Vegetation, Flora, Fauna and Environmental Considerations Report

Shire of Esperance 2024-25 Strategic Purpose Permit
Site B - River Road Gravel Pits

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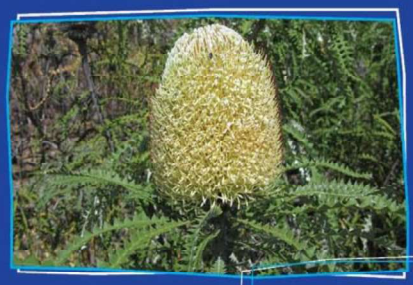

April 2024

Acknowledgement of country

The Shire of Esperance acknowledges the Kepa Kurl Wudjari people of the Nyungar nation and Ngadju people who are the traditional custodians of this land and have a continuing connection to land, waters and community. The Shire of Esperance pays respect to Elders past, present and emerging, and extend that respect to all Aboriginal Australians present today.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

BAM Act: Biosecurity and Agriculture Management Act 2007 (WA)
BC Act: Biodiversity Conservation Act 2016 (WA)
BOM: Bureau of Meteorology
DBCA: Department of Biodiversity, Conservation and Attractions
EP Act: Environmental Protection Act 1986 (WA)
EPA: Environmental Protection Authority
EPBC Act: Environment Protection and Biodiversity Conservation Act 1999 (CoA 1999)
IBRA: Interim Biogeographical Regionalisation for Australia
IUCN: International Union of Conservation Nature
LGA: Local Government Area
NVIS: National Vegetation Information System
PEC: Priority Ecological Community
PF: Priority Flora (Under BC Act)
SOE: Shire of Esperance
SLK: Straight Line Kilometres (Main Roads Western Australia)
TEC: Threatened Ecological Community
TF: Threatened Flora (Under BC Act)
TPFL: Threatened and Priority Flora Database (DBCA)
TPRF: Threatened and Priority Flora Report Form
WAH: Western Australian Herbarium (PERTH)
WAOL: Western Australian Organism List

Executive Summary

The Shire of Esperance Environmental Team was commissioned by the Shire of Esperance Asset Management department to undertake a review of the flora, vegetation and fauna values on the proposed 'River Road Gravel Pits' project in 2023-24 as part of their Strategic Purpose Permit application. The proposed development involves the clearing of 5.58 ha of native vegetation for the purpose of gravel extraction. The SOE Environmental Officers, Katherine Walkerden and Kahree Garnaut, completed the site assessment over the 31st of August and 4th of September, 2023.

A total of 141 vascular flora taxa representing 36 plant families and 92 genera were recorded within the 'River Road Gravel Pits' survey area during the spring 2023 survey. The majority of taxa recorded were representative of the Cyperaceae (10 taxa), Fabaceae (15 taxa), Myrtaceae (32 taxa), and Proteaceae (13 taxa) families. This total is inclusive of 131 native plant species and ten introduced (weed) species. Three vegetation types were distinguished and described during the field survey, consisting of Vegetation Type A: Mixed Mallee over *Hakea laurina* Open Shrubland; Vegetation Type B: Mixed Mallee over *Banksia media* Open Shrubland; and Vegetation Type C: Scattered Mallee over Dense Melaleuca Shrubland. Overall, the vegetation communities mapped and species recorded in the 'River Road Gravel Pits' survey area were consistent with the historical mapping of Beard (1973). Most of the vegetation communities are well represented at a local and regional scale by VA 47: Shrublands; Tallerack mallee-heath, with the exception of Vegetation Type C: Mixed Mallee over Dense Melaleuca Shrubland. This vegetation type was better represented by Beard VA 519: Shrublands: Mallee scrub, *Eucalyptus eremophila.*

One Priority flora pursuant to the *Biodiversity Conservation Act 2016* (BC Act), as listed by the Department of Biodiversity, Conservation and Attractions (DBCA), was located within the 'River Road Gravel Pits' survey area, namely the Priority 1 flora *Acrotriche platycarpa*, where 15 plants were recorded within the survey area. No plants will be taken. No floral taxa listed as Threatened under either the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) or the BC Act were recorded. Despite the determination of the EPBC Act-listed Kwongkan TEC to be 'Likely' to occur within the survey area, no vegetation types encountered during the survey bore sufficient resemblance, and were largely dominated by a eucalyptus mallee overstorey and a myrtaceous mid-storey. No other TECs or PECs were identified to be present within the survey area.

Suitable foraging habitat for the Carnaby's black-cockatoo (*Zanda latirostris*), an endemic south-western Australian bird listed as 'Endangered' under both the EPBC Act and the BC Act, was identified within the proposed clearing area. A total of 4.02 ha of suitable foraging habitat was mapped across Vegetation Type A: Mixed Mallee over *Hakea laurina* Open Shrubland and Vegetation Type B: Mixed Mallee over *Banksia media* Open Shrubland. Evidence of the species' foraging within the site was recorded through the identification of diagnostic chew marks on *Banksia media* flower and fruit cones. No exotic foraging habitat was identified.

Suitable habitat was identified within the proposed project area for two EPBC Act-listed Threatened Fauna and three BC Act-listed Priority Fauna. Suitable foraging habitat was identified across the semi-arid mallee across all three vegetation types for the malleefowl (*Leipoa ocellata,* Vulnerable), and marginal hunting habitat for the chuditch (*Dasyurus geoffroii,* Vulnerable), was identified within Vegetation Type A: Mixed Mallee over *Hakea laurina* Open Shrubland and Vegetation Type B: Mixed Mallee over *Banksia media* Open Shrubland. The narrow road reserve extent of the mallee vegetation suggests that it may be more likely used by these territorial species as a habitat corridor between the larger remnants of suitable habitat found in Reserve 31750 and along the Lort River riparian corridor. Three Priority Fauna listed under the BC Act, the southern death adder (*Acanthophis antarcticus*, Priority 3), the inland western rosella or bardinar (*Platycercus icterotis* subsp. *xanthogenys,* Priority 4) and the kwoora or western brush wallaby (*Notamacropus irma*, Priority 4), were found to have suitable habitat present. Small hollows and

inflorescence blossom in the mature mallee provided suitable habitat for the inland western rosella, whilst the dense shrubland understorey in the roadside vegetation provided a sheltered movement corridor for the western brush wallaby. The abundance of leaf litter and dense understorey across both Vegetation Type A and Vegetation Type B provided ample hunting habitat for the southern death adder. No other Threatened or Priority fauna species under the BC Act or EPBC Act are likely to be impacted upon by this proposal.

No EPBC Act-listed Threatened Ecological Communities (TEC) or BC Act-listed Priority Ecological Communities (PEC) were identified to be present within the survey area. Vegetation Type B: Mixed Mallee over *Banksia media* Open Shrubland demonstrated some similarities to the 'Proteaceae Dominated Kwongkan Shrublands of the Southeastern Floristic Province (Kwongkan)' Threatened Ecological Community (TEC) listed as 'Endangered' under the EPBC Act. However, assessment of species compositon indicated that an insufficient proportion of Proteaceae species (< 30%) was present to meet diagnostic Kwongkan TEC criteria.

As Shire Environmental Coordinator signs off on project work packs the following recommendation will be included within the internal SOE approval process for the gravel project:

a) All vehicles and construction equipment to be cleaned prior to start of the project;

b) Remove and stockpile topsoil, log debris and leaf litter where possible for use in future rehabilitation programs; and

c) Follow up spraying of emergent roadside weeds.

These have been addressed within the Rehabilitation Plan (Section 7.1) and Weed and Dieback Management Plan (Section 7.2) and, provided these measures are implemented, there should be no impediments to the upgrade of the River Road Gravel Pit.

1 Introduction

The Shire of Esperance endeavours to maintain a high level of road safety, being proactive in identifying high risk road designs and progressively upgrading them. The Shire of Esperance manages the largest road network of any local government in Western Australia, encompassing a total of 4,593 km of road. The Shire of Esperance is submitting ''River Road Gravel Pits'' project as Site B under the '2023-24 Strategic Purpose Permit' (Figure 1), for the purpose of extracting gravel for unsealed road maintenance within the Shire of Esperance.

Location and Scope of Project

The proposed works are located approximately 100 km north-west of Esperance in the Cascade district, within the River Rd road reserve managed by the Shire of Esperance. Specifically, it is situated approximately 4.5 km east of the intersection of Oldfield Road and River Road, at straight line kilometre (SLK; MRWA 2023) 15.13 to 16.20 (Main Roads 2023). A point within the proposed clearing permit area is -33.467244 S, 120.909903 E, or 305770 m N, 6294958 m E (UTM Zone 51 H, GDA94).

An ongoing problem for the Shire of Esperance is that it has been extremely difficult to source gravel from cleared land on farmland within the Cascades area of shire, as farmers are unwilling to allow the Shire of Esperance to extract gravel from their paddocks. As a result, gravel for road projects will need to be sourced from within the road reserve.

Within this survey area, three gravel extraction areas totalling 7.48 ha have been proposed, illustrated in Table 1 and depicted in Figure 1. To complete these works, a total of approximately 5.58 ha of native vegetation within these three proposed gravel pit areas will be required to be cleared on both sides of the road.

Table 1: Proposed clearing areas for gravel extraction.

Proposed Gravel Pit	River Road SLK	Polygon Area (ha)	Proposed Clearing Area (ha)
1	16.02 to 15.83	1.80	1.41
2	15.74 to 15.61	1.34	1.01
3	15.56 to 15.13	4.34	3.16
Total		**7.48 ha**	**5.58 ha**

Figure 1: Location of clearing permit.

