

The Shire has considered the option of reducing the speed limit along Ferguson Road on the approach to this intersection and wrote to Mainroads WA to see if they would support the reduction of speed from 80km/h to 70km/h or 60km/h. Mainroads advised that the only change they would consider was to reduce the adjacent 100km/h zone to 80km/h so that the speed zone is consistent along the length of Ferguson Road (Shire of Dardanup, 2023c).

The Shire also provided sufficient evidence that the clearing will not result complete bare ground, therefore mitigating the land degradation risks. “The purpose of the clearing permit application is to allow for safe sight lines at car level/breast height. There is no intent to remove groundcover or scalp the soil” (Shire of Dardanup, 2024b).
After consideration of the Shire’s necessity for the clearing, and avoidance and mitigation measures, it was determined that an offset to counterbalance the significant residual impacts to black cockatoos, western ring tail possums and clearing within an extensively cleared landscape was necessary. In accordance with the Government of Western Australia’s *Environmental Offsets Policy* and *Environmental Offsets Guidelines*, these significant residual impacts have been addressed through the conditioning of environmental offset requirements on the permit. The nature and suitability of the offset provided are summarised in Section 4.

3.2. Assessment of impacts on environmental values

In assessing the application, the Delegated Officer has had regard for the site characteristics (see Appendix B) and the extent to which the impacts of the proposed clearing present a risk to biological, conservation, land and water resource values.

The assessment against the clearing principles (see Appendix C) identified that the impacts of the proposed clearing present a risk to biological values (fauna) and significant remnant vegetation. The consideration of these impacts, and the extent to which they can be managed through conditions applied in line with sections 51H and 51I of the EP Act, is set out below.

3.2.1. Biological values (Fauna) - Clearing Principles (a and b)

Assessment

The application area is located within the Swan Coastal Plain IBRA region of Western Australia. According to available databases, 16 conservation significant fauna species have been recorded within the local area (a 10-kilometre radius of the application area). Of these species 10 were excluded given habitat features and vegetation type are not represented within the application area.

In determining the likelihood of conservation significant fauna occurring within the proposed clearing area, several factors were considered. These include the date of each record, results of the preferred habitat types, the proximity of records to the application area, as well as the type and condition of the vegetation within the application area. From the likelihood assessment, it is considered that the application area comprises suitable habitat for five conservation significant fauna species. Additionally, one species was considered possible to occur. The species include:

- *Zanda latirostris* (Carnaby's cockatoo), listed as endangered under the EPBC Act
- *Zanda baudinii* (Baudin's cockatoo), listed as endangered under the EPBC Act
- *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo), listed as vulnerable under the EPBC Act
- *Pseudocheirus occidentalis* (western ringtail possum), listed as critically endangered under the EPBC Act.
- *Phascogale tapoatafa wambenger* (south-western brush-tailed phascogale), listed as conservation dependent under the BC Act; and
- *Dasyurus geoffroii* (chuditch), possible to occur within the application area and listed as vulnerable under the EPBC Act.

Black cockatoos

The application area is within the distribution for all three black cockatoo species; Carnabys' cockatoo, Baudin's cockatoo and forest red-tailed black cockatoo, and is mapped as black cockatoo foraging habitat.

Foraging habitat

Black cockatoos are known to forage on a range of plant species, with the primary foraging resources varying among the three species (DCCEEW, 2022). Carnaby's cockatoos forage on the seeds, nuts, and flowers of a variety of plants, including Proteaceous species (such as *Banksia*, *Hakea*, and *Grevillea*), as well as *Allocasuarina*, *Eucalyptus*, *Corymbia calophylla* (marri), and a range of introduced species (Valentine and Stock, 2008). Baudin's cockatoos primarily feed on the seeds of marri, but may also forage on the seeds of Eucalyptus marginata (jarrah) and Proteaceous species (DEC, 2008). Forest red-tailed black cockatoos feed predominantly on the seeds of marri and jarrah, which comprise approximately 90 per cent of their diet (DEC, 2008).

The local area is considered extensively cleared, and the remnant vegetation is mapped as black cockatoo foraging habitat. The photographs provided by the applicant (see Appendix F) indicate suitable foraging species, including primary foraging for all three species of marri, and secondary foraging species for Carnaby's cockatoo and Baudin's cockatoo of *Xylomelum occidentale* (western woody pear), *Xanthorrhoea preissii* (grass tree) and one nonnative species; *Eucalyptus citriodora*, occur within the application area. The application also identified marri to be the dominant tree species within the application area. Given that this is a primary food source for all three black cockatoo species and noting the close proximity to permanent water sources and known roosting sites, the removal of 0.07 hectares of vegetation suitable for foraging is likely to impact black cockatoos within the local area.

Breeding habitat

Suitable breeding habitat for black cockatoos include trees which either have a suitable nest hollow or are of a suitable diameter at breast height (DBH) to develop a nest hollow (DCCEEW, 2022). Suitable breeding habitat

consists of both live and dead *Eucalyptus* and *Corymbia* species with a DBH of 500 millimetres. Trees between 300 to 500 millimetres are likely to develop hollows (DCCEEW, 2022) The application area consists of eight marri with a DBH greater then 300mm and one dead tree also with a DBH greater than 300 millimetres, given this the application area is likely to have suitable breeding habitat if hollows were present (Shire of Dardanup, 2023a). Given the application area consists of foraging species, is located less than one kilometre from quality foraging, and is located less than 500 meters from a water source, it may contain suitable breeding habitat. Noting the presence of marri trees of suitable size, it is possible for breeding to occur within the application area.

