



CLEARING PERMIT

Granted under section 51E of the Environmental Protection Act 1986

Purpose Permit number:	CPS 9483/1
Permit Holder:	Goldfields Margaret River Pty Ltd
Duration of Permit:	From 17 March 2022 to 17 March 2037

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

PART I – CLEARING AUTHORISED

1. Clearing authorised (purpose)

The permit holder is authorised to clear *native vegetation* for the purpose of a sewer extension.

2. Land on which clearing is to be done

Lot 9014 on Deposited Plan 413998, Margaret River
Lot 9007 on Deposited Plan 57387, Margaret River

3. Clearing authorised

The permit holder must not clear more than 0.69 hectares of *native vegetation* within the area cross-hatched yellow in Figure 1 of Schedule 1.

4. Period during which clearing is authorised

The permit holder must not clear any *native vegetation* after 17 March 2027.

PART II – MANAGEMENT CONDITIONS

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

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

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

6. Weed and dieback management

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

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

7. Directional clearing

The permit holder must conduct clearing activities in a slow, progressive manner from west to east to allow fauna to move into adjacent *native vegetation* ahead of the clearing activity.

8. Fauna management – western ringtail possums and south- western brush-tailed phascogales

- (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 southwestern brush-tailed phascogale(s) (*Phascogale tapoatafa*)
- (b) Clearing activities must cease in any area where fauna referred to in condition 8(a) are identified until either:
 - (i) the western ringtail possum and/or southwestern brush-tailed phascogale individual(s) has/have moved on from that area to adjoining suitable habitat; or
 - (ii) the western ringtail possum and/or southwestern brush-tailed phascogale individual(s) has/have been removed by a *fauna specialist*
- (c) Any western ringtail possum and/or southwestern brush-tailed phascogale individual(s) removed in accordance with condition 8(b)(ii) must be relocated by a *fauna specialist* to a *suitable habitat*, or as otherwise approved by the *CEO*.
- (d) Where fauna is identified under condition 8(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 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings or decimal degrees;
 - (iv) the number of individuals removed and relocated;
 - (v) the relevant qualifications of the *fauna specialist* undertaking removal and relocation;
 - (vi) the date each individual was removed;
 - (vii) the method of removal;
 - (viii) the date each individual was relocated;

- (ix) the location where each individual was relocated to, recorded using a GPS unit set to GDA94, expressing the geographical coordinates in Eastings and Northings or decimal degrees; and
- (x) details pertaining to the circumstances of any death of, or injury sustained by, an individual.

9. Fauna management – black cockatoo habitat

- (a) Prior to undertaking any clearing authorised under this permit within the areas cross-hatched yellow in 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* listed below:
 - (i) *Calyptorhynchus lateriosis* (Carnaby’s cockatoo);
 - (ii) *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo); and
 - (iii) *Calyptorhynchus baudinii* (Baudin’s cockatoo).
- (b) Where *black cockatoo habitat tree/s* are identified under condition 9(a), the permit holder must engage a *fauna specialist* to map *black cockatoo habitat tree/s* within the permit area.
- (c) Each *black cockatoo habitat tree* identified must be inspected by a *fauna specialist* for *evidence* of current or past breeding use by *black cockatoo species*.
- (d) Where a *black cockatoo habitat tree* with no *evidence* of current or past use by *black cockatoo species* is identified in accordance with condition 9(a), that tree must only be cleared immediately after the inspection.
- (e) Where a *black cockatoo habitat tree* is identified within the areas cross-hatched yellow on Figure 1 of Schedule 1 and that tree shows *evidence* of current or past breeding use by *black cockatoo species* under condition 9(c), 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.
- (f) Any *black cockatoo breeding tree* with *evidence* of current breeding use by *black cockatoo species* must not be cleared whilst it is in use for that breeding season as determined by the *fauna specialist* under condition 9(e).
- (g) For each suitably sized hollow for *black cockatoo species* nesting that cannot be avoided, the Permit Holder must install an artificial black cockatoo nesting hollow.
- (h) Each artificial black cockatoo nesting hollow required by condition 9(g) must be installed prior to commencement of the next black cockatoo breeding season following clearing of the related *black cockatoo breeding tree(s)*.
- (i) The artificial black cockatoo nest hollow(s) required by condition 9(g) of this permit must:
 - (i) be installed within the area cross-hatched green on Figure 2 of Schedule 1;
 - (ii) be designed and placed in accordance with the specifications detailed in Schedule 2; and
 - (iii) be monitored and maintained in accordance with the specifications detailed in Schedule 3, for a period of at least ten years.
- (j) Within two months of clearing authorised under this permit within the areas cross-hatched yellow on Figure 1 of Schedule 1, the permit holder must provide the results of the *fauna survey* in a report to the CEO.
- (k) The *fauna survey* report must include the following;
 - (i) the location of the *black cockatoo habitat tree(s)* recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994

- (GDA94), expressing the geographical coordinates in Eastings and Northings or decimal degrees;
- (ii) the location of any fauna species listed in condition 9(a), if identified, recorded using a GPS unit set to GDA94, expressing the geographical coordinates in Eastings and Northings or decimal degrees;
- (iii) the name and amount of each fauna species identified;
- (iv) whether the *black cockatoo habitat tree/s* identified show current or past use by black cockatoo species;
- (v) the methodology, used to survey the permit area;
- (vi) a photo of the *black cockatoo habitat tree(s)* identified; and
- (vii) a description of the *black cockatoo habitat tree(s)* identified, including the:
 - (A) species of *black cockatoo habitat tree(s)*; and
 - (B) condition of the *black cockatoo habitat tree(s)*.

10. Revegetation - mitigation

- (a) The Permit Holder must, within 12 months of the commencement of clearing authorised under this Permit:
 - (i) undertake *revegetation* within the area cross-hatched red in Figure 3 of Schedule 1 in accordance with the document titled '*PGPM-07-402 Landscape Finishes Plan*',
 - (ii) ensure only local provenance propagating material is used for *planting* activities;
 - (iii) ensure *planting* is undertaken at the optimal time;
 - (iv) undertake weed control and watering of seedlings for at least three years post-*planting*.
- (b) The Permit Holder must, within 24 months of undertaking *revegetation* in accordance with condition 10(a)(i) of this Permit:
 - (i) engage an environmental specialist to make a determination that the planted vegetation will survive;
 - (ii) if the determination made by the environmental specialist under condition 10(b)(i) is that all planted vegetation will not survive, the Permit Holder must undertake additional plantings within the area cross-hatched red in Figure 3 of Schedule 1 to achieve the species composition and densities detailed in the document titled '*PGPM-07-402 Landscape Finishes Plan*'.

PART III - RECORD KEEPING AND REPORTING

11. Records that must be kept

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

Table 1: Records that must be kept

No.	Relevant matter	Specifications
1.	In relation to the authorised clearing activities generally	<ul style="list-style-type: none"> (a) the species composition, structure, and density of the cleared area; (b) the location where the clearing occurred, recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings; (c) the date that the area was cleared; (d) the size of the area cleared (in hectares); and (e) actions taken to avoid, minimise, and reduce the impacts and extent of clearing in accordance with condition 5; and (f) actions taken to minimise the risk of the introduction and spread of weeds and dieback in accordance with condition 6. (g) actions taken in accordance with condition 7. (h) actions taken to manage and mitigate impacts to western ringtail possums and south-western brush-tailed phascogales in accordance with condition 8. (i) actions taken to revegetate in accordance with condition 10.
2.	In relation to black cockatoo fauna management pursuant to condition 9	<ul style="list-style-type: none"> (a) the time(s) and date(s) of inspection(s) of the suitable <i>black cockatoo habitat tree</i> by the <i>fauna specialist</i>; (b) a description of the inspection methodology employed by the <i>fauna specialist</i>; (c) the species name of any fauna determined by the <i>fauna specialist</i> to be occupying the suitable <i>black cockatoo habitat tree</i>; (d) where the suitable <i>black cockatoo habitat tree</i> is determined by the <i>fauna specialist</i> to be occupied by <i>black cockatoo species</i>: <ul style="list-style-type: none"> (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 <i>black</i>

No.	Relevant matter	Specifications
		<i>cockatoo habitat tree</i> was cleared.