Survey Area

Proposed Gravel Pit

Landgate Cadastre

Created on the 28/03/2024 by Kahree Garnaut
Shire of Esperance
Scale : 1:5,500
Imagery: Northover 3031 Aerial (January 2015)
Esri, TomTom, Garmin, FAO, NOAA, USGS, Esri, USGS
Coordinate System: GDA 1994 MGA Zone 51

Environmental Legislation and Guidelines

The Commonwealth (federal) legislation relevant to this survey:

- Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

The following Western Australian (state) legislation is relevant to this survey:

- Biodiversity Conservation Act 2016 (BC Act);
- Biodiversity Conservation Act 2016 Biodiversity Conservation (Listing of Native Species) (Flora) Order 2022;
- Biodiversity Conservation Act 2016 Biodiversity Conservation (Listing of Native Species) (Fauna) Order 2022;
- Biosecurity and Agriculture Management Act 2007 (BAM Act); and
- Environmental Protection Act 1986 (EP Act).

Western Australian guidelines relevant to this survey are:

- Environmental Factor Guideline: Flora and Vegetation (Environmental Protection Authority [EPA] 2016);
- Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016);
- A guide to the assessment of applications to clear native vegetation, Under Part V Division 2 of the Environmental Protection Act 1986 (DWER, 2014); and

International Agreements relevant to this survey are:

- Agreement between the Government of Australia and the Government of Japan for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment 1974 (Japan-Australia Migratory Bird Agreement – JAMBA);
- Agreement between the Government of Australia and the Government of the People's Republic of China for the Protection of Migratory Birds and their Environment 1986 (China-Australia Migratory Bird Agreement – CAMBA);
- Agreement between the Government of Australia and the Government of the Republic of Korea on the Protection of Migratory Birds 2007 (Republic of Korea-Australia Migratory Bird Agreement – ROKAMBA); and
- Convention on Wetlands of International Importance 1971 (Ramsar Convention).

2 OBJECTIVES

The objective of this survey was to undertake a flora, fauna and vegetation assessment of the 'River Road Gravel Pits' survey area. This is inclusive of the following:

a. Undertake a desktop study of the flora, fauna and vegetation of the 'River Road Gravel Pits' survey area, with an emphasis on threatened and priority flora, threatened and priority ecological communities (TECs and PECs) and Threatened and Priority fauna;

b. Review the historical literature of the 'River Road Gravel Pits' survey area;

c. Undertake a detailed survey of the 'River Road Gravel Pits' survey area, and collect and identify the vascular plant species present;

d. Review the conservation status of the vascular plant species recorded by reference to current literature and listings by the DBCA and plant collections held at the Western Australian State Herbarium (WAH), and listed by the Department of Climate Change, Energy, the Environment and Water under the EPBC Act;

e. Define and map the vegetation communities in the 'River Road Gravel Pits' survey area;

f. Define and map the location of any threatened and priority flora located within the 'River Road Gravel Pits' survey area;

g. Define any management issues related to flora, fauna and vegetation values;

h. Provide recommendations on the local and regional significance of the vegetation communities; and

i. Prepare a report summarising the findings.

3 METHODS

Desktop Assessment

Desktop information was collated for all areas within a 20 km buffer zone of the site using DBCA datasets sourced under agreement. These data sources are listed below:

- Western Australian Herbarium data (WAH);
- Threatened and Priority Flora Database (TPFL);
- DBCA's Esperance District Threatened Flora spatial dataset;
- Threatened and Priority Ecological Communities (TECs & PECs);
- Threatened, Specially Protected and Priority fauna; and
- Black cockatoo roost and breeding sites.

Additionally, the EPBC Act Protected Matters Search Tool (PMST; DCCEEW 2023a), was also utilised to identify the possible occurrence of Threatened flora, fauna and ecological communities within the 'River Road Gravel Pits' area. Search parameters were 'by polygon' and a 20 km buffer was applied to the search area; standard used in this IBRA subregion. Historical and State documentation and datasets consulted include:

- Vegetation mapping of the region, principally the coarse-scale vegetation associations of Beard (1973);
- Vegetation Extent by State-wide Pre-European mapping statistics (GoWA 2020);
- Soil landscape mapping (DAFWA);
- Dieback Information Data Management System (DIDMS; Gaia Resources);
- Shire of Esperance Weed Mapping Data;
- Existing site digital orthophotos (Northover 2015);
- Hydrographic Catchments (DWER); and
- Crown Reserves (Landgate).

Field Survey

The site was initially inspected on the 31st of August 2023, by the Shire of Esperance's Environmental Officers, Katherine Walkerden and Kahree Garnaut. A general assessment of possible ecological impacts included historical clearing, impact of fire regimes, regeneration from disturbance, waterlogging, senescence, weeds, erosion, sedimentation, introduced fauna, *Phytophthora* Dieback, and illegal dumping of rubbish.

A detailed field assessment of the flora and vegetation of the 'River Road Gravel Pits' survey area was undertaken by Shire of Esperance staff from 31st August to the 4th of September 2023 in accordance with methods outlined in Technical Guidance – Flora and vegetation surveys for environmental impact assessment (EPA 2016). All staff held valid collection licences to collect flora for scientific purposes, issued under the BC Act.

The methodology for assessing threatened (TF) and priority flora (PF) consisted of traversing by foot the entire 'River Road Gravel Pits' survey area on both sides of the River Road reserve, extending to the cadastre boundary. Surveyors utilised handheld Garmin GPS units loaded with the survey area boundary,

walking meandering traverses across the site to cover all areas within 10 m. All species encountered were recorded, with all but very common, easily identified and well-known species collected.

For PF or TF species identified in the desktop survey as possible to occur, scans of pressed specimens from either the WAH or local Esperance District Herbarium were taken into the field. Suitable associated habitat for TF or PF identified in the desktop study were intensively surveyed and extensively covered. If suspected or known conservation significant flora species were encountered, a specimen was collected for subsequent identification with GPS coordinates and plant numbers recorded for the population. During the survey, a field herbarium for 'River Road Gravel Pits' was also constructed for surveyor reference.

All species unknown in the field were collected, pressed and dressed in accordance with WAH instructions, and later identified by SOE's four environmental staff, using keys, WA Herbarium's Florabase, literature and the Esperance District Herbarium. Any species that were unable to be identified were submitted to the WAH for identification. Nomenclature of the species recorded is in accordance with the WAH.

The vegetation communities of 'Site B – 'River Road Gravel Pits'' was assessed for the presence of any TECs or PECs determined in the desktop assessment to be potentially occurring (DCCEEW 2023a, 2023b; DBCA 2023c, 2023e). Vegetation assemblages were compared to floristic and vegetation structural descriptions in approved conservation advice documents pertaining to individual TECs/PECs.

Specifically, the site was assessed for the 'Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia (Kwongkan)' TEC, which is listed as 'Endangered' under the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act 1999). The presence of Kwongkan was identified using diagnostic characteristics defined in the 'Approved Conservation Advice for Kwongkan (Commonwealth of Australia, 2014)' as;

> 2a) Characterised by Proteaceae species having 30% or greater cover of Proteaceae species across all layers where these shrubs occur (crowns measured as if they are opaque).
>
> AND / OR
>
> 2b) Two or more diagnostic Proteaceae species are present that are likely to form a significant vegetative component when regenerated.

Due to the lack of published Approved Conservation Advice for PECs recognised under State legislation; definitions elaborated in the *Priority Ecological Communities for Western Australia, Version 35* (DBCA 2023e) were used to diagnostically qualify observed vegetation types.

Only a basic fauna survey was conducted as per EPA (2020) guidelines. Observations of fauna presence, such as calls, diggings, foraging evidence, tracks and scats were noted. The area was assessed for suitability of habitat for Threatened and Priority fauna identified in the desktop assessment to be potentially occurring within the survey area. Carnaby's Cockatoo (*Zanda latirostris)* feeding, roosting and nesting habitat was also assessed using EPBC Act referral guidelines (DAWE 2022).

Survey Timing

The peak flowering period, and therefore optimal survey timing, for the South-west and Interzone Botanical Province is spring (September to October; EPA 2016). Therefore, the survey period coincided with the optimal flowering period for the botanical region. The surveys were timed, where possible, to align with peak flowering periods of conservation significant flora with the potential to occur in the 'River Road Gravel Pits' survey area.

Vegetation Descriptions

Vegetation communities present within the survey area were assessed during the field survey using methods outlined in Keighery (1994). Broad vegetation types defined by structure and composition were recorded and described using the National Vegetation Information System (NVIS; DEE 2017) classification system.

Condition of vegetation was assessed using Table 2 of the Technical Guidance – Flora and vegetation surveys for Environmental Impact Assessment (EPA 2016) categories, as 'Excellent', 'Very Good', 'Good', 'Degraded' or 'Completely Degraded'. This illustrates how healthy vegetation is, determined by vegetation structure, weed cover, presence of dieback, historical clearing, grazing and other signs of disturbance.

Additionally, possible environmentally sensitive areas, such as wetlands or granite, were noted if present. Overall, an assessment of environmental impacts to Department of Water and Environmental Regulation's (DWER) biodiversity values were inspected and valued.

Survey Limitations

A general assessment was made of the survey against a range of factors that may have limited the outcomes and conclusions of this report (Table 2). Based on this assessment, the present survey has not been subject to constraints which would affect the thoroughness of the survey, and the conclusions which have been formed.

Table 2: Potential limitations affecting the conclusions made in this report.

