Government of Western Australia
Department of Water and Environmental Regulation

Clearing Permit Decision Report

1 - Application details and outcome

3.1. Permit application details

Permit number:	CPS 9524/1
Permit type:	Purpose permit
Applicant name:	Shire of Esperance
Application received:	16 December 2022
Application area:	16.19 (revised) hectares of native vegetation within a 50.27 (revised) hectare footprint
Purpose of clearing:	Road widening and gravel extraction
Method of clearing:	Mechanical
Property:	West Point Road Reserve (PIN 11642288) Cascade Road Reserve (PINs 11642130, 11642734, 11644888 and 11644177) Rollond Road Reserve (PIN 11642289) Wharton Road Reserve (PIN11645694) Orleans Bay Road Reserve (PIN 11645695) Griffiths Road Reserve (PIN 11642267) Neds Corner Road Reserve (PINs 11642047, 11642045, and 11642044)
Location (LGA area/s):	Shire of Esperance
Localities (suburb/s):	North Cascade, Cascade and Condingup

3.2. Description of clearing activities

The Shire of Esperance (the Shire) propose to clear up to 16.19 hectares of native vegetation to meet current road safety design specifications in accordance with Austroads Guide to Road Design. To ensure the running surface of unsealed roads are safe, the Shire requires a continual supply of gravel. The proposed clearing occurs over four road reserves and two gravel pits within the Shire of Esperance (see Table 1 and Figures 1a-1d).

Site A - Cascade road is classified as a regional Distributor road giving access to properties north west of Cascade. It has a traffic composition of up to 22 per cent heavy vehicles during peak periods. The current clear width averages approximately 20 metres. The desired road width is 22 metres, and the preferred road profile to be utilised is STD00023 A. To minimise impacts of clearing the width of clearing has been reduced to 21 metres. The two gravel pits within this site were identified as last resorts after all alternatives, including accessing gravel on private property, were exhausted.

Site B - This road is classified as a regional distributor servicing the north western agricultural region with traffic composition of up to 30 per cent heavy vehicles during peak periods. The Shire has adopted the safe system principles approach to road design, as such the new road will incorporate sealed shoulders which will increase the seal width to 8 metres and batter slopes adjacent to shoulders which are flattened to 1:6 to incorporate a recoverable clear zone. To complete these works, native vegetation up to 4.5 metres from the current road footprint on both sides of the road is required to be cleared, increasing the active road footprint to 21 metres.

Site F - Road widening is required to widen the single lane bitumen road to dual lanes as this is a main access road to the Orleans Bay Caravan Park which had 155 vehicles per day in April 2012. Road upgrades and widening will include a 7 metre seal with up to 5.5 metres of road shoulder and mulched vegetation on each side of the road.

Site G - This road is classified as a Regional Distributor road giving access to properties north of Cascade, and traffic composition is up to 21 per cent heavy vehicles during peak periods. To complete these works, native vegetation up to 4.5 metres from the current road footprint on both sides of the road is required to be cleared, increasing the active road footprint to 22 metres.

Table 1. Amount of clearing proposed within the application area

Site	Clearing	Property
Site A – Cascade Road and Gravel Pits	6.56 ha within 11.08 ha footprint	West Point Road Reserve (PIN 11642288), Cascade Road Reserve (PINs 11642130 and 11642734), Rollond Road Reserve (PIN 11642289)
Site B – Cascade Road Bend	0.13 ha within 3.48 ha footprint	Cascade Road Reserve (PINs 11644888 and 11644177)
Site F – Whartons Road	2.28 ha within 5.42 ha footprint	Wharton Road Reserve (PIN 11645694), Orleans Bay Road Reserve (PIN 11645695)
Site G – Neds Corner Road	7.23 ha within 30.29 ha footprint	Griffiths Road Reserve (PIN 11642267) Neds Corner Road Reserve (PINs 11642047, 11642045, and 11642044)

3.3. Decision on application

Decision:	Granted
Decision date:	31 October 2023
Decision area:	16.19 hectares of native vegetation, as depicted in Section 1.5, below.

3.4. 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 21 days and one submission was received. Consideration of matters raised in the public submission is summarised in Appendix B.

In making this decision, the Delegated Officer had regard for the site characteristics (see Appendix C), relevant datasets (see Appendix H.1), the findings of a flora, fauna and vegetation survey (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 which is to improve road safety across multiple roads within the Shire of Esperance.

After consideration of the above information, as well as the avoidance, minimisation and mitigation actions taken by the Shire, the Delegated Officer determined that the proposed clearing will result in the following significant residual impacts:

- the loss of 7.69 hectares of native vegetation that provides foraging habitat for Carnaby's cockatoo (*Zanda latirostris*, EN),
- the loss of 13.10 hectares of suitable breeding habitat for malleefowl (*Leipoa ocellata*, VU),
- the loss of 2.46 hectares of native vegetation that is representative of the Commonwealth listed threatened ecological community (TEC) 'Proteaceae Dominated Kwongkan Shrublands of the southeast coastal floristic province of Western Australia' (Kwongkan Shrublands),
- the loss of 0.17 hectares of native vegetation that is representative of the priority ecological community (PEC) 'Swamp Yate, *Eucalyptus occidentalis*, woodlands in seasonally inundated clay basins in the South Coast of Western Australia' (Swamp Yate PEC - Priority 3),
- the loss of 16.19 hectares of significant remnant vegetation, including:
    - the loss of 7.35 hectares of native vegetation in an extensively cleared landscape, and
    - the loss of 9.56 hectares of vegetation mapped as and representative of highly cleared Beard vegetation associations (BVA) 512, 5048, and 6048.

In accordance with the Government of Western Australia's *Environmental Offsets Policy* (2011) and *Environmental Offsets Guidelines* (2014), the Delegated Officer determined that the following land acquisition offsets are required to address the above significant residual impacts:

- **Offset area 1 (banked offset)**: the change in Crown Reserve (35302) vesting from 'gravel' to 'conservation' comprising of 116.75 hectares of native vegetation, which provides:
    - vegetation in Very Good to Excellent condition (Keighery, 1994) within a highly cleared area,
    - high quality Carnaby's black cockatoo foraging habitat (Excellent to Very Good condition), and
    - vegetation representative of the Kwongkan Shrubland TEC (Pristine to Good condition).

- **Offset area 2 (banked offset)**: the change in Crown Reserve (26912) vesting from 'recreation and parklands' to 'conservation' comprising 1,661.70 hectares of native vegetation, which provides:
    - vegetation in Good to Excellent condition within a highly cleared area, and
    - suitable malleefowl foraging and breeding habitat.

- **Offset area 3:** the change in Crown Reserve (24633) vesting from 'recreation and parklands' to 'conservation' comprising 201.33 hectares of native vegetation (Reserve), which provides:
    - vegetation in Very Good to Excellent condition (Keighery, 1994), and
    - vegetation representative of the Swamp Yate PEC.

The Delegated Officer determined that the above offset was sufficient to counterbalance the significant residual impacts associated with this project. 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:

- potential indirect impacts to the surrounding flora and vegetation, including but not limited to conservation significant flora, Swamp Yate PEC, and Kwongkan Shrublands TEC, from risk of the introduction and spread of weeds and dieback into adjacent native vegetation,
- potential risk of land degradation from minor wind erosion, and
- potential direct impacts to fauna utilising the application area during the time of clearing.

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,
- construction activities to occur within three months of clearing to minimise wind erosion risks,
- undertake slow, progressive one directional clearing to allow terrestrial fauna to move into adjacent habitat ahead of the clearing activity,
- rehabilitation of 5.64 hectares within site A, post gravel 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.

3.5. Site maps

Figure 1a Map of the application area (Cascade Road and Gravel Pits, site A)

The areas crosshatched yellow indicate the areas authorised to be cleared under the granted clearing permit.

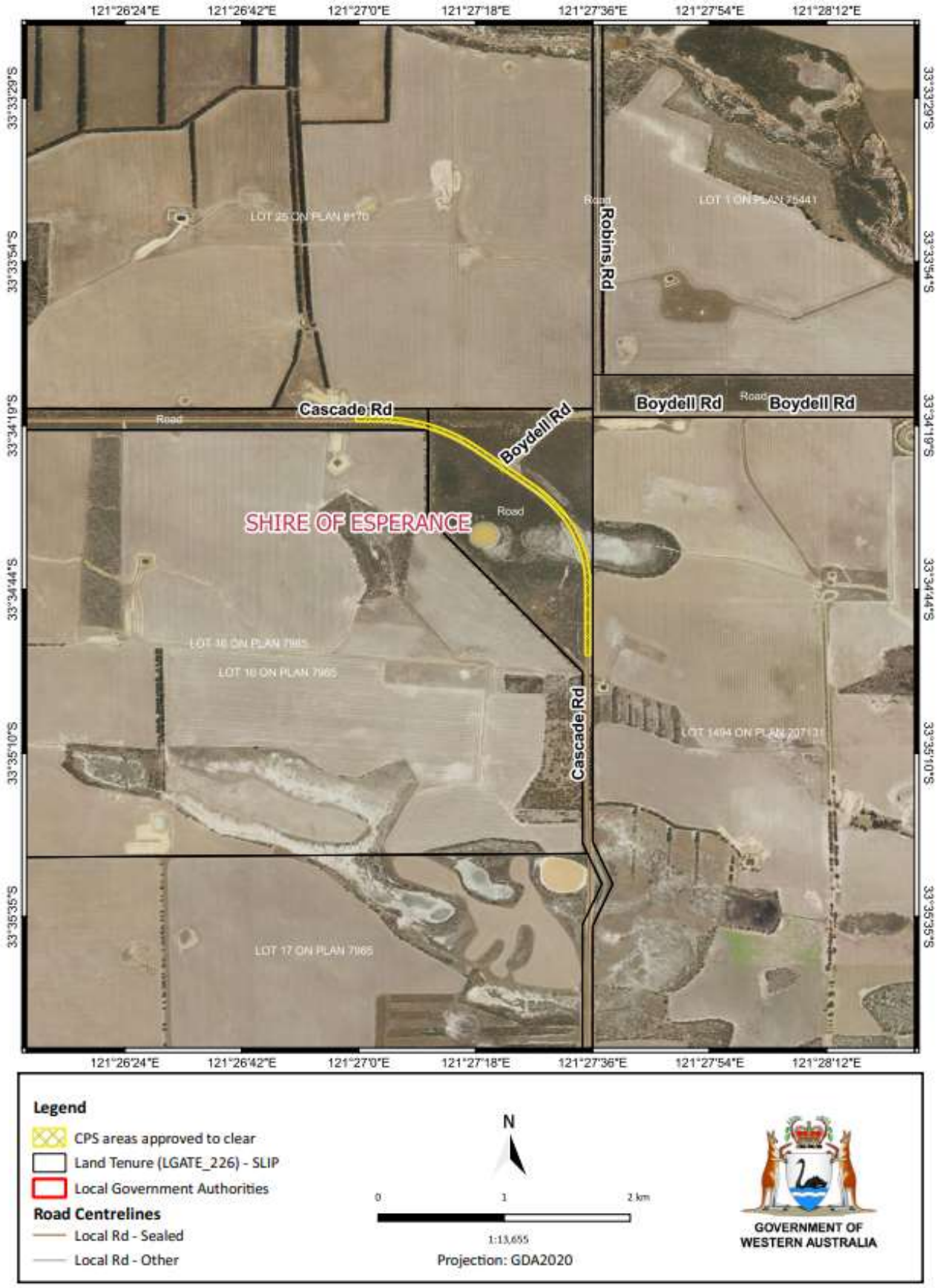


Figure 1b Map of the application area (Cascade Road Bend, site B)

The areas crosshatched yellow indicate the areas authorised to be cleared under the granted clearing permit.

Figure 1c Map of the application area (Wharton Road, site F)

The areas crosshatched yellow indicate the areas authorised to be cleared under the granted clearing permit.

