GOVERNMENT OF
WESTERN AUSTRALIA

CLEARING PERMIT

Granted under section 51E of the Environmental Protection Act 1986

ADVICE NOTE

Allocation of offset site

In relation to condition 6 and 7 of this Permit, it is noted that a combined 12.8 hectares of Lot 75 on Diagram 98087, Yelverton, will be attributed to the offset for this project. The nominated 12.8 hectare areas contain habitat for western ringtail possum and black cockatoo species and vegetation that is a significant remnant within an extensively cleared landscape, in addition to other environmental values.

PERMIT DETAILS

Area Permit Number:	CPS 8863/1
File Number:	DWERVT5616
Duration of Permit:	From 23 July 2023 to 23 July 2038

PERMIT HOLDER

Staunton Development Pty Ltd

LAND ON WHICH CLEARING IS TO BE DONE

Lot 75 on Diagram 98087, Yelverton

AUTHORISED ACTIVITY

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

CONDITIONS

1. Period during which clearing is authorised

The permit holder must not clear any *native vegetation* after 23 July 2028.

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

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

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

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

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

3. Weed and dieback management

When undertaking any clearing authorised under this permit, the permit holder must take measures to minimise the risk of introduction and spread of *weeds* and *dieback*, as outlined in the 'Proposed sand excavation closure and rehabilitation plan, Lot 75 (157) Haag Road, Yelverton' dated October 2021, including but not limited to the following actions:

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

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

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

4. Directional clearing

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

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

(a) In relation to the area cross-hatched yellow in Figure 1 of Schedule 1, the permit holder must engage a *fauna specialist* to inspect that area, including all trees and tree hollows present, within 24 hours prior to, and for the duration of clearing, for the presence of western ringtail possum(s) (*Pseudocheirus occidentali*s) and southwestern brush-tailed phascogale(s) (*Phascogale tapoatafa*).

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

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

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

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

(d) Any southwestern brush-tailed phascogale(s) individuals removed in accordance with condition 5(b)(ii) must be allowed to disperse into adjacent *native vegetation* or must be relocated by a *fauna specialist* to *suitable habitat.*

(e) Where fauna is identified under condition 5(a), the permit holder must, within two months of undertaking the inspection, provide the following records to the *CEO*:

  (i) the number of individuals identified;

(ii) the date each individual was identified;
(iii) the location where each individual was identified recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 2020 (GDA2020), expressing the geographical coordinates in Eastings and Northings or decimal degrees;
(iv) the number of individuals removed and relocated;
(v) the relevant qualifications of the *fauna specialist* undertaking the inspection and/or the *western ringtail possum specialist* undertaking removal and relocation;
(vi) the date each individual was removed;
(vii) the method of removal;
(viii) the date each individual was relocated;
(ix) the location where each individual was relocated to, recorded using a GPS unit set to GDA2020, expressing the geographical coordinates in Eastings and Northings or decimal degrees; and
(x) details pertaining to the circumstances of any death of, or injury sustained by, an individual.

6. Offsets – conservation covenant

Prior to undertaking any clearing authorised under this permit, and no later than one year after permit issued, the permit holder shall:
(a) give a conservation covenant under section 30B of the *Soil and Land Conservation Act 1945* setting aside the areas hatched red in Figure 2 of Schedule 1, for the protection and management of vegetation in perpetuity; and
(b) provide to the *CEO* a copy of the executed conservation covenant.

7. Offset - revegetation

Within 12 months of undertaking clearing authorised under this permit, and no later than one year after permit issued, for the areas hatched orange in Figure 3 of Schedule 1, the permit holder must implement and adhere to the 'Proposed sand excavation closure and rehabilitation plan, Lot 75 (157) Haag Road, Yelverton' dated October 2021, including but not limited to the following actions:
(a) commence *revegetation* and *rehabilitation* by;
(i) deliberately *planting* and/or *direct seeding* native vegetation, of which provides:
i. species which provide suitable foraging habitat for *black cockatoo species,*
ii. species which provide suitable habitat for western ringtail possums; and
(ii) ensuring only *local provenance* seeds and propagating material are used to *revegetate* and *rehabilitate*.
(b) establish 10 x 10 metre quadrat monitoring sites as specified in the attached Schedule 2;
(c) temporarily fence the area until completion criteria have been met and maintained for two years;
(d) undertake *weed* control activities prior to *planting*, and annually thereafter until completion criteria have been met and maintained for two years;

(e) achieve the completion criteria specified in the attached Schedule 2 after a five year monitoring period for areas *revegetated* and *rehabilitate*d under this condition;

(f) undertake remedial actions for areas *revegetated* and *rehabilitated*, where monitoring indicates that *revegetation/rehabilitation* has not met the completion criteria outlined in condition 7(e) of this permit, including;

(i) *revegetate/rehabilitate* the area by deliberately *planting* and/or *direct seeding native vegetation* that will result in the minimum completion criteria detailed in the completion criteria specified in the attached Schedule 2 and ensuring only *local provenance* seeds and propagating material are used;

(ii) additional *weed* control activities; and

(iii) annual monitoring of the *revegetated* and *rehabilitated* areas by an *environmental specialist*, until the completion criteria, specified in the attached Schedule 2 are met.

8. Revegetation - mitigation

Immediately after the cessation of extraction activities, and no later than six years after permit grant date, for the area hatched yellow in Figure 1 of Schedule 1, the permit holder must implement and adhere to the ‘‘Proposed sand excavation closure and rehabilitation plan, Lot 75 (157) Haag Road, Yelverton’ dated October 2021, including but not limited to the following actions:

(a) commence *revegetation* and *rehabilitation* by;

(i) ripping the ground on the contour to remove soil compaction;

(ii) deliberately *planting* and/or *direct seeding* native vegetation, of which provides:

i. species which provide suitable foraging habitat for *black cockatoo species,*

ii. species which provide suitable habitat for western ringtail possums; and

(iii) ensuring only *local provenance* seeds and propagating material are used to *revegetate* and *rehabilitate* the area.

(b) establish a minimum of four 10 x 10 metre quadrat monitoring sites;

(c) temporarily fence the area until completion criteria have been met and maintained for two years;

(d) undertake *weed* control activities prior to *planting* or *direct seeding,* and annually thereafter until completion criteria has been met and maintained for two years;

(e) achieve the completion criteria specified in the attached Schedule 2 after a five year monitoring period for areas *revegetated* and *rehabilitate*d;

(f) undertake remedial actions for areas *revegetated* and *rehabilitated* under condition 8 of this permit, where monitoring indicates that *revegetation/rehabilitation* has not met the completion criteria, outlined in condition 8(e) of this permit, including;

(i) *revegetate* the area by deliberately *planting* and/or *direct seeding native vegetation* that will result in the minimum targets detailed in the completion criteria specified in the attached Schedule 2 and ensuring only *local provenance* seeds and propagating material are used

(ii) undertake additional *weed* control activities; and

(iii) annual monitoring of the *revegetated* and *rehabilitated* areas by an *environmental specialist*, until the completion criteria specified in the attached Schedule 2 are met.

9. Records that must be kept

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

Table 1: Records that must be kept

No.	Relevant matter	Specifications
1.	In relation to the authorised clearing activities generally	(a) the species composition, structure, and density of the cleared area; (b) the location where the clearing occurred, recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 2020 (GDA2020), expressing the geographical coordinates in Eastings and Northings; (c) the date that the area was cleared; (d) the size of the area cleared (in hectares); (e) actions taken to avoid, minimise, and reduce the impacts and extent of clearing in accordance with condition 2; (f) actions taken to minimise the risk of the introduction and spread of *weeds* and *dieback* in accordance with condition 3; (g) actions taken in accordance with condition 4; (h) actions taken to manage and mitigate impacts to western ringtail possums and south-west brush-tail phascogales in accordance with condition 5; and (i) actions taken in accordance with condition 6.
2.	In relation to the *revegetation* and *rehabilitation* of areas pursuant to conditions 7 and 8	(a) a description of the *revegetation* and *rehabilitation* activities undertaken; (b) the size of the area *revegetated* and *rehabilitated*; (c) the date/s on which the *revegetation* and *rehabilitation* was undertaken; (d) the boundaries of the area *revegetated* and *rehabilitated* (recorded digitally as a shapefile); and

No.	Relevant matter	Specifications
		(e) other actions taken in accordance with condition 7 and 8.

10. Reporting

(a) The permit holder must provide to the *CEO* the records required under condition 10 of this permit when requested by the *CEO*.

(b) The permit holder must provide to the *CEO*, no later than 90 calendar days prior to the expiry date of the permit, a written report of records required under condition 9, where these records have not already been provided under condition 10(a).

DEFINITIONS

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

Table 2: Definitions

Term	Definition
Black cockatoo species	means one or more of the following species: (a) *Zanda lateriosis* (Carnaby's cockatoo); (b) *Zanda baudinii* (Baudin's cockatoo); and/or (c) *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo).
CEO	Chief Executive Officer of the department responsible for the administration of the clearing provisions under the *Environmental Protection Act 1986*.
clearing	has the meaning given under section 3(1) of the EP Act.
condition	a condition to which this clearing permit is subject under section 51H of the EP Act.
department	means the department established under section 35 of the *Public Sector Management Act 1994* (WA) and designated as responsible for the administration of the EP Act, which includes Part V Division 3.
dieback	means the effect of *Phytophthora* species on native vegetation.
direct seeding	means a method of re-establishing vegetation through the establishment of a seed bed and the introduction of seeds of the desired plant species.
environmental specialist	means a person who holds a tertiary qualification in environmental science or equivalent, and has a minimum of two (2) years work experience relevant to the type of environmental advice that an environmental specialist is required to provide under this permit, or who is approved by the *CEO* as a suitable *environmental specialist*.
EP Act	*Environmental Protection Act 1986* (WA)
fauna specialist	means a person who holds a tertiary qualification specialising in environmental science or equivalent, and has a minimum of 2 years work experience in fauna identification and surveys of fauna native to the region being inspected or surveyed, or who is approved by the

Term	Definition
	CEO as a suitable fauna specialist for the bioregion, and who holds a valid fauna licence issued under the *Biodiversity Conservation Act 2016*.
fill	means material used to increase the ground level, or to fill a depression.
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.
local provenance	means native vegetation seeds and propagating material from natural sources within 50 kilometres and the same IBRA subregion of the area cleared.
planting	means the re-establishment of vegetation by creating soil conditions and planting seedlings of the desired species
revegetate/ed/ing/ion	means actively managing an area containing native vegetation in order to improve the ecological function of that area.
rehabilitate/ed/ing/ion	means the re-establishment of a cover of *local provenance* native vegetation in an area using methods such as natural regeneration, direct seeding and/or *planting*, so that the species composition, structure and density is similar to pre-clearing vegetation types in that area.
suitable habitat (south-western brush-tailed phascogale)	Suitable habitat for southwestern brush-tailed phascogale is typically characterised by dry sclerophyll forests and open woodlands that contain hollow-bearing trees but a sparse ground cover
suitable habitat (western ringtail possum)	means habitat known to support western ringtail possums (*Pseudocheirus occidentalis*) within the known current distribution of the species, typically characterised by abundant foliage, presence of suitable nesting structures such as tree hollows, as well as high canopy cover and continuity. Known habitat includes peppermint (*Agonis flexuosa*) dominated woodlands, jarrah (*Eucalyptus marginata*) and marri (*Corymbia calophylla*) forests, riparian vegetation with a canopy of Bullich (*Eucalyptus megacarpa*) or flooded gum (*Eucalyptus rudis*), karri (*Eucalyptus diversicolor*) forests, sheoak (*Allocasuarina fraseriana*) dominated woodlands, and other stands of myrtaceous trees growing near swamps, watercourses or floodplains.
weeds	means any plant – (a) that is a declared pest under section 22 of the *Biosecurity and Agriculture Management Act 2007*; or (b) published in a Department of Biodiversity, Conservation and Attractions species-led ecological impact and invasiveness ranking summary, regardless of ranking; or (c) not indigenous to the area concerned.
western ringtail possum specialist	means a *fauna specialist* who holds a tertiary qualification specialising in environmental science or equivalent, has a minimum of two years of work experience in western ringtail possum (*Pseudocheirus occidentalis*) identification, surveys of western ringtail possums and capture and handling of western ringtail possums, and holds a valid fauna licence issued under the *Biodiversity Conservation Act 2016*.