12. 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 11; 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*, by 17 December 2036, a written report of records required under condition 11, where these records have not already been provided under condition 12(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 <i>Eucalyptus salmonophloia</i> or <i>Eucalyptus wandoo</i>) that contain hollows suitable for breeding by black cockatoo species.
black cockatoo species	means one or more of the following species: (a) <i>Calyptorhynchus lateriosis</i> (Carnaby's cockatoo); (b) <i>Calyptorhynchus baudinii</i> (Baudin's cockatoo); and/or (c) <i>Calyptorhynchus banksii naso</i> (forest red-tailed black cockatoo).
CEO	Chief Executive Officer of the department responsible for the administration of the clearing provisions under the <i>Environmental Protection Act 1986</i> .
clearing	has the meaning given under section 3(1) of the EP Act.
condition	a condition to which this clearing permit is subject under section 51H of the EP Act.
dieback	means the effect of <i>Phytophthora</i> species on native vegetation.
department	means the department established under section 35 of the <i>Public Sector Management Act 1994</i> (WA) and designated as responsible for the administration of the EP Act, which includes Part V Division 3.
EP Act	<i>Environmental Protection Act 1986</i> (WA)
evidence	means showing chew marks or scratching on the habitat tree representative of the species being surveyed, the presence of the species entering or leaving the habitat tree, and/or the presence of chicks/young.
fauna specialist	means a person who holds a tertiary qualification specialising in environmental science or equivalent and has a minimum of 2 years work experience in fauna identification and surveys of fauna native to the region being inspected or surveyed, or who is approved by the CEO as a suitable fauna specialist for the bioregion, and who holds a valid fauna licence issued under the <i>Biodiversity Conservation Act 2016</i> .
fauna survey	means a field-based investigation, including a review of established literature, of the biodiversity of fauna and/or fauna habitat of the permit area and where conservation significant fauna are identified in the permit area, also includes a fauna survey of surrounding areas to place the permit area into local context.
fill	means material used to increase the ground level, or to fill a depression.
local provenance	means native vegetation seeds and propagating material from natural sources within 50 kilometres and the same IBRA subregion of the area cleared.
mulch	means the use of organic matter, wood chips or rocks to slow the movement of water across the soil surface and to reduce evaporation.
native vegetation	has the meaning given under section 3(1) and section 51A of the EP Act.
optimal time	means the period from May to October for undertaking planting and seeding

Term	Definition
planting	means the re-establishment of vegetation by creating favourable soil conditions and planting seedlings of the desired species
rehabilitate/ rehabilitated rehabilitation	/ means actively managing an area containing native vegetation in order to improve the ecological function of that area.
revegetate / vegetated / revegetation	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	means habitat known to support to support western ringtail possums (<i>Pseudocheirus occidentalis</i>) and / or southwestern brush-tailed phascogale (<i>Phascogale tapoatafa</i>) 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 (<i>Agonis flexuosa</i>) dominated woodlands, jarrah (<i>Eucalyptus marginata</i>) and marri (<i>Corymbia calophylla</i>) forests, riparian vegetation with a canopy of Bullich (<i>Eucalyptus megacarpa</i>) or flooded gum (<i>Eucalyptus rudis</i>), karri (<i>Eucalyptus diversicolor</i>) forests, sheoak (<i>Allocasuarina fraseriana</i>) dominated woodlands, and other stands of myrtaceous trees growing near swamps, watercourses or floodplains.
weeds	means any plant – (a) that is a declared pest under section 22 of the <i>Biosecurity and Agriculture Management Act 2007</i> ; or (b) published in a Department of Biodiversity, Conservation and Attractions species-led ecological impact and invasiveness ranking summary, regardless of ranking; or not indigenous to the area concerned.

REFERENCES

RPS AAP Consulting Pty Ltd (2022). *PGPM-07-402 Landscape Finishes Plan for Clearing Permit CPS 9483/1 on e-mail*. Available at <https://ftp.dwer.wa.gov.au/permit/9483/>

END OF CONDITIONS


 Ryan Mincham
 2022.02.22
 09:43:24
 +08'00'

Ryan Mincham
 MANAGER
 NATIVE VEGETATION REGULATION

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

22 February 2022

Schedule 1

The boundary of the area authorised to be cleared is shown in the map below (Figure 1).



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

The boundary of the area within which artificial hollows are to be installed is shown cross-hatched green in the map below (Figure 2).



Figure 2: Map of the boundary of the area within which conditions apply

The boundary of the area within which revegetation is to occur is shown cross-hatched red in the map below (Figure 3).



Figure 3: Map of the boundary of the area within which conditions apply

SCHEDULE 2 – How to design and place artificial hollows for Carnaby’s cockatoo

Artificial hollows for Carnaby's cockatoo



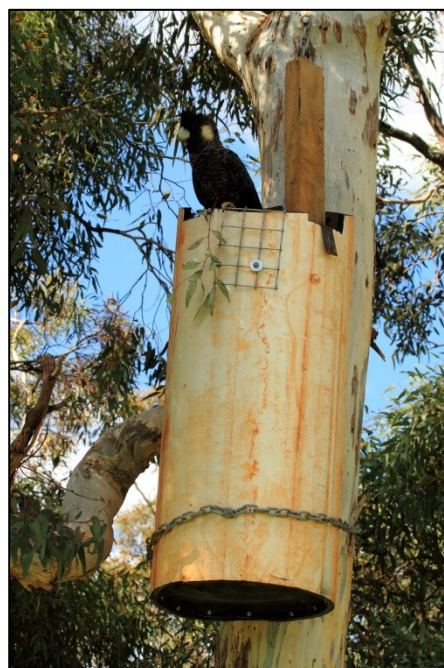
How to design and place artificial hollows for Carnaby's cockatoo

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

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

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

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



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

Walls

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

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

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

Base

The base of the artificial hollow must be;

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

Do not use:

- Saw dust or fibre products that will retain moisture.

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



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

Entrance

The entrance of the artificial hollow must;

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

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

Ladder

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

The ladder must be;

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

Do not use:

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

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

Sacrificial chewing posts

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

The sacrificial chewing posts must:

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

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



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

Photo by Rick Dawson

Mountings

The artificial hollows must be mounted such that:

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

Placement

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

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

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

Artificial hollows to be placed in trees require:

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

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

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

Safety

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

Maintenance and monitoring

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

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

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



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



Example fixing for artificial hollow
Photo by Christine Groom

Acknowledgements

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

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

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

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

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

SCHEDULE 3 – How to monitor and maintain artificial hollows for Carnaby’s cockatoo

Artificial hollows for Carnaby's cockatoo



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

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

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

Monitoring should be undertaken in order to detect:

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



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

How do I monitor artificial hollows?

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

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)	<ul style="list-style-type: none"> • 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)	<p>To observe at least two of the following:</p> <ul style="list-style-type: none"> • Breeding behaviour of adults around hollow or evidence of chewing • Female flushed from hollow • Noises from nestlings in hollow <p>Or to observe:</p> <ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • Looking inside nest to observe eggs or nestlings.
To determine use by any species	As often as possible.	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • 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>



Clearing Permit Decision Report

1 Application details and outcome

1.1. Permit application details

Permit number:	CPS 9483/1
Permit type:	Purpose permit
Applicant name:	Goldfields Margaret River Pty Ltd
Application received:	9 November 2021
Application area:	0.69 hectares of native vegetation
Purpose of clearing:	Sewer extension
Method of clearing:	Mechanical Removal
Property:	Lot 9014 on Deposited Plan 413998 Lot 9007 on Deposited Plan 57387
Location (LGA area/s):	Shire of Augusta-Margaret River
Localities (suburb/s):	Margaret River

1.2. Description of clearing activities

The vegetation proposed to be cleared is 0.69 ha within a 1.23 ha footprint required for the extension of a sewer service from McCormick Crescent (Rapids Landing development) to the Brookfield Estate future subdivision and development area (see Figure 1, Section 1.5). Four individual sections of native vegetation occur along the proposed sewer alignment that will require clearing and the sewer will cross the Darch Brook and its tributary.

The preferred installation method is to bore horizontally through the creek area to minimise potential impacts. If the preferred operating method of horizontal boring underneath the Darch Brook and its tributary is successfully undertaken, the final clearing area would likely be reduced to less than 0.39 ha. The installation methodology is dependent on the contractor, discussions with Water Corporation and the material that is encountered. As such, all native vegetation that is at risk of being cleared has been considered in the assessment of this application. Brookfield Estate Pty Ltd has been recently purchased by Goldfields Margaret River Pty Ltd.

1.3. Decision on application

Decision:	Granted
Decision date:	22 February 2022
Decision area:	0.69 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 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 F.1), the findings of a flora and fauna significance survey (see 0), 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 sewer extension is required to connect sewer services from the neighbouring Rapids Landing's development to the Brookfield Estate future subdivision and development area. This sewer alignment is shown on the Water Corporation's scheme planning and is critical for regional development (RPS, 2021).

The assessment identified that the proposed clearing would result in:

- the loss of 0.69 ha of native vegetation which is suitable habitat for *Pseudocheirus occidentalis* (western ringtail possum)
- the loss of 0.69 ha of black cockatoo foraging habitat, of which 0.28 ha is of good quality
- the removal of a tree with a potential breeding hollow for black cockatoos
- the potential introduction and spread of weeds and dieback into adjacent vegetation, which could impact on the quality of the adjacent vegetation and its habitat values; and
- short term impacts to the water quality within the watercourse.

After consideration of the available information, as well as the applicant's minimisation and mitigation measures (see Section 3.1), the Delegated Officer determined that the proposed clearing can be minimised and managed to be unlikely to lead to an unacceptable risk to environmental values.