Potential Survey Limitation	Impact on Current Survey
Availability of contextual information at a regional and local scale	**Not a limitation:** Reference resources such as Beard (1973) mapping, together with online flora and vegetation information, have provided an appropriate level of information for the current survey. The vegetation of the Esperance shire has previously been mapped by Beard (1973).
Resources (i.e. were there adequate resources to complete the survey to the required standard).	**Not a limitation:** Adequate resources were made available by Shire of Esperance to complete the surveys. However, the Esperance region is vastly understudied, and this must be noted when considering findings from this report.
Competency/experience of team carrying out survey; experience in the bioregion surveyed	**Not a limitation:** Staff have adequate experience working within the Shire of Esperance and wider areas. Two of the staff have consistently worked within this bioregion for more than 15 years. Staff were familiar with flora, fauna and TECs in the area. Any unknown or potential threatened or priority flora species were collected and identified, utilising resources available at the Western Australian Herbarium and consultation with expert taxonomists.
Proportion of flora collected and identification issues	**Potential limitation:** While many plants were in flower during the survey, a proportion of plants encountered during the survey were sterile and may impact the chance of identification of some specimens to species level. Orchid species may not emerge each year if conditions are not favourable. Although these may affect the completeness of the species list, it is not expected to have a significant effect on mapping reliability, nor on the identification of threatened and priority species in the area as the majority were perennial species. Surveys were only undertaken in one year
Effort and extent of survey	**Potential limitation:** The survey area was thoroughly covered. The threatened and priority flora search undertaken by staff by means of meandering foot-traverse between vegetation sites ensured thorough coverage of the survey area. Flora that was unknown or resembled threatened or priority flora were collected, the location and habitat noted, and the number of plants estimated.
Mapping reliability	**Not a limitation.** Handheld GPS units were used for the survey, which for a majority of field conditions have an accuracy level of ± 5 m.
Survey timing, rainfall, season of survey	**Not a limitation:** The EPA (2016a) recommends that flora and vegetation surveys in the South – West Botanical Province be conducted in Spring (September-November). All surveys have been conducted in August and September, at the start of this period.
Disturbances (fire/flood/clearing)	**Not a limitation:** Limited disturbances, with some intrusion of agricultural weeds around vegetation remnant edges indicating that historical and landscape-wide land clearing is the dominant form of disturbance. No signs of recent fire activity were observed.

4 DESKTOP ASSESSMENT RESULTS

Climate

The climate in the Cascade district is described as Mediterranean, characterised by cool wet winters and warm, dry summers (BoM 2023). According to the Shamba Downs Station data (Station No. 12267), the area receives an average annual rainfall of 434.2 mm (BOM 2023).

Catchment

The project is situated within the Esperance Coast Basin and Stokes Inlet: Lort – Young Catchment. At a finer scale, the project area is within the Young River sub-catchment. No surface water bodies or drainage depressions are mapped within the project area, with a tributary of the Young River situated approximately 0.7 km south of the project area within Reserve 31750.

Geology, Soils and Topography

The geological mapping unit for the project area is described as "dominantly Tertiary marine sediments with areas of outcropping Proterozoic granite and gneiss" (Schoknecht *et al.* 2004). The MU landform, located in the eastern part of the Salmon Gums Mallee Zone, is described as a "gently undulating plain with fixed shallow incised stream channels flowering in a unidirectional pattern toward major rivers" (Schoknecht *et al.* 2004). Within the area, one soil type, the Scaddan 6 Subsystem (246Sc_6) has been recorded. This is described is defined by "alkaline grey shallow sandy duplex soils associated with calcareous loamy earths, plus other minor soils, which characteristically supports mallee shrublands of Eucalyptus eremophila with an associated understorey of Melaleuca species" (Overhue et al. 1993).

Regional Vegetation

The site is located within the Eastern Mallee (MAL01) Interim Biogeographic Regionalisation of Australia (Thackway & Cresswell 1995) region. MAL01 is described as: "gently undulating, with partially occluded drainage. Mainly Mallee over Myrtaceous-Proteaceous heaths on duplex (sand over clay) soils. Melaleuca shrublands characterise alluvia, and Halosarcia (now Tecticornia) low shrublands occur on saline alluvium. A mosaic of mixed Eucalypt woodlands and Mallee occur on calcareous earth plans, and sandplains overlying the Eocene Limestone strata in the East. Semi-arid (dry) and warm Mediterranean."

Beard (1973) mapped one vegetation association (VA) within the site, namely VA 47 (Table 3). Approximately 35.85% of the pre-European extent of VA 47 remains across Western Australia. The VA is inadequately represented in IUCN reserves, with only 17.80% of the current extent conserved within the CAR system. Within the Shire of Esperance LGA, over 86.58% of VA 47 has been extensively cleared, therefore not meeting the 30% remaining threshold to be considered adequately represented in IUCN reserves.

Table 3: Vegetation associations mapped by Beard (1973) within the 'Site B – 'River Road Gravel Pits'', and statistics on pre-European remaining areas.

Vegetation Association	**Oldfield 47**
Name	Shrublands; tallerack mallee-heath
Description	Eucalyptus open mallee shrubland / Banksia mixed open shrubland / Andersonia mixed heath
Area mapped within site (ha)	7.48 ha – entire site.

Vegetation Association	Oldfield 47
Pre-European extent in IBRA sub-region MAL01 (%)	43.58
Pre-European extent in LGA (%)	13.42
Current extent conserved in IUCN area (%)	49.3
Pre-European extent conserved in IUCN area (%)	17.80

Surrounding Land Use

The area directly included in the clearing permit application 'Site B – 'River Road Gravel Pits' is currently intact and vegetated road reserve, measuring 50 m in width in the northern road reserve, and 30 m width in the southern component, managed by the Shire of Esperance. The current road footprint occupies 20 m wide, totaling approximately 1.76 ha of the survey area. The surrounding land use is predominantly cereal cropping within a mosaic of nature reserves and remnant vegetation on private freehold land, Shire and DPLH Crown reserves. The agricultural zone extends north for approximately 15 km, before transitioning into the extensive land use zone within the Shires of Dundas and Ravensthorpe.

The site is situated approximately 1.6 km from Reserve 31750, an A-Class, 2596 ha DPLH reserve vested as parkland. This significant reserve, adjoining Reserves 31751 (3437 ha) and 31762 (3218 ha) tracking the riparian corridor of the Lort River south to Stokes Inlet, would offer significant conservation values for native flora and fauna. No other Conservation-vested reserves were located within 5 km of the site. However, large contiguous patches of remnant vegetation on private land join Reserve 31750, enhancing the conservation value. Several reserves remaining as well-vegetated bushland remnants were located within 20 km of the site.

Potential Threatened and Priority Flora

Within a 20 km radius of the proposed impact site, three threatened (TF) and 29 priority (PF) flora were recorded (Appendix 5). Of these, one TF species, *Stenanthera localis* (CR), and 11 PF species had suitable known associated habitat that corresponded with vegetation communities and soil type of 'Site B – River Road Gravel Pits' project (Appendix 4).

Potential Threatened and Priority Ecological Communities

The desktop study identified the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act)-listed Endangered TEC, 'Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia (Kwongkan)' within 'Site B – River Road Gravel Pits' project area. No other TECs or PECs were identified by the desktop study as being within 'Site B – River Road Gravel Pits', or within a 20 km buffer of the site.

Potential Threatened and Priority Fauna

Two threatened fauna were recorded within a 20 km radius of the proposed impact site (Appendix 5; DCCEEW 2022c), namely the Carnaby's Black Cockatoo / Ngoolark (*Zanda latirostris*, EN / EN) and Malleefowl / Gnow (*Leipoa ocellata*, VU / VU). The PMST search revealed an additional five threatened fauna, including the curlew sandpiper (*Calidris ferruginea*, CR / CR), numbat (*Myrmecobius fasciatus*, EN / EN), Australasian bittern (*Botaurus poiciloptilus*, EN / EN), southern whiteface (*Aphelocephala leucopsis*, VU, not listed in BC Act), and grey falcon (*Falco hypoleucos*, VU / VU). No Priority or Migratory

fauna records exist within 20 km of the proposed impact site. However, the Eastern Mallee IBRA subregion is largely remote and understudied, and it remains possible that other Threatened and Priority fauna such as the following may occur within the project area or near surrounds: western quoll / chuditch (*Dasyurus geoffroii*, VU / VU), inland western rosella (*Platycercus icterotis* subsp. *xanthogenys*, P4), western brush wallaby (*Notamacropus irma*, P4), heath mouse / Dayang (*Pseudomys shortridgei*, VU / VU), western mouse / Walyadji (*Pseudomys occidentalis*, P4), southern death adder (*Acanthophis antarcticus*, P3), rainbow bee-eater (*Merops ornatus,* MI / P2) and peregrine falcon / kwedalbar (*Falco peregrinus*, OS). Therefore, a total of 12 Threatened, five Priority, three Migratory and one otherwise specially-protected fauna were considered to be possibly occurring within the proposed project area.

The desktop search indicated that there were no records of Carnaby's black-cockatoo roosting or breeding habitat within 20 km of the project area.

Phytophthora Dieback

Dieback Information Delivery and Management System (DIDMS; GAIA Resources, SCNRM & State NRM 2022) data shows negative *Phytophthora cinnamomi* or other *Phytophthora* sp. dieback sample results in the immediate area.

5 FIELD SURVEY RESULTS AND DISCUSSION

Flora

A total of 141 vascular plant taxa, representative of 92 genera and 36 families, were recorded within the 'River Road Gravel Pits' survey area. Of these, 131 were native species and 10 were introduced. The majority of taxa recorded were representative of the Cyperaceae (10 taxa), Fabaceae (15 taxa), Myrtaceae (32 taxa), and Proteaceae (13 taxa) families. Refer to Appendix 1 for the complete incidental species list.