END OF CONDITIONS

Mathew Gannaway
A/SENIOR MANAGER
NATIVE VEGETATION REGULATION

Officer delegated under Section 20
of the Environmental Protection Act 1986

29 June 2023

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

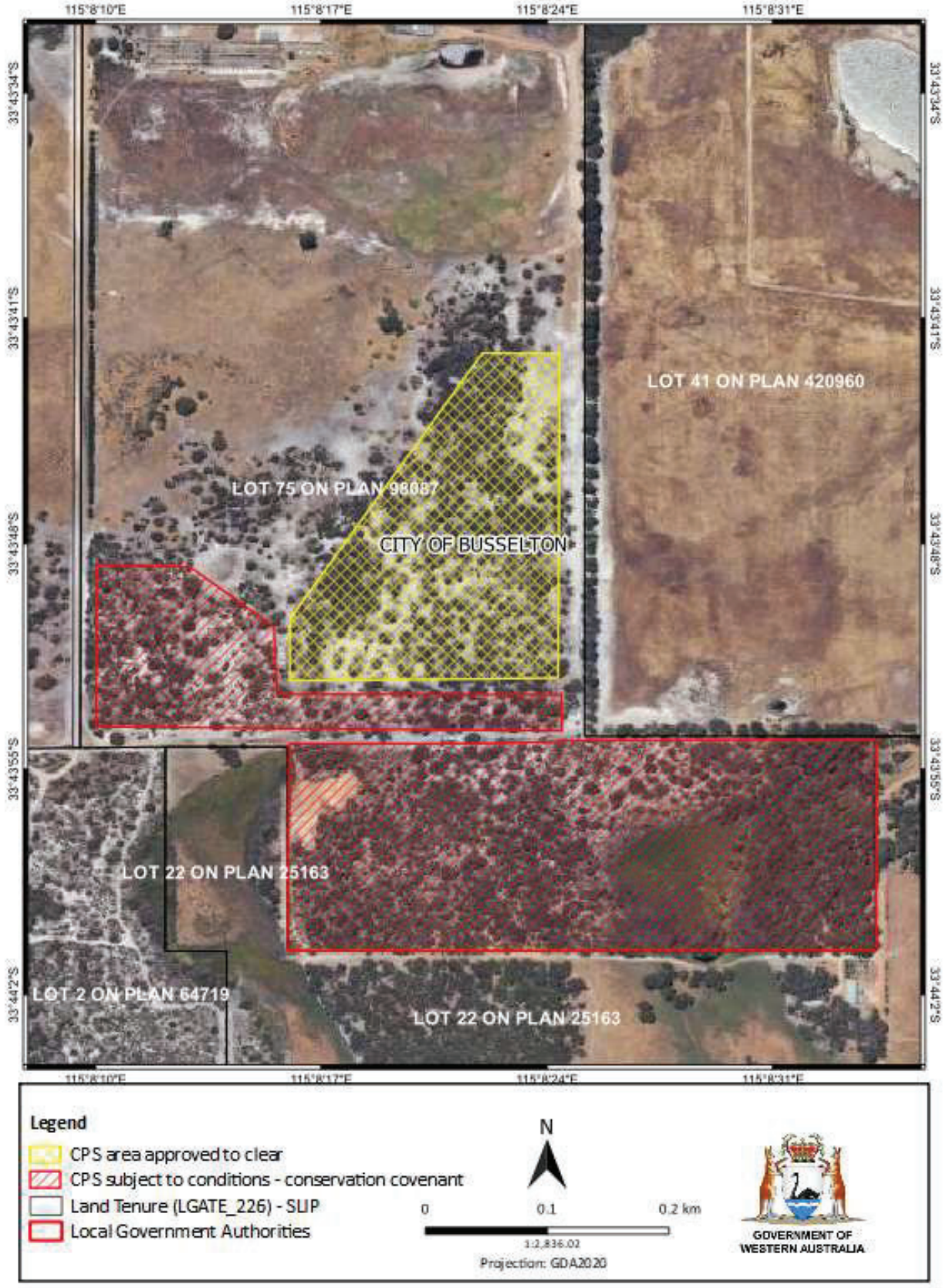


Figure 2: Map of the boundary of the area within which conditions apply

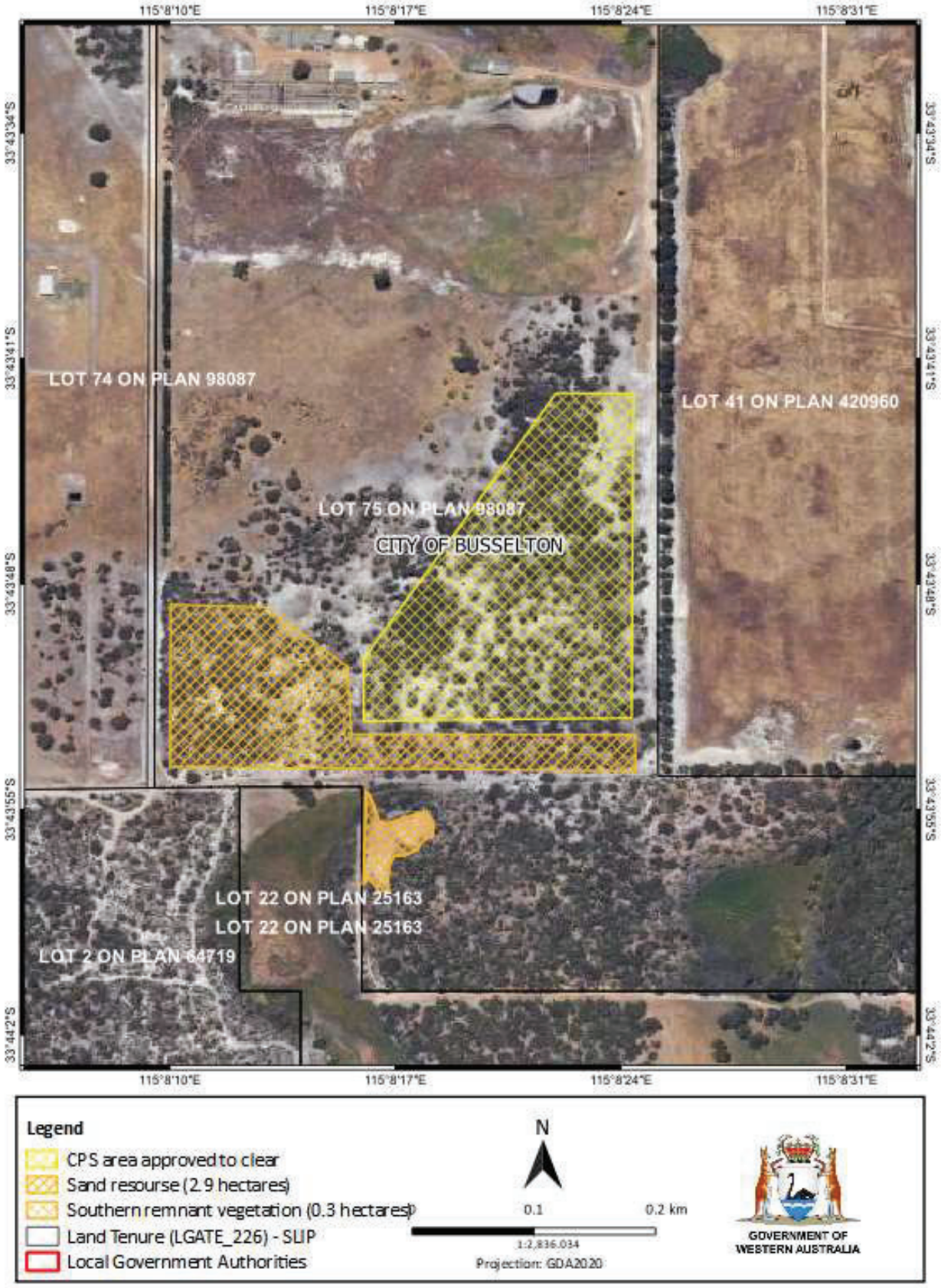


Figure 3: Map of the boundary of the area within which conditions apply

SCHEDULE 2

The revegetation completion criteria are shown in the table below.

Characteristic	Completion targets	Actions and timing	Remediation	Monitoring
Excavation area (5 hectare)				
Species richness	Species richness is 8 species /100 m^2	Year 1 prior to seeding Topsoil and vegetation fragments will be spread Year 1 Autumn Provision of 0.5 kg mixed seed per hectare Year 1 Winter Planting a minimum of 400 tube plants per hectare	Year 2 Winter Providing additional seed and tube plants if required Year 3-4 Winter Providing additional tube plants if required Remediation measures to be repeated until the Completion Criteria has been met for two years	Annual monitoring in Autumn within four 100 m^2 sample plots, combined with annual field monitoring and photographic verification for 5 years or until the completion criteria are met and maintained for 2 years
Species density	Plant density is 1 plant / m^2.			
Vegetation condition	Target vegetation Condition to be "Good" based on Keighery 1994			
Vegetation cover	< 20% bare ground assessed as vegetation cover.			
Weed cover	Weed cover not impacting revegetation, no Declared or "Environmental" weeds and weeds	Providing weed treatment prior to revegetation and for 3 years following completion	Additional weed treatment as necessary	Annually, during Autumn and Spring, for 5 years or until the completion criteria are met and maintained for 2 years
Southern remnant vegetation (0.3 hectares)				
Species richness	Species richness is 12 species /100 m^2.	Year 1 Prior to revegetation Ripping of existing gravel floor if required Year 1 Winter Planting a minimum of 200 tube	Year 2 Winter Providing additional seed and tube plants if required Year 3-4 Winter Providing additional tube	Annual monitoring in Autumn within one 100 m^2 sample plots, combined with annual field monitoring and photographic verification for 5 years or until the

Characteristic	Completion targets	Actions and timing	Remediation	Monitoring
Species density	The proposed plant density is 1 plant / m^2	plants per hectare Year 1 Autumn or Spring Spread of 0.5 kg mixed seed per hectare	plants if required Remediation measures to be repeated until the Completion Criteria has been met for two years	completion criteria are met and maintained for 2 years
Species diversity	Minimum 250 habitat tree species per hectare, *Eucalyptus* spp., *Agonis flexuosa, Nuytsia floribunda and Banksia* spp. at 3 years.			
Vegetation condition	Target vegetation Condition to be "Very Good" based on Keighery 1994 based on Baseline Sample Plots (Stream Environment and Water 2018) located in Vegetation of Very Good Condition			
Vegetation cover	< 20% bare ground assessed as vegetation cover.			
Weed cover	Weed cover; not impacting revegetation, no Declared or "Environmental" weeds and weeds	Providing weed treatment prior to revegetation and for 3 years following completion	Additional weed treatment as necessary	Annually, during Autumn and Spring, for 5 years or until the completion criteria are met and maintained for 2 years
Sand Resource Area (2.9 hectares of infill planting)				
Species richness	The species richness is 12 species /100 m^2	Year 1 Prior to revegetation • Ripping of existing gravel floor if required and, • Topsoil and vegetation fragments will be spread Year 1 Winter • Planting tube plants Year 1 Autumn or Spring	Year 2 Winter Providing additional seed and tube plants as required Year 3-4 Winter Providing additional tube plants if required Remediation measures to be repeated until the Completion Criteria has been met for two	Annual monitoring in Autumn within four 100 m^2 sample plots, combined with annual field monitoring and photographic verification for 5 years or until the completion criteria are met and maintained for 2 years
Species density	The plant density is 1 plant / m^2.			
Species diversity	Minimum 250 habitat tree species per hectare, *Eucalyptus* spp., *Agonis flexuosa, Nuytsia floribunda and Banksia* spp. at 3 years.			

Characteristic	Completion targets	Actions and timing	Remediation	Monitoring
Vegetation condition	Target vegetation Condition to be "Very Good" based on Keighery 1994.	• Spread of mixed seed	years	
Vegetation cover	< 20% bare ground assessed as vegetation cover.			
Weed cover	Weeds at numbers that do not impact revegetation. Absence of Declared Weeds	Providing weed treatment prior to revegetation and for 3 years following completion	Additional weed treatment as necessary	Annually, during Autumn and Spring, for 5 years or until the completion criteria are met and maintained for 2 years

Government of Western Australia
Department of Water and Environmental Regulation

Clearing Permit Decision Report

1 Application details and outcome

1.1. Permit application details

Permit number:	CPS 8863/1
Permit type:	Area permit
Applicant name:	Staunton Development Pty Ltd
Application received:	6 April 2020
Application area:	5 hectares of native vegetation (revised)
Purpose of clearing:	Sand extraction
Method of clearing:	Mechanical removal
Property:	Lot 75 on Diagram 98087
Location (LGA area/s):	City of Busselton
Localities (suburb/s):	Yelverton

1.2. Description of clearing activities

The vegetation applied to be cleared is contained within a single contiguous area within Lot 75 on Diagram 98087 (see Figure 1, Section 1.5). The application is to clear vegetation for the purposes of sand extraction.

1.3. Decision on application

Decision:	Granted
Decision date:	29 June 2023
Decision area:	5 hectares of native vegetation.

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 (the department) advertised the application for 28 days and one submission was received. The application was re-advertised for seven days due to a change in land owner and subsequent permit applicant (Staunton Development Pty Ltd, 2022). No further submissions were received. Consideration of matters raised in the public submission is summarised in 0.

In making this decision, the Delegated Officer had regard for the site characteristics (see 0), relevant datasets (see Appendix H.1) and the findings of biological surveys (see Appendix G), the clearing principles set out in Schedule 5 of the EP Act (see Appendix D), relevant planning instruments and any other matters considered relevant to the assessment (see Section 3). The Delegated Officer also took into consideration the purpose of the clearing is for sand extraction, which is a primary resource within the City of Busselton and is critical to the ongoing development of housing and road construction.

After consideration of the available information, as well as the applicant's minimisation and mitigation measures (see Section 3.1), the Delegated Officer determined the proposed clearing will result in the following significant residual impacts:

- the loss of five hectares of native vegetation that is suitable foraging habitat for Carnaby's black cockatoo and forest red-tailed black cockatoo,
- the loss of five hectares of native vegetation that is suitable habitat for western ringtail possums, and
- the loss of five hectares of vegetation considered significant as a remnant of native vegetation in an area that has been extensively cleared.

In accordance with the Government of Western Australia's *Environmental Offsets Policy and Environmental Offsets Guidelines*, the Delegated Officer determined that the following land acquisition and rehabilitation offsets are required to address the above significant residual impacts:

- Conservation and revegetation of 2.94 hectares of native vegetation within Lot 75 as detailed below:
    - revegetation of native vegetation, from degraded condition to very good condition that is a significant remnant within an extensively cleared landscape, contains black cockatoo foraging habitat, and western ringtail possum habitat.
- Conservation of 9.9 hectares of remnant native vegetation within Lot 75 as detailed below:
    - conservation of native vegetation in very good to degraded/good condition that is a significant remnant within an extensively cleared landscape, contains black cockatoo foraging habitat and western ringtail possum habitat, and
    - rehabilitation of 0.3 hectares of completely degraded vegetation to good condition that is a significant remnant within an extensively cleared landscape, contains black cockatoo foraging habitat and western ringtail possum habitat.

The Delegated Officer determined that the above offset was sufficient to counterbalance the significant residual impacts associated with the proposed clearing. Further information on the suitability of the offsets provided are summarised in Section 4.

The Delegated Officer determined that the proposed clearing may also result in the following impacts:

- risk to surrounding vegetation from the introduction and spread of weeds and dieback, and
- risk of land degradation from minor wind erosion.

The Delegated Officer therefore decided to grant a clearing permit subject to the following conditions, which have been imposed on the clearing permit, to manage and address the impacts of clearing:

- avoid and minimise measures to reduce the impacts and extent of clearing,
- take hygiene steps to minimise the risk of the introduction and spread of weeds and dieback,
- undertake slow, progressive one directional clearing to allow terrestrial fauna to move into adjacent habitat ahead of the clearing activity,
- pre-clearance searches for western ringtail possum and south-west brush tailed phascogale
- revegetation of cleared areas post extraction
- provision of an offset, as outlined above.

Given the above and noting that the offset provided (see Section 4) counterbalances the significant residual impacts, the Delegated Officer determined that the proposed clearing is unlikely to lead to an unacceptable risk to the environment.

1.5. Site map

Figure 1 Map of the application area

The area crosshatched yellow indicates the area authorised to be cleared under the granted clearing permit.