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

- avoid and minimise clearing to reduce the impacts and extent of clearing.
- take hygiene steps to minimise the risk of the introduction and spread of weeds and dieback.
- directional clearing to provide fauna an opportunity to move to adjacent native vegetation ahead of the clearing activity.
- fauna management to ensure that the proposed clearing will not adversely impact on conservation significant species, or any individuals present at the time of clearing; and
- revegetation consisting of the planting of native trees of suitable species within riparian areas and other areas in accordance with the Rapids Brookfield Sewer Landscape Plan.

1.5. Site map



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

The areas cross-hatched yellow indicate the areas authorised to be cleared under the granted clearing permit.



Figure 2 Map of the boundary of the area within which fauna conditions apply.

The area cross-hatched green indicates the area within which artificial hollows are to be installed under condition 9 of the Permit.



Figure 3 Map of the boundary of the area within which revegetation conditions apply.

The area cross-hatched red indicates the area within which revegetation is required in accordance with condition 10 of the 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 polluter pays principle
- 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)
- *Planning and Development Act 2005* (WA) (P&D Act)

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)
- Technical guidance – *Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA, 2016)
- Technical guidance – *Terrestrial Fauna Surveys for Environmental Impact Assessment* (EPA, 2016)

3 Detailed assessment of application

3.1. Avoidance and mitigation measures

Evidence was submitted by the applicant, demonstrating that avoidance and mitigation measures have been considered. The Delegated Officer was satisfied that the applicant has made a reasonable effort to avoid and minimise potential impacts of the proposed clearing on environmental values (for further details see Appendix A).

The sewer extension works boundary was reduced to avoid 0.02 ha of Good condition (Keighery 1994) native vegetation within the Darch Road reserve (RPS, 2021). The Rapids Landing's future cadastral boundaries in Lot 9014 also informed the sewer alignment, including:

- direct routes used to cross each watercourse to connect the existing gravity sewer pipe on McCormick Crescent to the Rapids Landing's future lots and to connect from the Rapids Landing's future lots to the Brookfield Estate's future lots
- maintaining close proximity to the Rapids Landing's developable area, usually within 10 metres, to limit encroachment on Darch Brook's riparian vegetation wherever practicable (RPS, 2021).

Balwyn Margaret River Pty Ltd has been consulted regarding the proposed clearing of native vegetation within its landholding. Brookfield Estate Pty Ltd (recently acquired by Goldfields Margaret River Pty Ltd) has advised that that its preferred installation method is to bore horizontally through the creek area, which would avoid disturbing the Darch Brook tributary and the installed drainage and landscaping infrastructure (RPS, 2021). However, ground conditions may prevent this if there is considerable rock or saturated loose ground conditions material at depth or if solid rock is hit, necessitating those areas be opened up regardless and cracking or removing rock as required. Brookfield Estate Pty Ltd has agreed to make every effort to minimise impacts to the existing infrastructure and landscaping and in the event that there are impacts; reinstatement of landscaping will be undertaken to the same or better condition (RPS, 2021). Brookfield has formulated a Landscape plan that includes the revegetation of these areas (Appendix A). This has been included as a condition on the permit to ensure the mitigation measure is undertaken and reported on. The Shire of Augusta-Margaret River has also indicated that they will work closely with the applicant during the construction works to ensure that all Shire requirements are met. Balwyn Margaret River Pty Ltd has provided conditional endorsement for the clearing of native vegetation to facilitate the installation of the sewer extension (RPS, 2021).

To address the potential that conservation significant fauna species are present within the proposed sewer extension immediately prior to the proposed clearing works commencing, Brookfield Estate Pty Ltd has committed to undertake pre-clearing inspections for fauna species with clearing works commencing immediately after fauna species have been confirmed not to be present (RPS, 2021). This has been included as a condition on the permit to ensure the mitigation measure is undertaken and reported on.

The risk of exposure and subsequent oxidation of potential acid sulphate soils is considered to have been mitigated using a horizontal boring installation technique. Surface soils will not be disturbed as would otherwise occur with traditional open trenching methods. If horizontal boring is to take place, there is likely to be no complete exposure pathway for the exposure of acid sulphate soils as a result of the project. If horizontal boring is not able to be undertaken for any reason, open trenching will be utilised. In this instance, soils will be managed as actual acid sulphate and management measures will be implemented and works will be managed in accordance with DWER Acid Sulfate Soils (ASS) guidelines (DWER, 2015) and with the DWER endorsed Acid Sulfate Soils and Dewatering Management Plans currently implemented by Brookfield and Rapid Landings estates.

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, or land and water resource values.

The assessment against the clearing principles (see **Error! Reference source not found.**) identified that the impacts of the proposed clearing present a risk to biological values (fauna), land degradation and water resources. 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 - Clearing Principles (a) and (b)

Assessment

According to available databases, there are records of 20 conservation significant flora species within the local area. The spring vegetation and flora survey identified no Threatened or Priority flora within the site (Ecosystem Solutions, 2021). Two vegetation communities were described and mapped within the Brookfield sewer extension clearing area:

- Vegetation Community A – *Corymbia calophylla* open woodland over *Agonis flexuosa* and *Corymbia calophylla* low open forest over *Agonis flexuosa*, *Hovea elliptica* and *Hakea amplexicaulis* tall open shrubland over *Acacia myrtifolia*, *Taxandria linearifolia* and *Agonis flexuosa* shrubland over *Taxandria linearifolia*, *Acacia myrtifolia* and *Hibbertia hypericoides* low open shrubland over *Loxocarya cinerea* sedgeland
- Vegetation Community B – *Corymbia calophylla* scattered trees over *Melaleuca viminea*, *Taxandria linearifolia* and *Agonis flexuosa* tall, closed scrub over *Leptocarpus sp.* sedgeland.

The majority of the native vegetation to be cleared is classified as Degraded, with smaller areas of Good to Very Good condition vegetation found in the wetter areas of Darch Brook and its tributary. The recorded vegetation communities did not have the characteristics of any Threatened Ecological Communities (TECs), as listed under the BC Act or the EPBC Act, or DBCA listed Priority Ecological Communities (PECs).

According to available databases, 34 conservation significant fauna species have been recorded within the local area. The closest record to the application area is a Baudin's Cockatoo (*Calyptorhynchus baudinii*). This species has been recorded 520 times within the local area.

Of the 34 species recorded within the local area, one was considered to have a medium likelihood of occurrence within the application area, *Phascogale tapoatafa wambenger* (south-western brush-tailed phascogale). A further four species were considered highly likely to occur within the application area based on their known habitat preferences and the habitat available within the application areas. These included *Calyptorhynchus baudinii* (Baudin's cockatoo), *Calyptorhynchus latirostris* (Carnaby's cockatoo), *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo), and *Pseudocheirus occidentalis* (western ringtail possum). Considering the presence of a dense understory, two ground-dwelling species are also considered likely to occur within the application area, the Water rat and the Quenda. Other fauna of conservation significance may use the site infrequently or as part of a larger patch, such as birds and fauna that rely on the freshwater habitat. Impacts to these species are considered negligible due to the small area of vegetation to be removed (Ecosystem Solutions, 2021). Subsequently a fauna survey was undertaken by Ecosystem Solutions in October 2021 to confirm the presence of species likely to occur.

The site was surveyed using the recommended methods from relevant guidelines. Black cockatoo species were heard to the north-east of the site, approximately 100 m from the northern extent of the Brookfield sewer extension clearing area. This approximate location was mapped by Ecosystem Solutions (2021) (Appendix B). No black cockatoos were observed utilising the site during the two dawn and two dusk/nocturnal surveys.

Three Western Ringtail Possums and one Quenda were observed during the two surveys on 7 and 12 October 2021. While no other animals of conservation significance were observed, either directly or through signs, the lack of this

data should not be taken directly as an indication that those species are absent from the site (Ecosystem Solutions, 2021).

Black cockatoos

Carnaby's cockatoo, Baudin's cockatoo and forest red-tail black cockatoo (collectively known as black cockatoos) nest in hollows in live or dead trees of karri, marri, wandoo, tuart, salmon gum, jarrah, flooded gum, York gum, powder bark, bullich and blackbutt (Commonwealth of Australia, 2012). Breeding habitat or a 'habitat tree' is defined in the EPBC Act referral guidelines as 'trees of species known to support breeding within the range of the species which either have a suitable nest hollow or are of a suitable diameter at breast height (DBH) to develop a nest hollow' (Commonwealth of Australia, 2012). The application area is within the known breeding range of Baudin's and Carnaby's black cockatoo and the 'core' range of forest red-tail black cockatoo, and therefore, is within the known range for all three black cockatoo species. A review of the available databases indicated the application area is within 10 kilometres of 17 mapped black cockatoo roosting sites. The local area does not contain any mapped black cockatoo breeding sites but does contain 741 previous records of black cockatoo species, the closest located 620 metres away.