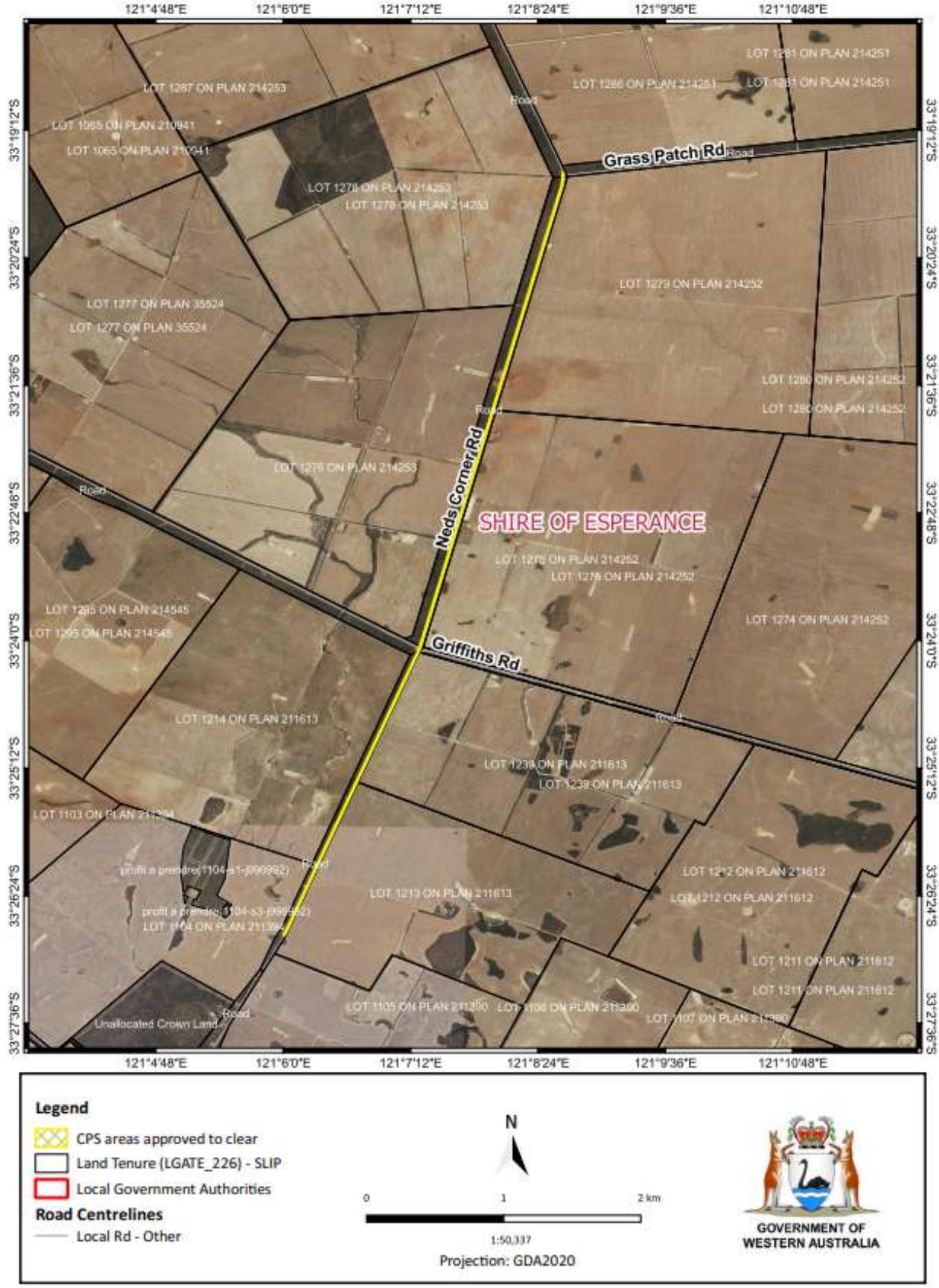


Figure 1d Map of the application area (Neds Corner Road, site G)

The areas crosshatched yellow indicate the areas authorised to be cleared under the granted clearing permit.

2 Legislative context

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

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

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

Other legislation of relevance for this assessment include:

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

Relevant policies considered during the assessment include:

- *Environmental Offsets Policy* (2011)

The key guidance documents which inform this assessment are:

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

Avoidance and minimisation

The original application submitted by the Shire was to clear 28.81 hectares across seven sites. This would have resulted in the following significant residual impacts:

- the loss of 18.47 hectares of suitable malleefowl breeding habitat,
- the loss of 10.09 hectares of native vegetation that provides significant foraging habitat for Carnaby's cockatoo,
- the loss of 2.49 hectares of native vegetation that is representative of the Kwongkan Shrublands TEC,
- the loss of 0.34 hectares of native vegetation that is representative of the Swamp Yate PEC,
- the loss of vegetation considered significant as remnants in a highly cleared landscape.

Through the exclusion of sites C, D and T, the Shire revised the application area to 16.19 hectares to reduce the significant residual impacts to:

- the loss of 13.10 hectares of suitable malleefowl breeding habitat,
- the loss of 7.69 hectares of native vegetation that provides foraging habitat for Carnaby's cockatoo,
- the loss of 2.46 hectares of native vegetation that is representative of the Kwongkan Shrublands TEC,
- the loss of 0.17 hectares of native vegetation that is representative of the Swamp Yate PEC,
- the loss of vegetation considered significant as remnants in a highly cleared landscape.

Regarding all sites, the Shire advised that to mitigate the impacts of clearing vegetation, where feasible clearing will not occur to the full permitted width, conserving vegetation. As standard practice the Shire noted that Project Managers and Project Supervisors communicate the location of significant flora and vegetation areas to staff in onsite debriefs. Additionally, Shire Environmental Officers will be demarcating prior to clearing to avoid unnecessary or accidental vegetation impacts.

The Shire (Shire of Esperance, 2022d) also provided the following specific avoidance and minimise information regarding several of the sites:

- The Shire has reduced the total footprints of the roads to mitigate the impact to these highly cleared vegetation communities. It is not practical for any further reduction of road widths to occur.
- Extracting gravel along Cascade road was only considered after significant efforts had been made to extract gravel from cleared farmland had failed. Clearing of native vegetation was only considered after other options had been exhausted.

- A portion of the vegetation representative of the Beard vegetation type 512 that is proposed to be cleared within site A will be rehabilitated post gravel extraction.

Mitigation

A Rehabilitation Plan was provided by the Shire for the rehabilitation of 5.64 hectares within site A, which will be rehabilitated post gravel extraction (Shire of Esperance, 2023b). In addition, the Shire prepared a Dieback and Invasive Weed Management Plan (Shire of Esperance, 2023a), outlining the risks of weed and dieback introduction and spread within each site and the management measures to be undertaken, including:

- Schedule activities in high dieback risk areas for low rainfall months and avoid wet or muddy conditions.
- Be aware of dieback free and infested areas prior to activities commencing.
- Regularly clean all vehicles and equipment, to keep in a clean condition.
- Clean all vehicles and equipment prior to starting works at a new location.
- Additional regular clean down measures including regular washdowns will be carried out for project areas that have vegetation in excellent condition.
- Construction works at each site to start at sections of least weed infestation and move to the more weedy sections.
- Stay on established roads and tracks.

The Delegated Officer was satisfied that the applicant has made a reasonable effort to avoid and minimise potential impacts of the proposed clearing on environmental values.

After consideration of avoidance and mitigation measures, it was determined that an offset to counterbalance the significant residual impacts to fauna habitat, conservation significant ecological communities and significant remnant vegetation was necessary. In accordance with the Government of Western Australia's *Environmental Offsets Policy* (2011) and *Environmental Offsets Guidelines* (2014), these significant residual impacts have been addressed through the conditioning of environmental offset requirements on the permit. The nature and suitability of the offset provided are summarised in Section 4.

3.2. Assessment of impacts on environmental values

In assessing the application, the Delegated Officer has had regard for the site characteristics (see Appendix C) 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 biological values (fauna habitat, priority flora and ecological communities), 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 (flora and vegetation) - Clearing Principles (a), (c) and (d)

Assessment

The application area is mapped within the Mallee and Esperance plains IBRA regions. These regions fall within the South-west botanical province. According to the technical guidance – *Flora and Vegetation Surveys for Environmental Impact Assessment*, the ideal survey timing within this region is during Spring (September – November) (EPA, 2016). The Shire conducted multiple surveys across the application area in accordance with this guidance (Shire of Esperance, 2021b; 2022a-c) (see Table 2 below).

Table 2. Survey type and timing for each site proposed to be cleared (Shire of Esperance, 2021b; 2022a-c).

Site	Level 1 flora survey	Targeted flora survey
A – Cascade Road and Gravel Pits	September 2020	August and September 2021
B – Cascade Road bend	July 2021	July 2021 and September 2021
F – Whartons Road	October 2021	-
G – Neds Corner Road	September 2021	December 2023

Summary of clearing areas

Site A

The proposed clearing of 6.56 hectares at site A occurs along Cascade Road reserve and includes two small areas proposed to be used for gravel pits (Figure 1a). Two vegetation types were identified within site A with the condition of the vegetation ranging from Excellent to Completely Degraded (Keighery, 1994) (see Appendix C). A portion of vegetation type A in Excellent condition met the guidelines for the Kwongkan Shrublands TEC. No threatened flora species were recorded during the survey, however five priority flora species, *Acacia diminuta* (P1), *Guichenotia asteriskos* (P2), *Goodenia laevis* subsp. *laevis* (P3), *Grevillea aneura* (P4) and *Gyrostemon ditrigynus* (P4) were recorded (Shire of Esperance, 2022a).

Site B

A total of 0.13 hectares is proposed to be cleared along the bend of Cascade Road reserve within site B. One vegetation type was recorded within site B in Excellent to Very Good condition (Keighery, 1994) (see Appendix C). No threatened or priority flora species were recorded during the survey (Shire of Esperance, 2021b).

Site F

The proposed clearing of 2.28 hectares at site F occurs along the Whartons Road reserve. Surveys conducted at this site recorded four vegetation types in Excellent to Good condition (Keighery, 1994) (see Appendix C). Vegetation type D was identified as the Kwongkan Shrubland TEC. No threatened species were recorded during the survey, however three priority flora species *Leucopogon corymbiformis* (P2), *Astartea elobata* (P2) and *Leucopogon apiculatus* (P3) were recorded (Shire of Esperance, 2022b).

Site G

The proposed clearing of 7.23 hectares at site G occurs along Neds Corner Road reserve. Surveys undertaken at this site recorded five vegetation types in Excellent to Completely Degraded condition (Keighery, 1994) (see Appendix C). Vegetation type A in Good to Very Good condition was identified as representative of the Kwongkan Shrublands TEC and vegetation type B in Very Good condition met the definition of the Swamp Yate PEC. No threatened flora species were recorded during the survey, however two priority flora species *Melaleuca similis* (P1) and *Goodenia laevis* subsp. *laevis* (P3) were recorded (Shire of Esperance, 2022c).

Ecological communities

According to available databases, two conservation significant ecological communities occur within the local area (20 kilometres from the application area);

- the Kwongkan Shrublands TEC listed as Endangered under the EPBC Act, regarded by DBCA as a priority 3 community and,
- the Swamp Yate PEC, regarded by DBCA as a priority 3 community.

Kwongkan Shrublands TEC

This ecological community is found in the south coast region of Western Australia dominated by flowering shrub species from the Proteaceae family (e.g. *Banksia*, *Grevillea*, *Hakea*). It is facing a high level of threat due to fragmentation that has resulted in a severe reduction in its integrity across its geographic distribution. Remaining areas of this TEC are vulnerable to the impacts of threats such as dieback due to *Phytophthora cinnamomi*, changing fire regimes, land clearing, invasive species, and climate change (Commonwealth of Australia, 2014). According to available databases, multiple occurrences of the Kwongkan Shrublands TEC occur within the local area of the application area with the nearest occurrence 4.1 kilometres south of site G.

The areas considered critical to the survival of the Kwongkan Shrubland TEC cover all patches that meet the key diagnostic characteristics and condition thresholds for the ecological community, and the buffer zones, particularly where this comprises surrounding native vegetation (Commonwealth of Australia, 2014). Vegetation representative of the Kwongkan Shrublands TEC was recorded within three sites (site A, F and G) across the application area (Shire of Esperance,2022a-c). A total of 2.46 hectares of vegetation in Good to Excellent condition was found to meet the guidelines for this TEC. Within site A, 1.32 hectares was recorded, within site F, 0.90 hectares and within site G, 0.24 hectares. In addition to the above proposed clearing of 2.46 hectares of the Kwongkan Shrubland TEC, 5.89 hectares has been approved to clear under the Shire's strategic purpose permit CPS 9341/1.

Weed invasion was recorded across the majority of the application area, however the burden of these species on the natural vegetation varied from low to high across the various sites. The survey undertaken at site A recorded a low weed burden (seven invasive species), however surveys across sites F and G recorded a higher weed burden (11

and 21 invasive species respectively). The proposed clearing may increase the distribution of weeds along roads and within adjacent vegetation that may represent this TEC.

Additionally, the spread of dieback into adjacent areas of the TEC is considered a risk. Within site A and F signs of dieback were recorded during the flora and vegetation surveys (Shire of Esperance, 2022a; 2022b). According to the Phytophthora Hazard Dispersion Model, all occurrences of this TEC within the application area (site A, F and G) occur in vegetation considered susceptible to dieback (Shire of Esperance, 2022a-c). Given this, it is considered likely that the proposed clearing will increase the risk of distribution of dieback along the application areas and within adjacent vegetation that may represent the TEC.

Swamp Yate PEC

The Priority 3 Swamp Yate PEC was recorded at site G within the application area (Shire of Esperance, 2022c). Priority Ecological Communities for Western Australia Version 32 (DBCA, 2008) defines this PEC as "Yate woodlands with intact understorey and fringing vegetation". Within site G, *Eucalyptus occidentalis* was present continuously within the two mapped areas, the southern area of vegetation type B had a disturbed understorey that had been heavily invaded by weeds, and was therefore considered not to meet the definition provided by the Department of Biodiversity Conservation and Attractions (DBCA). The northern area of this vegetation type was in Very Good condition and was considered to meet the definition of this PEC. Approximately 0.17 hectares of vegetation type B in Very Good (Keighery, 1994) condition was considered to represent the Swamp Yate PEC (Shire of Esperance 2022c).

As noted above in regards to the Kwongkan Shrubland TEC, the proposed clearing may increase the distribution of dieback and weeds along roads and within adjacent vegetation that may represent this PEC (Shire of Esperance, 2022a-c).

Conservation significant flora

According to available databases, a total of 88 conservation significant flora species are recorded within a 20 kilometre radius of each of the four sites across the application area. A likelihood of occurrence assessment was undertaken for the threatened and priority flora located within the local area taking into consideration, preferred habitat types, including soil and vegetation types mapped over the various sites across the application area. The likelihood analysis concluded that the application area may comprise suitable habitat for 34 conservation significant flora species.

Flora and vegetation surveys (Shire of Esperance, 2021b, 2022a-c) undertaken for the four sites across the application area identified ten priority flora species within the application area:

- *Acacia diminuta* (P1),
- *Melaleuca similis* (P1),
- *Astartea elobata* (P2),
- *Guichenotia asteriskos* (P2),
- *Leucopogon corymbiformis* (P2),
- *Banksia xylothemelia* (P3)
- *Goodenia laevis* subsp. *laevis* (P3),
- *Leucopogon apiculatus* (P3),
- *Grevillea aneura* (P4), and
- *Gyrostemon ditrigynus* (P4).