2 Legislative context

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

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

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

Other legislation of relevance for this assessment include:

- *Biodiversity Conservation Act 2016* (WA) (BC Act)
- *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act)
- *Planning and Development Act 2005* (WA) (P&D Act)
- *Rights in Water and Irrigation Act 1914 (WA) (RIWI Act)*

Relevant policies considered during the assessment include:

- *Environmental Offsets Policy* (2011)

The key guidance documents which inform this assessment are:

- *A guide to the assessment of applications to clear native vegetation* (DER, December 2013)
- *Procedure: Native vegetation clearing permits* (DWER, October 2019)
- *Environmental Offsets Guidelines* (August 2014)
- 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

Information was submitted by the applicant, demonstrating that the following avoidance and mitigation measures have been considered:

- The disturbance footprint has been reduced from 11.5 hectares to 5.0 hectares (see Figure 2 below).
- The revised excavation footprint has reduced the impacts to six trees with a diameter greater than 500 mm, of which four contain hollows (unsuitable for black cockatoos).
- The perimeter vegetation and vegetation in the south, which contains feeding habitat for black cockatoos, will be retained.
- During clearing fauna will be captured and relocated.
- All vehicles and equipment to be used during land clearing or land reinstatement, are to be clean and free from soil or plant material when arriving at site.
- Operations will occur on the floor of the pit with the face providing visual and noise screening to the closest residences.

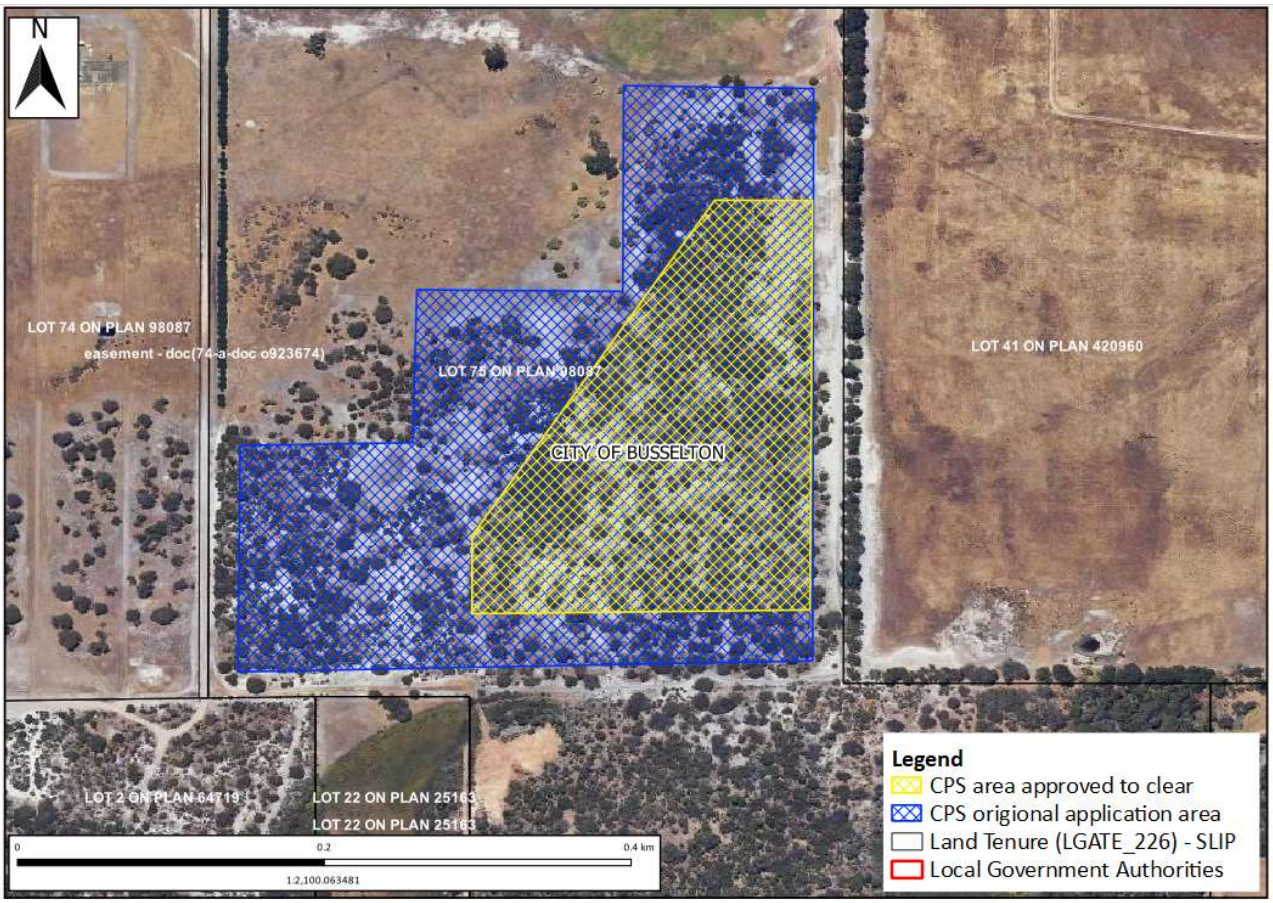


Figure 2. Map of the original application area (11.5 hectares) and the reduced application area (5 hectares)

In addition to the above, the applicant provided a Closure and Rehabilitation Plan (Landform Research, 2021) detailing management measures to minimise risk of environmental damage, including:

- risk assessment criteria,
- management of non-natural materials,
- landform restoration,
- soil reconstruction,
- fauna management:
    - during clearing fauna will be captured and relocated,
    - trees hollows will be salvaged and re-established in secure locations,
- rehabilitation procedures:
    - revegetation will consist of direct transfer of topsoil, brushing with local native plants derived from clearing and as required trees/shrubs installed as tube plants and local provenance seed. The planting rate and seeding is to achieve the completion criteria allowing for deaths to enable achievement of the Completion Criteria. Further details below:

The provisions of the Revegetation Plan are as follows:

- Timeframe:
    - The proposed pit of 5.0 hectares has two stages of 2.0 hectares and a final stage of 1.0 hectare.
    - Stage 1 will be closed at the same time as Stage 2 is being opened and excavated.
- Hygiene:
    - Vegetation and recovered materials will be stored no closer than 50 metres to the lot boundaries
    - Weed management:
        - Inspections are to be conducted to monitor the presence and introduction of Environmental and Declared Weeds on an annual or more frequent basis. On identification, Declared and significant environmental weeds will either be removed, buried, or sprayed with a herbicide.
        - All vehicles and equipment to be used during land clearing or land reinstatement, are to be clean and free from soil or plant material when arriving at site.
        - No soil and vegetation will be brought to the site apart from that to be used in rehabilitation.
        - Plants to be used in rehabilitation are to be free from weeds.

        - Weed affected top soils may need to be taken offsite or will be treated to minimise or mitigate weed spread.
        - Illegally dumped rubbish is the major source of weeds and will be removed promptly.
        - No weed contaminated or suspect soil or plant material is to be brought onto the site.
        - When clearing land for firebreaks, vehicles will work in conjunction with dieback principles and push from areas of better vegetation towards areas of lower quality vegetation.
        - Weeds are to be sprayed with broad spectrum spray prior to planting or seeding in weed affected soils as required.
    - Monitoring and control
        - Review of revegetated areas, annually in Spring – Autumn to determine if there are weeds that are impacting on the success of revegetation.
        - Apply additional weed control in the remnant vegetation, which will include more frequent treatment and monitoring until the weeds are controlled.
        - Ongoing monitoring and treatment twice yearly.
        - In addition; monitor prior to revegetation activities and for a minimum of 3 years post revegetation.
    - Dieback management
        - Vehicles are to be prohibited from entering vegetation ahead of excavation, apart from normal travel along made firebreaks and roads for normal security and maintenance activities.
        - A split operation will be worked where practicable, where the road transport vehicles only access one side of the stockpile or processing area and excavation vehicles operate on the other side of the stockpiles and processing, reducing the risk of contamination from road transport.
        - All vehicles and equipment used during land clearing or land reinstatement, will be clean and free from soil or plant material when arriving at site.
        - When removing topsoil and clearing, vehicles will run around the perimeter and then push inwards where possible.
        - Remnant vegetation ahead of the stage to be excavated is proposed to be quarantined where possible to minimise vehicles from entering, through reduced tracks, signage, site marking and or fencing as appropriate.
        - No soil and vegetation is to be brought to the site apart from that to be used in rehabilitation and that which is dieback free.
        - Plants to be used in rehabilitation are to be certified as from dieback free sources.
        - Rehabilitated surfaces will be free draining and not contain wet or waterlogged conditions.
        - Illegally dumped rubbish is to be removed promptly.
        - When clearing land for firebreaks, vehicles are to work from disturbed areas towards the pit; or, in situations where dieback interpretation is not possible, from areas of higher quality vegetation to areas of lower quality vegetation.
        - Roads are to be maintained as free draining and hard surfaced.
        - Quarry traffic will be restricted to the designated access roads, pit and stockpile areas apart from clearing land and maintaining fire breaks.
- Seed and tube installation:
    - Seeds are to be spread, bulked up with moist vermiculite, and smoke treated where possible. Leguminous seeds are to be scarified.
    - Tube plants are to be placed in low undulations and not on the high points of furrowed soil.
    - Timing:
        - Revegetation will take place during the first winter months following the availability of ground. Rehabilitation of Stage 1 will be commenced during the excavation of Stage 2.
        - Tube planting is to be conducted in winter (June – August). Seeding will take place in summer – autumn or spring.
    - Species
        - Local species *Agonis flexuosa, Eucalyptus marginata, Corymbia calophylla, Eucalyptus patens, Banksia attenuata, Banksia ilicifolia, Banksia grandis* and understorey species are to be used in revegetation because they are the favoured habitat of the western ringtail possum and black cockatoos. These species will be added as tube plants in addition to seed.
- Completion criteria:
    - Species richness is 8 species /100 m^2.
    - Plant density is 1 plant / m^2.
    - Minimum 250 habitat tree species per hectare, *Eucalyptus* spp., *Agonis flexuosa*, *Nuytsia floribunda* and *Banksia* spp., suitable as habitat for Ringtail Possum and Black cockatoos
    - Target vegetation condition to be “good” based on Keighery 1994.

    - < 20% bare ground assessed as vegetation cover.
    - Weed cover; not impacting revegetation, no Declared or “Environmental” weeds
- Monitoring and maintenance:
    - Four 100 m2 sample plots, combined with annual field monitoring and photographic verification for 5 years until the completion criteria are met
    - Review of revegetated areas, annually in Spring – Autumn to determine if there are weeds that are impacting on the success of revegetation.
    - Apply additional weed control in the remnant vegetation, which will include more frequent treatment and monitoring until the weeds are controlled.
    - Ongoing monitoring and treatment twice yearly.
    - In addition; monitor prior to revegetation activities and for a minimum of 3 years post revegetation
- Remediation:
    - If the Completion Criteria is not met or assessed as not likely to be met, additional tube planting and or seeding as required will be used as described above to increase the plant density and species richness and achieve the completion criteria.

After consideration of avoidance and mitigation measures, it was determined that an offset to counterbalance the significant residual impacts to fauna habitat and significant remnant vegetation were necessary. In accordance with the Government of Western Australia’s *Environmental Offsets Policy* and *Environmental Offsets Guidelines*, these significant residual impacts have been addressed through the conditioning of environmental offset requirements on the permit. The nature and suitability of the offsets provided are summarised in Section 4.

3.2. Assessment of impacts on environmental values

In assessing the application, the Delegated Officer has had regard for the site characteristics (see 0) 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 Appendix D) identified that the impacts of the proposed clearing present a risk to fauna habitat, significant remnant vegetation and land 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 (fauna) - Clearing Principle (b)

Assessment

The application area is located within the Swan Coastal Plain IBRA region of WA. According to available databases, 28 conservation significant fauna species have been recorded within the local area (10 kilometre radius of the application area). A number of these records are associated with marine, estuarine or freshwater habitats that do not occur within the application area. In determining the likelihood of conservation significant fauna occurring within the proposed clearing area, consideration was given to the date of each record, results of the preferred habitat types, proximity of records to the application area, and the type and condition of the vegetation within the application area.

From the likelihood assessment, the application area is considered to comprise suitable habitat for six conservation significant fauna species:

- *Zanda latirostris* (Carnaby’s cockatoo), listed as Endangered under the EPBC Act and BC Act;
- *Zanda baudinii* (Baudin’s cockatoo), listed as Endangered under the EPBC Act and BC Act;
- *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo), listed as Vulnerable under the EPBC Act and BC Act;
- *Pseudocheirus occidentalis* (western ringtail possum), listed as Critically Endangered under the EPBC Act and BC Act;
- *Phascogale tapoatafa wambenger* (south-western brush-tailed phascogale), listed as Conservation Dependent under the EPBC Act and BC Act; and
- *Isoodon fusciventer* (quenda), listed by the Department of Biodiversity, Conservation and Attractions (DBCA) as priority 4.

Black cockatoos

The proposed clearing area occurs within the known distribution range of Baudin’s black cockatoo, Carnaby’s cockatoo (non-breeding range) and the forest red-tailed black cockatoo (non-breeding range). Habitat requirements for black cockatoos can be categorised as foraging habitat, breeding habitat and night roosting habitat. The Swan

Coastal Plain is primarily used by black cockatoos for foraging resources, with some remnant vegetation suitable for breeding. Along the Swan Coastal Plain, black cockatoos will commonly use vegetation dominated by *Banksia* spp. and Tuart (*Eucalyptus gomphocephala*) woodlands, as well as Marri (*Corymbia calophylla*), with Jarrah (*E. marginata*) in the east (Commonwealth of Australia, 2022).

Within the proposed clearing area, three vegetation types have been described (Stream, 2018). These consist of, Banksia woodland, Sheoak-Banksia woodland, and Peppermint-Sheoak woodland. Species recorded within these vegetation types include *Banksia* spp., *Allocasuarina* spp., *E. marginata* and *Corymbia calophylla,* providing favoured foraging resources for all three species of black cockatoos (Stream, 2018; DAWE, 2022). A targeted fauna assessment of the application area noted that all vegetation present within the proposed clearing area represents a foraging resource for black cockatoos and evidence of black cockatoo feeding, potentially attributed to all three species of black cockatoo was recorded (Harewood, 2019).

Food resources within the range of breeding sites and roost sites are important to sustain populations, and foraging resources are therefore viewed in the context of known breeding and night roosting sites, particularly within 12 kilometres of an impact area (DAWE, 2022). A review of available desktop data revealed one confirmed forest red-tailed black cockatoo breeding record within 12 kilometres of the application area. The targeted fauna assessment identified 12 significant trees with a diameter at breast height >500 mm, six of which contained possible hollows, however none appeared suitable for black cockatoo breeding (Harewood, 2019).