Carnaby's cockatoos have preference for feeding habitat that includes jarrah and marri woodlands and forest heathland and woodland dominated by proteaceous plant species such as *Banksia sp.*, *Hakea sp.* and *Grevillea sp.*, also insects and insect larvae; pith of kangaroo paw (*Anigozanthos flavidus*); juice of ripe persimmons; tips of *Pinus* spp. and seeds of apples and pears (Commonwealth of Australia, 2012). Forest red-tailed black cockatoo's have preference for seeds of jarrah and marri in woodlands and forest, and edges of karri forests, including wandoo and blackbutt, *Eucalyptus caesia*, *E. erythrocorys*, Allocasuarina cones, fruits of snottygobble (*Persoonia longifolia*) and mountain marri (*Corymbia haematoxylon*), and some introduced eucalypts such as river red gum (*E. camaldulensis*) and flooded or rose gum (*E. grandis*). Baudin's cockatoo prefer native shrubland, kwongan heathland and woodland on seeds, flowers and nectar of native proteaceous plant species (*Banksia spp.*, *Hakea spp.*, *Dryandra spp.*, and *Grevillea spp.*), as well as *Callistemon* spp. and marri. Also seeds of introduced species including *Pinus spp.*, *Erodium spp.*, wild radish, canola, almonds and pecan nuts; insects and insect larvae; occasionally flesh and juice of apples and persimmons.

The fauna survey identified four trees within the development area, which had a diameter at breast height (DBH) over 500 mm, therefore representing trees that may be suitable to support nesting by Black Cockatoo species (Appendix E). Two of these trees were located just outside of the proposed clearing area. One tree within the proposed clearing area and two others located outside the area had observable hollows. No animals were observed utilising these trees during the dawn or dusk/nocturnal surveys (Ecosystem Solutions, 2021). A fauna management condition has been applied to the permit to require inspection of trees for hollows and implementation of management measures to mitigate impacts. In addition, to mitigate the loss of suitably sized hollows, the Delegated Officer imposed a condition on the clearing permit which requires the permit holder to install black cockatoo artificial nesting hollows equivalent in number to those which will be removed. This mitigation condition is consistent with the EPA advice (2019) which advises that measures for improving habitat values for Carnaby's cockatoo include enhancement of habitat, such as the use of artificial hollows.

A total of 0.69 ha of potential black cockatoo foraging habitat will be impacted by the proposed clearing, of which 0.28 ha is assessed as being of good quality. Considering the extent of suitable black cockatoo foraging habitat mapped within the local area relative to the extent of foraging habitat present within the application area, the proposed clearing is not likely to cause significant impacts upon the viability of the local populations of black cockatoos. The local area comprises approximately 17,224 hectares of native vegetation which is potential black cockatoo foraging habitat. The application area represents approximately 0.004 per cent of this extent. Approximately 41.81 per cent (7,202 hectares) of the remnant vegetation in the local area occurs within DBCA managed estate, or areas protected under conservation covenant under the *Soil and Land Conservation Act 1945* (Figure 4).

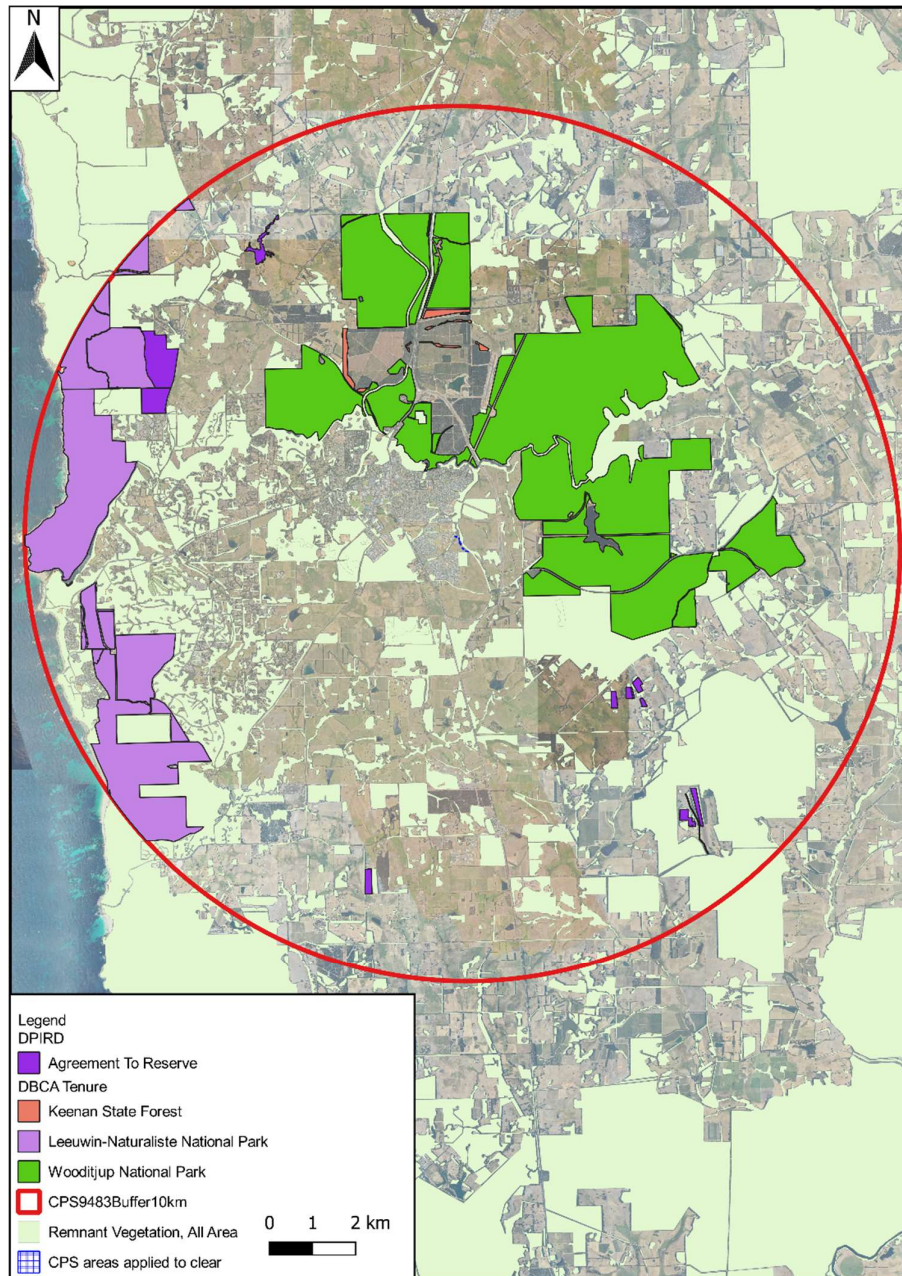


Figure 4: Representation of the extent of the remnant vegetation within the local (10km) area and the percentage of which is conserved within DBCA tenure or conservation covenant.

The referral guidelines indicate while breeding, black cockatoos will generally forage within a 6–12-kilometre radius of their nesting site. Following breeding, black cockatoos assemble into flocks and move through the landscape searching for food, usually foraging within 6 kilometres of a night roost (Commonwealth of Australia, 2012). This variable range indicates large areas of foraging habitat are required to support black cockatoo populations. Cumulative impacts of the loss of remnant vegetation restrict the availability of food sources for black cockatoos (Commonwealth of Australia, 2012).

Given the proximity to water sources such as the Darch Brook and its tributary, the trees within the survey area may offer potential roosting habitat. Only two large trees are located within the proposed clearing area and the fauna survey did not note any signs of current roosting within them (Ecosystem Solutions, 2021). Alternative roosting opportunities for black cockatoos remain within the immediate vicinity of the application area.

Noting the above and the presence of approximately 43 per cent coverage of remnant vegetation in the local area, it is not considered that the removal of up to 0.69 ha of foraging habitat will significantly impact the availability of black cockatoo foraging resources within the local area.

The Delegated Officer determined the application is not likely to remove significant foraging or roosting habitat for any threatened black cockatoo species.

Western Ringtail Possum (WRP)

The '*Western Ringtail Possum (Pseudocheirus occidentalis) Recovery Plan*' outlines strategies to slow the decline in population size, extent and area of occupancy through managing major threatening processes affecting the subpopulations and their habitats and allowing the persistence of the species in each of the identified key management zones: Swan Coastal Plain, southern forests and south coast (DPaW, 2017). The application area is located within the Southern Forest Management Zone.

Within this management zone, populations are associated with a diverse range of habitats including coastal heath, jarrah/marri woodland and forest, peppermint woodlands, myrtaceous heaths and shrublands, Bullich (*Eucalyptus megacarpa*) dominated riparian zones and karri forest.

Noting the habitat preferences of this species, the mapped vegetation type within the application area, the presence of waterbodies, large conservation areas close by and local records of the species, it is considered likely that western ringtail possum occur within the application area. Ecosystem Solutions (2021) recorded three western ringtail possums within the clearing area over two dusk/nocturnal surveys, however, no dreys were observed in the vegetation canopy.

The removal of vegetation within the application area is not likely to impact on the conservation status of the WRP, or persistence of WRP populations within the local area given the availability of comparable habitat adjacent to the application areas. Potential impacts to individuals that may be present at the time of clearing have been addressed through permit conditions.