Acacia diminuta (P1)

Acacia diminuta is known from seven individuals throughout the Mallee IBRA region. This species occurs on brown to yellow sandy loam or clay, and is associated with mallee scrub including *Eucalyptus* spp., *Melaleuca* spp., *Hakea* spp., *Acacia* spp., *Calothamnus* spp., *Hibbertia* spp., *Darwinia* spp., and *Hypocalymma* spp. (Western Australian herbarium, 1988-).

Across site A, a total of 11 individual plants were recorded within vegetation type F (see Appendix C). Since the survey, the clearing area has been adjusted to avoid the clearing of this species. The proposed clearing will not directly impact *Acacia diminuta* individuals, however the Shire will flag these occurrences to prevent accidental clearing (Shire of Esperance, 2022a).

Melaleuca similis (P1)

According to available databases, seven *Melaleuca similis* records are known to the Esperance plains and Mallee IBRA regions, of these, four are recorded within the local area.

A known population of *Melaleuca similis* occurs adjacent to the proposed clearing area at site G. A targeted flora survey was conducted in January 2021 to record an accurate population count of this occurrence. During this survey, a total of 39 plants were recorded, with only a single plant recorded within the proposed clearing area (Shire of Esperance, 2022c). The proposed clearing of 2.6% of this population is not considered likely to have a significant impact on the local population of this species.

As a mitigation measure, the Shire have proposed to collect seeds from this population prior to clearing occurring with collected seed being forwarded to DBCA (Shire of Esperance, 2022c).

Astartea eobalta (P2)

A population of 36 plants was recorded by the Shire during the Spring surveys of the application area within site F. Of these, 26 plants occur within the proposed clearing area.

Florabase contains 10 records of *Astartea eobalta* within the Esperance plains IBRA region. This species has been recorded within road reserves, creek lines and swampy areas, on grey or white sand over limestone gravel. Frequency of plants for each record ranges from one plant to 50 plants (Western Australian Herbarium, 1998-). Records span across a geographic range of 83 kilometres with five populations located within National Parks.

Advice from DBCA notes that this species is newly described, poorly known and the distribution and habitat requirements are not well understood, concluding that a loss of 72% of the population is likely to be locally and regionally significant. DBCA supports the proposed mitigation strategies of seed collection and lodgement with the WA Threatened Flora Seed Centre and flagging of nearby plants for avoidance during project operations (DBCA, 2023a).

Guichenotia asteriskos (P2)

Guichenotia asteriskos has a distribution over 200 kilometres east to west and 112 kilometres north to south when including this new population which is at the furthest south-east of all populations. This species is associated with heaths of *Banksia* spp., *Acacia* spp., and *Grevillea* spp. on sandy clay or loam with gravel, often found in areas of disturbance (such as road reserves). Across the Avon Wheatbelt, Esperance Plains and Mallee IBRA region there are 21 known records of *G. asteriskos* (Western Australian Herbarium, 1998-).

Within site A, a total of 105 individuals were recorded, of these, 55 occur within the proposed clearing area (Shire of Esperance, 2022a). The Shire noted that many more plants were visible in chained areas outside of the survey area, however these were not counted. It is considered by the Shire that there is likely to be significantly more of this species along the chained areas due to the high habitat suitability. Additional surveys undertaken by the Shire of the surrounding vegetation in Spring of 2022 recorded an additional 18 plants. Of these additional plants recorded, 11 of these are planned to be cleared under a recent permit application (Shire of Esperance, 2023c).

Advice sought from DBCA noted that based on the current known data, the removal of 66 (55 individuals under this proposed clearing and a further 11 proposed to be cleared under future projects) out of 123 individuals (54%) is likely to be significant at a local scale (DBCA, 2023b).

To mitigate the impacts of the proposed clearing on this species, the Shire have proposed to revegetate 5.64 hectares within site A post gravel extraction (Sire of Esperance, 2023b). The Shire has noted that given the current local distribution of this species there will likely be a similar or higher number of plants within the rehabilitated gravel pits (Sire of Esperance, 2023c). In addition, the Shire has proposed to undertake seed collection and lodgement at the WA Threatened Flora Seed Centre for *Guichenotia asteriskos* from Site A.

Leucopogon corymbiformis (P2)

A total of 12 records of *Leucopogon corymbiformis* are known from the Esperance IBRA region. No records are located within the local area of the proposed clearing areas. The closest record is located 32 kilometres east of site B.

The Shire recorded four individuals of *L. corymbiformis* within site F (Shire of Esperance, 2022b), with all four proposed to be cleared. Database records indicate the closest known populations are approximately 37 kilometres to the east and 45 kilometres to the west of site F. Advice received from DBCA notes that while there are several collections at the western most end of the species range near Esperance, and at the eastern end of its known range

in Cape Arid National Park, no other locations, apart from the four individuals proposed to be taken, occur within the middle of its range. Consequently, the proposed impacts have the potential to be regionally significant (DBCA, 2022a).

Additional surveys conducted by the Shire (Shire of Esperance, 2022d) mapped the population of *L. corymbiformis* at this location and identified a total of 500 individuals. In addition, the Shire have revised the total number of individuals to be cleared from four to three. Therefore, the revised impact of less than 1% of the population is not considered to be significant at a local or regional level (DBCA, 2022b).

Banksia cirsioides / xylothemelia (P3)

A suspected specimen of *Banksia xylothemelia* found during the survey of site A was sent to the WA Herbarium for identification. However, the plant could not be determined to species level and was identified by Michael Hislop as either *Banksia cirsioides* or *B. xylothemelia*. One individual was recorded within the proposed clearing area with an additional 20 located outside.

Banksia xylothemelia, P3, is a fairly widespread species with 50 records known across the Mallee and Esperance IBRA region. Database records show one record within the local rea of site A, approximately eight kilometres from the proposed clearing area. The population recorded within site A represents the eastern most extent for the species' distribution, however, the clearing of one potential individual is not considered likely to be significant at a local or regional level (DBCA, 2022a).

Goodenia laevis subsp. *laevis* (P3)

Goodenia laevis subsp. *laevis* occurs across a large geographical area from northwest of Cascade, east to Cape Arid and north to Norseman, extending into the Bremer Range. The extent of occurrence is over 18,000 square kilometres. According to database records *Goodenia laevis* subsp. *laevis* is known from 22 records across the Coolgardie, Mallee and Esperance Plains IBRA regions.

Populations of *Goodenia laevis* subsp. *laevis* were recorded within the application area at sites A and G (Shire of Esperance, 2022a; 2022c). Within site A, a population of 174 plants was recorded during the Spring survey. Of these, 56 individuals are located within the application area and 116 are located within close proximity to the clearing area. Within site G, a total of 786 individuals were recorded, of which 319 are proposed to be cleared.

In the survey reports provided for site A and G, the Shire have noted the discovery of numerous new populations of *Goodenia laevis* subsp. *laevis* since the 2019 flora surveys. At all sites, the plants were present in the road active footprint that have a high level of disturbance. It can be inferred that the abundance of *Goodenia laevis* subsp. *laevis* at the site is partially due to the disturbance cause by mechanical grading of the road shoulders (Shire of Esperance, 2022a). In addition, the Shire has advised that *Goodenia laevis* subsp. *laevis* has been nominated for downgrading of conservation status by the Esperance District DBCA Conservation Officer on the basis of its commonality throughout the Shire of Esperance (Shire of Esperance, 2022a; 2022c).

Advice received from DBCA noted that the proposed impact of 172 out of 174 individuals (~99%) at site A represents a significant local impact. However, given the number of populations reported in site A, the impact is not considered significant at a species level.

Leucopogon apiculatus (P3)

Leucopogon apiculatus is known from 56 records across a 173 kilometre range from Cape Le Grand to Mount Esmond in Nuytsland Nature Reserve. Six records occur within the local area of site F with the closest 0.31 kilometres from the proposed clearing area.

During surveys conducted across the application area, a total of 282 individuals of *Leucopogon apiculatus* were recorded. Of these, 157 will be directly impacted (55.6%). The species has a wide range and extensive known populations within national parks and nature reserves. Four other known populations of *Leucopogon apiculatus* within the adjacent Cape Le Grand National Park (R41097) will be retained. Given this and advice received from DBCA (DBCA, 2022a), the impacts are not considered to be significant local or regionally.

Grevillea aneura (P4)

Grevillea aneura has a range spanning 330km West to East and 84km North to South with known populations in the Shire of Esperance, Lake Grace, Kondinin and Ravensthorpe. According to database records, there are a total of 51 known individuals across the Mallee and Esperance Plains IBRA regions. The nearest record is located 0.11 kilometres form the application area (site A).

During the flora and vegetation surveys undertaken for site A, a total of 387 plants were recorded, of which 342 will be directly impacted (88%). The surrounding vegetation and community was not surveyed to determine the extent of the population. Given that the species within the pits and Cascade road, separated by only 400 metres, it is considered likely the species continues through the immediate area.

DBCA advice received noted that the proposed clearing of 88 per cent of the population within site A is significant at a local level. However, DBCA also noted that the species has a wide distribution with 51 collections made, including several collections near site A and it is therefore likely the species occurs throughout the adjacent area. Given the above, the proposed impacts are not considered significant at the species level, however they may be significant at a local level (DBCA, 2022b).

Gyrostemon ditrigynus (P4)

According to available databases, *Gyrostemon ditrigynus* is known from 34 records across the Mallee and Coolgardie IBRA regions. Two records occur within the local area with the closest record 2.64 kilometres from the application area (site A).

One specimen was recorded within site A during 2021 Spring surveys (Shire of Esperance, 2022a). The plant was growing in the area burned in 2016, likely the last plant from mass germination event after the fire, with *Gyrostemon ditrigynus* being known for senescing shortly after fire. A follow up survey was conducted in January of 2022 to accurately count and map the population, however, no additional plants were found within this population. During the follow up survey, a second population was discovered along cascade Road. The population extended for the entire length of the 10 kilometre long 2020 fire scar with the population having hundreds of plants for every 100 metres of road. Given this and the wide distribution of *Gyrostemon ditrigynus,* the clearing of one individual is not considered likely to be significant at a local or regional level.

Considering the above impacts to conservation significant flora, PEC and TEC, and advice received from DBCA (DBCA, 2022a-b; 2023a-b), the department requested additional mitigation and management measures to be provided by the Shire including a revegetation plan for the proposed revegetation within site A post gravel extraction. The Shire prepared a *Revegetation Plan* and a *Weed and Dieback Management Plan* outlining the risks of weed and dieback introduction and spread within each site and the management measures to be undertaken (Shire of Esperance, 2023a; 2023b), see Section 3.1 above.

Conclusion

Given the above, it is considered that the clearing of 2.46 hectares of Kwongkan Shrubland TEC and 0.17 hectares of Swamp Yate PEC constitutes a significant residual impact. In accordance with the Government of Western Australia's Environmental Offsets Policy and Environmental Offsets Guidelines, this significant residual impact has been addressed through the conditioning of environmental offset requirement, see Section 4 below.

Whilst the proposed clearing will remove individuals of priority flora, the impacts are not considered to be regionally significant nor will the clearing impact the conservation status of the species. The proposed works also has the potential to lead to indirect impacts to the above ecological communities and priority flora species from the introduction and/or spread or weeds and dieback.

Conditions

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

- weed and dieback management to manage potential impacts to adjacent vegetation as a result of the proposed clearing,
- the revegetation of 6.56 hectares within site A post gravel extraction,
- undertake seed collection and lodgement at the WA Threatened Flora Seed Centre for:
    - *Guichenotia asteriskos* (P2) from site A,
    - *Melaleuca similis (P1)* from site G, and
    - *Astartea eobalta* (P2) from site F
- provision of an offset (see section 4).

3.2.2. Biological values (fauna) - Clearing Principles (a) and (b)

Assessment

According to available databases, 41 conservation significant fauna species have been recorded within the local area (20 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 preferred habitat types of each fauna species, the proximity of records to the application area, and the type and condition of the vegetation within the application area.

Basic fauna surveys were conducted across the various sites within the application area in accordance with the technical guidance -*Terrestrial Fauna Surveys for Environmental Impact Assessment* (EPA, 2016). Taking into account the findings of these surveys and the likelihood assessment, the application area is considered likely to comprise suitable habitat for two conservation significant fauna species; Carnaby's cockatoo (*Zanda latirostris*), listed as Endangered under the EPBC Act and BC Act, and malleefowl (*Leipoa ocellata*), listed as Vulnerable under the EPBC Act and BC Act.

In addition, several bird species were considered possible to occur within the application area such as the crested tern (MI), caspian tern (MI), common sandpiper (MI) and the hooded plover (P4). These species are associated with coastal wetlands and mudflats and are known to forage on and around salt lakes (see Appendix C.4). The vegetation within site F and site B (see Appendix C) may provide suitable foraging habitat for these species. However, given the linear nature of these sites and the proximity to an active road, these sites are not considered to provide suitable breeding habitat.

Malleefowl (*Leipoa ocellata*, VU)

Malleefowl are found in arid and semi-arid areas dominated by mallee eucalypts on sandy soils (DPaW, 2016). They are known to also occur in mulga (*Acacia aneura*), broombush (*Melaleuca uncinata*), scrub pine (*Callitris verrucosa*), Eucalyptus woodlands and coastal heathlands. Malleefowl require abundant leaf litter and a sandy substrate for the successful construction of nest mounds (DPaW, 2016). The remaining populations of Malleefowl are highly fragmented due to extensive land clearing.