Night Roost sites

Black cockatoo night roosts are usually located in the tallest trees of an area, and in close proximity to both a food supply and surface water (DCCEEW, 2022). Known night roosting species include jarrah, marri, karri, flooded gum, blackbutt, tuart, salmon gum, wandoo and introduced eucalyptus (DCCEEW, 2022). Within the local area, there are four known roost sites, with the closest mapped 4.4 kilometres from the application area. Given the proximity to the Ferguson River, located approximately 400 metres from the application area, it is possible for the application area to provide suitable night roosting habitat. However, it is likely better quality night roosting is to occur in the Boyanup State Forest which is locate less than one kilometre from the application area.

Western ringtail possum

The western ringtail possum (*Pseudocheirus occidentalis*) is a small arboreal nocturnal marsupial listed as critically endangered under the EPBC Act. According to the western ringtail possum recovery plan (DCCEEW, 2017a), habitat critical to the survival for western ringtail possum is not well understood and is therefore based on observations of where western ringtail possum are most commonly recorded. There are three key management zones: the Swan Coastal Plain, Southern Forest and South Coast zones, which are known to currently or previously support large numbers of the species. The common themes of these management zones include habitats with high nutrient foliage availability for food, suitable structure for protection and nesting, as well as canopy continuity to avoid and escape predation and other threats. Other important characteristics include vegetation communities with long unburnt mature remnants of peppermint woodlands with high canopy continuity and high foliage nutrients, jarrah /marri forests and woodlands with limited anthropogenic disturbance, coastal heath, jarrah/marri woodland and forest, peppermint (*Agonis flexuosa)* woodlands, myrtaceous heaths and shrublands, *Eucalyptus megacarpa* dominated riparian zones and karri forest. There are a number of threatening processes impacting the western ringtail possum including habitat loss and fragmentation, introduced predators, climate change, timber harvesting, fire, hollow competition, habitat tree decline and disease.

Within the local area 328 mapped records of the western ringtail possum occur, with the nearest record mapped 565 metres from the application area within the bushland associated with the Ferguson River. While the application area is absent of peppermint trees, which are the preferred foraging resource, it does however contain secondary foraging resources of marri. Given the species also relies upon tree hollows and grass tree skirts for the construction of dreys for diurnal resting, the application area contains vegetation suitable for forming hollows as well as grass trees which is suitable for the construction of these dreys (DCCEEW, 2017a).

Although the application area consists of roadside vegetation, it does provide canopy connectivity to facilitate local movement between resources, provides suitable secondary foraging and flora species which provide suitable resting habitat.

South-western brush-tailed phascogale

The south-western brush-tailed phascogale (*Phascogale tapoatafa wambenger*) is a nocturnal arboreal *Dasyurid*, associated with dry sclerophyll forests and open woodlands that contain hollow-bearing trees, characterised by high canopy cover and connectivity (DEC, 2012). The brush-tail phascogale is an opportunistic hunter, predominantly preying upon insects, small mammals, birds, and lizards. Similar to black cockatoos and the western ringtail possum, the brush-tail phascogale relies upon tree hollow for nesting during the breeding season and commonly competes with the ringtail possum for hollow space, often evicting the ringtail possum from optimal hollows (DEWHA, 2009).

Available databases show 43 records within the local area, with the closest record 3.3 kilometres from the application area. Although the application area provides habitat suitable for the phascogale, their home ranges vary up to 70 hectares. Noting the distance to the nearest record and that better quality vegetation is located nearby in the Boyanup State Forest, it is unlikely the propose clearing will significantly impact the species. Any impacts to individuals if likely to transient the application area during the time of clearing, can be managed via permit conditions.

Chuditch

The chuditch, or Western quoll, (*Dasyurus geoffroii*), is the largest carnivorous marsupial occurring in Western Australia. It is largely restricted to southwest Western Australia and is listed as vulnerable under the EPBC Act. The chuditch primarily inhabits jarrah forests and woodlands, mallee shrublands, and heathlands. Their home ranges extend up to 15 square kilometres for males and 3 to 4 square kilometres for females. They are dependent on an

adequate number of suitable dens and refuge sites, which are typically found in hollow logs, tree limbs, rocky outcrops and burrows. They also require a sufficient prey biomass (large invertebrates, reptiles and small mammals) to survive (DCCEEW, 2017b). Available datasets show 14 records of the chuditch occur within the local area with the closest record mapped three kilometres from the application area. Although the application area provides habitat suitable for the chuditch, their home ranges vary in size and noting better quality vegetation is located nearby in the Boyanup State Forest, it is unlikely the proposed clearing will significantly impact the species.

Conclusion

Based on the above assessment, the proposed clearing will result in the loss of 0.07 hectares of high quality black cockatoo foraging habitat and habitat known to support western ringtail possums. While the application area does consist of habitat suitable for the phascogale and the chuditch, given the extent of the clearing and the proximity to better quality vegetation, it is unlikely the clearing will significantly impact the phascogale and the chuditch.

Conditions

To address the above impacts, the following management measures will be required as conditions on the clearing permit:

- Slow directional clearing to allow the species outlined above to move into adjacent vegetation ahead of the clearing activity.
- pre-clearance surveys for fauna species, which requires the inspection of all trees and hollows for the presence of black cockatoos, western ringtail possums and southwestern brush-tailed phascogale prior to clearing and for clearing to cease where any individuals are identified until the individual has dispersed.
- Provision of an offset (see Section 4) for the significant residual impacts of the loss 0.07 hectares of vegetation which provides significant habitat for three black cockatoo species and western ringtail possums.