South-Western Brush-Tailed Phascogale

In south-west WA, this species is known to occur in open woodlands that contain hollow-bearing trees. This species is reported to occur in highest densities in the Perup/Kingston area, Collie River valley, and near Margaret River and Busselton (DBCA, 2012). No south-western brush-tailed phascogale observations were recorded by Ecosystem Solutions (2021). The trees within the application area may contain hollows suitable for nesting by the south-western brush-tailed phascogale. The clearing permit has been conditioned to require the inspection of trees and management of individuals if encountered.

Water rat

The Rakali, or water rat, occupies a unique niche within south-west systems, being the only amphibious or semiaquatic species in the region (feeding largely underwater, but living on land). While a distribution map for the species is not available, the species is broadly expected to occur throughout much of the south-west living in burrows on low banks of rivers, lakes, wetlands, estuaries and even along the coast. It is noted that intact riparian vegetation and associated bank stability is critical to their survival. Noting the presence of waterbodies within the application area and riparian vegetation, the application area is likely to provide habitat for the species.

It is considered the removal of the vegetation to construct the sewer would not result in the removal of significant habitat for the species but may impact individuals. A directional clearing condition has been applied to the clearing permit to facilitate the movement of fauna into adjacent vegetation ahead of the clearing.

Quenda

The quenda occupies areas of dense understory such as around swamps or in banksia and jarrah woodlands and are distributed near the south coast from Guilderton north of Perth to east of Esperance. Noting the known distribution and the habitat presented within the application area, it is considered the application area may provide habitat for this species. They typically inhabit dense understory, such as those found in swamps or banksia and jarrah woodlands. Nest sites are indentations in the ground, located beneath shrubs and covered with leaves, dry grasses and other soft materials. Ecosystem Solutions (2021) observed one quenda and quenda diggings during a dusk/nocturnal survey in the south of the clearing area.

Given the larger areas of similar habitat adjacent to the clearing area, it is considered unlikely that the clearing activity would result in a significant impact to this species, however, there is scope for impact to individuals. A directional

clearing condition has been applied to the clearing permit to facilitate the movement of fauna into adjacent vegetation ahead of the clearing.

Given the presence of hollow bearing trees and known habitat for western ringtail possums (WRP) and black cockatoos, the applicant has committed to engaging an experienced fauna specialist to inspect the vegetation for evidence of recent use or occupation by these species, as well as south-western brush-tailed phascogale, immediately prior to, and for the duration of the clearing works being undertaken. This requirement has been imposed as a condition on the permit.

Conclusion

Based on the above assessment, the proposed clearing may result in impacts to individual fauna if present during the clearing, however, this is not likely to impact on the conservation status of any species that may have potential to occur within the application areas.

Conditions

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

- slow, directional clearing to allow fauna to move into adjacent vegetation ahead of the clearing activity will minimise impact to individuals
- fauna management conditions requiring a pre-clearing inspection of the application area for presence of black cockatoos, western ringtail possum and south-western brush-tailed phascogale; and
- revegetation of impacted areas in accordance with permit conditions.

3.2.2. Land and water resources - Clearing Principles (f), (g) and (i)

The proposed clearing area partially overlaps two watercourses, the Darch Brook and its tributary, which DBCA mapped as a palusvale wetland and a floodplain respectively (Ecosystem Solutions, 2021). The Darch Brook is a tributary of Margaret River. The two watercourses have not been listed as significant watercourses or wetlands.

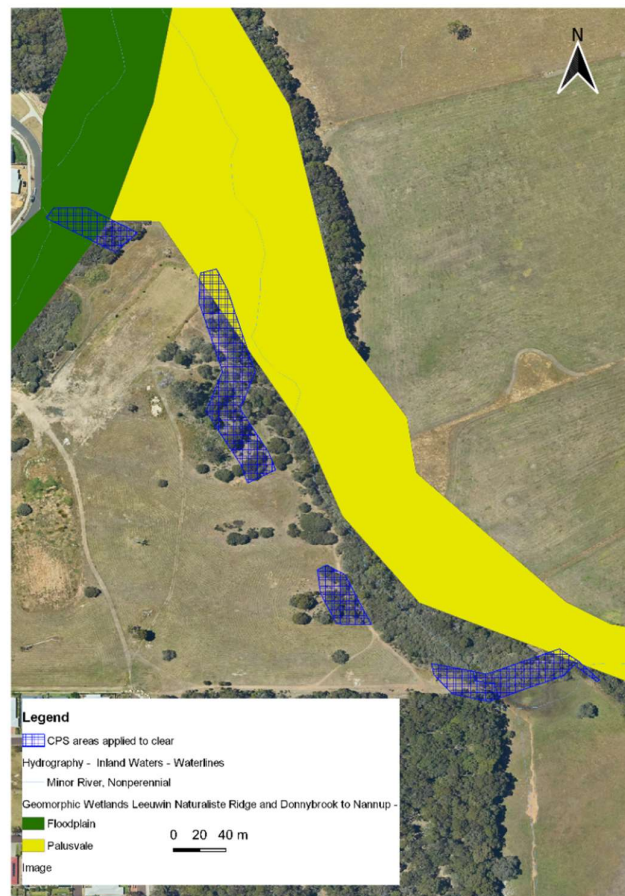


Figure 5: Hydrological mapping of the proposed clearing area.

Vegetation community 'B' was found to be growing within and adjacent to these watercourses, being described as concentrated in the seasonally wet areas to the north and south (Ecosystem Solutions 2021). Vegetation community 'A' was largely in a Degraded condition due to historical clearing and is proximate to the Darch Brook (Ecosystem Solutions, 2021).

The majority of native vegetation proposed to be cleared is growing in, or in association with the Darch Brook and its tributary watercourse (Ecosystem Solutions, 2021). Noting the relatively small extent of the proposed clearing and that the vegetation is mostly in a Degraded condition, the proposed clearing is not likely to have a significant impact on the larger extent of riparian habitat associated with the Darch Brook and its tributary.

The mapped soil type within the application area has a medium to high risk of wind erosion and waterlogging, a medium risk of phosphorus export, a high risk of subsurface acidification and a low flood, water erosion and salinity risk. Noting that horizontal boring is the preferred construction method, it is considered that the land degradation risk categories are low. Should clearing be required, vegetation is to be reinstated which further mitigates these risks. Mitigations with regards to acid sulphate soils have been proposed by the applicant and are discussed in Section 3.1.

The proposed clearing has the potential for localised sedimentation or turbidity of the surface water due to the earthworks and removal of vegetation. Indirect impacts to the downstream Darch Brook via construction works are possible, however, design and standard construction methodologies are likely to mitigate any potential impacts such as sedimentation and altered flows.

Conclusion

It is considered that the proposed clearing may impact on local surface water quality on a temporary basis. However, as the extent of the proposed clearing is small, and given some riparian vegetation will be retained and revegetation will occur upstream, the proposed clearing is not likely to cause long-term deterioration in the quality of surface water.

Conditions

No conditions are proposed due to the temporary and minimal impact likely from the proposed clearing.

3.3. Relevant planning instruments and other matters

The proposed sewer alignment and works were approved by the Minister for Water on 9 November 2020. This sewer alignment is shown on the Water Corporation's scheme planning and is deemed critical for regional development.

The Shire of Augusta-Margaret River advised DWER that local government approvals are not required as the project is classed as public works, and that the proposed clearing is consistent with the Shire's Local Planning Scheme. The Shire considered historical discussions with the applicant and met the developers on site to walk the alignment applied for. The Shire strongly supports the use of direct drilling under the creek to preserve the riparian vegetation. As most of the alignment is in, or directly adjacent to the proposed road reserves in the approved structure plan, the Shire are supportive of this alignment as the best option. In addition, the Shire has undertaken to work closely with the consultants during the construction works to ensure that all Shire requirements are met.

Brookfield Estate Pty Ltd has been recently purchased by Goldfields Margaret River Pty Ltd.

Acid sulfate soils (ASS) risk mapping indicates that the site is located within an area identified as representing a risk of ASS occurring within 3 m of the natural soil surface. Please refer to DWER's ASS guidelines for information to assist with the management of ground and/or groundwater disturbing works.

No Aboriginal sites of significance have been mapped within the application area. 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.

End

Appendix A. Additional information provided by applicant

During the assessment, third party concerns were raised about the lack of consideration for alternative alignments. The applicant organised a site visit with the Sustainability Planning Officer of the Shire of Augusta-Margaret River to walk the route of the applied alignment and to discuss the history and previous consideration of alternative alignments of the sewer line.

Subsequent to the site visit and discussions, the applicant provided DWER with a detailed summary of the history and consideration of previous alternative alignments (see below) and the Shire provided a statement in support of the alignment and indicating their strong preference for direct drilling under the creek line to preserve the riparian vegetation.