No Malleefowl or evidence of Malleefowl activity was encountered during the basic fauna surveys conducted across the application area. However, noting the above habitat requirements, site A and site G contain woodland and shrublands considered potentially suitable habitat for Malleefowl (Shire of Esperance 2022a; 2022c). A total of 13.10 hectares of suitable breeding habitat for Malleefowl occurs across the application area.

The entire proposed clearing area of site A, is considered to be suitable habitat for Malleefowl, including areas of suitable Malleefowl nesting habitat due to its sandy substrate and high leaf litter levels (Shire of Esperance, 2022a). Malleefowls are particularly susceptible to fires, and some areas within site A and areas adjacent were recently burnt. The vegetation within site G remains unburnt and is considered to provide suitable organic material for malleefowl breeding mounds, however no signs of malleefowl and no malleefowl mounds were recorded during the fauna surveys across either site. The fauna survey noted evidence of foxes at the site reducing the suitability of the site for Malleefowl. (Shire of Esperance, 2022c).

Advice received from DBCA on the significance of the clearing of 13.10 hectares malleefowl habitat noted that the proposed clearing of malleefowl habitat within a highly cleared landscape would be considered significant due to cumulative impacts (DBCA, 2022a). However, the majority of locations proposed to be cleared are relatively small, linear in nature and a number are highly disturbed. As a result, the consequence is likely to be minor due to other threatening processes (i.e. weeds, increased likelihood of vehicle strike).

To mitigate the loss of malleefowl habitat, the Shire has committed to revegetating site A post gravel extraction (see section 3.1).

Carnaby's cockatoo (*Zanda latirostris*, VU)

According to available databases the application area occurs within the known distribution of Carnaby's cockatoo, but just outside of the known breeding range (see Figure 2a and 2b). According to the department's likelihood assessment and the basic fauna surveys undertaken by the Shire of Esperance (Shire of Esperance, 2022a-d;

2023c), all four sites across the application area are considered to contain suitable habitat for Carnaby's cockatoo. Black cockatoo habitat can be considered in terms of foraging, breeding and roosting habitat (DAWE, 2022).

The application area is located within the Esperance plains and Mallee IBRA regions of the South Coast of Western Australia. This region provides a range of foraging resources for black cockatoos, in particular Carnaby's cockatoos. Carnaby's forage on the seeds, nuts and flowers of a variety of plants, including Proteaceous species (*Banksia*, *Hakea* and *Grevillea*), as well as *Allocasuarina* and *Eucalyptus* species, marri and a range of introduced species (DAWE, 2022). A variety of vegetation types across the application area were identified as suitable foraging habitat for Carnaby's (Shire of Esperance, 2022a-d; 2023c). A total of 7.69 hectares of suitable foraging habitat was recorded across the application area:

- Site A contains approximately 6.56 hectares of scattered/open *Hakea laurina* and mallee woodland' and 'semi-open Mallee with scattered *Banksia media* open shrubland,
- Site F contains approximately 0.90 hectares of scattered *Banksia speciosa* over *Taxandria callistachys* dominated mixed heath with Cyperaceae and Restionaceae understorey,
- Site G contains approximately 0.23 hectares of *Banksia media* dominated mixed shrubland with *Eucalyptus pleurocarpa* and *Hakea cinerea.*

Breeding habitat for species of black cockatoos is described within the 'EPBC Act referral guidelines for three threatened black cockatoo species' (DAWE, 2022) which includes a list of tree species known to support breeding which either, have a suitable nest hollow or are of a suitable diameter at breast height (DBH) to develop a nest hollow. For most tree species, suitable DBH is 500 mm. According to available datasets, the application area is located outside of the predicted breeding range for Carnaby's and is over 52 kilometres east of the nearest modelled breeding area for Carnaby's cockatoo (Commonwealth of Australia, 2012). No suitable breeding habitat was recorded within the application area given the lack of suitable sized trees and lack of hollows present (Shire of Esperance, 2022a-d; 2023c).

During the breeding season, black cockatoos area known to forage in areas up to 12 kilometres from their breeding nests. Foraging resources in proximity to known breeding sites are significant as black cockatoos rely on these foraging resources to successfully raise chicks. Given no suitable breeding habitat trees were recorded within the application area and the closest known breeding site is over 88 kilometres from the clearing areas, the vegetation within the application area is unlikely to be supporting foraging by breeding individuals.

Black cockatoo night roosts are usually located in the tallest trees of an area, and in close proximity to both a food supply and surface water (DAWE, 2022). According to available databases, known roost sites are recorded within close proximity to site F (8.9 kilometres), however no known roost sites have been recorded within 20 kilometres of site A, B or G. The basic fauna survey conducted across the application area recorded no suitable habitat for roosting (Shire of Esperance, 2022a-d; 2023c).

During the non-breeding period, black cockatoos will mainly forage in areas up to 20 kilometres from night roosting habitat, and in some cases this distance is greater. Black cockatoos rely upon the availability of night roosting habitat in proximity to foraging resources, and rely on access to watering points in selecting night roost sites, with roost sites usually within two kilometres of a watering point. Sites A, B and G are within close proximity to available water sources, however are over 20 kilometres from known roost sites. Given this, these sites are unlikely to support foraging by roosting individuals. Site F is within 20 kilometres of a known roost site, has suitable roosting habitat adjacent and is in close proximity to available water sources. Site F is therefore likely to support foraging by roosting individuals (Figure 2a and 2b).

The ongoing and historic loss and fragmentation of black cockatoo habitat has been a major contributor to the decline in populations of Carnaby's, in particular, the loss of nesting trees, loss of foraging habitat and fragmentation of breeding habitat from foraging resources. Therefore remnant patches of vegetation are considered important in maintaining black cockatoo habitat connectivity across the landscape. Advice received from DBCA on the significance of the proposed clearing on black cockatoo habitat highlighted the conservation values in the application area, specifically the proteaceous and myrtaceous woodlands which are an important food source for Carnaby's cockatoos. The roadside vegetation also forms an integral part of the ecological linkage of vegetation for Carnaby's and other fauna in the area (DBCA, 2022a-b).

Given the above, it is considered that the remaining suitable habitat for this species within its current range is likely to be significant. Specifically, it is considered that the 7.69 hectares of foraging habitat within the application area is significant for Carnaby's cockatoo due to the dominance of preferred foraging species (native proteaceous plant species); the Good to Excellent condition of the majority of the vegetation across the application area and the highly cleared nature of the surrounding local areas.

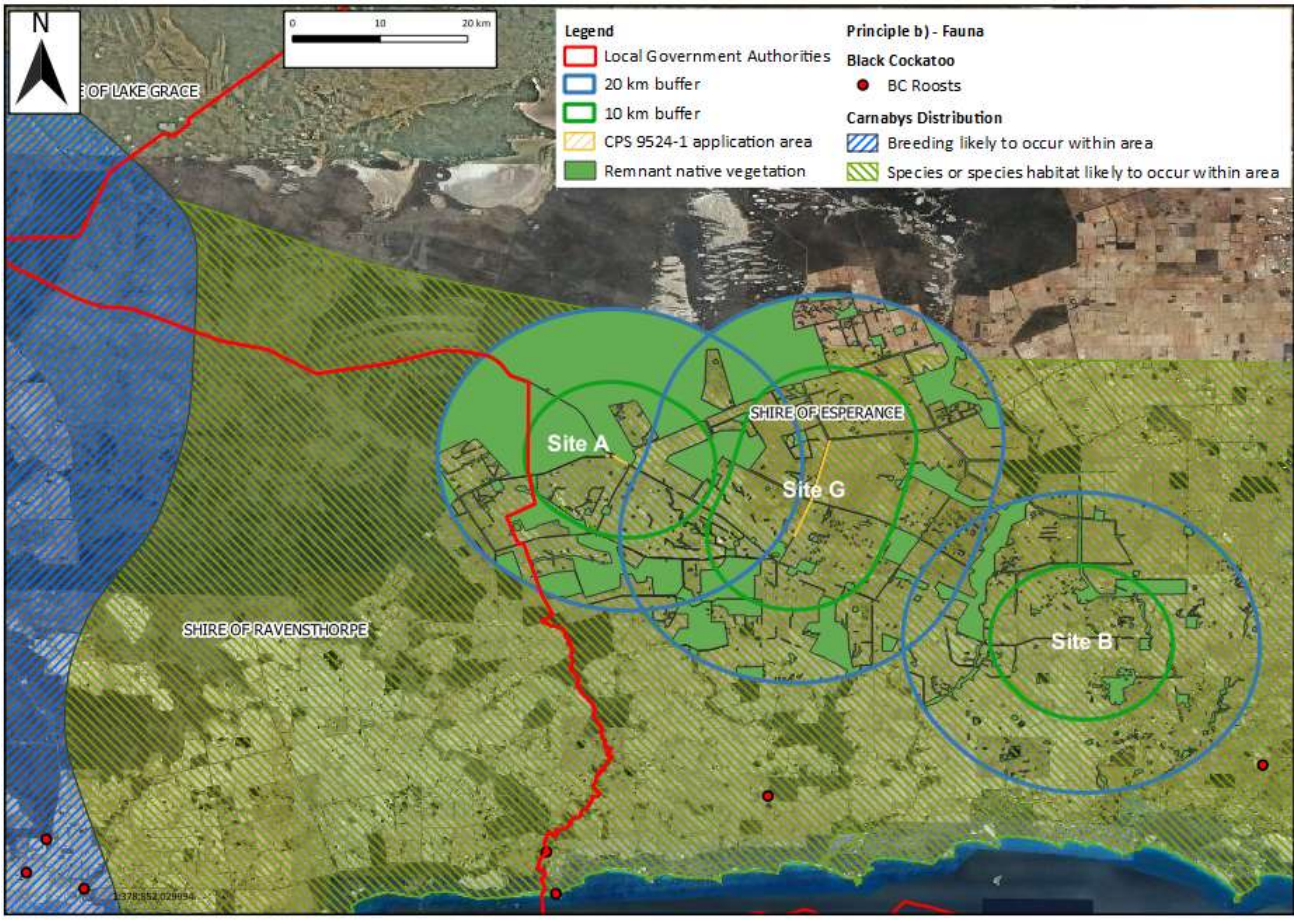


Figure 2. Black cockatoo distribution and roost sites relevant to the application area (sites A, B and G)

Figure 3. Black cockatoo distribution and roost sites relevant to the application area (sites B and F)

Ecological Linkage

The proposed clearing is not within any mapped ecological linkages and the extent of clearing over most of the application area is narrow. However, 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. The ecological linkage function is not expected to be severed by the proposed clearing.

Conclusion

Based on the above assessment, the proposed clearing of 16.19 hectares will result in the loss of 7.69 hectares of Carnaby's cockatoo habitat and 13.10 hectares of malleefowl breeding habitat. The clearing also has the potential to increase the risk of introduction and spread of weeds and dieback into adjacent vegetation impacting the quality of fauna habitat.

The proposed clearing is considered unlikely to contain significant habitat for the remaining conservation significant fauna that have been recorded in the local area. However, individuals may utilise the application area for dispersal through the landscape. Slow, directional clearing will allow fauna species to disperse into other areas of remnant vegetation.

For the reasons set out above, it is considered that the impacts of the proposed clearing on Carnaby's cockatoo foraging habitat and malleefowl breeding habitat constitutes a significant residual impact, and an offset is required (see Section 4).

Conditions

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

- the revegetation of 5.64 hectares within site A post gravel extraction,
- slow, progressive one directional clearing to allow terrestrial fauna to move into adjacent habitat ahead of clearing activity,
- provision of an offset (see section 4).

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 clearance 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 Mallee and Esperance plains IBRA regions. There are five mapped BVA's across the proposed clearing area. Three of these associations, BVA 512, 5048 and 6048 retain less than 30 per cent of their pre-European extent within the IBRA bioregions (see Appendix C.2). Several vegetation types described across the proposed clearing area are considered representative of these restricted vegetation associations. Given this, the proposed clearing will further reduce the extent of these associations (see Table 3).

The extent of native vegetation within the local area (20 kilometres form the application area) of each site is displayed in Table 2 below. The local area of sites B and F retains less than 30 per cent of the present pre-European extent (Commonwealth of Australia, 2001). Given this, 7.35 hectares of native vegetation across these sites areas are considered to be located within an extensively cleared landscape.

As mentioned in section 3.2.1 and 3.2.2 above, the application area contains significant foraging habitat for Carnaby's cockatoo, suitable habitat for malleefowl, Kwongkan Shrublands TEC, Swamp Yates PEC, and priority flora species. Given this, the areas proposed to be cleared are considered significant as remnants in areas that have been extensively cleared.

Table 3. Highly cleared vegetation associations within the application area

Site	Clearing proposed (ha)	Local area vegetation extent (%)	Clearing within BVA 512 (ha)	Clearing within BVA 5048 (ha)	Clearing within BVA 6048 (ha)
Site A	6.56	54.81	6.56	N/A	N/A
Site B	0.12	11.31	N/A	0.12	N/A
Site F	7.23	29.43	N/A	N/A	0.90
Site G	2.28	37.92	2.28	N/A	N/A
Total	**16.19**	N/A	**8.84**	**0.12**	**0.90**

Conclusion

Based on the above assessment, the proposed clearing will result in the loss of 16.19hectares of native vegetation that is a significant remnant within an extensively cleared landscape, including:

- the loss of 7.35 hectares of vegetation located within a highly cleared landscape,
- the loss of 8.84 hectares of the highly cleared BVA 512,
- the loss of 0.12 hectares of the highly cleared BVA 5048 and
- the loss of 0.90 hectares of the highly cleared BVA 6048

For the reasons set out above, it is considered that the impacts of the proposed clearing on 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:

- dieback and weed control, which ensures protocols are put in place to limit the introduction and transportation of dieback- and weed-affected materials,
- the revegetation of 6.56 hectares within site A post gravel extraction,
- provision of an offset (see section 4).