Suitable black cockatoo roost habitat is generally in or near riparian environments or other permanent water sources. According to available databases, a total of 14 black cockatoo roost sites have been recorded within 12 kilometres of the application area, with the closest recorded 1.28 kilometres south of the proposed clearing area (see Figure 2). Given the application area is within 10 kilometres of known roost sites, and is in close proximity to available water sources, the proposed clearing area is likely to support foraging by roosting individuals.

Connecting patches of vegetation between foraging resources, breeding habitat and night roosting habitat are essential to enable black cockatoos to access resources across their range. Black cockatoos have been significantly impacted by historical clearing of its habitat, resulting in fragmentation of breeding and foraging habitat, loss of breeding hollows, changes in the species distribution, and genetic partitioning (DAWE, 2022). Therefore, remnant patches of vegetation are considered important in maintaining black cockatoo habitat connectivity across the landscape. Given the above, it is considered that the remaining suitable habitat for these species' within its current range is likely to be significant. Specifically, it is considered that the five hectares of foraging habitat within the application area is significant for black cockatoo due to the presence of nearby roost sites, dominance of preferred foraging species and the highly cleared nature of the surrounding local areas.

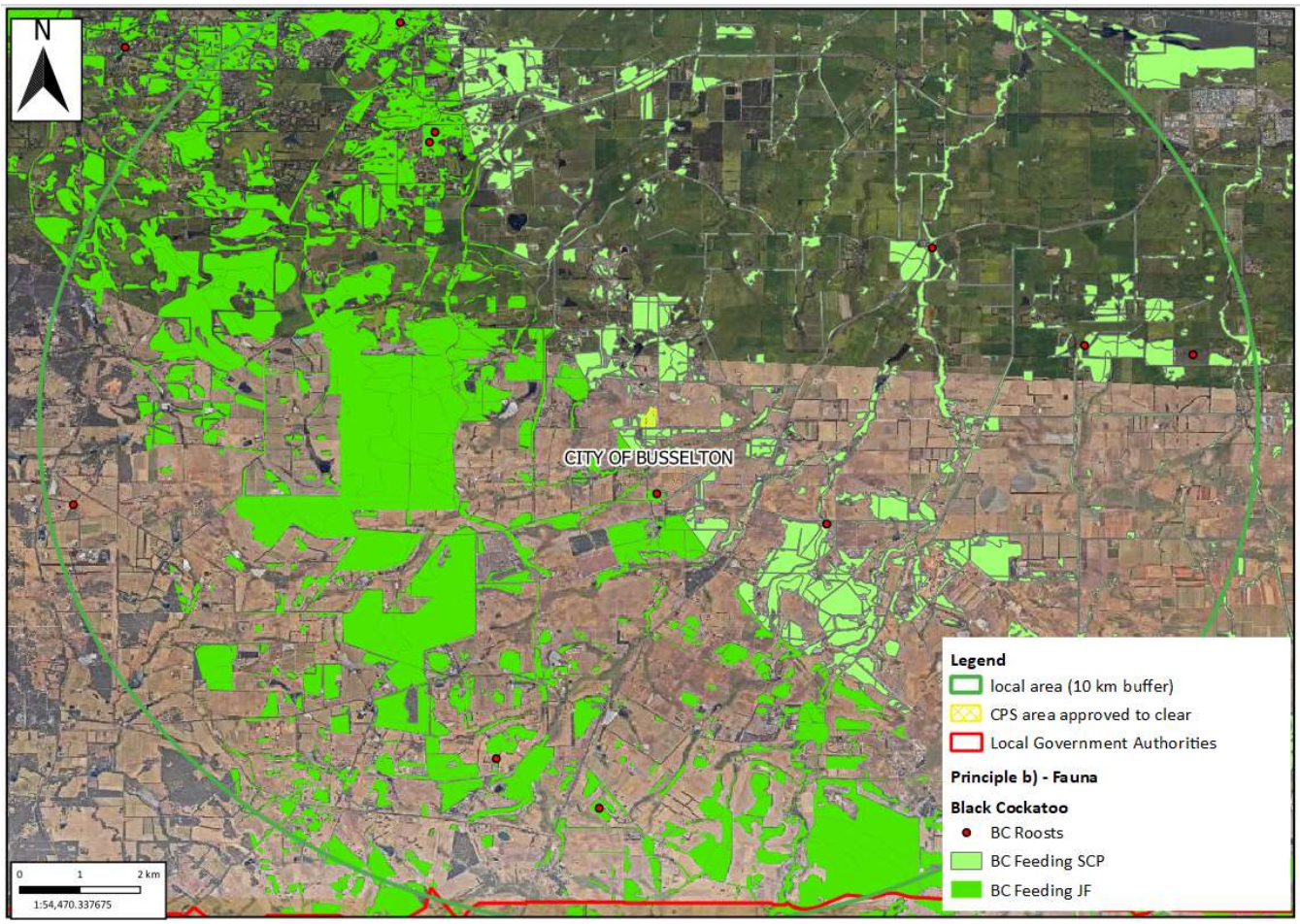


Figure 3. Map of the location of black cockatoo habitat suitability within the application area CPS 8863/1 and surrounds.

Western ringtail possum

Based on available datasets, there are 130 records of western ringtail possum (WRP) within the local area. Of these, five records are within the application area and additional records in adjacent vegetation. These records are based on a fauna survey undertaken in 2013. The application area is within the Swan Coastal Management Zone *Pseudocheirus occidentalis* (western ringtail possum) as described within the 'Western Ringtail Possum Recovery Plan' (DPaW, 2017). The management 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).

Vegetation communities critical to the species includes long unburnt mature remnants of peppermint (*Agonis flexuosa*) woodlands with high canopy continuity and high foliage nutrients; jarrah (*Eucalyptus marginata*)/marri (*Corymbia calophylla*) forests and woodlands with limited anthropogenic disturbance (unlogged or lightly logged, and a low intensity and low frequency fire history), that are intensively fox-baited and have low indices of fragmentation. Any habitat where WRPs occur naturally are considered critical and worthy of protection (DPaW, 2017).

A recent targeted fauna assessment of the application area (Harewood, 2019) did not identify any evidence of WRP utilisation, concluding that WRP are either completely absent from the proposed clearing area or present in such low numbers that they avoided detection. Although WRP presence was not recorded, the report determined that all vegetation within the clearing area likely comprises habitat suitable for the WRP (Harewood, 2019). Based on previous records and suitable habitat within the application area, it is considered that the application area provides suitable habitat for WRP. Pre-clearance surveys for the WRP and slow directional clearing will ensure, if present, no individuals are impacted during clearing.

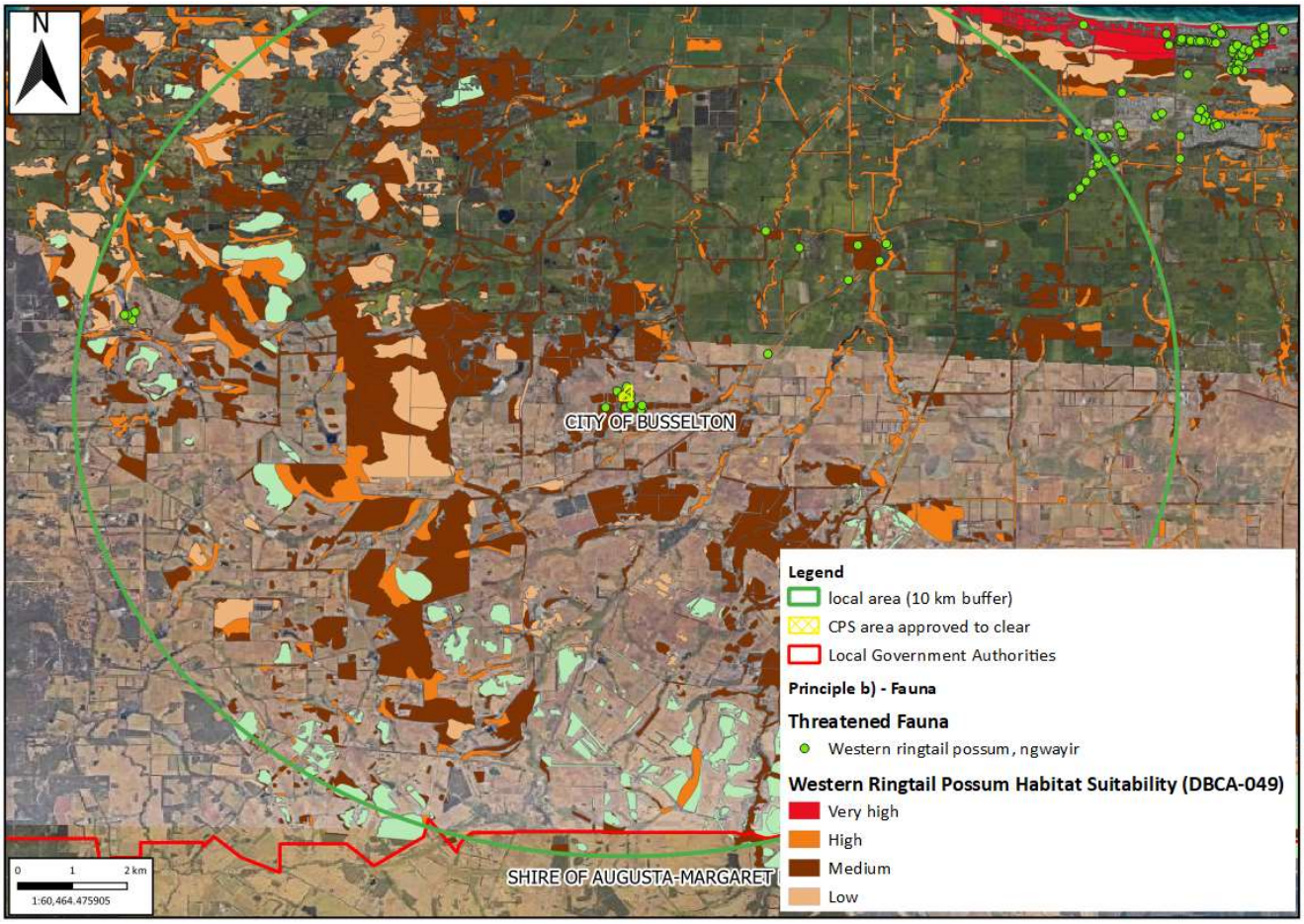


Figure 4. Map of the location of *Pseudocheirus occidentalis* (western ringtail possum) habitat suitability within the application area CPS 8863/1 and surrounds.

South-western brush-tailed phascogale

From a review of the database records and habitat preferences, it was determined during the likelihood analysis that the vegetation type within the application area may provide suitable habitat for *Phascogale tapoatafa wambenger* (south-western brush-tailed phascogale, CD).

The south-western brush-tailed phascogale is an arboreal Dasyurid, associated with dry sclerophyll forests and open woodlands that contain hollow-bearing trees, characterised by high canopy cover and connectivity (DEC, 2012b). Available databases show 38 records within the local area with the closest record 2.16 kilometres form the application area. As discussed above, the application area contains 12 habitat trees with six containing hollows. While these hollows were deemed unsuitable size for use by black cockatoo species it is unclear from the fauna report whether suitability for other fauna species was assessed (Harewood, 2019). In the absence of a targeted survey for South-western brush-tailed phascogale and noting the presence of hollow-bearing jarrah and marri trees, it is considered the application area may provide habitat for this species. However, given the patchy nature of the canopy cover observed from aerial imagery and the site photos provided (Harewood, 2019; Appendix G), it is considered unlikely to provide significant habitat for south-western brush-tailed phascogale.

It is noted that vegetation to the south of the application area contains marri-jarrah woodland in very good condition (Stream, 2018; see Appendix G). It is considered that this area is likely to provide better suited habitat for the south-western brush-tailed phascogale. Given this, the application area may be used for dispersal between patches of remnant vegetation. Pre-clearance surveys for the south-western brush-tailed phascogale and slow directional clearing will ensure, if present, no individuals are impacted during clearing.

Quenda

Quenda are ground-dwelling marsupials, typically associated with forest or woodlands near watercourses, where understorey consists of dense scrub and leaf litter is abundant (DEC, 2012a). According to available databases, a total of 23 records occur within the local area with the closest record 1.92 kilometres from the application area. Given

the application area contains remnant marri (with scattered jarrah) woodland, it is likely to contain suitable habitat for quenda. However, it is acknowledged that the condition of the vegetation within the application area is mostly degraded and is therefore unlikely to provide sufficient understorey cover and leaf litter to comprise preferred habitat for the species. It is also acknowledged that no evidence of individuals was observed within the application area or greater property during the fauna survey (Harewood, 2019). The proposed clearing area is therefore, not considered to contain significant habitat for this species.

Ecological linkage

While the proposed clearing is not within any mapped ecological linkages, noting the extent of clearing in the local area, the vegetation proposed to be cleared may contribute to an ecological linkage function enabling fauna to move between areas of remnant vegetation. As mitigation measures, the applicant has maintained a buffer of vegetation surrounding the application area and the clearing area is proposed to be revegetated once sand extraction is complete (see Section 3.1). Given this, and the condition of the vegetation within the application area, the proposed clearing is not likely to sever an ecological linkage or significantly impact vegetation connectivity and fauna dispersal within the local area.

Conclusion

Based on the above assessment, the proposed clearing will result in the loss of five hectares of significant foraging habitat for black cockatoos and western ringtail possum. For the reasons set out above, it is considered that the impacts of the proposed clearing on black cockatoo foraging habitat and western ringtail possum habitat constitutes a significant residual impact.

The proposed clearing is not likely to impact significant habitat for the remaining conservation significant fauna that have been recorded in the local area. However, individuals may utilise the application area to disperse through the landscape and mechanical clearing activities may pose a risk of fauna fatalities should individuals occur within the application area. Slow, directional clearing to allow for dispersal of species into other areas of remnant vegetation will mitigate this risk.

Conditions

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

- avoidance and minimisation to reduce the impacts and extent of clearing
- undertake progressive directional clearing to allow fauna to move ahead of clearing,
- pre-clearance surveys for fauna species, which requires the inspection of all trees and hollows for the presence of western ringtail possums and south-western brush-tailed phascogale prior to clearing and for clearing to cease where any individuals are identified until the individual has dispersed.
- offsets (as described in Section 4)

3.2.2. Biological values (flora and vegetation) - Clearing Principles (a), (c) and (d)

Assessment

The flora and vegetation assessment mapped three vegetation types within the application area, Banksia woodland, Sheoak-Banksia woodland, and Peppermint-Sheoak woodland (Stream, 2018; Appendix G). The vegetation was mapped as predominantly degraded and completely degraded largely attributed to agricultural development and grazing (Stream, 2018).