3.2.2. Environmental value: (Significant Remnant vegetation) - Clearing Principle (e)

Assessment

The national objectives and targets for biodiversity conservation in Australia have a target to prevent clearing of ecological communities with an extent below 30 per cent of that present pre-1750, below which species loss appears to accelerate exponentially at an ecosystem level (Commonwealth of Australia, 2001). The application area is located within the Swan Coastal Plain IBRA, which currently retains 38.62 per cent of the pre-European vegetation extent (Commonwealth of Australia, 2019b)

At a local scale, the application area is mapped within the Cartis complex (75) which retains 14.98 percent of its pre-European extent. This complex is described as low open forest to open forest of *Eucalyptus marginata* (Jarrah), *Corymbia calophylla* (Marri) and *Corymbia haematoxylon* (Mountain Marri) with definite second storey of *Banksia* species (Government of WA, 2019). Within the 10 kilometre radius of the application area; 28.72 percent of remnant vegetation is remaining which is below the national 30 per cent threshold.

Given this, both the vegetation complex and the local extent of remaining vegetation is inconsistent with national targets and the application area contributes to the remnant vegetation in a highly fragmented landscape and is therefore considered significant, particularly for the Cartis complex.

Ecological linkage

Within fragmented landscapes, the maintenance of linkages or connected patches of remnant vegetation is important for ecological function and for maintaining biodiversity. These linkages facilitate the movement of animals, seeds and pollen while also assisting in providing resilience to disturbances. Remnant vegetation can contribute to both local and regional ecological linkage (DEC, 2009).

The application area is located 2.42 kilometres west of the South West regional ecological linkage (SWREL) (219). While the application area does not intersect this linkage, the vegetation proposed to be cleared remains an important local linkage connecting vegetation pockets with larger remnants and vegetation associated with the nearby Ferguson River (DEC,2009).

Given the application area exists within a highly fragmented landscape and provides a local linkage function for critically endangered fauna, it is considered as a significant remnant in an extensively cleared landscape.

Conclusion

Based on the above assessment, the proposed clearing will result in a loss of 0.07 hectares of the Cartis complex and significant remnant vegetation within the local area as well as a loss of 0.07 hectares of vegetation which provides important local ecological linkage function for critically endangered fauna.

Given this and after application of the mitigation hierarchy, it is considered a significant residual impact remains and therefore an offset is required to counterbalance this impact.

Conditions
To address the above impacts, the following management measures will be required as conditions on the clearing permit:

- Provision of an offset (see Section 4) for the significant residual impacts of the loss 0.07 hectares of vegetation representative of the Cartis complex which provides important local linkage value and is considered a significant remnant within a highly fragmented landscape.

3.2.3. Environmental Value: Land resources (Land degradation) - Clearing Principle (g)

The soil of the application area is mapped as a single unit; Cartis foot slope phase (213Fo), which is described as very low relief (1-5 per cent) foot slopes, with rapidly drained deep bleached grey sands and occasionally deep yellow brown sands, with minor occurrence of gravels (DPIRD, 2019). This soil type is highly susceptible to wind erosion, water repellence and subsurface acidification and at moderate risk of phosphorus export.

Given the purpose of the clearing is to improve sight lines, post clearing the area will be bare of middle and upper story vegetation, however the lower story predominately covered in pastural weeds including kikuyu grass, emerging watsonia and winter soursop, will remain post clearing. Given the extent of the clearing, the topography, surrounding vegetation which provides as a wind break and along with the applicants measures to avoid leaving bare ground, it is unlikely the clearing will result in an increased risk of wind erosion, water repellence, subsurface acidification or phosphorus export.

Conclusion
Given the above assessment, it is unlikely the proposed clearing will result in appreciable land degradation risk.

Conditions
No management conditions required.

3.3. Relevant planning instruments and other matters

The Shire of Dardanup advised DWER that the proposed clearing is consistent with the Shire's Local Planning Scheme.

The application area is located within the boundaries of the Gnaala Karla Booja Indigenous Land Use Agreement area. No Aboriginal Heritage Places have been mapped within the application area. There are several Aboriginal Heritage Places within the local area (10-kilometre radius from the centre of the area proposed to be cleared) with the closest being Ferguson River located approximately 390 metres away.

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

4. Suitability of offsets

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

- 0.07 hectares of native vegetation which provides moderate to high quality foraging for three black cockatoo species,
- 0.07 hectares of roadside vegetation containing species known to support western ringtail possums, and
- 0.07 hectares of native vegetation that is representative of a highly cleared vegetation complex (Cartis complex) within an extensively cleared landscape.

The applicant proposed an environmental offset involving rehabilitation of 1.49 hectares within two road reserves. The vegetation within these reserves ranges from degraded to good condition. The proposed offset areas are located within Dipiazzi Road and Banksia Road reserves, and are spread across 13 patches situated between 800 metres to four kilometres from the application area. This larger area was further revised to 0.706 hectares enabling the Shire to Offset the minimum extent required to counterbalance the significant residual impacts of the clearing by 100 per cent (noting 0.67 hectares is the minimum extent required). The refined revegetation area is confined to seven pockets within the road reserves listed above. The proposed rehabilitation involves tube stock planting using species preferred for foraging by western ringtail possum and black cockatoos and species representative of the Cartis complex.

In assessing whether the proposed offset is adequately proportionate to account for the significant residual impacts of the proposal, DWER undertook a calculation using the WA Offsets Calculator. The offset calculations identified the the rehabiliation of natiave vegetation from degraded to good condition as below would mitigate the impacts identified above:

- infill planting of approximately 0.36 hectares of patchy roadside vegetation (with minimal foraging value) with known black cockatoo foraging species to improve the condition of the foraging habitat to moderate to high quality.
- infill planting of approximately 0.67 hectares of roadside vegetation with species known to support western ringtail possum to improve the habitat and connectivity for western ringtail possums.
- infill planting of approximately 0.21 hectares of roadside vegetation to improve the condition of the native vegetation from Degraded to Good/Very Good condition with species representative of the Cartis complex.