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

Assessment

Principle (f) aims to conserve vegetated watercourses and wetlands and their buffers. As a portion of the application area is mapped within a wetland and intersects a non-perennial river, the vegetation within these areas are considered to be growing in, or in association with, an environment associated with a watercourse and/or wetland.

Riparian vegetation was mapped within sites A and G (Shire of Esperance, 2022a; 2022c). Within site A, 0.125 hectares of wetland fringing vegetation (type A) was recorded. Within site G, two sections of the clearing area fringe upon seasonally inundated *Eucalyptus occidentalis* Yate woodlands. A listed non perennial watercourse also cuts through the Yate Woodland.

The department notes that the land adjacent to the proposed clearing area and local area has been modified through historical clearing for road infrastructure and agriculture. To manage these impacts the Shire has noted that site G has existing culverts in the road (at SLK 36.780) which enables water to flow from one side of the road to the other. These culverts have been in place since the original construction of the road, and no impact on water flows through the wetland or inundation have been observed. When undertaking the necessary road upgrades two new culvert pipes will be used to replace the existing ones (Shire of Esperance, 2022d).

Within the application area, the mapped soils are moderately to highly susceptible to wind erosion and nutrient export. Noting the purpose of the proposed clearing, cleared areas will be replaced with a hard road surface negating any potential for wind erosion. Soils will not be excavated at depth, and groundwater will not be intersected, reducing the risk of exposing any acid sulphate soils. Noting the extent of the proposed clearing, the condition of the vegetation, and standard road construction methods employed, the proposed clearing is not likely to cause appreciable land degradation.

Conclusion

Based on the above assessment, the proposed clearing is unlikely to result in significant impacts to the ecological values of vegetation communities associated with a watercourse or wetland. For the reasons set out above, it is considered that the impacts of the proposed clearing are likely to be minimal, localised and short-term. It is considered that the potential impacts of wind erosion can be managed through a condition on the permit requiring construction works to begin with three months of clearing.

Conditions

To address potential impacts to nearby native vegetation from the proposed clearing, construction works will be required to begin with three months of clearing.

3.3. Relevant planning instruments and other matters

On 24 May 2023, the department was made away that a member of the public had undertaken unauthorised clearing of native vegetation within Neds Corner Road reserve. A portion of this area overlaps with the application area (site G). This incident is currently under investigation by the department's compliance and enforcement team. The Shire have been notified and have advised the department that they wish to maintain the cleared area (Shire of Esperance, 2023e). Given this, the impacts to this vegetation have been considered in the assessment above (Section 3).

Several Aboriginal sites of significance have been mapped within the local area, none of which occur within the application area. It is the permit holder's responsibility to 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 7.69hectares of native vegetation that provides foraging habitat for Carnaby's cockatoo,
- the loss of 13.10 hectares of suitable breeding habitat for malleefowl,
- the loss of 2.46 hectares of native vegetation that is representative of the Kwongkan Shrublands TEC,
- the loss of 0.17 hectares of native vegetation that is representative of the Swamp Yate PEC,
- the loss of 16.19 hectares of significant remnant vegetation, including
    - the oss of 7.35 hectares of native vegetation in an extensively cleared landscape, and
    - the loss of 9.56 hectares of vegetation mapped as and representative of highly cleared Beard vegetation associations 512, 5048, and 6048.

The Shire proposed an environmental offset consisting of the use of three banked offset sites:

- **Offset area 1 (banked offset)**: the change in Crown Reserve (35302) vesting from 'gravel' to 'conservation' comprising of 116.75 hectares of native vegetation, which provides:
    - vegetation in Very Good to Excellent condition (Keighery, 1994) within a highly cleared area within the Shire of Esperance,
    - high quality Carnaby's cockatoo foraging habitat (Excellent to Very Good condition), and
    - vegetation representative of the Kwongkan Shrubland TEC (Pristine to Good condition).

- **Offset area 2 (banked offset)**: the change in Crown Reserve (26912) vesting from 'recreation and parklands' to 'conservation' comprising 1,661.70 hectares of native vegetation, which provides:
    - vegetation in Good to Excellent condition within a highly cleared area within the Shire of Esperance, and
    - suitable malleefowl foraging and breeding habitat.

- **Offset area 3:** the change in Crown Reserve (24633) vesting from 'recreation and parklands' to 'conservation' comprising 201.33 hectares of native vegetation (Reserve), which provides:
    - vegetation in Very Good to Excellent condition (Keighery, 1994), and
    - vegetation representative of the Swamp Yate PEC.

In support of the above offset proposal the Shire has provided site assessment reports and associated data for each of the offset sites (Shire of Esperance, 2023d). See Table 4 below for a summary of the characteristics of each offset site.

In assessing whether the proposed offsets are 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 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.

Table 4. Offset Site characteristics

Reserve 35302 (Lot 1985 on Deposited Plan 91222) – banked offset site	
Size	106.75 hectare site: • 44.75 hectares previously used for CPS 9341/1 • The remaining 62 hectares to be used for this Permit
Area required	The following areas are required to be offset: • 62 hectares of significant remnant vegetation, • 23 hectares of black cockatoo foraging habitat, and • 12.71 hectares of Kwongkan Shrubland TEC
Location	Within the Shire of Esperance, 12 kilometres west of the nearest proposed clearing area
Vesting	The purpose of the reserve will be changed from 'gravel extraction' to 'conservation' (per the conditions of CPS 9341/1)
Site values	The Shire of Esperance conducted a site survey (Shire of Esperance, 2023d): • The site occurs within an extensively cleared local area with around 15% vegetation cover remaining; • Approximately 42% of the site is in Pristine condition, the remainder is largely in Excellent to Good condition, only a small portion in Degraded to Completely Degraded condition (these are being rehabilitated to Good condition under CPS 9341/1), • Vegetation types: o Veg type A: Open Tallerack Mallee-heath and *Lambertia inermis* over mixed heath - 19 hectares o Veg type B: *Banksia armata* dominated low heath with diverse Ericaceae, Myrtaceae and Proteaceae heath – 68.6 hectares o Veg type C: *Melaleuca hnatiukii* and *Melaleuca brevifolia* shrubland over *Austrostipa juncifolia* and open samphire - 24.6 hectares • Banked values remaining within the site: o 62 hectares of significant remnant vegetation, o 23.85 hectares of high quality Carnaby's black cockatoo foraging habitat, o 42 hectares of Kwongkan Shrubland TEC (in Pristine to Good condition), and

- critical habitat for *Eremophila glabra* ssp. Scaddan (EN), recorded < 5m from the reserve.

Figure 4. Vegetation type A: Open Tallerack Mallee-heath and *Lambertia inermis* over mixed heath. Photo taken on the 16/06/2022 by Katherine Walkerden. Photo taken at GDA 94 Zone 51 387489.2M S 6284957.7M N Facing West.

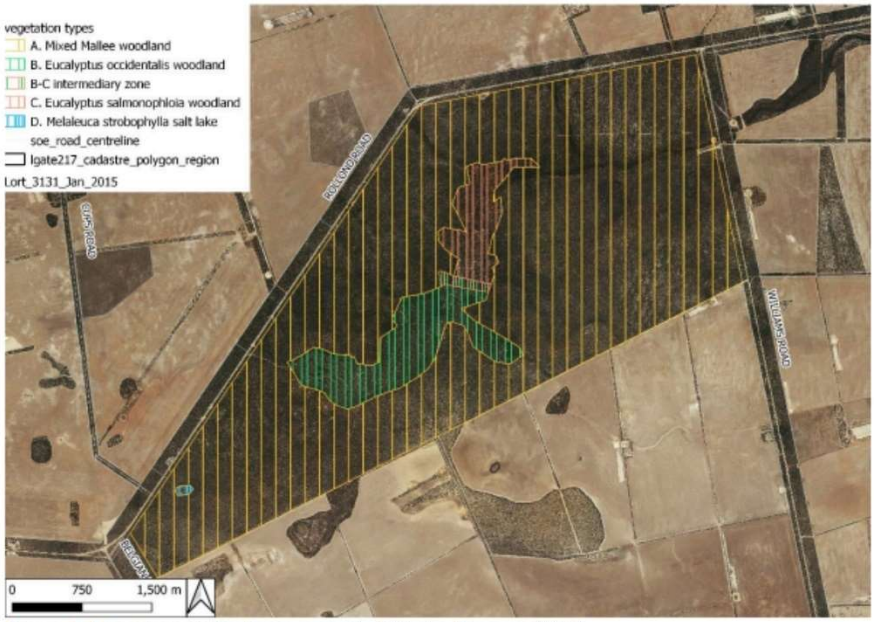
Figure 5. Vegetation type B: *Banksia armata* dominated low heath with diverse Ericaceae, Myrtaceae and Proteaceae heath. Photo taken on the 08/06/2022 by Katherine Walkerden. Photo taken at GDA

Figure 3. Map of vegetation types president within the proposed offset.

Reserve 26912 (Lot 1536 on Deposited Plan 209681) – banked offset site	
Size	1661.3 hectares site 251.3 hectares used for CPS 8608/1 and CPS 8884/1 1,410 hectares remaining
Area required	The following areas are required to be offset: • 87.16 hectares of malleefowl habitat, and • 1.82 hectares significant remnant vegetation
Location	Within the Shire of Esperance, 24 kilometres north of the nearest clearing area

Vesting	The purpose of the reserve will be changed from 'Recreation and Parklands' to 'Conservation'.

Site values	The Shire of Esperance conducted a site survey (Shire of Esperance, 2023d):
	• Vegetation in Good to Excellent condition
	• Vegetation consists of Beard vegetation associations 51, 482 and the highly restricted vegetation association 512
	• The vegetation is characterised by the following vegetation communities:
	  ○ Emergent yate forest (*Eucalyptus occidentalis*) within the wetland basin
	  ○ Thickets of the wetland climber *Muehlenbeckia cunninghamii*
	  ○ Dense thicket of broomebush (*Melaleuca acuminata*) fringing the wetland areas
	  ○ Fringing stands of salmon gum and York gum (*E.loxophleba*)
	  ○ Mallee woodlands of sand and blue mallee (*E.tetragona*)
	• Suitable malleefowl habitat (Vegetation type A)
	• Contains populations of the Priority one flora species *Leucopogon rugulosus.*

	 **Figure 3.** Map of vegetation types present within the Reserve 26912.  **Figure 5.** Vegetation type A (unburned): Mixed Eucalyptus woodland with mixed melaleuca shrubs. Photo taken on the 23/05/2023 by Katherine Walkerden.
Reserve 24633 (Lot 1559 on Deposited Plan 207747) – unused banked offset site	
Size	201.67 hectares (entire site still available)

Area required	The following area is required to be offset: • 1.49 hectares of Swamp Yate PEC
Location	Shire of Esperance, 14 kilometres south of the nearest clearing area
Vesting	Previous purpose was 'Parks and Recreation' – the purpose is now 'Environmental Conservation'
Site values	The Shire of Esperance conducted a site survey (Shire of Esperance, 2023d): • Native vegetation in Good to Excellent condition • Vegetation consists of Beard vegetation associations 47 and 931 • 28.74 hectares of which represents the Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia TEC. • 171.54 hectares of wetland vegetation - yate/ paperbark mixed forest. • DBCA advice confirmed the presence if the Swamp Yates PEC within the site (DBCA, 2023b) • Contains two Priority flora species; *Caesia viscida* (P2) and *Patersonia inaequalis* (P2).
	  **Figure 5.** Photo of Yate Swamp taken from Western side of Coomalbidgup Swamp. Photo t Katherine Walkerden on the 26.05.2023.