Conservation significant flora

According to available databases, 45 conservation significant flora species have been recorded within the local area. A likelihood of occurrence assessment for threatened and priority flora located within the local area was undertaken for the application area. Noting the preferred habitat types, including soil and vegetation types mapped over the application area, the likelihood analysis concluded that the application area may comprise suitable habitat for five conservation significant flora species (Appendix C.C.3).

The flora and vegetation assessment (Stream, 2018) recorded four significant taxa within the survey area (Table 1.), however none of these occur within the proposed clearing area. With reference to a previous survey (Eco Logic

Environmental Services, 2013), Stream Water and Environment note *Hibbertia ferruginea,* a recently recognised taxa, was recorded. This species was not relocated during the recent survey (Stream, 2018) and it is unclear whether the 2013 record was within the proposed clearing area. No priority or threatened flora were recorded within the proposed clearing area during the current survey (Stream, 2018).

Table 1. Significant taxa recorded during the current survey (Stream, 2018)

Taxa	Reason for significance (adapted from Keighery et al 2008)	Community recorded in (see Table 6).
Homalospermum firmum	Disjunct population (West Whicher Scarp), Significant population, uncommon in area, restricted to freshwater seepages.	Wetland Shrubland (HfAf)
Dampiera linearis	Morphological variant, genetic variant.	Jarrah-Marri Woodland (EmCcAf)
Hibbertia acerosa	Disjunct population, Significant population, Uncommon in area.	Jarrah-Marri Woodland (EmCcAf)
Hibbertia ferruginea	Recently recognised taxa, NB population west of Vasse Highway common.	Previously recorded by Eco Logic Environmental Services (2013) in Banksia Woodland (BaBiKg) equivalent.
Hypolaena exsulca	Morphological variant	Marri Forest (CcEmBg) and Wetland Shrubland (HfAf)

Ecological communities

The flora and vegetation survey undertaken in 2018 did not include analysis of floristic community types (Stream, 2018), however 7.3 hectares of the mapped Sheoak-Banksia Woodland (AfBaBi) was inferred to comprise the Banksia Woodlands of the Swan Coastal Plain Threatened Ecological Community (TEC) based on the key diagnostic criteria outlined in the conservation advice (Commonwealth of Australia, 2016). This community is listed as Priority 3 Priority Ecological Community by DBCA and Endangered under the EPBC Act. Based on the patch size and condition of vegetation within the clearing area, it is not considered to meet the criteria of Banksia Woodlands of the Swan Coastal Plain TEC (Commonwealth of Australia, 2016).

The Sheoak-Banksia Woodland (Stream, 2018; Appendix G) within the proposed clearing area was also inferred to comprise the State listed Priority 1 West Whicher Scarp Banksia attenuata woodland (B2) (which is a component of the EPBC listed Banksia Woodland of the Swan Coastal Plain TEC). However, the poor condition of the vegetation and disturbed nature of the understorey in particular, meant that definitive identification of the priority ecological community is difficult. It is noted that this Whicher Scarp vegetation group (B2) is typically species-poor. Vegetation condition associated with this community ranged from completely degraded to degraded/good, with the majority of the vegetation in degraded condition (Stream, 2018).

Considering the condition of the vegetation proposed to be cleared and the proposed mitigation measures proposed by the applicant, including the revegetation of the clearing area post extraction, the impacts to the above communities are not considered to be significant.

Conclusion

Based on the above assessment, the proposed clearing of vegetation in mostly degraded condition is not considered likely to represent significant habitat for any threatened or priority flora species or to be critical for the continuation of these species. For the reasons set out above, it is considered that impacts to vegetation potentially representative of the West Whicher Scarp Banksia attenuata woodland (B2) does not constitute a significant residual impact.

Conditions

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

- take hygiene steps to minimise the risk of the introduction and spread of weeds and dieback

3.2.3. Significant remnant vegetation - Clearing Principle (e)

Assessment

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

At a local scale, the application area is mapped within the Yelverton Uplands vegetation complex, described as: Woodland of *Allocasuarina fraseriana, Eucalyptus marginata* subsp. *marginata, Xylomelum occidentale, Banksia attenuata* on sandy slopes in the humid zone (Webb *et al.* 2016). The Yelverton complex retains 55.71 per cent of its pre-European extent (Commonwealth of Australia, 2019a). The flora and vegetation survey mapped three vegetation types for the proposed clearing area, broadly described as: Banksia woodland, Sheoak-Banksia woodland, and Peppermint-Sheoak woodland. The vegetation ranges from good to completely degraded condition (Keighery, 1994), with a majority recorded in degraded condition. The vegetation proposed to be cleared is considered representative of this complex. The remining extent of the Yelverton complex is consistent with the national targets (Commonwealth of Australia, 2001). However, the extent of native vegetation within the local area (10 kilometres form the application area) retains approximately 23.4 per cent native vegetation cover and is inconsistent with the national targets (Commonwealth of Australia, 2001).

As mentioned above (section 3.2.1), the application area contains foraging habitat for black cockatoos and western ringtail possum and may provide a linkage function for fauna within the local area. Given this, the application area is considered to be a significant remnant located within an extensively cleared landscape. To mitigate the impacts of the proposed clearing, the applicant has proposed to revegetate the clearing area post extraction (see Section 3.1) as per the revegetation plan outlined in the Closure and Rehabilitation Plan (Landform Research, 2021).

Conclusion

Based on the above assessment, the proposed clearing will result in the loss of five hectares of significant remnant vegetation within an extensively cleared landscape. For the reasons set out above, it is considered that the impacts of the proposed clearing of significant remnant vegetation constitutes a significant residual impact, and an offset is required (see Section 4).

Conditions

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

- revegetation of clearing area post extraction (see section 3.1)
- offsets (as described in Section 4)

3.2.4. Land and water resources - Clearing Principles (g) and (i)

Assessment

The mapped soil type Yelverton deep sandy flats phase has a high risk of land degradation in the form of phosphorus export and wind erosion. The subsurface acidification, waterlogging, flooding, and salinity has been assessed to be low risk (DPIRD 2019; Appendix C.1).

A Multiple Use Wetland is recorded within 30 metres of the proposed clearing area. This wetland is a palusplain, of which seasonal waterlogging is a characteristic. Given the sandy soils and assumed high infiltration potential, impacts to surface water quality are unlikely. Taking into consideration the proximity of the wetland, clearing of vegetation has the potential to cause deterioration in the quality of groundwater, particularly given the sandy nature of the soils

and high risk of nutrient export. Excavation operations will be limited to 0.5 metres above the groundwater table in line with the conditions of the applicant's extractive industry licence and therefore waterlogging is not anticipated to occur.

The Closure and Rehabilitation Plan (Landform Research, 2021) has identified management and remedial controls to reduce the risk of impacts to surface and ground water. According to the Closure and Rehabilitation Plan, if the highest winter water table is found to be different to the hydrogeological data prepared by Water Direct Pty Ltd (Landform Research, 2021), the floor elevation of future stages will be adjusted up or down to compensate. If the water table is exposed on the floor of the pit the depression will be backfilled to comply with the 0.5 metre separation from the final land surface. The floor elevation will maintain the pre-mine water table gradients from north west towards the south east.

To mitigate impacts to the quality of ground water, the operational management proposed for the excavation includes management and removal of wastes and refuelling and servicing management. In addition, no fuel will be stored in the pit and all major servicing will be completed offsite (Section 3.1; Landform Research, 2021).

Given the application area will remain surrounded by vegetation and the mitigation measures proposed by the applicant, including revegetation of the site (Section 3.1; Landform Research, 2021), any impacts are expected to be minor and temporary. Therefore, the proposed clearing is not expected to lead to appreciable land degradation or impacts to surface or ground water.

Conclusion

Based on the above assessment, the proposed clearing is not anticipated to result in appreciable land degradation or impacts to surface or ground water. For the reasons set out above, it is considered that the impacts of the proposed clearing can be managed through implementation of the Closure and Rehabilitation Plan (Landform Research, 2021).

Conditions

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

- revegetation of the proposed clearing area post extraction (see section 3.1)
- implementation of the Closure and Rehabilitation Plan (see section 3.1)

3.3. Relevant planning instruments and other matters

The proposed clearing area is located within the Rural Zone of the City of Busselton and is mapped by the Department of Mines, Industry Regulation and Safety as a regionally significant basic raw material (sand) and identified under the State Planning Policy 2.4 (DPLH, 2021).

The City of Busselton (City) advised the department that the proposed clearing is consistent with the City's Local Planning Scheme. An extractive industry licence and development approval (under the *Planning and Development Act 2005*) were granted (subject to conditions) by the City with the condition that development is undertaken in accordance with the following plans (City of Busselton, 2022):

- Staging Plan with existing contours and maximum seasonal groundwater levels;
- Concept Final Contour Plan; and 2.3 Conservation Covenant Areas Plan dated 16 November 2021;
- Operations Environment Management Plan dated 16 November 2021;
- Social Impact Assessment dated 16 November 2021 (SIS 2021);
- Closure and Rehabilitation Plan dated 1 October 2021.

The proposed clearing area occurs within the Geographe Bay Rivers Surface Water Area and Busselton-Capel Groundwater Area proclaimed under the RIWI Act. Any taking or diversion of surface water in this proclaimed area (whether by direct pumping, construction of a dam, or excavation) can be subject to licensing. Any groundwater abstraction in this proclaimed area is subject to licensing by the department, other than supply from the shallow water table (superficial) aquifer for domestic and non-intensive stock watering purposes. Details validating the water supply is a condition of the extractive industry licence granted by the City.

Several Aboriginal sites of significance have been mapped within the local 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.

4 Suitability of offsets

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

- The loss of five hectares of foraging habitat for Carnaby's black cockatoo and forest red-tailed black cockatoo,
- The loss of five hectares of native vegetation that is suitable habitat for western ringtail possum, and
- The loss of five hectares of native vegetation that is a significant remnant within an extensively cleared landscape,

The applicant proposed an environmental offset consisting of:

- Conservation and revegetation of 2.94 hectares of native vegetation within Lot 75 as detailed below:
    - revegetation of native vegetation, from degraded condition to very good condition that contains black cockatoo foraging habitat, and western ringtail possum habitat and is a significant remnant within an extensively cleared landscape.
- Conservation of 9.9 hectares of native vegetation within Lot 75 as detailed below:
    - conservation of native vegetation in very good to degraded/good condition that contains black cockatoo foraging habitat, and western ringtail possum habitat and is a significant remnant within an extensively cleared landscape, and
    - rehabilitation of 0.3 hectares (within the 9.9 hectare conservation covenant area) of completely degraded vegetation to good condition that contains black cockatoo foraging habitat, and western ringtail possum habitat and is a significant remnant within an extensively cleared landscape.

A Rehabilitation Plan provided by the applicant (Landform Research, 2021) was reviewed, and approved by the department.

In assessing whether the proposed offset is adequate and proportionate to the significance of environmental values being impacted, a calculation using the WA State Offset Metric was undertaken. The calculation indicates that when combined, the proposed offsets will address 100 percent of the significant residual impacts of clearing and is therefore consistent with the WA Environmental Offsets Policy, September 2011. The justification for the values used in the offset calculation is provided in Appendix F.

Using the WA State Offset Metric calculator, the following values are required to offset the significant residual impact of the proposed clearing:

- revegetation of 2.94 hectares of native vegetation from degraded condition to very good condition within Lot 75 (see Figure 4 below) that provides:
    - a significant remnant within an extensively cleared landscape
    - black cockatoo foraging habitat; and
    - western ringtail possum habitat
- conservation of 9.9 hectares of native vegetation in very good to degraded/good condition within Lot 75 (see Figure 4 below) that includes the rehabilitation of 0.3 hectares of completely degraded vegetation to good condition and provides:
    - a significant remnant within an extensively cleared landscape
    - black cockatoo foraging habitat; and
    - western ringtail possum habitat

Given the above, the Delegated Officer considers that this adequately counterbalances the significant residual impacts listed above. The justification for the values used in the offset calculation is provided in 0.

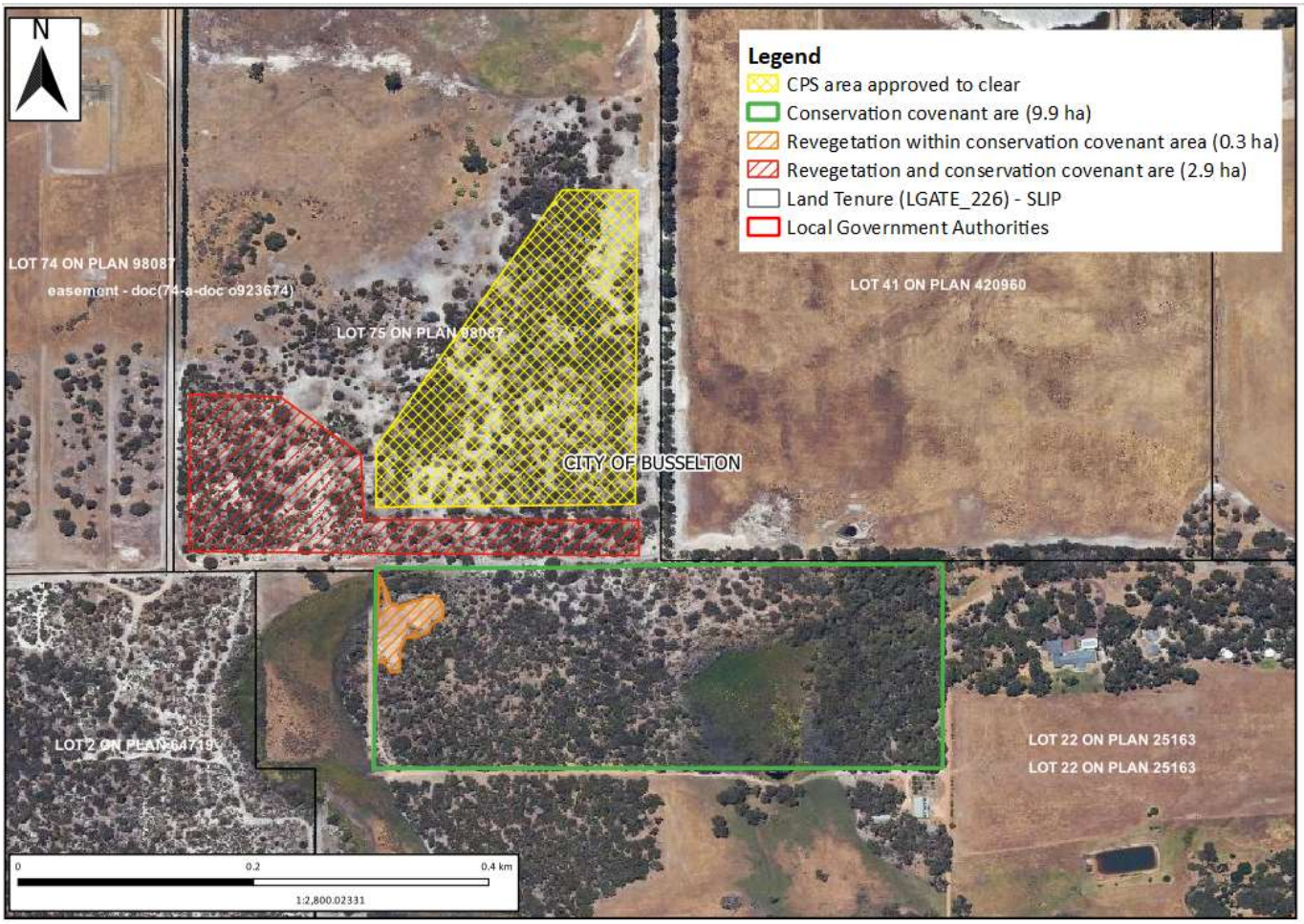


Figure 5. proposed offset areas for clearing permit application CPS 8863-1

End

Appendix A. Additional information provided by applicant

During the assessment, the applicant responded to requests for information on the following (see below).