Additional information with regards to alignment alternatives provide by applicant:

“WGE / Stantec (engineers for the developer of Brookfield Estate) contacted the Shire of Augusta-Margaret River in October 2019 regarding a reticulated sewer connection for the Brookfield Estate. The Water Corporation had advised that the sewer located within the adjacent Development – “Rapids Landing”, would need to be extended to allow connection and development to occur for the Estate. Many different routes were evaluated by WGE / Stantec, however, the following were the final preferred options:

- Route A – sewer proposed adjacent the anticipated future road reserve of Rapids Landing. Selected as it would be used in the future for the adjacent housing connections and would be adjacent to a road reserve with less vegetation removal. The developer of Rapids Landing originally objected to this route being adopted because it went through their landholding.
- Route B – alternative route for sewer proposed within the Darch Brook Road reserve. Would require significant vegetation removal (almost the entire width of road reserve) and would be mostly outside of Rapids Landing. Water Corporation advised they would not support this option unless all vegetation was cleared along this route.

The proposed sewer will provide the main point of connection to the future Brookfield Development, and therefore must be constructed as deep as possible to allow the entire future catchment to connect into it with a gravity feed (this is supported by Water Corporation’s scheme planning). The only point of connection to the sewer in Rapids Landing (which provides the depth required) is as shown in Route A and Route B. There is an existing sewer main located within Pimelia Drive, however, that main is 1.4m higher and would not provide the servicing depth required for the Brookfield development.

The Shire of Augusta-Margaret River advised in October 2019 that they strongly preferred the sewer be placed adjacent to the future road reserve within the Rapids Landing estate (Route A). Route A was also consistent with the Water Corporation’s sewer planning to date. The Shire has a significant presumption against the clearing of vegetation where it can be avoided, and that a sewer alignment through the Darch Road reserve (Route B) would likely be resisted due to environment values. Darch Road contains a portion of the strategic Wannang Biddi trail, and the amenity of the trail is largely a consequence of the significant vegetation within the reserve.

The Minister of Water considered an objection raised by the developer of Rapids Landing regarding the proposed sewer for Brookfield Estate and possible options from the Water Corporation. On 9 November 2020, they approved the proposed sewer works to proceed.

Following a site visit with the developer of Brookfield Estate in January 2022, the Shire of Augusta-Margaret River conveyed their strong support for consideration of direct drilling under the creekline to preserve the riparian vegetation. As most of the alignment is in, or directly adjacent to the proposed road reserves in the approved structure plan, the Shire are supportive of this alignment as the best option.

Brookfield Estate Pty Ltd’s preferred installation method is to bore horizontally through the creek area, which would avoid disturbing the Darch Brook tributary and the installed drainage and landscaping infrastructure at the northern connection point. However, ground conditions may prevent this if there is considerable rock or saturated loose ground conditions at depth which would require open trenching for construction. Brookfield Estate Pty Ltd has agreed to make every effort to minimise impacts to the existing infrastructure and landscaping and in the event that there are impacts, reinstatement of landscaping will be undertaken to the same or better condition.

The proposed sewer alignment is shown on the Water Corporation’s scheme planning and is critical for regional development. No vegetation clearing is required within the Darch Road reserve for the proposed sewer alignment. To limit encroachment on Darch Brook’s riparian vegetation wherever practicable, the alignment maintained close proximity to the Rapids Landing’s developable area, usually within 10 m, and direct routes were used to cross each watercourse to connect the existing gravity sewer pipe in Rapids Landing to Brookfield Estate.”

Additional information has been received with regards to the below:

Acid Sulfate Soil Risk

The proposed sewer alignment is positioned external to existing Acid Sulfate Soils (ASS) investigations and DWER approved Acid Sulfate Soils and Dewatering Management Plans (ASSDMP) for Brookfield Estate and Rapids Landing, however, the local geology is anticipated to be similar. No Western Australian Planning Commission planning condition exists for these works; however, Brookfield wishes to adopt a conservative approach that ensures protection of the environment and existing infrastructure, whilst maintaining the expectations of DWER. As such, works will be managed in accordance DWER ASS guidelines (DWER, 2015) and with the following DWER endorsed Acid Sulfate Soils and Dewatering Management Plans

- Acid Sulfate Soils and Dewatering Management Plan Brookfield Stage 7 (RPS, January 2015)
- Acid Sulfate Soils and Dewatering Management Plan Rapids Landing Stages 5B to 10 (RPS, January 2015), and associated addendum

Revegetation of the riparian area

Please see the attached Landscape works documentation (PGPM-07 Rapids Brookfield Sewer Landscape Plans RevA_200810), providing detail on the rehabilitation planting.

Appendix B. Site characteristics

B.1. Site characteristics

Characteristic	Details
Local context	<p>The area proposed to be cleared is part of a small strip of native vegetation in the intensive land use zone of Western Australia. It is adjacent to the Darch Brook and its tributary on the east side and the Rapids Landing and Brookfield Estate residential developments to the west. The vegetation on the opposite side of the watercourse and riparian vegetation has been extensively cleared for agricultural purposes. A narrow strip of vegetation remains along Darch Road. The four proposed clearing areas form part of, but are not essential for the function of ecological linkages in the local area.</p> <p>Spatial data indicates the local area (10-kilometre radius from the centre of the area proposed to be cleared) retains approximately 43.43 per cent of the original native vegetation cover.</p>
Ecological linkage	<p>The application areas form a small part of an ecological linkage along the Darch Brook and tributary, which link to larger remnants of vegetation and Reserve 24726 (currently vested for the purpose of Public Recreation). The vegetated area of Darch Road is considered an important shady walk and cycle trail by the Shire and vegetation within the road reserve is considered as a valuable local ecological link.</p>
Conservation areas	<p>The closest conservation area to the application area is Wooditjup National Park located approximately 1.4 kilometres southeast of the application area.</p>
Vegetation description	<p>A vegetation survey (Ecosystem Solutions, 2021) indicates the vegetation within the proposed clearing area consists of two vegetation communities:</p> <ul style="list-style-type: none"> Vegetation Community A – <i>Corymbia calophylla</i> open woodland over <i>Agonis flexuosa</i> and <i>Corymbia calophylla</i> low open forest over <i>Agonis flexuosa</i>, <i>Hovea elliptica</i> and <i>Hakea amplexicaulis</i> tall open shrubland over <i>Acacia myrtifolia</i>, <i>Taxandria linearifolia</i> and <i>Agonis flexuosa</i> shrubland over <i>Taxandria linearifolia</i>, <i>Acacia myrtifolia</i> and <i>Hibbertia hypericoides</i> low open shrubland over <i>Loxocarya cinerea</i> sedgeland Vegetation Community B – <i>Corymbia calophylla</i> scattered trees over <i>Melaleuca viminea</i>, <i>Taxandria linearifolia</i> and <i>Agonis flexuosa</i> tall, closed scrub over <i>Leptocarpus sp.</i> sedgeland. <p>The full survey descriptions and maps are available in 0</p> <p>This is inconsistent with the mapped vegetation type(s):</p> <ul style="list-style-type: none"> Cowaramup, Cw1, which is described as a Mixture of open forest to woodland of <i>Eucalyptus diversicolor-Corymbia calophylla</i> and woodland of <i>Eucalyptus marginata subsp. marginata -Corymbia calophylla</i> on slopes and low woodland of <i>Melaleuca preissiana-Banksia littoralis</i> on depressions in the hyperhumid zone (Mattiske and Havel, 1998) <p>The mapped vegetation type retains approximately 34 per cent of the original extent (Government of Western Australia, 2019).</p>
Vegetation condition	<p>The vegetation survey (Ecosystem Solutions, 2021) indicates the vegetation condition within the majority of the site to be Degraded or Completely Degraded (Keighery, 1994), having been parkland cleared and lacking in native understorey species. The wetter areas of the site have regenerated well over the last decade and are of Good and Very Good condition (Keighery, 1994), with weeds being the biggest disturbance within these areas. The full Keighery (1994) condition rating scale is provided in Appendix D. The full survey descriptions and mapping are available in 0.</p>
Climate and landform	<p>The site sits at approximately 80m AHD and slopes gently down to Darch Brook, which runs along the eastern boundary of the site. The annual average rainfall is estimated to be 951 millimetres as taken from Witchcliffe.</p>