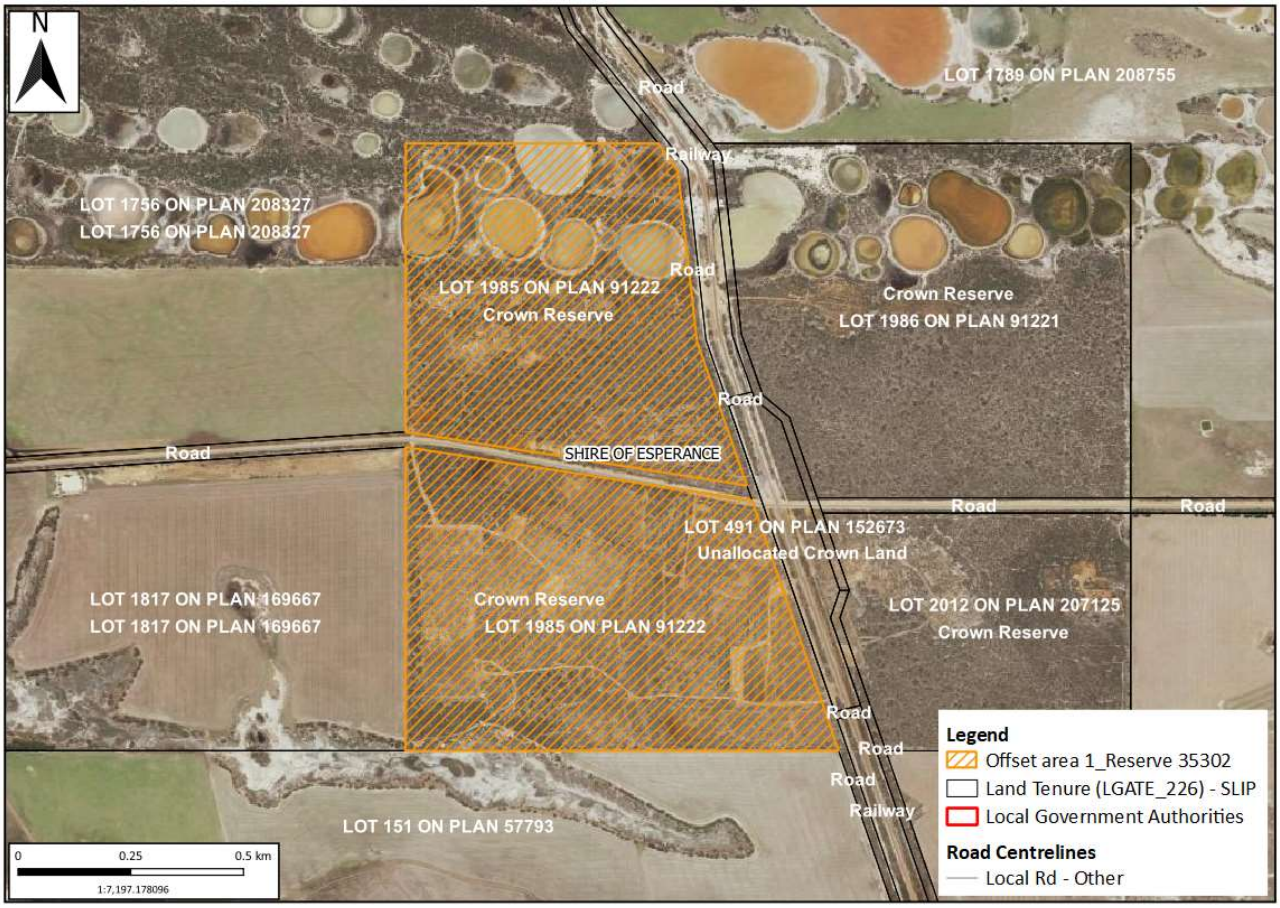


Figure 4. Offset site 1 (Reserve 35302) proposed by the Shire of Esperance.

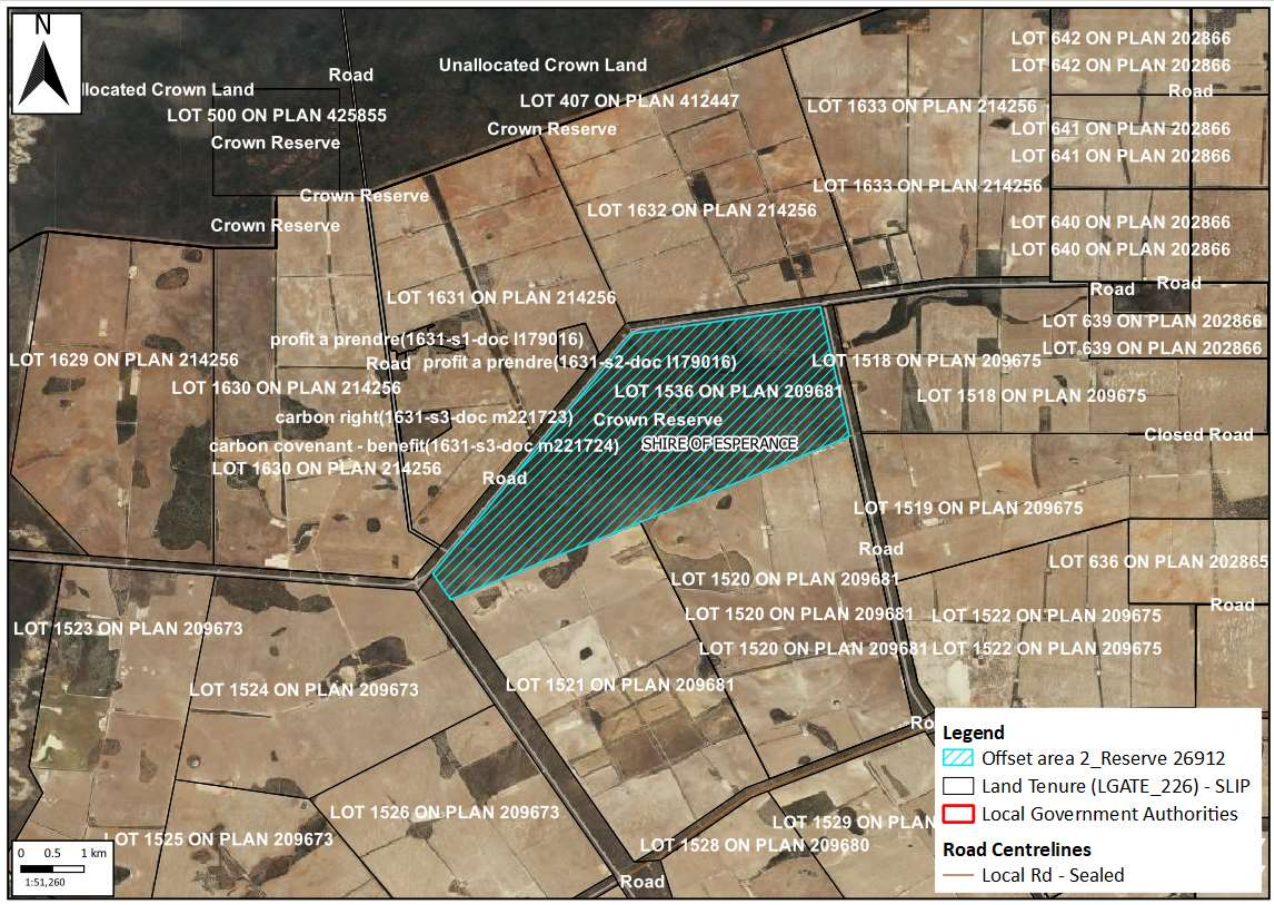


Figure 5. Offset site 2 (Reserve 26912) proposed by the Shire of Esperance.

Figure 6. Offset site 3 (Reserve 24633) proposed by the Shire of Esperance.

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 28.81 hectares to 16.19 hectares. This information is presented in Section 33.1 of the Decision Report.
Additional targeted flora surveys	The Shire conducted additional targeted surveys with further individuals of *Guichenotia asteriskos* (P2), *Leucopogon corymbiformis* (P2), and *Austrobaeckea uncinella* (P3) recorded (Shire of Esperance, 2022d; 2023c). This information is presented in Section 3.2.1 of the Decision Report.
Mitigation of weed and dieback risks resulting from the proposed clearing	The Shire provided a Dieback and Invasive Weed Management plan (Shire of Esperance, 2023a). This information is presented in Section 33.1 of the Decision Report.
Supporting documentation for proposed offset sites	The Shire provided an offset proposal and supporting documents for the proposed offset sites Crown Reserve 26912, Crown Reserve 35302 and Crown Reserve 24633. This information is presented in Section 4 and Appendix F of the Decision Report.

Appendix B. Details of public submissions

One public submission was received in relation to the proposed clearing (Submission, 2022).

Summary of comments	Consideration of comment
Insufficient information provided. Specifically, no flora and fauna surveys.	The Shire provided survey reports for each site proposed to be cleared, including the findings of additional survey work requested by the department. This information is presented in Section 3.2.1 of the Decision Report, Appendix A and Appendix G.
The documents provided indicate that no provision has been made for control of dieback and weed spread in the management of construction activities.	Consideration of the impact of weeds and dieback under Section 3.1 and Section 3.2 above. A Dieback and Invasive Weed Management Plan has been provided by the Shire (Shire of Esperance, 2023a). Weed and dieback management measures will be conditioned on the permit.
The width of the clearing required being greater than 20 metres. The footprint of the road formation can be further reduced by construction on one side of the road, reducing the area of disturbance required	Justification for the proposed clearing and avoidance and mitigation measures provided by the Shire is in Section 3.1 above.

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 twenty kilometre radius of the application area.

<table>
<tr><th>Characteristic</th><th>Details</th></tr>
<tr><td>Local context</td><td>The areas proposed to be cleared are located within road reserves in the Shire of Esperance, which falls within the intensive land use zone of Western Australia. The majority of the proposed clearing areas are directly adjacent to agricultural land.</td></tr>
<tr><td>Ecological linkage</td><td>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 across the proposed clearing area.</td></tr>
<tr><td>Conservation areas</td><td>The nearest conservation areas to the areas proposed to be cleared are as follows:
Griffiths Nature Reserve, located 4.3 kilometres east of site A;
Unnamed nature reserve, located 4.7 kilometres north of site B;
Cape Le Grand National Park, located 2.8 kilometres west of site F; and
Griffiths Nature Reserve, located 7.1 kilometres west of site G.</td></tr>
<tr><td>Vegetation description and condition</td><td>Flora and vegetation surveys (Shire of Esperance 2021b, 2022a-c) were conducted by the Shire of Esperance across the original seven proposed clearing areas. The full survey descriptions and mapping are available in Appendix G. The vegetation described in the surveys provided by the Shire broadly align with the pre-European mapping across the application area.

Vegetation condition ranged from Excellent to Completely Degraded (Keighery, 1994) across the application area (Shire of Esperance 2021b, 2022a-c).
The full Keighery (1994) condition rating scale is provided in Appendix E. Representative photos, survey descriptions and mapping are available in Appendix G.

<table>
<tr><th>Site</th><th>Vegetation description and condition</th></tr>
<tr><td>Site A – Cascade road</td><td>Pre-European mapping (LORT_512)
Eucalypt shrubland Eucalyptus eremophila, E. redunca, E. spp.
Survey vegetation description:
Type A: Open Eucalyptus pleurocarpa and Banksia media dominated mallee woodland with Acacia, Proteaceae and Goodeniaceae understorey, and
Type B: Mixed Mallee over mixed Melaleuca shrubland with Acacia and Goodeniaceae understory.
Vegetation condition ranges from Excellent (98.51%) to Completely Degraded (0.80%).</td></tr>
<tr><td>Site B – Cascade road</td><td>Pre-European mapping (ESPERANCE_5048)
Mixed heath with scattered tall shrubs Acacia spp., Proteaceae and Myrtaceae.
Survey vegetation description:
Type A: Melaleuca brevifolia and M. cuticularis dominated salt lake fringe with Eucalypts angulosa and Acacia cyclops (representative of ESPERANCE_27)
Type B: Scattered Mallee over mixed low proteaceous dominated shrubland with Fabaceae and Goodeniaceae shrubs (no clearing to be undertaken in this vegetation type).
Vegetation condition ranges from Excellent (73.37%) to Very Good condition (26.62%).</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Characteristic</th><th colspan="2">Details</th></tr>
<tr><td></td><td>Site F – Whartons</td><td>Pre-European mapping (FANNY COVE_42 and 6048)
Wattle, teatree & other species Acacia spp. Melaleuca spp.
Mixed heath with scattered tall shrubs Acacia spp., Proteaceae and Myrtaceae.
Survey vegetation description:
Type A: Scattered Nuytsia floribunda over Taxandria callistachys dominated mixed heath over Cyperaceae and Restionaceae understorey
Type B: Introduced Eucalypts over mixed low shrubs
Type C: Acacia saligna and mixed Melaleuca dominated shrubland
Type D: Scattered Banksia speciosa over Taxandria callistachys dominated mixed heath with Cyperaceae and Restionaceae understorey
Vegetation condition ranges from Excellent (93.23%) to Good (3.60%)</td></tr>
<tr><td></td><td>Site G – Neds Corner road</td><td>Pre-European mapping (LORT_47 and 512)
Mixed heath with scattered mallee e.g. Eucalyptus tetragona
Eucalypt shrubland Eucalyptus eremophila, E. redunca, E. spp.
Survey vegetation description:
Type A: Banksia media dominated mixed shrubland with Eucalyptus pleurocarpa and Hakea cinerea
Type B: Eucalyptus occidentalis woodlands over a depressed clay basin
Type C: Mixed Mallee over mixed Melaleuca shrubland
Type D: Banksia media and Mallee over Melaleuca shrubland
Type E: Dense Melaleuca shrubland over Allocasuarina, Hakea and Calothamnus quadrifidus with lepidosperma understorey
Vegetation description ranges from Excellent (88%) to Completely Degraded (0.4%)</td></tr>
<tr><td>Climate and landform</td><td colspan="2">The Esperance climate is described as Mediterranean, characterised by cool wet winters and dry warm summers (BoM, 2019). The area receives an average annual rainfall of 350 to 500 millimetres.</td></tr>
<tr><td>Land degradation risk</td><td colspan="2">Land degradation risk across the application area is mapped as:<table><tr><th>Site</th><th>Risk</th></tr><tr><td>Site A – Cascade road</td><td>The site is mapped as having a medium to high risk of land degradation from subsurface acidification and wind erosion</td></tr><tr><td>Site B – Cascade road</td><td>The site is mapped as having a medium to high risk of land degradation from subsurface acidification and wind erosion. The site is also mapped as having a medium risk of water logging and salinity</td></tr></table></td></tr>
</table>