Request for information	Further information provided
Avoidance and mitigation measures	Details of avoidance and mitigation measures were provided and the application area was reduced from 11.5 hectares to 5.0 hectares. This information is presented in Section 3.1 of the Decision Report.
Rehabilitation plan for the proposed offset site	The applicant provided a Rehabilitation Plan (Landform Research, 2021). This information is presented in Section 3.1 and 4 of the Decision Report.

Appendix B. Details of public submissions

One public submission was received in relation to the proposed clearing (Submission, 2020).

Summary of comments	Consideration of comment
Comments provided by the submitter noted that the application area contained vegetation likely to provide foraging and breeding habitat. The submission noted the importance of the retention of foraging and breeding habitat to prevent the further decline in black cockatoo populations. The submission also raised the potential significance of cumulative impacts and that the applicant should consider their obligations under the EPBC Act. The submission noted that impacts can be mitigated effectively by providing appropriate replacement habitat, through revegetation and artificial hollows	Considered in the assessment of impacts to environmental values (refer to Section 3.2.1 and 3.2.2). The application area was reduced from 11.5 hectares to 5.0 hectares and the extraction area will be rehabilitated with black cockatoo foraging species. In addition, an area totalling 3.2 hectares will be rehabilitated with black cockatoo foraging species as a part of the offset proposal.

Appendix C. Site characteristics

C.1. Site characteristics

The information provided below describes the key characteristics of the area proposed to be cleared and is based on the best information available to the department at the time of this assessment. This information was used to inform the assessment of the clearing against the Clearing Principles, contained in Appendix D. The 'local area' is considered a ten kilometre radius of the application area.

Characteristic	Details
Local context	The proposed clearing area is a five hectare area of native vegetation which has connectivity to native vegetation occurring to the south, and is surrounded by predominantly cleared rural land used for agricultural purposes and grazing of livestock to the north, east and west. Spatial data indicates the local area (10 km radius of the proposed clearing area) retains approximately 23.5% of the original native vegetation cover.
Ecological linkage	The areas proposed to be cleared may contribute towards fauna dispersal within the landscape due to the extensive clearing that has occurred within the local area, however there are no formal linkages mapped and the proposed clearing will not sever any linkages.
Conservation areas	The proposed clearing area is not located within or adjacent to any conservation areas. The nearest conservation area is Haag Nature Reserve, which is situated approximately 360 metres north west of the proposed clearing area.
Vegetation description	The flora and vegetation survey (Stream, 2018) undertaken for the application area indicates the vegetation within the proposed clearing area consists of three vegetation

<table>
<tr><th>Characteristic</th><th>Details</th></tr>
<tr><td></td><td>types, Banksia woodland, Sheoak-Banksia woodland, and Peppermint-Sheoak woodland. Representative photos and maps are available in Appendix G.

This is consistent with the mapped vegetation complex:
• Yelverton uplands, Yd: Woodland of Allocasuarina fraseriana-Eucalyptus marginata subsp. marginata-Xylomelum occidentale- Banksia attenuata on sandy slopes in the humid zone (Webb et al. 2016).

The mapped vegetation type retains approximately 55.71 per cent of the original extent (Government of Western Australia, 2019).</td></tr>
<tr><td>Vegetation condition</td><td>The flora and vegetation survey (Stream, 2018) indicates the vegetation within the proposed clearing area is in good to completely degraded condition (Keighery, 1994).

The full Keighery (1994) condition rating scale is provided in 0. Representative photos and mapping are available in Appendix G.</td></tr>
<tr><td>Climate and landform</td><td>The proposed clearing area is situated within the ‘Donnybrook Sunkland Zone’, described as:

“Moderately dissected lateritic plateau on Perth Basin sedimentary rocks. Soils are formed in lateritic colluvium, weathered in-situ sedimentary rocks and alluvium (poorly drained sandy alluvial plain in the south)” (DPIRD, 2018).</td></tr>
<tr><td>Soil description</td><td>The proposed clearing area is mapped within the Whicher Scarp System, described as:

“Low scarp and raised platform, on the northern edge of the Donnybrook Sunkland. Sandy gravel and pale deep sands, loamy gravel and non-saline wet soils. Jarrah-marri forest and woodland.”

Specifically, the soil is mapped within the ‘Yelverton deep sandy flats Phase’, described as:
“Level to gently undulating raised shelf, lying 10-40 m above the Swan Coastal Plain. The soils are mainly sands.”</td></tr>
<tr><td>Land degradation risk</td><td>The proposed clearing area is mapped within the Yelverton deep sandy flats Phase of the Whicher Scarp System. Land degradation risk for this subsystem is outlined below, expressed as the percentage of that subsystem being at risk and its associated risk rating (DPIRD, 2018).
<table>
<tr><th rowspan="2">Hazard/Aspect</th><th colspan="2">Yelverton deep sandy flats Phase</th></tr>
<tr><th>Degradation risk (% of subsystem at risk)</th><th>Risk rating</th></tr>
<tr><td>Wind erosion</td><td>86%</td><td>High to Extreme</td></tr>
<tr><td>Waterlogging and inundation</td><td>19%</td><td>Moderate to Very High</td></tr>
<tr><td>Water Erosion</td><td>0%</td><td>Very High to Extreme</td></tr>
<tr><td>Salinity</td><td>0%</td><td>Moderate</td></tr>
<tr><td>Flood risk</td><td>0%</td><td>Moderate to High</td></tr>
<tr><td>Phosphorus export</td><td>59%</td><td>High to Extreme</td></tr>
</table></td></tr>
<tr><td>Waterbodies</td><td>The desktop assessment and aerial imagery indicated that there are no surface water features or geomorphic wetlands within the proposed clearing area.
A Multiple Use Wetland (UFI 13201) is located around 30 metres south of the proposed clearing area boundary.</td></tr>
</table>

Characteristic	Details
Hydrogeography	The application area occurs within the Geographe Bay Rivers Surface Water Area and Busselton-Capel Groundwater Area proclaimed under the RIWI Act.
Flora	According to available databases, 45 conservation significant flora species have been recorded within the local area. Of these, five species occur on the same soil and vegetation type as the application area. No conservation significant flora species were recorded during the flora and vegetation survey (Stream, 2018).
Ecological communities	According to available databases, two TECs and eight PECs are recorded within the local area. The 'Banksia Woodlands of the Swan Coastal Plain' PEC is mapped within the application area.
Fauna	According to available databases a total of 28 conservation significant fauna species occur within the local area. The closest record is the western ringtail possum, recorded within the application area. The application area occurs within the known distribution of all three black cockatoo species and 11 known roost sites and one known breeding site occur within the local area. Evidence of foraging by black cockatoos was recorded during the fauna survey (Greg Harewood, 2019)

C.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*					
Swan Coastal Plain	1,501,221.93	579,813.47	38.62	222,916.97	14.85
Vegetation complex**					
Yelverton uplands, Yd	2,439.37	1,358.92	55.71	356.92	14.63
Local area					
10km radius	32,924.42	7,707.81	23.4	-	-

*Government of Western Australia (2019a)

**Government of Western Australia (2019b)

C.3. Flora analysis table

With consideration for the site characteristics set out above, relevant datasets (see Appendix H.1), and biological survey information (Stream, 2018), impacts to the following conservation significant flora required further consideration.

Species name	Conservation status	Suitable habitat features ? [Y/N]	Suitable vegetation type? [Y/N]	Suitable soil type? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Are surveys adequate to identify? [Y, N, N/A]
Olearia strigosa	P3	N	N	N	2.78	1	Y
Verticordia lehmannii	P4	N	N	N	2.78	1	Y
Verticordia plumosa var. *ananeotes*	T	N	N	N	2.86	1	Y
Daviesia elongata	T	Y	Y	Y	7.63	14	Y

Species name	Conservation status	Suitable habitat features ? [Y/N]	Suitable vegetation type? [Y/N]	Suitable soil type? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Are surveys adequate to identify? [Y, N, N/A]
Boronia capitata subsp. *gracilis*	P3	Y	Y	Y	7.67	6	Y
Acacia semitrullata	P4	Y	Y	Y	9.34	7	Y
Drakaea micrantha	T	Y	Y	Y	9.42	7	Y
Johnsonia inconspicua	P3	Y	Y	Y	9.42	20	Y

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

C.4. Fauna analysis table

With consideration for the site characteristics set out above, relevant datasets (see Appendix H.1), and biological survey information (Greg Harewood, 2019), impacts to the following conservation significant fauna required further consideration.

Species name	Conservation status	Suitable habitat features? [Y/N]	Suitable vegetation type? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Are surveys adequate to identify? [Y, N, N/A]
Pseudocheirus occidentalis (Western ringtail possum)	CR	Y	Y	0.00	130	Y
Zanda baudinii (Baudin's cockatoo)	EN	Y	Y	1.80	112	Y
Calyptorhynchus sp. 'white-tailed black cockatoo' (Baudin's or Carnaby's black cockatoo)	EN	Y	Y	1.92	121	Y
Isoodon fusciventer (quenda)	P4	N	Y	1.92	23	Y
Phascogale tapoatafa wambenger (south-western brush-tailed phascogale)	CD	N	Y	2.16	38	Y
Calyptorhynchus banksii naso (forest red-tailed black cockatoo)	VU	Y	Y	2.37	50	Y
Zanda latirostris (Carnaby's cockatoo)	EN	Y	Y	2.37	25	Y
Dasyurus geoffroii (chuditch)	VU	N	Y	5.07	3	Y
Notamacropus Irma (western brush wallaby)	P4	N	Y	7.27	4	Y

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

C.5. Ecological community analysis table

Community name	Conservation status	Suitable habitat features? [Y/N]	Suitable vegetation type? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Are surveys adequate to identify? [Y, N, N/A]
Banksia Woodlands of the Swan Coastal Plain ecological community	Priority 3 (DBCA)	Y	Y	0.00	285	Y
Shrublands of near permanent wetlands in creeklines of the Whicher Scarp (Whicher Scarp community G2)	Priority 1 (DBCA)	N	N	0.58	13	Y
Swan Coastal Plain Paluslope Wetlands	Priority 1 (DBCA)	N	N	0.86	11	Y
West Whicher Scarp *Banksia attenuata* woodland (Swan Coastal Plain centred	Priority 1 (DBCA)	N	N	1.47	9	Y

Community name	Conservation status	Suitable habitat features? [Y/N]	Suitable vegetation type? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Are surveys adequate to identify? [Y, N, N/A]
woodlands of grey/white sands community B2)						
Shrublands on southern Swan Coastal Plain Ironstones (Busselton area) (floristic community type 10b as originally described in Gibson et al. 1994)	Critically Endangered (BC Act)	N	N	2.09	6	Y
Corymbia calophylla woodlands on heavy soils of the southern Swan Coastal Plain (floristic community type 1b as originally described in Gibson et al. 1994)	Critically Endangered (BC Act)	N	N	4.79	8	Y

Appendix D. Assessment against the clearing principles

Assessment against the clearing principles	Variance level	Is further consideration required?
Environmental value: biological values		
Principle (a): *"Native vegetation should not be cleared if it comprises a high level of biodiversity."* Assessment: The area proposed to be cleared contains significant habitat for Carnaby's black cockatoo, forest red-tailed black cockatoo and western ringtail possum.	At variance	Yes *Refer to Section 3.2.1, above.*
Principle (b): *"Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna."* Assessment: The area proposed to be cleared contains significant foraging habitat for Carnaby's black cockatoo, forest red-tailed black cockatoo and suitable habitat for western ringtail possums.	At variance	Yes *Refer to Section 3.2.1, above.*
Principle (c): *"Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora."* Assessment: No threatened flora species were considered likely to occur within the proposed clearing area, nor were any recorded during the flora and vegetation survey (Stream, 2018). The area proposed to be cleared is unlikely to contain threatened flora species.	Not likely to be at variance	Yes *Refer to Section 3.2.2, above.*
Principle (d): *"Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community."* Assessment: The area proposed to be cleared contains species that indicate the presence of the Banksia Woodlands of the Swan Coastal Plain TEC. However, given the condition of the patch, the vegetation does not meet the requirements of the TEC.	Not likely to be at variance	Yes *Refer to Section 3.2.2, above.*
Environmental value: significant remnant vegetation and conservation areas		
Principle (e): *"Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared."* Assessment: The extent of the native vegetation in the local area is inconsistent with the national objectives and targets for biodiversity conservation in Australia. The vegetation proposed to be cleared is not considered to be part of a significant ecological linkage in the local area.	At variance	Yes *Refer to Section 3.2.3, above.*
Principle (h): *"Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area."* Assessment: Given the distance to the nearest conservation area, the proposed clearing is not likely to have an impact on the environmental values of nearby conservation areas.	Not likely to be at variance	No

Assessment against the clearing principles	Variance level	Is further consideration required?
Environmental value: land and water resources		
Principle (f): *"Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland."* Assessment: Given no water courses or wetlands are recorded within the application area, the vegetation is not considered to be growing in, or in association with, an environment associated with a watercourse or wetland.	Not likely to be at variance	No
Principle (g): *"Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation."* Assessment The mapped soils are highly susceptible to wind erosion and nutrient export. Noting the mitigation measures proposed by the applicant and measures outlined within the Closure and Rehabilitation Plan (Landform Research, 2021), the proposed clearing is not likely to have an appreciable impact on land degradation.	Not likely to be at variance	Yes *Refer to Section 3.2.4, above.*
Principle (i): *"Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water."* Assessment: Given no water courses, wetlands or Public Drinking Water Sources Areas are recorded within the application area, the proposed clearing is unlikely to impact surface or ground water quality.	Not likely to be at variance	No
Principle (j): *"Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding."* Assessment: 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. Given no water courses or wetlands are recorded within the application area, the proposed clearing is unlikely to contribute to waterlogging.	Not likely to be at variance	No

Appendix E. Vegetation condition rating scale

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

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 F. Offset calculator value justification

F.1. Environmental value: Significant remnant vegetation

Calculation	Score (Area)	Rationale
Conservation significance		
Description	Principle e	Vegetation considered significant as a remnant within an extensively cleared landscape. Local area retains less than 30% of the pre-European vegetation extent. Vegetation in degraded/good to completely degraded condition (Keighery, 1994).
Type of environmental value	Vegetation/Habitat	Vegetation considered significant as a remnant due to the highly cleared nature of the vegetation within the local area and provides foraging habitat for black cockatoos and suitable habitat for western ringtail possums.
Conservation significance of environmental value	Terrestrial native vegetation complex - <30% extent remaining in the bioregion	Vegetation considered significant as a remnant within an extensively cleared landscape. Local area retains less than 30% of the pre-European vegetation extent.
Landscape level value impacted	yes/no	Yes
Significant impact		
Description	Significant remnant vegetation	Vegetation considered significant as a remnant within an extensively cleared landscape. Local area retains less than 30% of the pre-European vegetation extent. Vegetation in degraded/good to completely degraded condition (Keighery, 1994).
Significant impact (hectares)	5	5 hectares of vegetation within the application area considered significant remnant vegetation.
Quality (scale)	6.00	Biological surveys of the application area indicate the vegetation condition ranges from degraded/good to completely degraded condition (Keighery, 1994) with moderate to high habitat values.