Several specimens were submitted to the WAH as non-threatened species. This included *Acacia tetanophylla* which was submitted for gap filling. Three specimens belonging to the Cyperaceae family, particularly from the Lepidosperma genus, were submitted to the WAH to assist with the taxonomic revision of the genera.

A number of plant specimens collected could not be identified accurately to species level due to the absence of sufficient taxonomic characters to enable accurate identification. The principal reasons for not being able to fully identify some of the collected specimens to species level were:

- Plant material was sterile or lacked sufficient taxonomic features to permit accurate identification to species level. In these cases, the species is identified as, for example, *Prasophyllum* sp.; and / or
- The plant material collected could not be determined to a known taxon. For example, Lepidosperma (as species are currently undergoing taxonomic revision).

Threatened and Priority Flora

No TF were found within the clearing footprint. One Priority flora, *Acrotriche platycarpa* (Priority 1) was identified within the survey area. Queries of spatial datasets were requested specifically for these species, to interrogate impact of proposed works on species sustainability (DBCA 2023a, 2023b, 2023c; DCCEEW 2022d). *Acrotriche platycarpa* was not recorded on the TPFL database. This species was only recently discovered and was not expected to have been added to the TPFL database. It was noted that additional information on *Acrotriche platycarpa* was located on file.

5.1.1 *Acrotriche platycarpa*, Priority 1

Two specimens of *Acrotriche platycarpa* were sent to the WA Herbarium for identification confirmation (KSW01123 and KSW01323, Accession 10411), with specimens retained. It was confirmed as *Acrotriche platycarpa* by Michael Hislop (WAH) on 04/10/2023. A Threatened and Priority Flora Reporting Form (TPRF) was completed and sent to Department of Biodiversity, Conservation and Attractions (DBCA) District Flora Conservation Officer and Species and Communities Branch on 10/01/2023 (Appendix 2).

Twelve plants were in the original project area (depicted as the survey area), however, adjustment of the project area to prevent clearing within 10 m of this species resulted in three clearing areas that do not impact this species. The neighbouring rehabilitated gravel pit to the west of the site was also searched for *Acrotriche platycarpa* with a lower survey intensity than the rest of the survey area, revealing an additional three plants within the rehabilitated gravel pit.

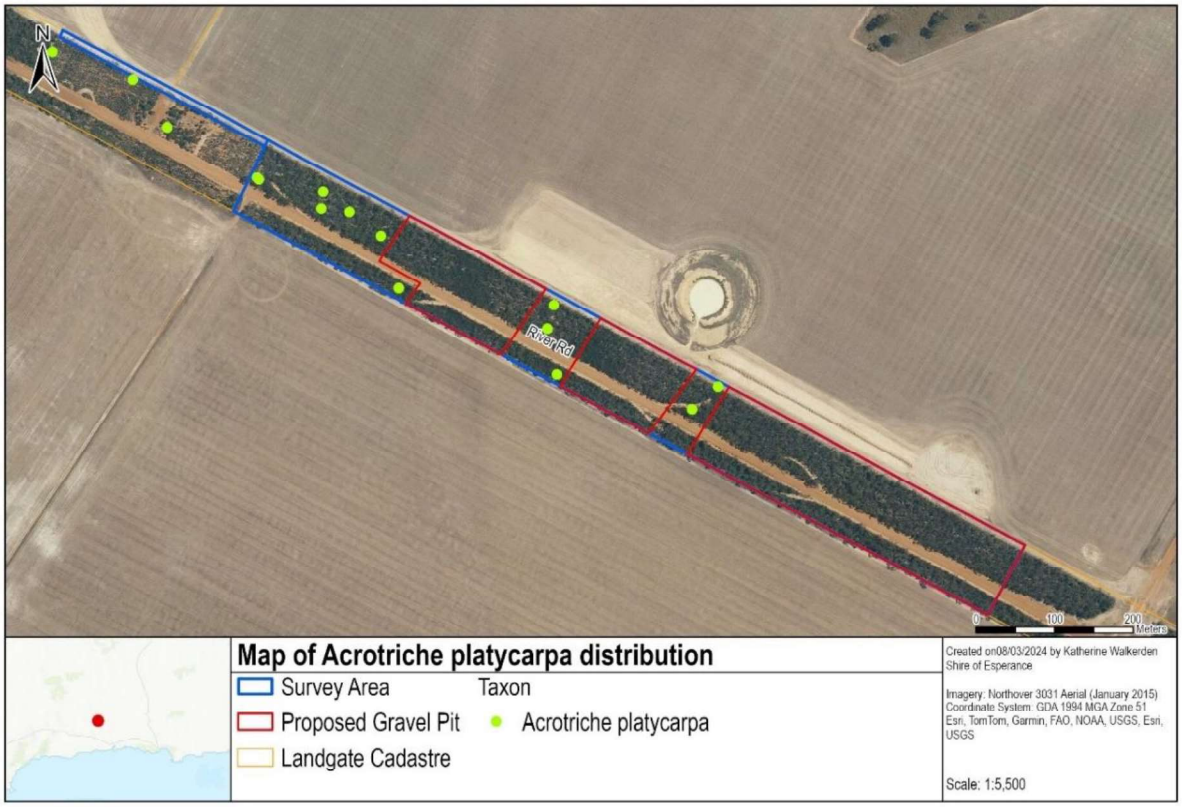

Figure 2. Priority 1, *Acrotriche playtycarpa* distribution within 'River Road Gravel Pits' project area.

Acrotriche playtycarpa was first discovered in 2021 and formally described in 2023 (Hislop, Walkerden, Waters, 2023). The River Road population is the fourth known population of this species, with the addition of this population there is now a total of 135 known plants.

Table 4: Known populations of *Acrotriche platycarpa*, Priority 1 flora.

Last Collector No.	Location	Frequency	Tenure	Most recent record date	Current impacts
KSW9222	Coomalbidgup Road Reserve	66	Road Reserve	14/07/2022	

Last Collector No.	Location	Frequency	Tenure	Most recent record date	Current impacts
KSW326	UCL, near West Point Road	5	UCL	02/07/2023	
KSW364	West Point Road Reserve and Reserve 31749	49	Road Reserve (Shire of Esperance), Road Reserve (Shire of Ravensthorpe) and unmanaged reserve	12/08/2023	State Barrier Fence Esperance extension. Clearing has been conducted through the population, it is unclear if any plants were impacted.
KSW01323	River Road	15	Road reserve	4/09/2023	

Weeds

During the site inspection, ten introduced weed species were recorded (Table 4; refer to comprehensive flora list in Appendix 1). The majority of weed invasion occurred within the 5-10 m edge where the remnant roadside vegetation fringed agricultural fields, and where cross overs for farm access intersected the vegetation (Figure 3). These areas were observed to have diminished vegetation condition, ranging from 'Completely Degraded' to 'Good'. Scattered weeds occurred within the spoon drains. All species were listed as environmental weeds under the Environmental Weed Strategy for Western Australia (EWSWA; CALM 1999), and were listed as 'Permitted' under Schedule 11 of the *Biosecurity and Agricultural Management Act* 2007 (BAM Act). No Weeds of National Significance (WoNS; EPBC Act) or Declared Pests (BAM Act; DPIRD 2023) were recorded within the project area. Of the ten weed species, *Eragrostis curvula* was the most extensive and concerning. This is a priority environmental weed in the SOE's Environmental Weed Strategy 2009 – 2018 (Field 2009).

It is likely that proposed works may increase the distribution of weeds and degrade vegetation along the entire road reserve where works occur. It is strongly recommended that regular wash downs during the course of works to remove weed seeds or follow up herbicide control of invasive species occur.

Figure 3: Agricultural weed invasion along the northern edge of the roadside vegetation corridor, illustrating the intrusion of *Eragrostis curvula*, *Schismus arabicus*, *Lepidium africanum* and *Arctotheca calendula* into the mallee vegetation.

Phytophthora Dieback

No evidence of dieback infestation was encountered during the field survey, with the presence of numerous dieback-susceptible genera such as *Banksia, Hakea, Eucalyptus, Beaufortia*, and *Isopogon* suggesting the project area is currently dieback-free. This finding is consistent with the DIDMS (2018) confidence mapping. Proposed works will be conducted using appropriate hygiene measures to limit spreading of the disease, including clearing in dry conditions and clean down of vehicles and machinery before entering the site.

Vegetation Communities

Three vegetation types were identified within the 'Site B – River Road Gravel Pits', as defined by structure and composition (Table 5). It is believed that the Beard (1973) vegetation associations identified in Section 4.4 are an appropriate match for two vegetation types observed. Both Vegetation Type A and B were dominated by a eucalypt mallee overstorey featuring Tallerack (*Eucalyptus pleurocarpa*) amongst numerous other eucalypt mallees, with an open mixed shrubland midstorey featuring *Banksia media.* Several species listed in the description of the community, specifically *Lambertia inermis* and *Andersonia* sp. were not present, and instead the understorey was predominantly comprised of species within the Proteaceae, Myrtaceae and Fabaceae families.

Vegetation Type C was best represented by VA 519, which is mapped approximately 400 m from the site. This VA is described as 'Eucalypt open mallee shrubland / *Melaleuca* sp. shrubland', which is consistent with the description of Vegetation Type C. Although *Eucalyptus eremophila* was not recorded within the site, it is not a strict component of VA 519, and at the site this species was substituted by numerous other mallee eucalypts. Refer to Figures 3-5 for photos of the individual vegetation types.

Table 5: Vegetation communities identified within proposed 'River Road Gravel Pits' project area.