<table>
<tr><th>Characteristic</th><th>Details</th></tr>
<tr><td></td><td>
<table>
<tr><td>Site F – Whartons</td><td>The site is mapped as having a medium to high risk of land degradation from subsurface acidification and wind erosion</td></tr>
<tr><td>Site G – Neds Corner road</td><td>The site is mapped as having a medium to high risk of land degradation from subsurface acidification and wind erosion</td></tr>
</table>
</td></tr>
<tr><td>Soil description</td><td>The soil across the application area is mapped as:
<table>
<tr><th>Site</th><th>Vegetation description and condition</th></tr>
<tr><td>Site A – Cascade road</td><td>• Scaddan 6 Subsystem: Red-brown uniform siliceous sands.
• Scaddan 4 Subsystem: Red alkaline gradational soils.</td></tr>
<tr><td>Site B – Cascade road</td><td>• Esperance 1 a Phase: Gravelly, yellow mottled duplex soil with < 30 cm of sand over gravel layer (Fleming (shallow)), Dy5.82, on level plain,
• Esperance 2 a Phase: Gravelly, yellow mottled duplex soil with < 30 cm of sand over gravel layer (Fleming (shallow)), Dy5.82, on level plain,
• Esperance 2 b Phase: Gently undulating plain. Slopes 1-3%, relief <9m.
• Esperance C p Phase: Paperbark swamps.</td></tr>
<tr><td>Site F – Whartons</td><td>• Merivale 5 Subsystem: Gently inclined scarp about 40m relief covered by dunes & sand sheets. Pallinup formation, and overlying deposits of Quaternary sands. Pale deep sands and grey shallow sandy duplex soils.
• Tooregullup 6 Subsystem: Gently undulating plain and gently inclined scarp with sand sheets and dunes. Coastal sands / over Tertiary sediments. Pale deep sand and associated calcareous deep sand.</td></tr>
<tr><td>Site G – Neds Corner road</td><td>• Scaddan 4 Subsystem: Red alkaline gradational soils.
• Scaddan 1 Subsystem: Alkaline solonetzic duplex soils.</td></tr>
</table>
</td></tr>
<tr><td>Waterbodies</td><td>The desktop assessment and aerial imagery indicated that:
• site A is 0.45 kilometres form a minor tributary of the Young River
• site B intersects a natural, nonperennial swamp associated with Coobidge creek
• site G intersects a minor tributary of the Young River
• site F is 0.38 kilometres from a perennial river, Dailey River</td></tr>
<tr><td>Hydrogeography</td><td>The application area is located across several Catchments.
• Site A and G are located within the Stokes Inlet: Lake_Young catchment,
• Site B is located within the Lake Gore catchment, and
• Site F is within the _Coastal catchment

The application area is not within any proclaimed areas under the Rights in Water and Irrigation Act 1914 or the Country Areas Water Supply Act 1947</td></tr>
</table>

<table>
<tr><th>Characteristic</th><th>Details</th></tr>
<tr><td>Flora</td><td>A total of 88 flora records in local area. There are records of 34 conservation significant flora species found on the same soil and vegetation types as the application, of which seven occur within 1 kilometre of the application area.

Targeted flora surveys (Shire of Esperance 2021b, 2022a-c) conducted across the application area recorded several priority flora within the proposed clearing area.
<table>
<tr><th>Site</th><th>Conservation significant flora</th></tr>
<tr><td>Site A – Cascade road</td><td>• Acacia diminuta (P1),
• Guichenotia asteriskos (P2),
• Goodenia laevis subsp. laevis (P3),
• Grevillea aneura (P4) and
• Gyrostemon ditrigynus (P4).</td></tr>
<tr><td>Site B – Cascade road</td><td>No Threatened or priority species, were identified within the clearing area.</td></tr>
<tr><td>Site F – Whartons</td><td>• Leucopogon corymbiformis (P2),
• Astartea elobata (P2) and
• Leucopogon apiculatus (P3).</td></tr>
<tr><td>Site G – Neds Corner road</td><td>• Scaevola archeriana (P1),
• Melaleuca similis (P1), and
• Goodenia laevis subsp. laevis (P3).</td></tr>
</table></td></tr>
<tr><td>Ecological communities</td><td>The federally listed (EPBC Act) Kwongkan shrubland TEC has been recorded within the local area of the proposed clearing areas.

Biological surveys undertaken for the application area recorded vegetation representative of the Kwongkan shrubland TEC (2.46 hectares) and the Swamp Yates PEC (0.17 hectares) across the following sites:
<table>
<tr><th>Site</th><th>Ecological community</th></tr>
<tr><td>Site A – Cascade road</td><td>Kwongkan Shrublands TEC (1.32 ha)</td></tr>
<tr><td>Site B – Cascade road</td><td>No priority or threatened ecological communities</td></tr>
<tr><td>Site F – Whartons</td><td>Kwongkan Shrublands TEC (0.90 ha)</td></tr>
<tr><td>Site G – Neds Corner road</td><td>Kwongkan Shrublands TEC (0.24 ha)
Swamp Yate PEC (0.17 ha)</td></tr>
</table></td></tr>
<tr><td>Fauna</td><td>Desktop records identified 41 records of conservation significant species within the local area. Of these, 13 are considered possible to occur within the application area.

The application area is within the mapped distribution of Carnaby’s cockatoos but outside of the mapped breeding distribution. One recorded roost occurs within the local area of site F. No breeding has been recorded within the local area of the proposed clearing sites.

A basic fauna survey (Shire of Esperance 2021b, 2022a-c) recorded foraging habitat for Carnaby’s cockatoos (Zanda latirostris, EN) across all sites within application area, however, no roosts or hollows were identified.
Several sites (site A, B and G) were considered to contain suitable habitat for malleefowl (Leipoa ocellata, VU).</td></tr>
</table>

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*					
Mallee	7,395,894.36	4,180,937.68	56.53	1333257.35	17.43
Esperance Plains	2,899,940.66	1,494,450.87	51.53	822,666.27	28.37
Vegetation complex*					
Beard vegetation association in Esperance Plains bioregion					
42	135,419.99	128,052.58	94.56	-	53.73
47	959,935.91	336,492.07	35.05	178,325.54	18.58
512	203.78	38.75	19.02	-	-
5048	31,738.00	1,177.13	3.71	160.11	14.00
6048	113,688.87	16,099.85	14.16	377.45	1.19
Beard vegetation association in Mallee bioregion					
47	66,127.02	31,535.89	47.69	5,783.40	8.75
512	237,682.29	62,771.24	26.41	5,654.35	2.38
5048	50.96	4.18	8.21	-	-
Local area (20 km radius)					
Site A	137,448.09	75,340.05	54.81	-	-
Site B	132,025.80	14,936.99	11.31	-	-
Site F	65,600.56	24,877.67	37.92	-	-
Site G	1,81,304.41	53,356.70	29.43	-	-

*Government of Western Australia (2019)

C.3. Flora analysis table

With consideration for the site characteristics set out above, relevant datasets (see Appendix H.1), and biological survey information (Shire of Esperance, 2021b, 2022a-c), 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]
Melaleuca similis	1	Y	Y	Y	0.00	6	Y
Grevillea aneura	4	Y	Y	Y	0.11	13	Y
Cryptandra polyclada subsp. *polyclada*	3	Y	Y	Y	0.19	1	Y
Bentleya diminuta	2	Y	Y	Y	0.23	1	Y
Acacia diminuta	1	Y	Y	Y	0.31	6	Y
Guichenotia apetala	1	Y	Y	Y	0.41	1	Y
Goodenia laevis subsp. *laevis*	3	Y	Y	Y	2.60	5	Y
Gyrostemon ditrigynus	4	Y	Y	Y	2.64	3	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]
Stenanthera localis	T	Y	Y	Y	2.98	30	Y
Astroloma sp. Grass Patch (A.J.G. Wilson 110)	2	Y	Y	Y	3.61	3	Y
Acacia amyctica	2	Y	Y	Y	3.63	9	Y
Acacia singula	3	Y	Y	Y	3.87	4	Y
Opercularia acolytantha	3	Y	Y	Y	3.99	3	Y
Philotheca gardneri subsp. *globosa*	1	Y	Y	Y	6.61	6	Y
Acacia bartlei	3	Y	Y	Y	6.94	3	Y
Conostylis lepidospermoides	T	Y	Y	Y	6.99	27	Y
Melaleuca dempta	3	Y	Y	Y	7.01	3	Y
Dampiera orchardii	2	Y	Y	Y	8.37	2	Y
Eremophila serpens	4	Y	Y	Y	8.86	2	Y
Eremophila chamaephila	3	Y	Y	Y	9.83	7	Y
Hypocalymma sp. Cascade (R. Bruhn 20896)	T	Y	Y	Y	9.93	19	Y
Eucalyptus stoatei	4	Y	Y	Y	10.51	5	Y
Persoonia scabra	3	Y	Y	Y	12.28	1	Y
Hydrocotyle papilionella	2	Y	Y	Y	16.26	4	Y
Bossiaea flexuosa	3	Y	Y	Y	17.09	2	Y
Melaleuca viminea subsp. *appressa*	2	Y	Y	Y	17.47	2	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 (Shire of Esperance, 2021b, 2022a-c), 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]
Malleefowl (*Leipoa ocellata*)	VU	Y	Y	0.00	7	Y
Crested tern (*Thalasseus bergii*)	MI	Y	Y	0.00	14	Y
Common Sandpiper (*Actitis hypoleucos*)	MI	Y	Y	0.08	6	Y
Red-necked stint (*Calidris ruficollis*)	MI	Y	Y	0.10	4	Y
Long-toed Stint (*Calidris subminuta*)	MI	Y	Y	0.10	1	Y
Caspian Tern (*Hydroprogne caspia*)	MI	Y	Y	0.51	13	Y
Quenda (*Isoodon fusciventer*)	MI	Y	Y	0.56	3	Y
Carnaby's cockatoo (*Calyptorhynchus latirostris*)	P4	Y	Y	0.09	20	Y
Hooded plover (*Thinornis rubricollis*)	P4	Y	Y	3.35	1	Y

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]
Whimbrel (*Numenius phaeopus*)	MI	Y	Y	5.10	1	Y
Curlew sandpiper (*Calidris ferruginea*)	CR	Y	Y	9.28	1	Y
Sharp-tailed sandpiper (*Calidris acuminata*)	MI	Y	Y	9.28	5	Y
Common greenshank (*Tringa nebularia*)	MI	Y	Y	9.28	5	Y

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

C.5. Ecological community analysis table

Community 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)	Are surveys adequate to identify? [Y, N, N/A]
Proteaceae Dominated Kwongkan Shrublands of the southeast coastal floristic province of Western Australia	EN (EPBC Act) P3 (DBCA)	Y	Y	Y	Within application area	Y
Swamp Yate, *Eucalyptus occidentalis*, woodlands in seasonally inundated clay basins in the South Coast of Western Australia	P3 (DBCA)	Y	Y	Y	Within application area	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 areas proposed to be cleared contain priority flora, fauna habitat, the priority listed Swamp Yate PEC and the federally listed Kwongkan Shrublands TEC.	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 areas proposed to be cleared contains habitat for conservation significant fauna, including significant foraging habitat for Carnaby's cockatoo and breeding habitat for mallefowl.	At variance	Yes *Refer to Section 3.2.2, above.*
Principle (c): *"Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora."* Assessment: The areas proposed to be cleared are unlikely to contain habitat for threatened flora. No Threatened flora were considered likely to occur within the proposed clearing area and none were recorded during the targeted	Not likely to be at variance	Yes *Refer to Section 3.2.1, above.*

Assessment against the clearing principles	Variance level	Is further consideration required?
searches conducted across the application area (Shire of Esperance, 2021b, 2022a-c)		
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 areas proposed to be cleared contain vegetation that represents the federally listed Kwongkan Shrublands TEC.	At variance	Yes *Refer to Section 3.2.1, 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 mapped vegetation types and native vegetation in the local area are below the national objectives and targets for biodiversity conservation in Australia. The vegetation proposed to be cleared is considered to be part of significant remnant in an extensively cleared landscape.	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
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: The area proposed to be cleared intersects a minor water course and a wetland, therefore the vegetation proposed to be cleared is considered to be growing in, or in association with, an environment associated with a watercourse or wetland.	At variance	Yes *Refer to Section 3.2.4, above.*
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 moderately to highly susceptible to wind erosion and nutrient export. Noting the extent of the application area and that the final purpose will be a sealed road, 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: The application area intersects a minor waterbody and a wetland. Given the small extent of vegetation proposed to be cleared, any change resulting from the clearing of native vegetation is considered to be minor and temporary. No	Not likely to be at variance	No

Assessment against the clearing principles	Variance level	Is further consideration required?
long-term impacts on quality of surface and underground water are anticipated as a result of clearing native vegetation.		
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. The clearing proposed at site B has a medium risk of increased flooding associated with the intersected wetland. Given the small amount of proposed clearing of riparian vegetation over two sites, the proposed clearing is unlikely to exacerbate the incidence or intensity of flooding.	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

Field Name	Description	Justification for value used
Significant impact		
Description	Conservation significance of the habitat/community impacted	**0.1%** - Afforded to significant remnant vegetation that has than 30% remaining within the bioregion.
		0.2% - Afforded to malleefowl habitat as this species is listed as Vulnerable under the BC Act and the EPBC Act.
		1.2% - Afforded to Carnaby's cockatoo habitat as this species is listed as Endangered under the BC Act and the EPBC Act.
		1.2% - Afforded to Kwongkan Shrublands TEC as this community is listed as Endangered under the EPBC Act.
		0.12% - Afforded to Swamp Yates PEC as this community is identified by DBCA as a priority ecological community.
Area of impact (habitat/community) or Quantum of impact (features/individuals)	The area of habitat/community impacted	**16.19 ha** – The entire application area comprises significant remnant vegetation.
		13.10 ha - The application area comprises 13.10 hectares of malleefowl habitat.
		7.69 ha - The application area comprises 7.69 hectares of Carnaby's cockatoo foraging habitat.
		2.47 ha - The application area includes 2.47 hectares of vegetation representative of Kwongkan shrublands TEC.
		0.17 ha – The application area includes 0.17 hectares of vegetation representative of the Swamp Yate PEC.
Quality of impacted area (habitat/community)	The quality score for area of habitat/community being impacted - a measure of how well a particular site supports a particular threatened species or ecological community and contributes to its ongoing viability	**7** - best fit (average) for the combination of vegetation condition (Excellent to degraded) for the **significant remnant vegetation** within a highly cleared landscape.
		7 - best fit (average) for the combination of site context (moderate) and habitat attributes (moderate to high) for **malleefowl habitat.**
		7 – best fit (average) for the combination of site context (moderate) and foraging habitat species (high) for **Carnaby's cockatoo .**
		8 - best fit (average) for the combination of vegetation condition of the Kwongkan Shrubland TEC (Good to excellent).
		7 – vegetation representative of the **Swamp Yate PEC** in Very Good condition.