The calculator indicated that the rehabilaition offset proposed by the Shire would address the significant residual impact of the proposed clearing by greater than 100 per cent, and is consistent with the WA Environmental Offsets Policy (2011). Appendix E provides the justification for the values used in the offset calculation.

The Delegated Officer noted that the revegetation offset will result in a restoration of fauna habitat and vegetation considered significant in an area that has been extensively cleared, and is of better quality than that currently present in the application area. While the vegetation cannot be conserved in perpetuity, the rehabilitated areas will be afforded protection under the EP Act by virtue of being an offset. On this basis, the Delegated Officer determined that the implementation of the above offset strategy will adequately account for the significant residual impacts of the proposed clearing.

Given the revision to the offset area occurred during the final stages of the assessment the Shire's Revegetation Plan reflects the larger offset area. The offset condition on the permit is relevant to the following areas of the Revegetation Management Plan (Shire of Dardanup, 2024a):

- Image 4 areas 877, 814 and 1215
- Image 5 areas 1847
- Image 6 areas 551, 570, 1186

These areas are reflected in Plan 2 and 3 of the Permit CPS 10333/1.

While the species list will remain the same in Section 7.1 of the Revegetaiton Management Plan, the Shire will adapt the number of individuals required to complete the offset accordingly to ensure the Completion Criteria (Table 4 of the Revegetation Management Plan) is met.

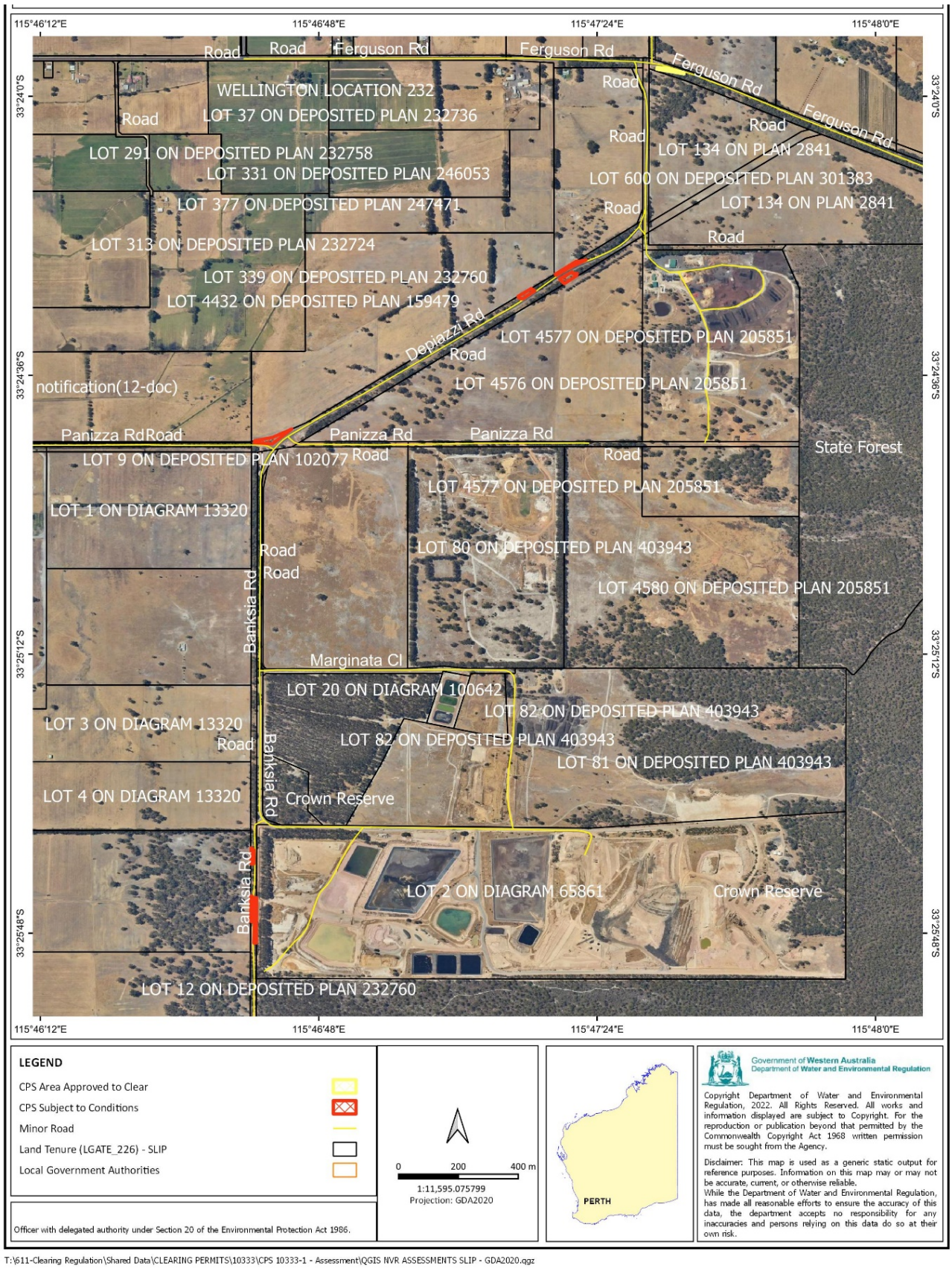

Figure 2: Location of the revegetation offset areas (cross-hatched red), in relation to the application area for CPS 10333/1 (cross-hatched yellow)