Type	Description	Figure	Closest Matching Beard Vegetation Association	Area (ha)
A	Mixed Mallee over *Hakea laurina* Open Shrubland	4	VA 47: Shrublands; tallerack mallee-heath.	1.62
B	Mixed Mallee over *Banksia media* Open Shrubland	5	VA 47: Shrublands; tallerack mallee-heath.	3.50
C	Scattered Mallee over Dense Melaleuca Shrubland	6	VA 519: Shrublands: mallee-scrub, *Eucalyptus eremophila*.	0.46

Vegetation Type A: Mixed Mallee over *Hakea laurina* Open Shrubland

Vegetation Type A was present across 1.62 ha of the proposed clearing area. Characterised by stands of eucalypt mallee over sparse tall shrubs of *Hakea laurina* and a dense shrubland of primarily Myrtaceous species, this vegetation type was observed to contain a high level of species richness and habitat diversity regarding variability in vegetation density and cover. This vegetation type ranged in condition from Degraded to Excellent, with the majority existing in an Excellent condition.

Figure 4: Vegetation Type A: Mixed Mallee over *Hakea laurina* Open Shrubland.

Vegetation Type B: Mixed Mallee over *Banksia media* Open Shrubland

Vegetation Type B: Mixed Mallee over *Banksia media* Open Shrubland extended across approximately 3.50 ha within the proposed gravel pit clearing area. This vegetation assemblage boasted a high level of floristic richness and structural diversity, ranging from mallee over closed shrublands of *Banksia media* to mallee over sparse low shrubland of *Banksia media*, Myrtaceous and Fabaceous shrubs and sedges. The condition of this vegetation type ranged from Good to Excellent, with the majority existing in an Excellent condition.

Figure 5: Vegetation Type B: Mixed Mallee over *Banksia media* Open Shrubland. Note the high diversity in floristic composition and structure throughout the vegetation community.

Vegetation Type C: Scattered Mallee over Dense Melaleuca Shrubland

Vegetation Type C: Scattered Mallee over Dense Melaleuca Shrubland extended over approximately 0.46 ha within the proposed clearing area. The vegetation community was characterised by a sparse overstorey of eucalypt mallee, particularly *E. flocktoniae, E. kessellii* subsp. *eugnosta*, and *E. phenax*, over a dense thicket-like understorey of *Melaleuca striata, Melaleuca* sp. and *Hibbertia racemosa*. The ground layer was sparse with a thick layer of leaf litter. Some areas of the vegetation assemblage appeared to be seasonally-inundated, with damp moss-covered clay soil indicating either shallow winter inundation, or poor drainage resulting in periodic inundation following rainfall. The condition of this vegetation type ranged from Good to Excellent, with the majority in Excellent condition.

Figure 6: Vegetation Type C: Scattered Mallee over Dense Melaleuca Shrubland.

Vegetation Condition

Vegetation condition was generally consistent across the site, with the most disturbed and degraded areas localised to a 5-10 m fringe around the edges, and where spoon drains and farm access cross-overs had been cleared (Table 6). The majority of the core vegetation was present in an Excellent condition, with minimal weed invasion and signs of disturbance (Figure 7). No signs of recent fire activity were observed, and the vegetation appeared long-unburnt (>15 years). Within the proposed gravel pit clearing area, the vegetation was primarily in an Excellent condition, with several small (> 1 ha) patches of Vegetation Type B in Very Good condition within the core.

The primary form of disturbance was the clearing of vegetation around the remnant facilitating the intrusion of agricultural weeds. Introduced fauna, particularly Declared Pests such as European rabbits (*Oryctolagus cuniculus*), feral cats (*Felis catus*) and European red foxes (*Vulpes vulpes*) have resulted in disturbances and ecological changes such as predation on small native fauna, and alteration of the understorey through grazing of native vegetation seedlings, warren construction, and destructive diggings.

Table 6: Quantifying vegetation to be cleared by vegetation type and condition.

Vegetation Type	Vegetation Condition Area (ha)					
	Excellent	Very Good	Good	Degraded	Completely Degraded	Total
A: Mixed Mallee over *Hakea laurina* Open Shrubland	1.39	0.12	0.11	-	-	**1.62**
B: Mixed Mallee over *Banksia media* Open Shrubland	2.35	0.74	0.41	-	-	**3.50**
C: Scattered Mallee over Dense Melaleuca Shrubland	0.42	0.01	0.03	-	-	**0.46**
Total	**4.16**	**0.87**	**0.55**	**-**	**-**	**5.58**

Figure 7: Vegetation types present within proposed gravel pit.

Survey Area
Proposed Gravel Pit
Landgate Cadastre

Vegetation Type
A: Mixed Mallee over *Hakea laurina* Shrubland
B: Mixed Mallee over *Banksia media* Open Shrubland
C: Scattered Mallee over Dense Melaleuca Shrubland

Created on the 28/03/2024 by Kahree Garnaut
Shire of Esperance
Scale : 1:5,500
Imagery: Northover 3031 Aerial (January 2015)
Esri, TomTom, Garmin, FAO, NOAA, USGS, Esri, USGS
Coordinate System: GDA 1994 MGA Zone 51

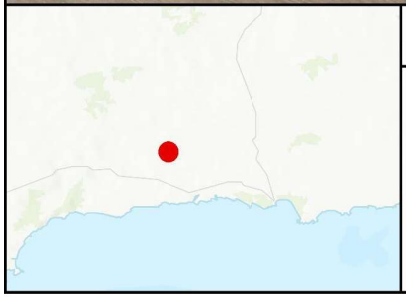

Figure 8: Vegetation condition within proposed gravel pit.

Survey Area
Proposed Gravel Pit
Landgate Cadastre

Vegetation Condition
Excellent
Very Good
Good
Degraded

Created on the 28/03/2024 by Kahree Garnaut
Shire of Esperance
Scale : 1:5,500
Imagery: Northover 3031 Aerial (January 2015)
Esri, TomTom, Garmin, FAO, NOAA, USGS, Esri, USGS

Coordinate System: GDA 1994 MGA Zone 51

Threatened and Priority Ecological Communities

No vegetation types identified in the site bore sufficient resemblance to Kwongkan Shrublands TEC. The vegetation types present did not bear resemblance to any other potentially occurring TECs or PECs.

Across the site, including the adjacent rehabilitated gravel pit, there were three diagnostic Kwongkan TEC species present, namely *Banksia armata* (Prickly Dryandra), *Banksia media* (Southern Plains Banksia), and *Isopogon formosus* (Clustered Coneflower). However, Vegetation Type B exhibited only two diagnostic Kwongkan species (*Banksia media* and *Isopogon formosus*), and had an understorey shrubland layer comprised predominantly of species from the Cupressaceae, Myrtaceae, and Fabaceae families. Vegetation Type A did not resemble Kwongkan TEC as *Hakea laurina*, the dominant shrubland component, is not a diagnostic Kwongkan species, and the remaining composition of the understorey was primarily comprised of species that were members of the Dilleniaceae, Fabaceae, and Myrtaceae families. Therefore, neither vegetation type met the 30% Proteaceae species composition criterion required to qualify as Kwongkan TEC, and it was determined this TEC was absent from the proposed project area.

Fauna

Of the two Threatened fauna identified within the desktop survey, both have suitable habitat within the proposed clearing permit area. No malleefowl or Carnaby's black-cockatoos were sighted during the survey, although evidence of Carnaby's black-cockatoo foraging on *Banksia media* cones was observed within Vegetation Type A. Additionally, three Carnaby's Cockatoo were observed flying over Cascades on the way to the site on the 4th of September 2023, approximately 10 km away from the project area.

Thirty-two faunal taxa were recorded within the project area, of which 28 species were native and four were introduced species. All native fauna, with the exception of Carnaby's Cockatoo, are not listed under EPBC Act, and are considered 'Least Concern' under the *Biodiversity Conservation Act 2016*.

Three of the four introduced species were listed as Declared Pest – C3 Management under the BAM Act, namely the European red fox, European rabbit, and feral cat. These Declared Pests were detected via observations of tracks, skeletal material, and diagnostic diggings and warrens. European foxes, rabbits and feral cats are extensively distributed across the region, requiring landscape-scale integrated management. The dog tracks observed on the road verge may have been from a domestic dog (e.g. farm dog), or a wild dog, in which case this animal would be regarded as a Declared Pest under Category 3 - Management.

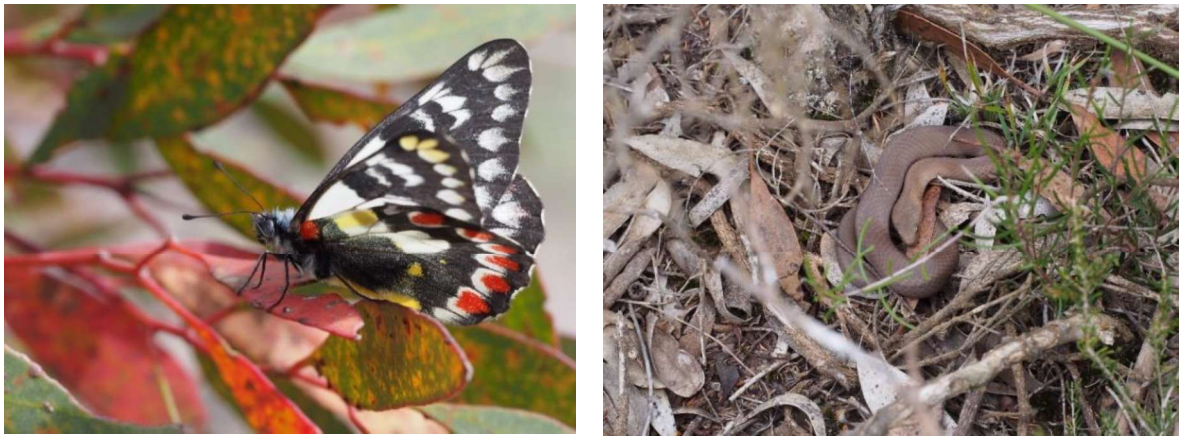

Figure 9. Red-spotted jezebel butterfly (*Delias aganippe*) and Bardick (*Echiopsis curta*) observed within the survey area. Photos taken by Katherine Walkerden on the 4th September 2023.