Field Name	Description	Justification for value used
Rehabilitation credit		
Description		**5.64 ha** to be rehabilitated post gravel extraction consisting of black cockatoo habitat, significant remnant vegetation, malleefowl habitat and 1.32 hectares of Kwongkan Shrubland TEC.
Current quality of rehabilitation site	The quality score for the area of habitat/community proposed to be rehabilitated - a measure of how well a particular site supports a particular threatened species or ecological community and contributes to its ongoing viability	**1 –** the area will be Degraded post gravel extraction but will maintain site context values (within the known distribution of Carnaby's cockatoo and within a highly cleared landscape).
Future quality WITHOUT rehabilitation	The predicted future quality score (habitat/community) of the proposed mitigation site without the mitigation	**1 –** the area is not expected to improve or decline without intervention.
Future quality WITH rehabilitation	The predicted future quality score (habitat/community) of the proposed mitigation site with the mitigation	**6 –** A quality score of (6) has been assigned for the revegetation offset based on the provision of a revegetation plan.
Time until ecological benefit (years)	This describes the estimated time (in years) that it will take for the main benefit of the quality (habitat/community) to be realised	**10 years –** the time required for the vegetation to establish and represent a **significant remnant vegetation and the Kwongkan shrublands TEC.** **15 years –** the time required for the vegetation to establish and mature to provide **malleefowl and black cockatoo** habitat values.
Confidence in rehabilitation result (%)	The capacity of the rehabilitation to achieve the main benefit of the quality (habitat/community) to be realised	**80% -** moderate to high level of confidence based on the revegetation plan provided by the Shire.
Revegetation credit (net present value)	The net present value of the mitigation (area of habitat/community or number of individuals/features) that will be applied to the quantum of impact	**2.23 credit** – for revegetation of significant remnant vegetation.
		2.21 credit – for revegetation of malleefowl habitat.
		1.89 credit – for revegetation of Carnaby's cockatoo foraging habitat.
		0.47 credit – for revegetation of Kwongkan Shrubland TEC.
Offset		
Proposed offset area (area in hectares)	Calculated area required to offset significant residual impacts	**75.9 ha** – of significant remnant vegetation within Reserve 35302 (81.7%) and Reserve 26912 (18.3%).
		87.16 ha – of malleefowl habitat within Reserve 26912 (100%).
		23 ha – of Carnaby's cockatoo foraging habitat within Reserve 35302 (100%).

Field Name	Description	Justification for value used
		12.71 ha – of Kwongkan Shrubland TEC within Reserve 35302 (100%).
		1.49 ha – of Swamp Yates PEC within Reserve 24633 (100%).
Duration (habitat/community)	This describes the timeframe over which changes in the level of risk to the proposed mitigation site can be considered and quantified	**20** - The offset site will be vested as 'Conservation'. 20 years is the maximum value associated with this field.
Time until ecological benefit (habitat/community) or Time horizon (features/individuals)	This describes the estimated time (in years) that it will take for the main benefit of the quality (habitat/community) improvement of the proposed mitigation to be realised	**1** - one year has been assigned, being the time until tenure change can occur.
Start quality (habitat/community)	The quality score for the area of habitat/community proposed as mitigation - a measure of how well a particular site supports a particular threatened species or ecological community and contributes to its ongoing viability	**8** - **Reserve 35302** contains **significant remnant vegetation** in Excellent to Good condition containing vegetation representative of the **Kwongkan shrublands TEC** and high quality **Carnaby's cockatoo foraging habitat** (Mallee woodlands and Proteaceae heath)
		8 - **Reserve 26912** contains **significant remnant vegetation** in Excellent condition and high quality **malleefowl habitat** (Yate forest, Melaleuca shrublands and Mallee woodlands)
		8 - **Reserve 24633** contains vegetation in Excellent condition representative of the **Swamp Yate PEC**
Future quality without offset (habitat/community) or Future value without offset (features/individuals)	The predicted future quality score (habitat/community) of the proposed mitigation site without the mitigation	**8** – the vegetation condition and habitat values within **Reserve 35302, 26912 or 24633** are not expected to decline or increase.
Future quality with offset (habitat/community) or Future value with offset (features/individuals)	The predicted future quality score (habitat/community) of the proposed mitigation site with the mitigation	**8** – managing the reserves as conservation will ensure the vegetation condition and habitat values within **Reserve 35302, 26912 or 24633** are maintained.
Risk of loss (%) without offset (habitat/community)	This describes the chance that the habitat/community on the proposed mitigation site will be completely lost (i.e. no longer hold any value for the protected matter of concern) over the foreseeable future without the mitigation	**20%** - The current management order of **Reserve 35302** is 'gravel extraction' therefore there is a moderate risk of future loss.
		15% - The current management order of **Reserves 26912 and 24633** is 'Parks and Recreation' therefore there is a moderate to low risk of future loss. This value is consistent with the banked offsets (CPS 8884/1).

Field Name	Description	Justification for value used
Risk of loss (%) with offset (habitat/community)	This describes the chance that the habitat/community on the proposed mitigation site will be completely lost (i.e. no longer hold any value for the protected matter of concern) over the foreseeable future with the mitigation	**5%** - **Reserves 35302, 26912 and 24633** will be conserved in perpetuity through a change in tenure to 'Conservation' and therefore the risk of loss is low.
Confidence in result (%) – risk of loss (habitat/community)	The capacity of measures to mitigate risk of loss of the mitigation site	**90%** - there is a high level of certainty that **Reserves 35302, 26912 and 24633** will be conserved in perpetuity.

Appendix G. Biological survey information excerpts (Shire of Esperance 2021b, 2022a-c)

Site A - Cascade Road and Gravel Pits (Shire of Esperance, 2022a)

Figure 1. Site A vegetation types

Figure 2. Site A vegetation condition

Figure 3. Site A vegetation type A

Figure 4. Site A vegetation type B

<u>Site B – Cascade Road Bend</u> (Shire of Esperance, 2021b)

Figure 5. Site B vegetation type

Figure 6. Site B vegetation condition

Figure 7. Site B vegetation type A

Figure 8. Site B vegetation type B

<u>Site F - Wharton Road</u> (Shire of Esperance, 2022b)

Figure 9. Site F vegetation types

Figure 10. Site F vegetation condition

Figure 11. Site F vegetation type A

Figure 12. Site F vegetation type B

Figure 13. Site F vegetation type C

Figure 14. Site F vegetation type D

<u>Site G - Neds Corner Road</u> (Shire of Esperance, 2022c)

Figure 15. Site G vegetation type

Figure 16. Site G vegetation condition

Figure 17. Site G vegetation type A

Figure 18. Site G vegetation type B

Figure 19. Site G vegetation type C

Figure 20. Site G vegetation type D

Figure 21. Site G vegetation type E

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)

H.2. References

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

Commonwealth of Australia (2014) *Proteaceae Dominated Kwongkan Shrubland: a nationally-protected ecological community*. Department of the Environment, Canberra.

Department of Agriculture, Water and the Environment (DAWE) (2022*), Referral guideline for 3 WA threatened black cockatoo species: Carnaby's Cockatoo, Baudin's Cockatoo and the Forest Red-tailed Black-cockatoo*, Department of Agriculture, Water and the Environment, Canberra.

Department of Biodiversity, Conservation and Attractions (DBCA) (2022a) *Species and Communities Branch advice for clearing permit application CPS 9524/1*, received 22 July 2022. Department of Biodiversity, Conservation and Attractions, Western Australia (DWER Ref: DWERDT641901).

Department of Biodiversity, Conservation and Attractions (DBCA) (2022b) *Species and Communities Branch advice for clearing permit application CPS 9524/1*, received 5 August 2022. Department of Biodiversity, Conservation and Attractions, Western Australia (DWER Ref: DWERDT641901).

Department of Biodiversity, Conservation and Attractions (DBCA) (2023a) *Species and Communities Branch advice for clearing permit application CPS 9524/1*, received 10 February 2023. Department of Biodiversity, Conservation and Attractions, Western Australia (DWER Ref: DWERDT725417).

Department of Biodiversity, Conservation and Attractions (DBCA) (2023b) *Species and Communities Branch advice for clearing permit application CPS 9524/1*, received 27 July 2023. Department of Biodiversity, Conservation and Attractions, Western Australia (DWER Ref: DWERDT812332).

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

Department of the Environment (DER) (2014). Approved Conservation Advice for Proteaceae Dominated Kwongkan Shrublands of the southeast coastal floristic province of Western Australia. Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/126-conservation-advice.pdf

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

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

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

Government of Western Australia. (2019) *2018 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of March 2019.* WA Department of Biodiversity, Conservation and Attractions. https://catalogue.data.wa.gov.au/dataset/dbca-statewide-vegetation-statistics

Heddle, E. M., Loneragan, O. W., and Havel, J. J. (1980) *Vegetation Complexes of the Darling System, Western Australia*. In Department of Conservation and Environment, Atlas of Natural Resources, Darling System, Western Australia.

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

Mattiske, E.M. and Havel, J.J. (1998) *Vegetation Complexes of the South-west Forest Region of Western Australia.* Maps and report prepared as part of the Regional Forest Agreement, Western Australia for the Department of Conservation and Land Management and Environment Australia.

Molloy, S., Wood, J., Hall, S., Wallrodt, S. and Whisson, G. (2009) *South West Regional Ecological Linkages Technical Report*, Western Australian Local Government Association and Department of Environment and Conservation, Perth.

Northcote, K. H. with Beckmann G G, Bettenay E., Churchward H. M., van Dijk D. C., Dimmock G. M., Hubble G. D., Isbell R. F., McArthur W. M., Murtha G. G., Nicolls K. D., Paton T. R., Thompson C. H., Webb A. A. and Wright M. J. (1960-68) *Atlas of Australian Soils*, Sheets 1 to 10, with explanatory data. CSIRO and Melbourne University Press: Melbourne.

Schoknecht, N., Tille, P. and Purdie, B. (2004) *Soil-landscape mapping in South-Western Australia – Overview of Methodology and output*s Resource Management Technical Report No. 280. Department of Agriculture.

Shah, B. (2006) *Conservation of Carnaby's Black-Cockatoo on the Swan Coastal Plain, Western Australia*. December 2006. Carnaby's Black-Cockatoo Recovery Project. Birds Australia, Western Australia.

Shepherd, D.P., Beeston, G.R. and Hopkins, A.J.M. (2001) *Native Vegetation in Western Australia, Extent, Type and Status*. Resource Management Technical Report 249. Department of Agriculture, Western Australia.

Shire of Esperance (2021) *Clearing permit application CPS 9524/1*, received 16 December 2021 (DWER Ref: DW ERDT539946).

Shire of Esperance (2021b) *Vegetation, Flora, Fauna and Environmental Considerations, and Targeted Flora Report – Site B – Cascade Road Bend*, received 24 February 2022 (DWER Ref: DWERDT568983).

Shire of Esperance (2022a) *Vegetation, Flora, Fauna and Environmental Considerations, and Targeted Flora Report - Site A – Cascade Road and Gravel Pits,* received 24 February 2022 (DWER Ref: DWERDT568983).

Shire of Esperance (2022b) *Vegetation, Flora, Fauna and Environmental Considerations, and Targeted Flora Report - Site F – Wharton Road Widening,* received 24 February 2022 (DWER Ref: DWERDT568983).

Shire of Esperance (2022c) *Vegetation, Flora, Fauna and Environmental Considerations, and Targeted Flora Report - Site G - Neds Corner Rd SLK 36.85 - 51,* received 24 February 2022 (DWER Ref: DWERDT568983).

Shire of Esperance (2022d) *Response to request for further information letter*, received 19 August 2022 (DWER Ref: DWERDT647386).

Shire of Esperance (2023a) *Dieback and Invasive Weed Management Plan CPS 9524-1*, received 4 May 2023 (DWER Ref: DWERDT647386).

Shire of Esperance (2023b) Rehabilitation Plan CS 9524-1 Site A-Cascade Road and Gravel Pits, received 4 May 2023 (DWER Ref: DWERDT775308).

Shire of Esperance (2023c) *Response to request for further information letter*, received 4 May 2023 (DWER Ref: DWERDT647386).

Shire of Esperance (2023d) *Response to request for further information letter*, received 9 June 2023 (DWER Ref: DWERDT790163).

Shire of Esperance (2023e) *Unauthorised vegetation clearing – Shire report*, received 10 July 2023 (DWER Ref: DWERDT647386).

Submission (2022) *Public submission in relation to clearing permit application CPS 9524/1,* received 2 February 2022 (DWER Ref: DWERDT557773).

Valentine, L.E. and Stock, W. (2008) *Food Resources of Carnaby's Black Cockatoo (Calyptorhynchus latirostris) in the Gnangara Sustainability Strategy Study Area*. Edith Cowan University and Department of Environment and Conservation. December 2008.

Western Australian Herbarium (1998-). *FloraBase - the Western Australian Flora*. Department of Biodiversity, Conservation and Attractions, Western Australia. https://florabase.dpaw.wa.gov.au/ (Accessed 11 June 2022).