Calculation	Score (Area)	Rationale
Rehabilitation credit		
Description	5	Revegetation of 5 hectares of native vegetation from completely degraded condition to good condition that is a significant remnant within an extensively cleared landscape and contains black cockatoo foraging habitat and suitable habitat for western ringtail possums.
Offset – Conservation and rehabilitation of 2.94 hectares		
Description	0	Rehabilitation of 2.94 hectares of significant remnant native vegetation within Lot 75 that provides habitat values for black cockatoo foraging and western ringtail possums.
Proposed offset (area in hectares)	2.94	2.94 hectares of native vegetation.
Current quality of offset site	6.00	The vegetation within the offset site is in good to completely degraded condition (Keighery, 1994).
Future quality WITHOUT offset	6.00	The quality is considered unlikely to improve or decline beyond its current quality over the next 20 years.
Future quality WITH offset	7.00	Revegetation (direct planting and seeding) within the site is expected to increase the condition of the vegetation to good condition (Keighery, 1994).
Time until ecological benefit (years)	10.00	It is expected that it will take 10 years for the vegetation to be established and to provide habitat values for black cockatoo foraging and western ringtail possums.
Confidence in offset result (%)	85%	There is a moderate to high level of confidence that the revegetation will meet the completion criteria of the revegetation plan (Landform Research, 2021).
Duration of offset implementation (maximum 20 years)	20.00	The offset site will be protected in perpetuity
Time until offset site secured (years)	1.00	It is expected that the transfer will be complete within 12 months.
Risk of future loss WITHOUT offset (%)	25.0%	The site is currently zoned as rural, located within a primary resource area for sand extraction. Sand extraction has occurred within and/or adjacent to this offset site, therefore there is a moderate to high risk of future loss
Risk of future loss WITH offset (%)	5.0%	A conservation covenant will be placed over the offset site, thus the risk of loss is considered to be low.
Offset ratio (Conservation area only)	N/A	N/A
Landscape level values of offset?	N/A	N/A
Offset – Conservation of 9.9 hectares		
Description	0	Conservation of 9.9 hectares of significant remnant native vegetation within Lot 75 that provides habitat values for black cockatoo foraging and western ringtail possums.
proposed offset (area in hectares)	9.9	9.9 hectares of native vegetation.
Current quality of offset site	7.00	The vegetation within the offset site is in very good condition (Keighery, 1994).
Future quality WITHOUT offset	7.00	The quality is considered unlikely to improve or decline beyond its current quality over the next 20 years.
Future quality WITH offset	7.00	The quality is not considered to improve or decline beyond its current quality over the next 20 years.
Time until ecological benefit (years)	1.00	It is expected that it will take 1 year for a conservation covenant to be placed over the offset site.

Calculation	Score (Area)	Rationale
Confidence in offset result (%)	95%	There is a high level of confidence that the land will be purchased and that the habitat quality will not deteriorate with the offset's implementation.
Duration of offset implementation (maximum 20 years)	20.00	The offset site will be protected in perpetuity.
Time until offset site secured (years)	1.00	It is expected that it will take 1 year for a conservation covenant to be placed over the offset site.
Risk of future loss WITHOUT offset (%)	25.0%	The site is currently zoned as rural, located within a primary resource area for sand extraction. Sand extraction has occurred within and/or adjacent to this offset site, therefore there is a moderate to high risk of future loss
Risk of future loss WITH offset (%)	5.0%	A conservation covenant will be placed over the offset site, thus the risk of loss is considered to be low.
Offset ratio (Conservation area only)	N/A	N/A
Landscape level values of offset?	N/A	N/A
Offset – Rehabilitation of 0.3 hectares		
Description	0	Rehabilitation of 0.3 hectares of significant remnant native vegetation within Lot 75 that provides habitat values for black cockatoo foraging and western ringtail possums.
proposed offset (area in hectares)	0.3	0.3 hectares of native vegetation.
Current quality of offset site	1.00	The vegetation within the offset site is in completely degraded condition (Keighery, 1994).
Future quality WITHOUT offset	1.00	The quality is considered unlikely to improve or decline beyond its current quality over the next 20 years.
Future quality WITH offset	5.00	Revegetation (direct planting and seeding) within the site is expected to increase the condition of the vegetation to good condition (Keighery, 1994).
Time until ecological benefit (years)	10.00	It is expected that it will take 10 years for the vegetation to be established and to provide habitat values for black cockatoo foraging and western ringtail possums.
Confidence in offset result (%)	80%	There is a moderate level of confidence that the revegetation will meet the completion criteria of the revegetation plan (Landform Research, 2021).
Duration of offset implementation (maximum 20 years)	20.00	The offset site will be protected in perpetuity.
Time until offset site secured (years)	1.00	It is expected that it will take 1 year for a conservation covenant to be placed over the offset site.
Risk of future loss WITHOUT offset (%)	25.0%	The site is currently zoned as rural, located within a primary resource area for sand extraction. Sand extraction has occurred within and/or adjacent to this offset site, therefore there is a moderate to high risk of future loss
Risk of future loss WITH offset (%)	5.0%	A conservation covenant will be placed over the offset site, thus the risk of loss is considered to be low.
Offset ratio (Conservation area only)	N/A	N/A
Landscape level values of offset?	N/A	N/A

F.2. Environmental value: Carnaby's black cockatoo foraging habitat

Calculation	Score (Area)	Rationale
Conservation significance		
Description	Carnaby's black cockatoo habitat	Black cockatoo foraging habitat supporting roosting individuals within the known distribution of Carnaby's black cockatoos. Application area is located within an extensively cleared landscape.
Type of environmental value	Species (Flora/Fauna)	Carnaby's black cockatoo foraging habitat supporting roosting individuals.
Conservation significance of environmental value	Rare/Threatened Species - Endangered	Carnaby's cockatoo is listed as endangered under the BC Act and EPBC Ac
Landscape level value impacted	yes/no	Yes
Significant impact		
Description	Carnaby's black cockatoo habitat	Black cockatoo foraging habitat supporting roosting individuals within the known distribution of Carnaby's black cockatoos.
Significant impact (hectares)	5	5 hectares of suitable foraging habitat.
Quality (scale)	6.00	Biological surveys of the application area indicate the vegetation ranges from good/degraded to good condition. Primary foraging species are present (Banksia and scattered Jarrah), water sources are within close proximity, known roost sites are within 20 kilometres and suitable roosting habitat is within close proximity.
Rehabilitation credit		
Description	5	Revegetation of 5 hectares of native vegetation from completely degraded condition to good condition that provides suitable black cockatoo foraging habitat and is a significant remnant within an extensively cleared landscape.
Offset – Conservation and rehabilitation of 2.94 hectares		
Description	0	Rehabilitation of 2.94 hectares of native vegetation within Lot 75 on Plan 98087 that provides habitat values for black cockatoo foraging and is a significant remnant within an extensively cleared landscape.
proposed offset (area in hectares)	2.94	2.94 hectares of native vegetation.
Current quality of offset site	7.00	The vegetation within the offset site provides primary foraging species (Banksia and Sheoak woodland with scattered Jarrah) and potential future breeding habitat (Jarrah and Marri). The vegetation is in good to completely degraded condition (Keighery, 1994), water sources are within close proximity, known roost sites are within 20 kilometres and suitable roosting habitat is within close proximity.
Future quality WITHOUT offset	7.00	The quality is considered unlikely to improve or decline beyond its current quality over the next 20 years.
Future quality WITH offset	8.00	Revegetation (direct planting and seeding) of suitable black cockatoo habitat species (Banksia, Sheoak, Marri and Jarrah) within the site is expected to increase the habitat values of the site and the condition of the vegetation to good condition (Keighery, 1994).
Time until ecological benefit (years)	15.00	It is expected that it will take 15 years for the vegetation to mature and provide foraging habitat values for Carnaby's black cockatoo foraging.
Confidence in offset result (%)	85%	There is a moderate to high level of confidence that the revegetation will meet the completion criteria of the revegetation plan (Landform Research, 2021).

Calculation	Score (Area)	Rationale
Duration of offset implementation (maximum 20 years)	20.00	The offset site will be protected in perpetuity
Time until offset site secured (years)	1.00	It is expected that the transfer will be complete within 12 months.
Risk of future loss WITHOUT offset (%)	25.0%	The site is currently zoned as rural, located within a primary resource area for sand extraction. Sand extraction has occurred within and/or adjacent to this offset site, therefore there is a moderate to high risk of future loss
Risk of future loss WITH offset (%)	5.0%	A conservation covenant will be placed over the offset site, thus the risk of loss is considered to be low.
Offset ratio (Conservation area only)	N/A	N/A
Landscape level values of offset?	N/A	N/A
Offset – Conservation of 9.9 hectares		
Description	0	Conservation of 9.9 hectares of significant remnant native vegetation within Lot 75 on Plan 98087 that provides habitat values for black cockatoo foraging and is a significant remnant within an extensively cleared landscape.
proposed offset (area in hectares)	9.9	9.9 hectares of native vegetation.
Current quality of offset site	8.00	The vegetation within the offset site provides primary foraging species (Banksia, Sheoak and Marri woodland with scattered Jarrah) and potential roosting and future breeding habitat (Jarrah and Marri). The vegetation is in very good condition (Keighery, 1994), water sources are within close proximity, known roost sites are within 20 kilometres and suitable roosting habitat is within close proximity.
Future quality WITHOUT offset	8.00	The quality is considered unlikely to improve or decline beyond its current quality over the next 20 years.
Future quality WITH offset	8.00	The quality is not considered to improve or decline beyond its current quality over the next 20 years.
Time until ecological benefit (years)	1.00	It is expected that it will take 1 year for a conservation covenant to be placed over the offset site.
Confidence in offset result (%)	95%	There is a high level of confidence that the land will be purchased and that the habitat quality will not deteriorate with the offset's implementation.
Duration of offset implementation (maximum 20 years)	20.00	The offset site will be protected in perpetuity.
Time until offset site secured (years)	1.00	It is expected that it will take 1 year for a conservation covenant to be placed over the offset site.
Risk of future loss WITHOUT offset (%)	25.0%	The site is currently zoned as rural, located within a primary resource area for sand extraction. Sand extraction has occurred within and/or adjacent to this offset site, therefore there is a moderate to high risk of future loss
Risk of future loss WITH offset (%)	5.0%	A conservation covenant will be placed over the offset site, thus the risk of loss is considered to be low.
Offset ratio (Conservation area only)	N/A	N/A
Landscape level values of offset?	N/A	N/A
Offset – Rehabilitation of 0.3 hectares		
Description	0	Rehabilitation of 0.3 hectares of significant remnant native vegetation within Lot 75 on Plan 98087 that provides habitat values for black cockatoo foraging and is a significant remnant within an extensively cleared landscape.