5.10.1 Fauna Habitat for Threatened and Priority Fauna

Suitable habitat was found within the project area for both malleefowl and Carnaby's Cockatoo, as well as potential or marginal habitat for the western brush wallaby, inland western rosella, southern death adder, and chuditch.

Fauna habitat incidentally observed within the survey area included burrows and piles of woody or rocky debris for small reptiles; small hollows in mallee trees suitable for nesting arboreal fauna such as microbats (sub-order Microchiroptera) small parrots and pardalotes; ant nests for echidna foraging; dense understorey vegetation for ground-dwelling mammal and avian cover; and an abundance of leaf litter for invertebrates. Refer to Figure 9 below.

Figure 9: Fauna habitat found within survey area, clockwise from top-left: Rocky pile creating shelter for reptiles and invertebrates; small hollow in mallee trunk for small birds such as pardalotes; vegetative debris creating shelter for reptiles; and echidna diggings in old ant nest.

5.1.2 Carnaby's black-cockatoo or manitch, *Zanda latirostris,* Endangered

The Shire of Esperance Black Cockatoo assessment was conducted in accordance with the EPBC Act Referral guidelines (DAWE 2022), which, in the Esperance region, is relevant for one of the three threatened black-cockatoo species, the Carnaby's black-cockatoo (Zanda latirostris). The desktop assessment indicated that the species has been recorded within 20 km of the proposed project area; however, no known roost or breeding sites exist within this buffer. Inspection of aerial imagery revealed the presence of numerous established pine plantations and / or pine windbreaks within 15 km of the site, providing suitable roosting habitat which may be opportunistically used by the cockatoos (Finn, Stocks & Valentine 2009). Three Carnaby's black-cockatoos were sighted by Kahree Garnaut and Katherine Walkerden flying over the Cascade townsite in September 2024, approximately 10 km west of the project site. The species is migratory, tending to spend July to December in semi-arid and temperate eucalyptus woodlands along the south coast and wheatbelt to breed in deep hollows formed in old-growth trees (DPaW 2013). Carnaby's black-cockatoo tend to be more abundant in the Esperance region from January to June, when they return to feed on nutritious, energy-rich Proteaceae and Myrtaceae species within the coastal shrublands, heaths, and mallee (DPaW 2013). Therefore, low numbers of Carnaby's black-cockatoo were expected in the Cascade district during the spring survey, and any remaining feeding debris was anticipated to be old and degraded in nature.

Within the survey area, evidence of Carnaby's black-cockatoo foraging was found within Vegetation Type B, where chewed *Banksia media* cones were observed (Figure 10). Vegetation Type A: Mixed Mallee over *Hakea laurina* Open Shrubland and Vegetation Type B: Mixed Mallee over *Banksia media* Open Shrubland were identified as providing potential foraging habitat, with evidence of foraging observed amongst *Banksia media* shrubs. No signs of foraging were observed in either Vegetation Type A or Vegetation Type C: Scattered Mallee over Dense Melaleuca Shrubland. Vegetation Type C did not contain sufficient foraging species to warrant being considered as significant foraging habitat for Carnaby's black-cockatoo. The foraging quality scoring tool (DAWE, 2022) was utilised to provide a measure of foraging habitat quality for all three vegetation types (Appendix 13). A total of 4.02 ha of Carnaby's black-cockatoo foraging habitat was mapped within the proposed project area, comprised of 3.50 ha of high-quality habitat in the form of Vegetation Type B, and 1.52 ha of low-quality habitat in the form of Vegetation Type A (Figure 12).

Forty-three plant species offering forage material in the form of blossom, fruiting material, and seeds were recorded in the proposed project area and adjacent rehabilitated gravel pit (Groom 2010, Valentine & Stock 2008 and Johnston 2011). Specifically, foraging species included members of the Proteaceae family, such as *Banksia media, B. armata, Hakea corymbosa, Grevillea pectinata, H. ilicifolia, H. laurina, H. lissocarpha, H. newbeyana, Isopogon polycephalus, Isopogon* sp. Fitzgerald River, *Petrophile fastigiata*, and *P. squamata* subsp. Northern; the Myrtaceae family, including *Beaufortia schaueri, B. micrantha*, *Calothamnus gibbosus*, various melaleuca shrubs and eucalypt mallees; *Callitris roei*, and several *Acacia* species. It is also known that Carnaby's black-cockatoos opportunistically forage on spilt grain and canola seeds during and after harvest.

Given that the proposed gravel pit area contained a total of 4.02 ha of foraging habitat, a referral for assessment and approval under the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) is likely to be required.

Figure 10: Evidence of Carnaby's black-cockatoo foraging on *Banksia media* in Vegetation Type B.

5.1.3 Malleefowl or gnow, *Leipoa ocellata*, Vulnerable

No targeted assessment for malleefowl occurrence was conducted, with the habitat present within the project area instead compared to species' information presented in the National Recovery Plan for Malleefowl *Leipoa ocellata* (Benshemesh 2007). No Referral Guidelines relevant to malleefowl currently exist. According to the DBCA threatened and priority fauna database, the closest record of malleefowl to the survey area was 13.4 km from the proposed project area, whilst ALA records indicate that numerous sightings of malleefowl have been recorded in North Cascade near Lake Sharpe, and approximately 25 km west of the survey area near Cheadanup Nature Reserve. It is highly likely that malleefowl occupy the vegetation conserved around the Young River corridor 2 km west of to the survey area.

Suitable habitat was found across the site, with all tree vegetation types consisting of semi-arid woodland and mallee shrublands that are long-unburnt with an abundance of leaf litter and sandy substrate for mound-building (Benshemesh 2007). As the project area consists of a long, narrow vegetated roadside corridor, it is likely that this habitat would be used for foraging or movement between breeding areas in larger reserves. No nest mounds were encountered during the survey, which was conducted during the species' active breeding season in September – November. Therefore, no malleefowl breeding activity is likely to occur within the project area.

5.1.4 Chuditch or western quoll, *Dasyurus geoffroii*, Vulnerable

Marginal hunting and nesting habitat for the chuditch was present throughout the site, particularly within Vegetation Type A and B. The abundance of fallen timber, hollows and burrows beneath trees, and dense understorey provides ample shelter for the nocturnal dasyurid, which has a broad habitat range from mallee shrublands, heath, woodlands and eucalypt forest. This species is territorial with large home ranges exceeding 4 km^2 for males and 0.9 km^2, and therefore they possibly resident in the nearby Young River corridor, and use the road reserve as a movement corridor (DEC 2012).

According to the DBCA database, the most recent sightings of chuditch in the Esperance region occurred in the early 2000s. A translocated population was released at Lake Magenta NR in 1997-98 and has been successful (DEC 2012); it is possible individuals from these translocated populations are dispersing further into the Great Western Woodlands and adjacent mallee. ALA records indicate that chuditch have been sighted in riparian corridors of the Phillips River and Fitzgerald River NP adjacent to Culham Inlet, approximately 86 km west of the survey area, connected to the survey area by contiguous habitat through the Great Western Woodlands and roadside vegetation.

5.1.5 Southern death adder, *Acanthophis antarcticus*, Priority 3

The southern death adder is an ambush predator that relies on abundant leaf litter or sand in rainforests, sclerophyllous woodlands and forests, shrublands and heathlands. ALA records indicate that the species has been detected near Overshot Hill Nature Reserve, north of Ravensthorpe (approximately 85 km west of the survey area) and near Woody Lake in Esperance (approximately 100 km south-east). However, the contiguous habitat connecting the Great Western Woodlands to North Cascades is vastly understudied, and fauna observations are scarce. The vegetation within the survey area was characterised by an abundance of leaf litter and pockets of densely vegetated understorey, providing ample hunting habitat for the southern death adder (Figure 11). It is likely that this species is sparsely distributed in the area, given the prevalence of threatening factors such as introduced predators and secondary poisoning from consuming baited rodents.

Figure 11: Abundant leaf litter and vegetative debris providing ample hunting habitat for the Priority 3 reptile, the southern death adder, within Vegetation Type A.

5.1.6 Inland western rosella or bardinar, *Platycercus icterotis xanthogenys*, Priority 4

The Priority 4 inland western rosella has not adapted as well to agricultural food sources and landscape modification as the common coastal south-west subspecies (*P. icterotis icterotis*), and remains restricted to dry sclerophyll woodlands and mallee with a shrubland or heathland understorey in the eastern WA Wheatbelt, Great Western Woodlands, and surrounding areas. Numerous mallee hollows exceeding 5 cm in diameter were present, posing potential nesting habitat for the inland western rosella. The mallee vegetation within the site provides valuable foraging and potentially nesting opportunities for the parrot, particularly as it is close to larger foraging grounds within adjacent nature reserves, and potential breeding grounds in the nearby Great Western Woodlands. Observations of the species on the ALA database are scarce, with two known records from the Great Western Woodlands near Kalgoorlie-Boulder and Norseman, over 100 km from the survey area. Recent sightings of the inland western rosella east of Ravensthorpe (near FQM Nickel Mine, 52 km south-west of survey area) by SOE Environmental Officer, Kahree Garnaut, have been submitted to DBCA.