End

Appendix A. Additional information provided by applicant

DWER Request for information	Further information provided
Further avoidance and mitigation measures to mitigate the significant residual impact of: • black cockatoo habitat, • western ringtail possum habitat, • extensively cleared landscape; and • local ecological linkage.	The application area was reduced in size from 0.171 to 0.073 hectares as a result in a change in the speed limit from 100km/hr to 80km/hr further along Ferguson Road. Given this, the requirement of the sightlines were reduced as traffic will be approaching the Ferguson and Depiazzi road intersection at a slower speed. This reduction in the clearing excludes a 600 millimetre diameter marri tree, native and weed understory as well as two 2 lemon scented gums from the application area.
Further justification for the necessity of the clearing.	The Shire has received several requests from the public to improve the intersection, as there have been reports of westbound vehicles on Ferguson Road having to apply heavy braking to avoid colliding with slow moving trucks, which have just exited Depiazzi Rd heading west. In response to these concerns the Shire are implementing a number of measures to improve safety, including the clearing of native vegetation to improve sightlines (see Section 3.1 for details).
Identify a suitable offset	The applicant provided a suitable offset of roadside revegetation along two road reserves. This is summarised in Section 4; Suitability of an offset and the offset calculation justification is summarised in Appendix E.
Further mitigation measures for wind erosion.	The understory is nearly completely dominated by kikuyu and winter weeds, the clearing is to remove mainly Marri trees, and Grass Trees. There is no intent to remove groundcover or scalp the soil. As such, there isn't expected to have much, if any bare soil exposed. Additionally, directly east/adjacent to the site is more vegetation along the roadside, which will act as a windbreak.

Appendix B. Site characteristics

B 1. Site characteristics

Characteristic	Details
Local context	The area proposed to be cleared is a 0.11 hectare isolated patch of native vegetation in the intensive land use zone of Western Australia. It is surrounded by extensively cleared land used for agricultural purposes. The proposed clearing area is a small, isolated remnant in a highly cleared landscape. *Aerial imagery and Spatial data indicates the local area (10 kilometre radius from the centre of the area proposed to be cleared) retains approximately 28.7 per cent of the original native vegetation cover.*
Ecological linkage	While the proposed clearing is not within any mapped ecological linkages, it does contribute towards local linkages as the surrounding local area is widely cleared for agricultural purposes.
Conservation areas	The local area comprises of six conservation areas. The Boyanup State Forest is located the closest at approximately 750 metres from the application area and Dardanup Conservation Park is located approximately 2.1 kilometres from application area. The remaining conservation areas are all located greater than five kilometres from the application area.
Vegetation description	Photographs supplied by the applicant (Appendix F) indicate the vegetation within the proposed clearing area is sparse consisting of:

Characteristic	Details

	• Mature and juvenile *Corymbia calophylla,*
	• *Macrozamia riedlei,*
	• *Xanthorrhoea preissii,*
	• *Xanthorrhoea gracilis*,
	• *Hardenbergia comptoniana,* and
	weed species of:
	  • kikuyu grass
	  • veldt grass,
	  • winter soursop,
	  • bridal creeper,
	  • emergent watsonia, and
	  • mature *Eucalyptus/ Myrtaceous* species
	This is consistent with the mapped vegetation type:
	• Cartis Complex, which is described as low open forest to open forest of Eucalyptus marginata (Jarrah) - Corymbia calophylla (Marri) - Corymbia haematoxylon (Mountain Marri) with definite second storey of Banksia spp. (Shepherd et al, 2001)
	However, it is noted the application area is absent of a second story of B*anksia* species.
	The mapped vegetation type retains approximately 14.98 per cent of the original extent (Government of Western Australia, 2019).

Vegetation condition	Photographs supplied by the applicant indicate the vegetation within the proposed clearing area is in good (Keighery, 1994**)** condition. The full Keighery (1994) condition rating scale is provided in Appendix D and representative photos are available in Appendix F.
Climate and landform	The climate of the Dardanup area is mild to moderate temperatures with the winter months having higher rainfall than summer months and an annual rainfall of approximately 735 millimetres (BOM 2023). The application area is situated on the 45 metre contour line and gently slopes from west to south east.
Soil description	The soil is mapped as Cartis foot slopes phase (*213Fo),* defined as very low relief (1-5%) foot slopes, with rapidly drained deep bleached grey sands, occasionally deep yellow brown sands and minor occurrence of gravels.
Land degradation risk	The mapped soil unit of the application area consists of a high risk of wind erosion, water repellence and subsurface acidification, while phosphorus export is a moderate risk.
Waterbodies	The desktop assessment and aerial imagery indicated that no watercourses transect the area proposed to be cleared. Ferguson River is located approximately 390 metres north of the application area, separated by Ferguson Road and extensively cleared land for agricultural purpose.
Hydrogeography	The application area is not mapped within any proclaimed groundwater or surface water areas, however the Bunbury Groundwater Area proclaimed under the RIWI Act is located 48 metres to the west and the Collie River Irrigation District proclaimed under the RIWI Act is also located to the west approximately 390 metres. The ground water salinity has been mapped at 3000-7000 TDS/Mg/L
Flora	According to available databases, there are records of 33 conservation significant flora species within the local area. Of these seven are considered threatened, four is Priority 1 (P1), four are P2, 10 are P3 and eight are P4.
Ecological communities	The application area is mapped within a mapped occurrence of the state listed Priority 3 Banksia Woodlands of the Swan Coastal Plain ecological community. However the vegetation within the application area is not representative of this PEC/TEC.
Fauna	According to available databases, 17 conservation significant fauna species have been recorded within the local area. The closest record to the application area is the *Pseudocheirus occidentalis (*western ringtail possum) located approximately 560 metres from the application area. The *Dasyurus geoffroii* (chuditch) and *Phascogale tapoatafa wambenger* (south-western brush tailed phascogale) were both located

Characteristic	Details
	approximately three kilometres from the application area. Within the local area there is four known black cockatoo roosts with the closet located approximately 4.3 kilometres from the application area.