Calculation	Score (Area)	Rationale
proposed offset (area in hectares)	0.3	0.3 hectares of native vegetation.
Current quality of offset site	1.00	The vegetation within the offset site is in completely degraded condition (Keighery, 1994) with little to no habitat values.
Future quality WITHOUT offset	1.00	The quality is considered unlikely to improve or decline beyond its current quality over the next 20 years.
Future quality WITH offset	5.00	Direct planting and seeding of suitable black cockatoo habitat species (Banksia, Sheoak, Marri and Jarrah) within the site is expected to increase the habitat values and condition of the vegetation to good condition (Keighery, 1994).
Time until ecological benefit (years)	15.00	It is expected that it will take 15 years for the vegetation to mature and provide habitat values for black cockatoo foraging.
Confidence in offset result (%)	80%	There is a moderate level of confidence that the revegetation will meet the completion criteria of the revegetation plan (Landform Research, 2021).
Duration of offset implementation (maximum 20 years)	20.00	The offset site will be protected in perpetuity.
Time until offset site secured (years)	1.00	It is expected that it will take 1 year for a conservation covenant to be placed over the offset site.
Risk of future loss WITHOUT offset (%)	25.0%	The site is currently zoned as rural, located within a primary resource area for sand extraction. Sand extraction has occurred within and/or adjacent to this offset site, therefore there is a moderate to high risk of future loss
Risk of future loss WITH offset (%)	5.0%	A conservation covenant will be placed over the offset site, thus the risk of loss is considered to be low.
Offset ratio (Conservation area only)	N/A	N/A
Landscape level values of offset?	N/A	N/A

F.3. Environmental value: Western ringtail possum habitat

Calculation	Score (Area)	Rationale
Conservation significance		
Description	Western ringtail possum habitat	Western ringtail possum habitat. Known records within the application area and within close proximity. Fauna survey recorded suitable habitat, however no sign of individuals and/or use.
Type of environmental value	Species (Flora/Fauna)	Western ringtail possum habitat
Conservation significance of environmental value	Rare/Threatened Species – Critically Endangered	Western ringtail possum is listed as Critically Endangered under the BC Act and EPBC Ac
Landscape level value impacted	yes/no	Yes
Significant impact		
Description	Western ringtail possum habitat	Western ringtail possum habitat. Known records within the application area and within close proximity.
Significant impact (hectares)	5	5 hectares of suitable foraging habitat.
Quality (scale)	4.00	Suitable habitat for western ringtail possums (Peppermint, Marri and Jarrah open woodland). Known records within the application area and within close proximity. Fauna survey recorded suitable habitat (however canopy cover is less than referred), but no sign of individuals and/or use.
Rehabilitation credit		

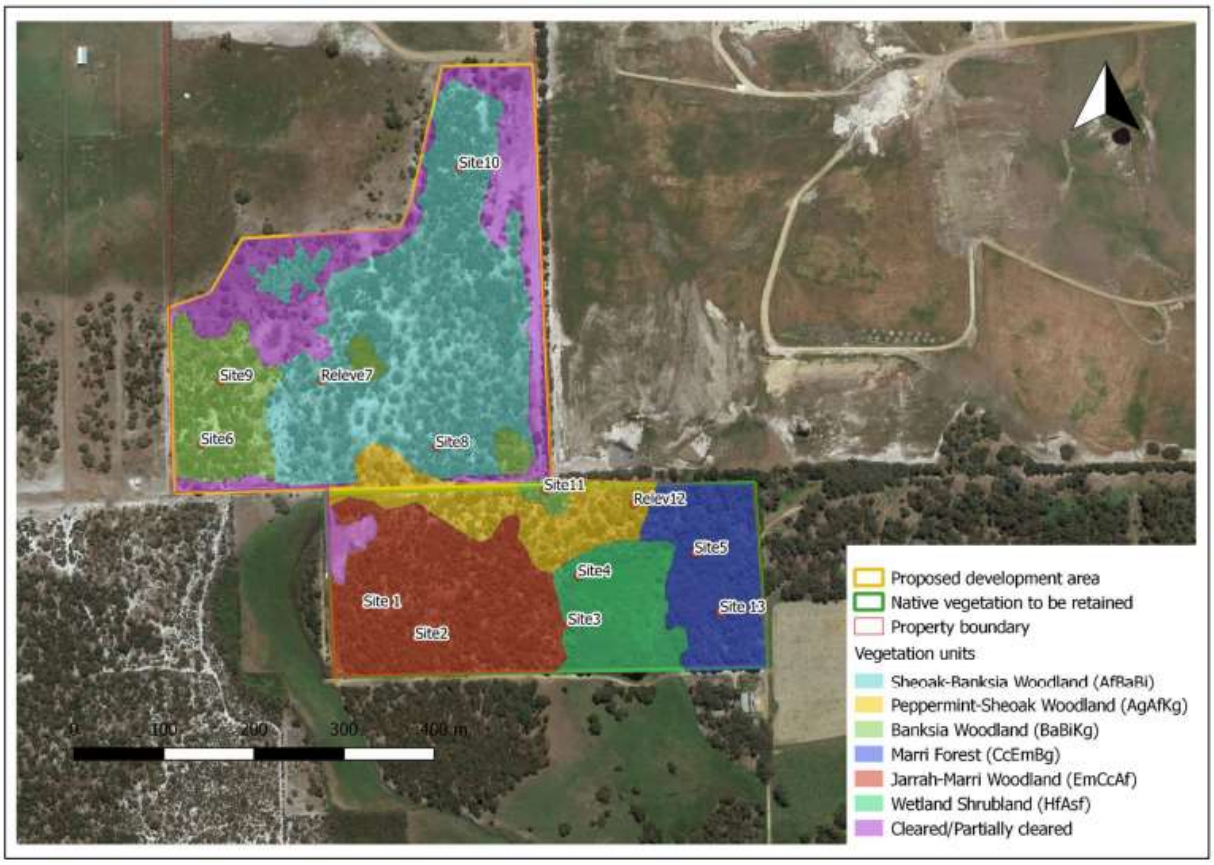
Calculation	Score (Area)	Rationale
Description	5	Revegetation of 5 hectares of native vegetation from completely degraded condition to good condition that provides suitable western ringtail possum habitat and is a significant remnant within an extensively cleared landscape.
Offset – Conservation and rehabilitation of 2.94 hectares		
Description	0	Rehabilitation of 2.94 hectares of native vegetation within Lot 75 on Plan 98087 that provides suitable western ringtail possum habitat and is a significant remnant within an extensively cleared landscape.
proposed offset (area in hectares)	2.94	2.94 hectares of native vegetation.
Current quality of offset site	4.00	The vegetation within the offset site provides suitable habitat for western ringtail possums. The vegetation is in good to completely degraded condition (Keighery, 1994), and known records occur within close proximity of the site.
Future quality WITHOUT offset	4.00	The quality is considered unlikely to improve or decline beyond its current quality over the next 20 years.
Future quality WITH offset	6.00	Direct planting and seeding of suitable western ringtail possum habitat species (Peppermint, Marri and Jarrah) within the site is expected to increase the habitat values of the site and the condition of the vegetation to good condition (Keighery, 1994).
Time until ecological benefit (years)	15.00	It is expected that it will take 15 years for the vegetation to mature and provide foraging habitat values for western ringtail possums.
Confidence in offset result (%)	85%	There is a moderate to high level of confidence that the revegetation will meet the completion criteria of the revegetation plan (Landform Research, 2021).
Duration of offset implementation (maximum 20 years)	20.00	The offset site will be protected in perpetuity
Time until offset site secured (years)	1.00	It is expected that the transfer will be complete within 12 months.
Risk of future loss WITHOUT offset (%)	25.0%	The site is currently zoned as rural, located within a primary resource area for sand extraction. Sand extraction has occurred within and/or adjacent to this offset site, therefore there is a moderate to high risk of future loss
Risk of future loss WITH offset (%)	5.0%	A conservation covenant will be placed over the offset site, thus the risk of loss is considered to be low.
Offset ratio (Conservation area only)	N/A	N/A
Landscape level values of offset?	N/A	N/A
Offset – Conservation of 9.9 hectares		
Description	0	Conservation of 9.9 hectares of significant remnant native vegetation within Lot 75 on Plan 98087 that provides habitat for western ringtail possums and is a significant remnant within an extensively cleared landscape.
proposed offset (area in hectares)	9.9	9.9 hectares of native vegetation.
Current quality of offset site	7.00	The vegetation within the offset site provides suitable habitat for western ringtail possums. The vegetation is in very good condition (Keighery, 1994), and known records occur within close proximity of the site.
Future quality WITHOUT offset	7.00	The quality is considered unlikely to improve or decline beyond its current quality over the next 20 years.

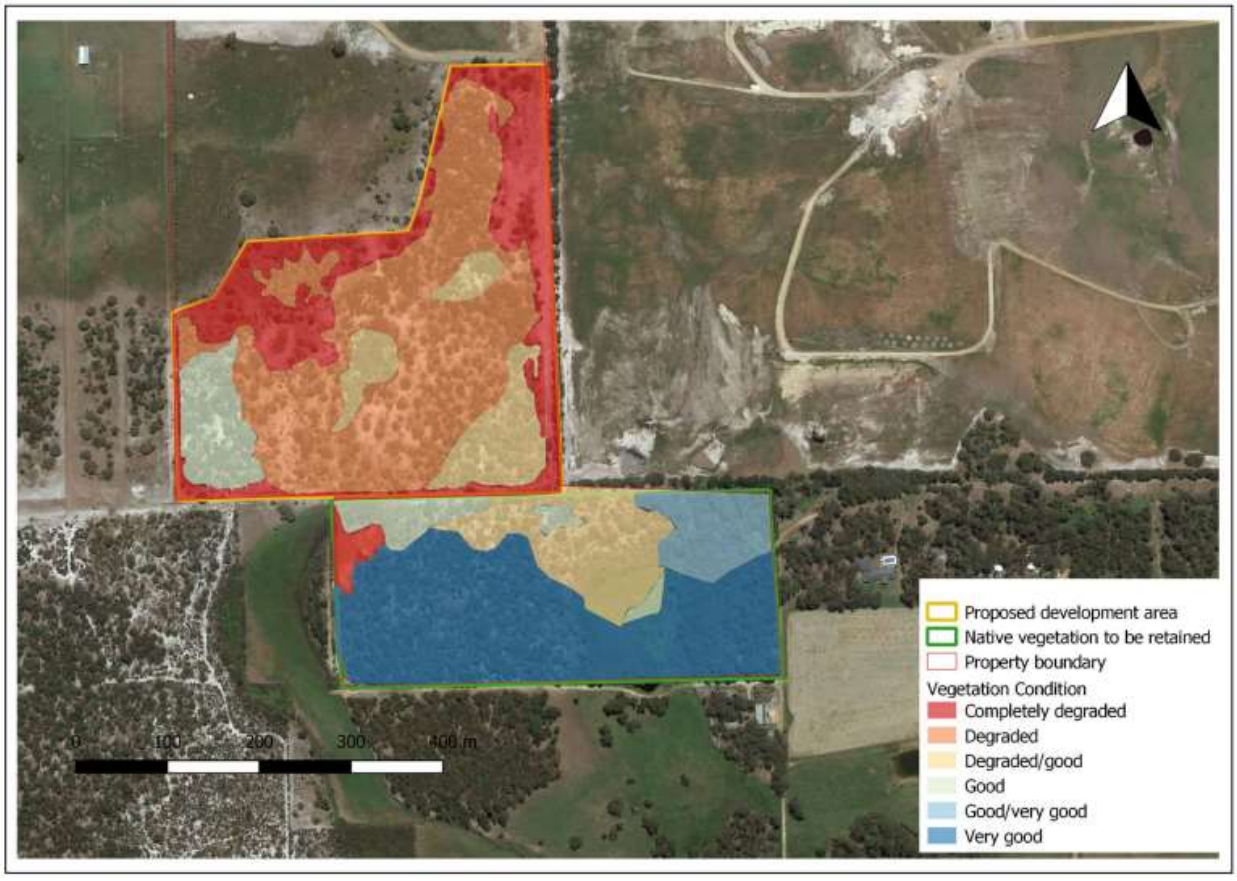
Calculation	Score (Area)	Rationale
Future quality WITH offset	7.00	The quality is not considered to improve or decline beyond its current quality over the next 20 years.
Time until ecological benefit (years)	1.00	It is expected that it will take 1 year for a conservation covenant to be placed over the offset site.
Confidence in offset result (%)	95%	There is a high level of confidence that the land will be purchased and that the habitat quality will not deteriorate with the offset's implementation.
Duration of offset implementation (maximum 20 years)	20.00	The offset site will be protected in perpetuity.
Time until offset site secured (years)	1.00	It is expected that it will take 1 year for a conservation covenant to be placed over the offset site.
Risk of future loss WITHOUT offset (%)	25.0%	The site is currently zoned as rural, located within a primary resource area for sand extraction. Sand extraction has occurred within and/or adjacent to this offset site, therefore there is a moderate to high risk of future loss
Risk of future loss WITH offset (%)	5.0%	A conservation covenant will be placed over the offset site, thus the risk of loss is considered to be low.
Offset ratio (Conservation area only)	N/A	N/A
Landscape level values of offset?	N/A	N/A
Offset – Rehabilitation of 0.3 hectares		
Description	0	Rehabilitation of 0.3 hectares of significant remnant native vegetation within Lot 75 on Plan 98087 that provides habitat for western ringtail posums and is a significant remnant within an extensively cleared landscape.
proposed offset (area in hectares)	0.3	0.3 hectares of native vegetation.
Current quality of offset site	1.00	The vegetation within the offset site is in completely degraded condition (Keighery, 1994) with little to no habitat values.
Future quality WITHOUT offset	1.00	The quality is considered unlikely to improve or decline beyond its current quality over the next 20 years.
Future quality WITH offset	5.00	Direct planting and seeding of suitable western ringtail possum habitat species (Peppermint, Marri and Jarrah) within the site is expected to increase the habitat values and condition of the vegetation to good condition (Keighery, 1994).
Time until ecological benefit (years)	15.00	It is expected that it will take 15 years for the vegetation to mature and provide habitat values for western ringtail possums.
Confidence in offset result (%)	80%	There is a moderate level of confidence that the revegetation will meet the completion criteria of the revegetation plan (Landform Research, 2021).
Duration of offset implementation (maximum 20 years)	20.00	The offset site will be protected in perpetuity.
Time until offset site secured (years)	1.00	It is expected that it will take 1 year for a conservation covenant to be placed over the offset site.
Risk of future loss WITHOUT offset (%)	25.0%	The site is currently zoned as rural, located within a primary resource area for sand extraction. Sand extraction has occurred within and/or adjacent to this offset site, therefore there is a moderate to high risk of future loss
Risk of future loss WITH offset (%)	5.0%	A conservation covenant will be placed over the offset site, thus the risk of loss is considered to be low.
Offset ratio (Conservation area only)	N/A	N/A

Calculation	Score (Area)	Rationale
Landscape level values of offset?	N/A	N/A

Appendix G. Biological survey information excerpts (Stream, 2018; Greg Harewood, 2019)

Vegetation communities and condition mapped by Stream Environment and Water (Stream, 2018)





Representative photos of the vegetation within Site 6 (top), 9 (middle) and 11(bottom), described as: Open forest of *Banksia attenuata, B. ilicifolia* and *Agonis flexuosa* over open shrubland of *Kunzea glabrescens* over grassland of *Briza minor* with sparse forbland of *Chamaescilla corymbosa* and *Hypochaeris glabra* (Stream, 2018).

Representative photos of the vegetation within Site 7 (top), 8 (middle) and 10 (bottom), described as: Open forest of Allo*casuarina fraseriana, Banksia attenuata, B. ilicifolia* and *Agonis flexuosa* over sparse shrubland of *Podocarpus drouynianus* and *Taxandria parviceps* over sparse forbland of *Burchardia congesta, Chamaescilla corymbosa* and *Ursinia anthemoides* (Stream, 2018).

Habitat trees identified during the targeted fauna assessment (Harewood, 2019)

Habitat types identified during the targeted fauna assessment (Harewood, 2019)

Plate 1: Open Forest of Jarrah, Sheoak, Banksia and Peppermint over an Open Herbland – north east section of proposal area.

Plate 2: Open Forest of Banksia, Sheoak, Jarrah and Peppermint over an Open Shrubland/Scattered shrubs over a Herbland – central eastern side of proposal area.

Appendix H. Sources of information

H.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)

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