5.1.7 Western brush wallaby or kwoora, *Notamacropus irma*, Priority 4

Suitable habitat for the Western brush wallaby was identified to occur across the site within all vegetation types. The abundance of mallee habitat connected to large, congruous nature reserves suggests the habitat is likely used as a movement corridor by the Western brush wallaby, particularly where dense melaleuca thickets in Vegetation Type C provide cover from introduced predators. Western brush wallabies have been sighted along Cascade Road (reported to DBCA; Kahree Garnaut) approximately XX km west of the survey area. Records on the ALA database indicate sightings are scattered across Fitzgerald River National Park, Ravensthorpe, and lower Great Western Woodlands near Mt Madden, North Cascade, and Lake King (ALA 2024).

5.1.8 Rainbow bee-eater, *Merops ornatus*, Marine / Migratory and Priority 2

Suitable habitat for the rainbow bee-eater was identified to occur across the entire survey area. The species is known to occur throughout the Esperance region, particularly in North Cascade, Forrestiana and Boyatup, Balladonia, and the coastal areas of Munglinup and Esperance. However, given the adaptability of this migratory species to cleared agricultural landscapes and ability to breed in gravel pits, this species was not determined to be unlikely to be significantly impacted by this proposed project.

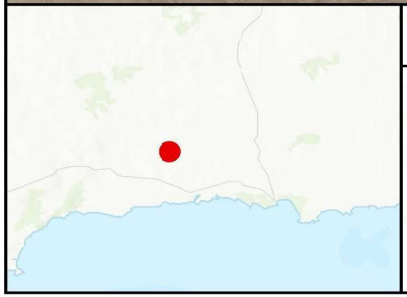

Figure 12: Cockatoo foraging habitat present in proposed gravel pit.

Survey Area
Proposed Gravel Pit
Landgate Cadastre

Habitat Quality
High
Low

Created on the 28/03/2024 by Kahree Garnaut
Shire of Esperance
Scale : 1:5,500
Imagery: Northover 3031 Aerial (January 2015)
Esri, TomTom, Garmin, FAO, NOAA, USGS, Esri, USGS

Coordinate System: GDA 1994 MGA Zone 51

6 REVIEW OF 10 CLEARING PRINCIPLES FOR NATIVE VEGETATION

The 'Site B – 'River Road Gravel Pits' project is likely to be at variance to three of the ten clearing principles employed by the Department of Water and Environmental Regulations (DWER) to assess application impacts against environmental values, as listed under Schedule 5 of the Environmental Protection Act 1986 (DWER 2014; 2023). Refer to Table 7 below.

Table 7: Assessment of the 10 Clearing Principles for native vegetation under the EPA 1986.

Principle	Verdict	Justification
Principle (a) Native vegetation should not be cleared if it comprises a high level of biological diversity.	Likely to be at Variance	During the spring survey, 131 taxa of native flora were recorded over three vegetation communities. Given the relatively small area of the survey area, the observed species richness and vegetation diversity is considered to constitute a high level of biodiversity, which is expected considering the site is located approximately 7 km north of the transition between the mapped MAL01 and ESP02 IBRA subregions.
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 indigenous to Western Australia.	Likely to be at Variance	The site contains 4.02 ha of medium to low-quality foraging habitat for the Carnaby's Black Cockatoo, listed as EN under the EPBC Act and BC Act, due to the presence of vegetation high in Proteaceous and Myrtaceous species, and this species was detected to be present within Vegetation Type B during the field survey. Suitable habitat for the malleefowl and chuditch, both VU fauna listed under the EPBC Act and BC Act, was also found, albeit more likely utilised as a movement corridor. Suitable habitat for two Priority 4 fauna, the inland western rosella and western brush wallaby, was also found to extend across the proposed clearing area. Clearing the entirety of the proposed clearing area will temporarily sever the ecological linkage, discouraging the use of the habitat by indigenous fauna.
Principle (c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.	Not at Variance	One priority species was observed in the area. The project area was significantly altered to exclude *Acrotriche platycarpa* (P1) from the project area, no plants will be taken.
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.	Not at Variance	No vegetation types met diagnostic criteria or definitions of Kwongkan Shrublands TEC, and no other TECs or PECs were determined to be present within the survey area.

Principle	Verdict	Justification
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.	Likely to be at Variance	Only 13.42% of the pre-European extent of Beard VA 47 (within which the site is mapped) remains within the Shire of Esperance LGA, therefore being classified as 'extensively cleared'.
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.	Not at Variance	No vegetation in this area was growing in association with watercourses or wetlands.
Principle (g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	May be at Variance	Within an extensively cleared landscape primarily utilised for broadacre cereal cropping, remnant vegetation stretching along road reserves provides crucial windbreak services acting to prevent wind erosion of field soil, particularly when bare and exposed to strong December winds after harvest. Although the area to be cleared will be small (> 10 ha), it may have some local impact on leeward crops whilst the pits are active, until rehabilitation is completed.
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.	May be at Variance	The vegetation within the road reserve is largely intact and in excellent condition, and functions as an effective movement corridor connecting remnant vegetation of the Young River riparian corridor. Therefore, although the closest conservation-vested reserve is 12.16 km from the survey area (Reserve 30583), fragmenting of the road reserve may cause loss of connectivity and ecological value.
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.	Unlikely to be at Variance.	The Young River is located approximately 1.9 km south of the site and is unlikely to be impacted upon by this proposal.
Principle (j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.	Unlikely to be at Variance.	Not assessed during the survey; however, unlikely to be an issue given the projects' high point in the landscape and distance from waterways.

7 RECOMMENDATIONS

As Shire Environmental Coordinator signs off on project work packs the following recommendation will be included within the internal SOE approval process for the road project:

a) All vehicles and construction equipment to be cleaned prior to start of the project to mitigate spread of weeds and introduction of Phytophthora dieback;

b) Conduction of works during the drier months of summer and autumn to minimise risk of dieback spread;

c) Complete rehabilitation of gravel pit areas post-extraction; and

d) Implementation of an approved weed management plan.

Revegetation Plan

The proposed 'River Road Gravel Pits' site will be rehabilitated by standard Shire of Esperance protocols. including the floristic and vegetative assessment of a reference site, stockpiling of topsoil material prior to gravel extraction, reshaping of the exhausted gravel pit to natural contours, spreading of stockpiled topsoil across the site, and preparatory site ripping.

7.1.1 Rehabilitation Methodology

A dozer will be used to clear native vegetation, stockpile topsoil, and remove overburden (consisting of approximately 300 mm of overlying soil substrate). The topsoil contains large reservoirs of valuable native seed, subterranean fauna and live clonal tissue; therefore, it will be stockpiled separate from the overburden to be used in rehabilitation. Multispectral drone imagery will be conducted prior to clearing so that the original vegetation cover and density can be used as a reference site.

After the exhaustion and cessation of extractive activity in the proposed gravel pits, rehabilitation works will commence in the following autumn or winter (April – June) prior to the onset of the main winter rain. Rehabilitation works will involve spreading stockpiled overburden and subsequently topsoil across the cleared area, and ripping of the site to a depth of 200 – 350 mm. The stored seed in the soil bank will be relied on to facilitate the revegetation component of rehabilitation, with direct seeding or tubestock planting only occurring as a contingency measure. Weed control (refer to Section 7.2) will occur concurrently.

7.1.2 Rehabilitation Completion Criteria

The floristic and vegetation baseline data from the September 2023 reconnaissance survey will be used as the reference for rehabilitation success and completion criteria. Annual site inspections will be conducted to assess vegetation foliar cover, density, species richness and vegetative health. A drone may be flown over the site every alternate year to ascertain multispectral imagery to determine spatial distribution of vegetative health, cover, and density across the site. Refer to Table 8 below for a description of completion criteria and targets for the proposed 'River Road gravel pit' site.

Table 8: Completion criteria following the SMART (specific, measurable, achievable, relevant, time-bound) principles for the rehabilitation of the West Point Road gravel pit.

Criterion	Baseline Floristic data	Completion Target	Completion Criteria
1	131 native vascular plant taxa present prior to clearing across three vegetation types	Restoration of a majority of floristic species richness after five years	75 native vascular plant taxa present
2	Vegetation was classified as Carnaby's black-cockatoo	Returns of 80% foraging species after five years	35 proteaceous, myrtaceous and / or

Criterion	Baseline Floristic data	Completion Target	Completion Criteria
	foraging habitat prior to clearing, with 43 forage species present		casuarinaceous species present
3	Vegetation cover as presented in pre-clearing drone aerials	Return of > 60% of vegetation cover by five years	Drone aerial presenting adequate and increasing vegetative cover > 60%.
4	Weed cover < X %	Minimal weed cover across rehabilitated site after five years	Weed cover < 5% in core areas of rehabilitation
5	Vegetation predominantly in 'Excellent' condition	Restoration of vegetation condition to near pre-clearing state after five years	Assessment of vegetation condition to be 'Very Good' or better

7.1.3 Monitoring

Monitoring of the rehabilitated areas will enable determination of successful achievement of completion criteria, and early detection of issues that may necessitate the enactment of contingency measures. Monitoring will involve annual on-site inspections by qualified environmental specialists (minimum tertiary-level qualification in Environmental Science). On-site inspections will involve visual assessment of correct implementation of rehabilitation processes (i.e. complete spreading of topsoil), vegetative health and foliar cover, survey of establishing species in the revegetation area, signs of fauna return, and determination of any issues potentially impeding rehabilitation success. Monitoring will coincide with the Annual Compliance inspection period for the 2024 / 2024 financial year. Drone aerials will commence five years after the implementation of rehabilitation activities. Monitoring of the site will continue until achievement of successful rehabilitation.