B 2. Vegetation extent

	Pre-European extent (ha)	Current extent (ha)	Extent remaining (%)	Current extent in all DBCA managed land (ha)	Current proportion (%) of pre-European extent in all DBCA managed land
.					
Swan Coastal Plain	1,501,221.93	579,813.47	38.62	38.45	14.85
Vegetation complex					
Cartis Complex	3,281.50	491.62	14.98	90.86	2.77
Local area					
10km radius	31,633.33	9,083.61	28.72	-	-

*Government of Western Australia (2019a)

**Government of Western Australia (2019b)

B 3. Fauna analysis table

Species name	Conservation status	Suitable habitat features? [Y/N]	Suitable vegetation type? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Are surveys adequate to identify? [Y, N, N/A]
Calyptorhynchus banksii naso	VU	Y	Y	3.894144	6	N/A
Calyptorhynchus baudinii	EN	Y	Y	8.387656	3	N/A
Calyptorhynchus latirostris	EN	Y	Y	4.194708	30	N/A
Dasyurus geoffroii	VU	N	Y	3.013248	14	N/A
Phascogale tapoatafa wambenger	CD	Y	Y	3.29678	43	N/A
Pseudocheirus occidentalis	CR	Y	Y	0.564916	328	N/A

T: threatened, CR: critically endangered, EN: endangered, VU: vulnerable, P: priority

B 4. Land degradation risk table

Risk categories	*Land Unit 1*
Wind Erosion	>70% of map unit has a high (to extreme) risk
Water Repellence	>70% of map unit has a high (to extreme) risk
Subsurface Acidification	>70% of map unit has a high (to extreme) risk
Phosphorus export risk	50-70% of map unit has a high (to extreme) risk

Appendix C. Assessment against the clearing principles

Assessment against the clearing principles	Variance level	Is further consideration required?
Environmental value: biological values		
Principle (a): *"Native vegetation should not be cleared if it comprises a high level of biodiversity."* Assessment: The area proposed to be cleared contains significant habitat for threatened fauna. While the application area is mapped as a Banksia Woodland of the Swan Coastal Plain ecological community the vegetation present is not representative of this community and therefore the clearing is unlikely to impact the PEC.	May be at variance	Yes *Refer to Section 3.2.1, above.*
Principle (b): *"Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna."* Assessment: The area proposed to be cleared contains significant habitat for black cockatoos and western ringtail possum.	At variance	Yes *Refer to Section 3.2.1, above.*
Principle (c): *"Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora."* Assessment: The area proposed to be cleared is unlikely to contain habitat suitable for flora species listed under the BC Act.	Not likely to be at variance	No
Principle (d): *"Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community."* Assessment: The area proposed to be cleared does not contains species that can indicate a threatened ecological community.	Not likely to be at variance	No
Environmental value: significant remnant vegetation and conservation areas		
Principle (e): *"Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared."* Assessment: The extent of the mapped vegetation type and native vegetation in the local area is inconsistent with the national objectives and targets for biodiversity conservation in Australia. The vegetation proposed to be cleared is considered to be part of a significant ecological linkage in the local area.	At variance	Yes *Refer to Section 3.2.2, above.*
Principle (h): *"Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area."* Assessment: Given the distance to the nearest conservation area, the proposed clearing is not likely to have an impact on the environmental values of nearby conservation areas.	Not likely to be at variance	No
Environmental value: land and water resources		

Assessment against the clearing principles	Variance level	Is further consideration required?
Principle (f): *"Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland."* Assessment: Given no water courses or wetlands are recorded within the application area, the proposed clearing is unlikely to impact on- or off-site hydrology and water quality.	Not likely to be at variance	No
Principle (g): *"Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation."* Assessment: The mapped soils are highly susceptible to wind erosion, water repellence and subsurface acidification and a medium risk of phosphorus exports. Noting the extent and the location of the application area the proposed clearing is not likely to have an appreciable impact on land degradation.	Not likely to be at variance	Yes *Refer to Section 3.2.3, above.*
Principle (i): *"Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water."* Assessment: Given no watercourses, wetlands or Public Drinking Water Sources are recorded within application area, the proposed clearing is unlikely to impact surface or ground water quality.	Not likely to be at variance	No
Principle (j): *"Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding."* Assessment: Given no watercourses or wetlands are recorded within the application area, the soil type (Cartis foot slopes phase) which is described as being rapidly drained and the area is not mapped within a waterlogging risk area, the proposed clearing is unlikely to contribute to waterlogging.	Not likely to be at variance	No

Appendix D. Vegetation condition rating scale

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

Considering its location, the scale below was used to measure the condition of the vegetation proposed to be cleared. This scale has been extracted from

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

Measuring vegetation condition for the South West and Interzone Botanical Province (Keighery, 1994)

Condition	Description
Pristine	Pristine or nearly so, no obvious signs of disturbance.
Excellent	Vegetation structure intact, with disturbance affecting individual species; weeds are non-aggressive species.

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

Appendix E. Offset calculator value justification

4.2. Western ringtail possum habitat

WA Environmental Offsets Calculator
Rationale for scores used in the offset calculator