Characteristic	Details																																
Soil description	The soil is mapped as Cowaramup Uplands System (216Co) - Lateritic plateau, in the Leeuwin Zone. Sandy gravel, loamy gravel and grey sandy duplex. Jarrah-marri forest. Soil systems are further divided into mapping units. The soils within the Site are identified as: <ul style="list-style-type: none"> • Cowaramup wet vales Phase - 216CoCOvw - Small, broad U-shaped drainage depressions with swampy floors. Gravelly duplex (Forest Grove) soils on sideslopes and poorly drained alluvial soils on valley floor. 																																
Land degradation risk	<table border="1"> <thead> <tr> <th>RISK</th> <th>LIKELIHOOD</th> <th>DESCRIPTION</th> <th>RISK LEVEL</th> </tr> </thead> <tbody> <tr> <td>Water Erosion</td> <td>M1</td> <td>10-30% of map unit has a high to extreme water erosion risk</td> <td>Low</td> </tr> <tr> <td>Wind Erosion</td> <td>H1</td> <td>50-70% of map unit has a moderate to very high waterlogging risk</td> <td>High</td> </tr> <tr> <td>Salinity</td> <td>L1</td> <td><3% of map unit has a moderate to high salinity risk or is presently saline</td> <td>Low</td> </tr> <tr> <td>Flood</td> <td>M1</td> <td>10-30% of the map unit has a moderate to high flood risk</td> <td>Low</td> </tr> <tr> <td>Waterlogging</td> <td>H1</td> <td>50-70% of map unit has a moderate to very high waterlogging risk</td> <td>High</td> </tr> <tr> <td>Subsurface Acidification</td> <td>H2</td> <td>>70% of map unit has a high subsurface acidification risk or is presently acid</td> <td>High</td> </tr> <tr> <td>Phosphorus Export</td> <td>M2</td> <td>30-50% of map unit has a high to extreme phosphorus export risk</td> <td>Moderate</td> </tr> </tbody> </table>	RISK	LIKELIHOOD	DESCRIPTION	RISK LEVEL	Water Erosion	M1	10-30% of map unit has a high to extreme water erosion risk	Low	Wind Erosion	H1	50-70% of map unit has a moderate to very high waterlogging risk	High	Salinity	L1	<3% of map unit has a moderate to high salinity risk or is presently saline	Low	Flood	M1	10-30% of the map unit has a moderate to high flood risk	Low	Waterlogging	H1	50-70% of map unit has a moderate to very high waterlogging risk	High	Subsurface Acidification	H2	>70% of map unit has a high subsurface acidification risk or is presently acid	High	Phosphorus Export	M2	30-50% of map unit has a high to extreme phosphorus export risk	Moderate
RISK	LIKELIHOOD	DESCRIPTION	RISK LEVEL																														
Water Erosion	M1	10-30% of map unit has a high to extreme water erosion risk	Low																														
Wind Erosion	H1	50-70% of map unit has a moderate to very high waterlogging risk	High																														
Salinity	L1	<3% of map unit has a moderate to high salinity risk or is presently saline	Low																														
Flood	M1	10-30% of the map unit has a moderate to high flood risk	Low																														
Waterlogging	H1	50-70% of map unit has a moderate to very high waterlogging risk	High																														
Subsurface Acidification	H2	>70% of map unit has a high subsurface acidification risk or is presently acid	High																														
Phosphorus Export	M2	30-50% of map unit has a high to extreme phosphorus export risk	Moderate																														
Waterbodies	The desktop assessment and aerial imagery indicated that one minor, non-perennial watercourse, Darch Brook and its tributary in the Margaret River catchment, transect the area proposed to be cleared.																																
Hydrogeography	The application area is within the Busselton-Capel Groundwater Area as proclaimed under the <i>RIWI Act 1914</i> .																																
Flora	According to available databases, there are records of 20 conservation significant flora species within the local area. Of these, three species are Priority 1 (P1), two are P2, nine are P3, three are P4 and three are threatened species. The spring vegetation and flora survey identified no Threatened or Priority flora within the site (Ecosystem Solutions, 2021).																																
Ecological communities	The closest ecological community of conservation significance to the application area is the State listed Priority 2 <i>Melaleuca lanceolata</i> forests, Leeuwin Naturaliste Ridge PEC, located approximately 8.6 kilometres west of the application area.																																
Fauna	According to available databases, 34 conservation significant fauna species have been recorded within the local area. The closest record to the application area is a Baudin's Cockatoo (<i>Calyptorhynchus baudinii</i>). This species has been recorded 520 times within the local 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
IBRA bioregion*					
Warren*	833,985.56	659,432.21	79.07	558,485.38	66.97
Vegetation complex					
Cowaramup, Cw1**	6,144.37	1,726.07	28.09	592.86	9.65
Local area					
10km radius	32,489.80	14,108.83	43.43	-	-

	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
--	--------------------------	---------------------	----------------------	--	--

*Government of Western Australia (2019a)

**Government of Western Australia (2019b)

B.3. Fauna analysis table

Species name	Conservation status	Suitable habitat features? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Are surveys adequate to identify? [Y, N, N/A]
<i>Calyptorhynchus banksii naso</i> (forest red-tailed black cockatoo)	VU	Y	1.21	12	Y
<i>Calyptorhynchus baudinii</i> (Baudin's cockatoo)	EN	Y	0.62	520	Y
<i>Calyptorhynchus latirostris</i> (Carnaby's cockatoo)	EN	Y	0.82	121	Y
<i>Calyptorhynchus</i> sp. 'white-tailed black cockatoo' (white-tailed black cockatoo)	EN	Y	1.70	88	Y
<i>Falco peregrinus</i> (Peregrine falcon)	OS	Y	2.58	5	Y
<i>Hydromys chrysogaster</i> (Water-rat, rakali)	P4	Y	1.97	13	Y
<i>Isodon fusciventer</i> (Quenda, southwestern brown bandicoot)	P4	Y	0.75	98	Y
<i>Phascogale tapoatafa wambenger</i> (South-western brush-tailed phascogale, wambenger)	CD	Y	0.72	91	Y
<i>Pseudocheirus occidentalis</i> (western ringtail possum, ngwayir)	CR	Y	0.76	432	Y
<i>Tyto novaehollandiae novaehollandiae</i> (masked owl (southwest))	P3	Y	2.64	3	Y

Appendix C. Assessment against the clearing principles

Assessment against the clearing principles	Variance level	Is further consideration required?
Environmental value: biological values		
<p>Principle (a): <i>“Native vegetation should not be cleared if it comprises a high level of biodiversity.”</i></p> <p>Assessment: The proposed clearing area is not likely to contain locally or regionally significant flora or assemblages of plants. The application area:</p> <ul style="list-style-type: none"> • contains two vegetation communities, ranging in condition from Degraded to Very Good (Keighery, 1994) • provides habitat for conservation significant fauna, however, this habitat is not assessed as being significant in the local context • does not comprise of threatened or priority flora; and • does not contain native vegetation which represents a TEC or PEC. <p>Consequently, the native vegetation proposed to be cleared is not considered to have high biodiversity values.</p>	Not likely to be at variance	Yes <i>Refer to Section 3.2.1, above.</i>
<p>Principle (b): <i>“Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna.”</i></p> <p>Assessment: The proposed clearing area provides habitat for conservation significant fauna. Noting the extent and comparative condition of native vegetation within the local area relative to the extent of vegetation proposed to be cleared, these species are not considered to be solely reliant on the proposed clearing area for food resources or habitat. The significance of potential black cockatoo breeding habitat within the application area will be confirmed through the pre-clearing inspection of habitat trees.</p>	May be at variance	Yes <i>Refer to Section 3.2.1, above.</i>
<p>Principle (c): <i>“Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora.”</i></p> <p>Assessment: No threatened flora species listed under the BC Act were recorded within the proposed clearing area (Ecosystem Solutions, 2021).</p>	Not likely to be at variance	No
<p>Principle (d): <i>“Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community.”</i></p> <p>Assessment: No Threatened Ecological Communities (TECs) listed under the BC Act or the EPBC Act have been mapped within eight kilometres of the application area (Appendix B1). The vegetation over the application area does not align with any known TECs.</p>	Not likely to be at variance	No
Environmental value: significant remnant vegetation and conservation areas		
<p>Principle (e): <i>“Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.”</i></p> <p>Assessment: The national objectives and targets for biodiversity conservation in Australia has a target to prevent the clearance of ecological communities with an extent below 30 per cent of that present prior to the year 1750, below which species loss appears to accelerate exponentially at an ecosystem level (Commonwealth of Australia 2001).</p>	Not likely to be at variance	No

Assessment against the clearing principles	Variance level	Is further consideration required?
The extent of native vegetation in the local area is consistent with the national objectives and targets for biodiversity conservation in Australia. The vegetation proposed to be cleared is not considered to be part of a significant ecological linkage in the local area.		
<p><u>Principle (h):</u> “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.”</p> <p><u>Assessment:</u> Given the distance to the nearest conservation area, the proposed clearing is not likely to have an impact on the environmental values of any nearby conservation areas.</p>	Not likely to be at variance	No
Environmental value: land and water resources		
<p><u>Principle (f):</u> “Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.”</p> <p><u>Assessment:</u> Given watercourses are within the application area, the proposed clearing may impact on- or off-site hydrology and water quality.</p>	At variance	Yes <i>Refer to Section 3.2.2, above.</i>
<p><u>Principle (g):</u> “Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.”</p> <p><u>Assessment:</u> The mapped soils highly susceptible to subsurface acidification, moderately susceptible to wind erosion, waterlogging and phosphorus export risk. Noting the extent of the application area and the purpose of the clearing, the proposed clearing is not likely to have an appreciable impact on land degradation but may have temporary impacts.</p>	Not likely to be at variance	Yes <i>Refer to Section 3.2.2, above.</i>
<p><u>Principle (i):</u> “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.”</p> <p><u>Assessment:</u> Given the minor watercourses recorded within the application area, the proposed clearing may impact surface or ground water quality.</p>	May be at variance	Yes <i>Refer to Section 3.2.2, above.</i>
<p><u>Principle (j):</u> “Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.”</p> <p><u>Assessment:</u> The mapped soils and topographic contours in the surrounding area do not indicate the proposed clearing is likely to contribute to increased incidence or intensity of flooding. The application area is located outside of any recognised floodplain areas (DWER-020).</p>	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.
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. Biological survey information excerpts

A flora and fauna significance assessment was undertaken by Ecosystem Solutions for the Brookfield sewer extension clearing area in October 2021 (Ecosystem Solutions, 2021). This assessment identified the presence and distribution of flora and fauna on site and assessed its vegetation values. Conservation significant flora, vegetation and fauna species were assessed, including an assessment against the Commonwealth's significant impact guidelines for black cockatoos and western ringtail possum.