Calculation	Score (Area)	Rationale
Conservation significance		
Description	Western ringtail possum habitat	Application area is mapped as medium habitat suitability and consists of habitat for *Pseudocheirus occidentalis* (western ringtail possum) (WRP).
Type of environmental value	Species (Flora/Fauna)	Fauna habitat
Conservation significance of environmental value	Rare/threatened species – critically endangered	WRP is listed as critically endangered under the EPBC Act.
Landscape-level value impacted	Yes/no	Yes - habitat connectivity along the road reserve.
Significant impact		
Description	Western ringtail possum habitat	The application area consists of native vegetation that provides suitable foraging and refuge habitat for the WRP
Significant impact (hectares) / Type of feature	0.07	The application area consists of 0.07 hectares of native vegetation that provides suitable foraging and refuge habitat for the WRP
Quality (scale) / Number	6.00	The application area is located within the known distribution of WRP and is mapped as medium habitat suitability for the species. 328 records of WRP have been recorded from the local area, with the closest record is 560 metres from the application area. The application area provides habitat connectivity for the local population of WRP and also provides foraging and refuge habitat.
Rehabilitation credit		
N/A		
Offset		
Description	Revegetation and rehabilitation of adjacent road reserve	Revegetation of native trees which are species known as WRP habitat.
Proposed offset (area in hectares)	0.67	The total area required to be rehabilitated counterbalance the significant residual impacts of the proposed clearing on the WRP.
Current quality of offset site / Start number (of type) of feature)	3.00	The identified revegetation sites consist of an overall vegetation health of 'good to degraded' condition, with patchy connectivity and minimal foraging habitat present.
Future quality WITHOUT offset (scale) / Future number WITH offset	3.00	Without revegetation the offset site would remain with an overall vegetation health of 'degraded to good' condition with minimal WRP habitat present.

Future quality WITH offset (scale) / Future number with offset	6.00	It is expected for vegetation to improve to provide better quality habitat for WRP.
Time until ecological benefit (years)	15.00	13 years minimum to achieve foraging resource, plus 2 years for revegetation to commence.
Confidence in offset result (%)	0.8	80% confidence due to the purpose of the land in which the revegetation is taking place within a road reserve and unable to be conserved in perpetuity.
Duration of offset implementation (maximum 20 years)	20.00	Foraging resource to be maintained in perpetuity.
Time until offset site secured (years)	1.00	Minimum 1 year applied as security of tenure will not change.
Risk of future loss WITHOUT offset (%)	30.0%	There is a moderate risk of loss, as the offset area is situated within a road reserve
Risk of future loss WITH offset (%)	30.0%	There is a moderate risk of loss, as the area cannot be conserved in perpetuity due to it being within a road reserve, however, the area is afforded protection under the EP Act by virtue of being an offset.
Offset ratio (Conservation area only)	N/A	
Landscape level values of offset?	N/A	

4.3. Black cockatoo foraging habitat.

WA Environmental Offsets Calculator
Rationale for scores used in the offset calculator.

Calculation	Score (Area)	Rationale
Conservation significance		
Description	Black cockatoo (BC) habitat	The application area is within the known distribution zone of the *Zanda latirostris* (Carnaby's black cockatoo), *Zanda baudinii* (Baudin's black cockatoo) and *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo). The application area consists of foraging habitat; including primary foraging of *Corymbia calophylla* (Marri), and secondary foraging including *Xanthorrhoea preissii* (grass trees) and *Xylomelum occidentale* (western woody pear) as well as potential nesting and roosting habitat.
Type of environmental value	Species (fauna)	Foraging habitat for three BC species
Conservation significance of environmental value		Endangered (Carnaby's/Baudin's) and Vulnerable (Forest red-tailed cockatoo)
Landscape-level value impacted		Yes - linkage along the road reserve
Significant impact		
Description	Loss of BC habitat	The application area consists of 0.07 hectares of native vegetation that provides suitable foraging and potential roosting and breeding habitat for all three black cockatoo species.
Significant impact (hectares) / Type of feature	0.07	0.07 hectares of suitable habitat for endangered black cockatoo species will be impacted by the proposed clearing.
Quality (scale) / Number	7	The application area is within the known distribution zone for all three black cockatoos and consists of known foraging species, consists of roadside foraging habitat including Marri (primary food source), grass trees and western woody pears. 4 known roost sites are within the local area, the nearest confirmed roost site is located 4.4 kilometres, and the nearest confirmed breeding site is located 11.7km away. In addition, the application area is located within 400 metres of the Ferguson River and less than 2.5 kilometres from two dams which may provide as watering sites. Given the application area is also located within an extensively cleared area of the species range, a quality score of 7 was applied.
Rehabilitation credit		
N/A		
Offset		

Description	Rehabilitation within adjacent road reserve	Revegetation of native vegetation known as black cockatoo foraging habitat.
Proposed offset (area in hectares)	0.36	The total area required to counterbalance the significant residual impacts of the proposed clearing on BC habitat.
Current quality of offset site / Start number (of type) of feature)	3.00	The overall vegetation health of the proposed offset site is 'Degraded' to 'Good' condition with minimal foraging habitat present and contains open canopy areas where infill planting can be undertaken.
Future quality WITHOUT offset (scale) / Future number WITH offset	3.00	Without revegetation the offset site would remain the same with no improvement in habitat quality for black cockatoos.
Future quality WITH offset (scale) / Future number WITH offset	6.00	It is expected for vegetation to improve from low quality foraging habitat to medium to high quality foraging habitat for black cockatoos.
Time until ecological benefit (years)	17.00	15 years minimum to achieve foraging resource, plus 2 years for revegetation to commence.
Confidence in offset result (%)	0.8	80% confidence due to the purpose of the land in which the revegetation is taking place within a road reserve and unable to be conserved in perpetuity.
Duration of offset implementation (maximum 20 years)	20.00	The offset will be implemented in perpetuity. The maximum value has been applied.
Time until offset site secured (years)	1.00	Minimum 1 year applied as security of tenure will not change.
Risk of future loss WITHOUT offset (%)	30.00	There is a moderate risk of loss, as the area cannot be conserved in perpetuity due to it being within a road reserve.
Risk of future loss WITH offset (%)	30.00	There is a moderate risk of loss, as the area cannot be conserved in perpetuity due to it being within a road reserve, however, is afforded protection under the EP Act by virtue of being an offset.
Offset ratio (Conservation area only)	N/A	
Landscape level values of offset?	N/A	

4.4. Significant remnant vegetation

WA Environmental Offsets Calculator
Rationale for scores used in the offset calculator.