No Threatened flora species listed under the *Biodiversity Conservation Act 2016* (BC Act), or the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), were recorded. No Department of Biodiversity, Conservation and Attractions (DBCA) listed Priority flora species were recorded.

Two vegetation communities were described and mapped within the Brookfield sewer extension clearing area:

- Vegetation Community A – *Corymbia calophylla* open woodland over *Agonis flexuosa* and *Corymbia calophylla* low open forest over *Agonis flexuosa*, *Hovea elliptica* and *Hakea amplexicaulis* tall open shrubland over *Acacia myrtifolia*, *Taxandria linearifolia* and *Agonis flexuosa* shrubland over *Taxandria linearifolia*, *Acacia myrtifolia* and *Hibbertia hypericoides* low open shrubland over *Loxocarya cinerea* sedgeland
- Vegetation Community B – *Corymbia calophylla* scattered trees over *Melaleuca viminea*, *Taxandria linearifolia* and *Agonis flexuosa* tall, closed scrub over *Leptocarpus* sp. sedgeland.

The majority of the native vegetation to be cleared is classified as Degraded, with smaller areas of Good to Very Good condition vegetation found in the wetter areas of Darch Brook and its tributary.

The recorded vegetation communities did not have the characteristics of any Threatened Ecological Communities (TECs), as listed under the BC Act or the EPBC Act, or DBCA listed Priority Ecological Communities (PECs).





The Brookfield Sewer extent of works is within the area of modelled distribution of Black Cockatoo and Western Ringtail Possum species. The site has been surveyed using the recommended methods from relevant guidelines.

A total of four trees with a DBH over 500 mm were observed within, or immediately adjacent to the site, one with observed hollows and two with potential hollows. No Black Cockatoos or signs of foraging, nesting or roosting were evident at the time of survey, however, they were heard to the north of the site.

Three Western Ringtail Possums (WRP) were observed over the surveys, along with one Quenda and Quenda diggings. A fauna spotter should be used to monitor any vegetation removal, to ensure no fauna, particularly Western Ringtail Possum are present, at the time of any vegetation clearing. While no other animals of significance were observed, either directly or through signs, the lack of this data should not be taken directly as an indication that those species are absent from the site. No trapping or seasonal sampling was conducted. A referral under the EPBC Act is not considered required as this action is unlikely to significantly impact on the species or local populations.

Appendix F. Sources of information

F.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)
- 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)

F.2. References

Brookfield Estate Pty Ltd (2021) *Clearing permit application CPS 9483/1*, received 9 November 2021 (DWER Ref: DWERDT525015).

Commonwealth of Australia (2001) *National Objectives and Targets for Biodiversity Conservation 2001-2005*, Canberra.

Department of Environment Regulation (DER) (2013). *A guide to the assessment of applications to clear native vegetation*. Perth. Available from: https://www.der.wa.gov.au/images/documents/your-environment/native-vegetation/Guidelines/Guide2_assessment_native_veg.pdf.

Department of Primary Industries and Regional Development (DPIRD) (2019). *NRInfo Digital Mapping. Department of Primary Industries and Regional Development*. Government of Western Australia. URL: <https://maps.agric.wa.gov.au/nrm-info/> (accessed January 2022).

Department of Water and Environmental Regulation (DWER) (2019). *Procedure: Native vegetation clearing permits*. Joondalup. Available from: https://dwer.wa.gov.au/sites/default/files/Procedure_Native_vegetation_clearing_permits_v1.PDF.

Ecosystem solutions (2021) *Flora & Fauna Significance Assessment Brookfield Estate, Margaret River, October 2021* (DWER Ref: A2068748).

Environmental Protection Authority (EPA) (2016). *Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment*. Available from: http://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/EPA%20Technical%20Guidance%20-%20Flora%20and%20Vegetation%20survey_Dec13.pdf.

Environmental Protection Authority (EPA) (2016). *Technical Guidance – Terrestrial Fauna Surveys*. Available from: https://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/Tech%20guidance-%20Terrestrial%20Fauna%20Surveys-Dec-2016.pdf.

Environmental Protection Authority (EPA). (2019). EPA Technical Report: Carnaby's Cockatoo in Environmental Impact Assessment in the Perth and Peel Region. Advice of the Environmental Protection Authority under Section 16(j) of the *Environmental Protection Act 1986*.

- Government of Western Australia (2019) *2018 South West Vegetation Complex Statistics. Current as of March 2019*. WA Department of Biodiversity, Conservation and Attractions, Perth, <https://catalogue.data.wa.gov.au/dataset/dbca>
- Government of Western Australia. (2019) *2018 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of March 2019*. WA Department of Biodiversity, Conservation and Attractions. <https://catalogue.data.wa.gov.au/dataset/dbca-statewide-vegetation-statistics>
- Hedde, E. M., Loneragan, O. W., and Havel, J. J. (1980) *Vegetation Complexes of the Darling System, Western Australia*. In Department of Conservation and Environment, Atlas of Natural Resources, Darling System, Western Australia.
- Keighery, B.J. (1994) *Bushland Plant Survey: A Guide to Plant Community Survey for the Community*. Wildflower Society of WA (Inc). Nedlands, Western Australia.
- Mattiske, E.M. and Havel, J.J. (1998) *Vegetation Complexes of the South-west Forest Region of Western Australia*. Maps and report prepared as part of the Regional Forest Agreement, Western Australia for the Department of Conservation and Land Management and Environment Australia.
- Molloy, S., Wood, J., Hall, S., Wallrodt, S. and Whisson, G. (2009) *South West Regional Ecological Linkages Technical Report*, Western Australian Local Government Association and Department of Environment and Conservation, Perth.
- Northcote, K. H. with Beckmann G G, Bettenay E., Churchward H. M., van Dijk D. C., Dimmock G. M., Hubble G. D., Isbell R. F., McArthur W. M., Murtha G. G., Nicolls K. D., Paton T. R., Thompson C. H., Webb A. A. and Wright M. J. (1960-68) *Atlas of Australian Soils*, Sheets 1 to 10, with explanatory data. CSIRO and Melbourne University Press: Melbourne.
- RPS AAP Consulting Pty Ltd (2021) *Supporting information for clearing permit application CPS 9483/1*, received 19 January 2022 (DWER Ref: DWERDT559076).
- RPS AAP Consulting Pty Ltd (2021) *Supporting information for clearing permit application CPS 9483/1*, received 2 February 2022 (DWER Ref: DWERDT559088).
- RPS AAP Consulting Pty Ltd (2021) *Supporting information for clearing permit application CPS 9483/1*, received 7 February 2022 (DWER Ref: DWERDT563378).
- Schoknecht, N., Tille, P. and Purdie, B. (2004) *Soil-landscape mapping in South-Western Australia – Overview of Methodology and outputs* Resource Management Technical Report No. 280. Department of Agriculture.
- Shah, B. (2006) *Conservation of Carnaby's Black-Cockatoo on the Swan Coastal Plain, Western Australia*. December 2006. Carnaby's Black-Cockatoo Recovery Project. Birds Australia, Western Australia.
- Shepherd, D.P., Beeston, G.R. and Hopkins, A.J.M. (2001) *Native Vegetation in Western Australia, Extent, Type and Status*. Resource Management Technical Report 249. Department of Agriculture, Western Australia.
- Shire of Augusta- Margaret River (2021) *Advice for clearing permit application CPS 9483/1*, received 23 December 2021 (DWER Ref: DWERDT543338).
- Trudgen, M.E. (1991) *Vegetation condition scale* in National Trust (WA) 1993 Urban Bushland Policy. National Trust of Australia (WA), Wildflower Society of WA (Inc.), and the Tree Society (Inc.), Perth.
- Valentine, L.E. and Stock, W. (2008) *Food Resources of Carnaby's Black Cockatoo (Calyptorhynchus latirostris) in the Gnaragara Sustainability Strategy Study Area*. Edith Cowan University and Department of Environment and Conservation. December 2008.
- Western Australian Herbarium (1998-). *FloraBase - the Western Australian Flora*. Department of Biodiversity, Conservation and Attractions, Western Australia. <https://florabase.dpaw.wa.gov.au/> (Accessed 25 November 2021)