Calculation	Score (Area)	Rationale
Conservation significance		
Description	Extensively cleared landscape	The application area is within an extensively cleared landscape
Type of environmental value	Vegetation	Native vegetation within an extensively cleared landscape
Conservation significance of environmental value	Terrestrial native vegetation complex - <30% extent remaining in the bioregion	The local area retains only 28.72% remnant vegetation and the Cartis complex retains 14.98% therefore the clearing of the application area will result in further loss of remnant vegetation and the Cartis vegetation complex.
Landscape-level value impacted	Yes	A roadside linkage will be reduced.
Significant impact		
Description	Extensively cleared landscape	The application area consists of 0.07 hectares of native vegetation within an extensively cleared landscape.
Significant impact (hectares) / Type of feature	0.07	0.07 hectares of native vegetation within an extensively cleared landscape which provides suitable habitat for endangered black cockatoo species will be impacted by the proposed clearing.
Quality (scale) / Number	5.00	The application area is in good condition (Keighery,1994) and within an extensively cleared landscape with only 28.72% of the native vegetation extent remaining. The mapped vegetation complex, Cartis Complex retains only 15% of its pre-European extent, however the application area is not fully representative of this complex. The application area provides significant foraging habitat for black cockatoos, as well as dispersal and foraging habitat for western ringtail possums. The proximity to water sources and known black cockatoo roosting sites, with addition of local connectivity to other native vegetation pockets, contributes to an overall quality score of 5 for the application area.

Rehabilitation credit		
N/A		
Offset		
Description	Revegetation and rehabilitation of roadside vegetation	Rehabilitation of adjacent road reserve.
Proposed offset (area in hectares)	0.21	The total area required to counterbalance the significant residual impacts of the proposed clearing of native vegetation within an extensively cleared landscape.
Current quality of offset site / Start number (of type) of feature)	3.00	The identified road reserve proposed for revegetation consist of Good to Degraded vegetation.
Future quality WITHOUT offset (scale) / Future number WITH offset	3.00	No change in quality is expected without the proposed rehabilitation.
Future quality WITH offset (scale) / Future number WITH offset	6.00	Assuming rehabilitation with using best practice rehabilitation methods and appropriate completion criteria would improve the vegetation condition to Good to Very Good condition.
Time until ecological benefit (years)	12.00	It is assumed rehabilitation would take 10 years to establish, plus 2 years for revegetation to commence.
Confidence in offset result (%)	0.8	70% confidence due to the purpose of the land in which the revegetation is taking place within a road reserve and unable to conserved in perpetuity.
Duration of offset implementation (maximum 20 years)	20.00	The offset will be implemented in perpetuity. The maximum value has been applied.
Time until offset site secured (years)	1.00	Minimum 1 year applied as security of tenure will not change.
Risk of future loss WITHOUT offset (%)	30.0%	There is a moderate risk of loss, as the area cannot be conserved in perpetuity due to it being within a road reserve.
Risk of future loss WITH offset (%)	30.0%	There is a moderate risk of loss, as the area cannot be conserved in perpetuity due to it being within a road reserve, however, is afforded protection under the EP Act by virtue of being an offset.
Offset ratio (Conservation area only)	N/A	
Landscape level values of offset?	N/A	

Appendix F. Photographs of the vegetation






Appendix G. Sources of information

G.1. GIS databases

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

- 10 Metre Contours (DPIRD-073)
- Aboriginal Heritage Places (DPLH-001)
- Cadastre (LGATE-218)
- Cadastre Address (LGATE-002)
- Contours (DPIRD-073)
- DBCA – Lands of Interest (DBCA-012)
- DBCA Legislated Lands and Waters (DBCA-011)
- Directory of Important Wetlands in Australia – Western Australia (DBCA-045)
- Environmentally Sensitive Areas (DWER-046)
- Flood Risk (DPIRD-007)
- Groundwater Salinity Statewide (DWER-026)
- Hydrography – Inland Waters – Waterlines
- Hydrological Zones of Western Australia (DPIRD-069)
- IBRA Vegetation Statistics
- Imagery
- Local Planning Scheme – Zones and Reserves (DPLH-071)
- Native Title (ILUA) (LGATE-067)
- Offsets Register – Offsets (DWER-078)
- Pre-European Vegetation Statistics

- Public Drinking Water Source Areas (DWER-033)
- Ramsar Sites (DBCA-010)
- Regional Parks (DBCA-026)
- Remnant Vegetation, All Areas
- RIWI Act, Groundwater Areas (DWER-034)
- RIWI Act, Surface Water Areas and Irrigation Districts (DWER-037)
- Soil Landscape Land Quality – Flood Risk (DPIRD-007)
- Soil Landscape Land Quality – Phosphorus Export Risk (DPIRD-010)
- Soil Landscape Land Quality – Subsurface Acidification Risk (DPIRD-011)
- Soil Landscape Land Quality – Water Erosion Risk (DPIRD-013)
- Soil Landscape Land Quality – Water Repellence Risk (DPIRD-014)
- Soil Landscape Land Quality – Waterlogging Risk (DPIRD-015)
- Soil Landscape Land Quality – Wind Erosion Risk (DPIRD-016)
- Soil Landscape Mapping – Best Available
- Soil Landscape Mapping – Systems
- Wheatbelt Wetlands Stage 1 (DBCA-021)

Restricted GIS Databases used:

- ICMS (Incident Complaints Management System) – Points and Polygons
- Threatened Flora (TPFL)
- Threatened Flora (WAHerb)
- Threatened Fauna
- Threatened Ecological Communities and Priority Ecological Communities
- Threatened Ecological Communities and Priority Ecological Communities (Buffers)

G.2. References

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