7.1.4 Contingency Plan

Where the rehabilitation is deemed unsuccessful by comparison to the completion criteria (Section 5), contingency measures will be undertaken, until the completion criteria are met sufficiently. This is an adaptive process and dependent on what completion criteria have failed. A few standard techniques are outlined below:

a) If the composition of species does not meet criteria, then specific species will be infill planted and/or seeded during the next revegetation season from April to June; and / or

b) If listed environmental weeds exist in the site then herbicide and or manual control will be applied to affected areas; and / or

c) If the substrate is determined to be unsuitable (i.e. compacted, too aerated), then amelioration practices such as ripping or re-spreading of material.

Keystone and dominant species will be selected as a contingency measure if respreading topsoil and stockpiled vegetation has unsuccessful germination and does not meet the completion criteria. The incidental species list from the spring 2023 flora survey (Appendix 1) will be the basis for determining species selection for seed and tubestock seedlings, based on availability. Seed can also be collected from the surrounding road reserve.

Weed and Dieback Management Plan

7.1.5 Operational Dieback Hygiene Management

A substantial number of plant pathogens can be spread by moving infected soil, plant material and water, including the notorious water- and soil-borne protozoan, *Phytophthora*, a genus of many species of which two are particularly prominent in the Esperance region, *P. cinnamomi* and *P. psuedocryptogea*. Dieback Information Database Mapping System (DIDMS) indicates that the adjacent Young River corridor is mapped as 'Moderate Confidence Uninfested', with the closest confident infestation occurring approximately 50 km south near Lake Shaster. Therefore, the priority with the proposed 'River Road gravel pits' site is preventing the introduction of Phytophthora dieback through appropriate hygiene management procedures. Standard Shire of Esperance weed and disease hygiene management practices include the following:

a) Ensuring all machinery, plant and equipment are free of soil and vegetative matter prior to entering and leaving the site; and

b) Ensuring soil is moved only during dry conditions; and

c) Ensuring all workers have footwear free of soil and plant material.

7.1.6 Weed Management

There was very minor weed infestation present with the proposed project area, with the disturbed margins of the vegetated roadside remnant displaying agricultural weed invasion within a 5 – 10 m buffer. During operation of the proposed gravel pits and their rehabilitation, the prevention of agricultural weed establishment within the rehabilitation area is pertinent to prevent problematic weed issues. Several systematic strategies to minimise the risk of weed introduction and establishment within the rehabilitated site include:

a) Regular wash-downs of machinery, plant and equipment;

b) Personnel ensuring that their clothes, socks and footwear are cleaned of any soil and plant material (especially seeds) prior to entering site;

c) Early-intervention in the event of weed detection.

If any highly-invasive weed species are encountered that will likely result in an infestation, such as recognised priority weeds from the Shire of Esperance's Environmental Weed Strategy (South Coast Consulting, 2009), Declared Pests (BAM Act) and Weeds of National Significance (WoNS; EPBC Act), early-intervention control works such as hand-pulling, herbicide spraying and slashing will occur. Follow-up control works may be required.

8 LIST OF PERSONNEL

The following Shire of Esperance Staff were involved in this project:

Name	Katherine Walkerden
Position	Environmental Officer
Project Involvement	Desktop and field survey, specimen identification, report writing.
Qualifications	BSc, MEnvSc
Experience	3 years' experience doing botanical surveys in the region.
Scientific Licence	FT61000788

Name	Kahree Garnaut
Position	Environmental Officer
Project Involvement	Desktop and field survey, specimen identification, GIS mapping, report writing.
Qualifications	BSc -EnvSc, ConsBio
Experience	2 years' experience doing botanical and ecological surveys in the Esperance region, with an additional 2 years' experience across the broader south-west, south coast and Midwest regions. Particular experience relating to threatened black cockatoos.
Scientific Licence	FT61001450

Name	Rosamund Mary Hoggart
Position	Environmental Assistant
Project Involvement	Specimen Identification
Qualifications and Experience	BSc (Hons)Ag
	15 years' experience as an amateur botanist in the region and is highly regarded by Esperance Wildflower Society and her peers in Esperance as one of the best botanists in Esperance.
Scientific Licence	N/A

Name	Julie Waters
Position	Environmental Coordinator
Project Involvement	Specimen identification, Report proof reading and verification
Qualifications	BEnvSc (Hons)
Experience	20 years working in environmental field including Flora Conservation Officer for previous DBCA, and 15 years' experience doing fauna and botanical surveys in the region.
Scientific Licence	FT61000787

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10 APPENDICES

Appendix 1: Incidental Species List – Flora

Family	Genus	Species	Common Name	Invasive	WA Conservation Status	Herbarium Reference
Aizoaceae	*Carpobrotus*	*modesta*	Inland Pigface			
Amaranthaceae	*Ptilotus*	*polystachyus*	Prince of Wales Feather			
Apiaceae	*Platysace*	*effusa*				
Asparagaceae	*Laxmannia*	*grandiflora*	Paper-lily			
Asparagaceae	*Lomandra*	*micrantha* subsp. *teretifolia*				
Asparagaceae	*Lomandra*	*mucronata*				
Asparagaceae	*Thysanotus*	*patersonii*	Paterson's Fringe Lily			
Asteraceae	*Arctotheca*	*calendula*	Cape Weed	X		
Asteraceae	*Argentipallium*	*niveum*				
Asteraceae	*Erigeron*	*bonariensis*		X		
Asteraceae	*Sonchus*	*oleraceus*		X		
Asteraceae	*Ursinia*	*anthemoides*	Solar Fire			
Asteraceae	*Vellereophyton*	*dealbatum*		X		
Asteraceae	*Vittadinia*	*gracilis*				
Brassicaceae	*Brassica*	*tournefortii*	Mediterranean Turnip	X		
Brassicaceae	*Lepidium*	*africanum*	Rubble Peppercress	X		
Caryophyllaceae	*Polycarpon*	*tetraphyllum*	Four-leaf Allseed	X		
Chenopodiaceae	*Atriplex*	*semibaccata*	Berry Saltbush			
Chenopodiaceae	*Chenopodium*	*desertorum*				

Family	Genus	Species	Common Name	Invasive	WA Conservation Status	Herbarium Reference
Chenopodiaceae	*Enchylaena*	*tomentosa*	Barrier Saltbush			
Crassulaceae	*Crassula*	*exserta*				
Cupressaceae	*Callitris*	*roei*	Roe's Cypress Pine			
Cyperaceae	*Gahnia*	*ancistrophylla*	Hook-leaved Sedge			
Cyperaceae	*Lepidobolus*	*chaetocephalus*				
Cyperaceae	*Lepidosperma*	*carphoides*	Black Rapier Sedge			
Cyperaceae	*Lepidosperma*	*sanguinolentum*				
Cyperaceae	*Lepidosperma*	sp.				KSW06923 Acc10519
Cyperaceae	*Lepidosperma*	sp.				KSW07023 Acc10519
Cyperaceae	*Leptospermopsis*	*erubescens*				
Cyperaceae	*Leptospermopsis*	*maxwellii*				
Cyperaceae	*Netrostylis*	sp.				KSW04423 Acc 10471
Cyperaceae	*Schoenus*	*racemosus*				
Dilleniaceae	*Hibbertia*	*exasperata*				
Dilleniaceae	*Hibbertia*	*gracilipes*				
Dilleniaceae	*Hibbertia*	*pungens*				
Droseraceae	*Drosera*	*sp. Branched Styles*				
Ericaceae	*Acrotriche*	*platycarpa*			P1	KSW01123 Acc 10411, KSW01323 Acc 10411
Ericaceae	*Lissanthe*	*rubicunda*				
Ericaceae	*Lysinema*	*ciliatum*				
Ericaceae	*Styphelia*	*lissanthoides*				
Ericaceae	*Styphelia*	sp. Newdegate				

Family	Genus	Species	Common Name	Invasive	WA Conservation Status	Herbarium Reference
Euphorbiaceae	*Beyeria*	*sulcata*				
Euphorbiaceae	*Stachystemon*	*brachyphyllus*				
Fabaceae	*Acacia*	*declinata*				
Fabaceae	*Acacia*	*fragilis*				
Fabaceae	*Acacia*	*gonophylla*				
Fabaceae	*Acacia*	*lasiocarpa* var. *bracteolata*				
Fabaceae	*Acacia*	*mutabilis* subsp. *angustifolia*				
Fabaceae	*Acacia*	*octonervia*				
Fabaceae	*Acacia*	*tetanophylla*				KSW06823, Acc 10518
Fabaceae	*Chorizema*	*aciculare*	Needle-leaved Chorizema			
Fabaceae	*Daviesia*	*lancifolia*				
Fabaceae	*Daviesia*	*teretifolia*				
Fabaceae	*Gompholobium*	*baxteri*				
Fabaceae	*Hovea*	*pungens*	Devil's Pins			
Fabaceae	*Templetonia*	*sulcata*				
Fabaceae	*Pultenaea*	*indira* subsp. *indira*				
Geraniaceae	*Erodium*	*botrys*	Long Storksbill	X		
Goodeniaceae	*Coopernookia*	*strophiolata*				
Goodeniaceae	*Dampiera*	*lavandulacea*				
Goodeniaceae	*Lechenaultia*	*formosa*	Red Leschenaultia			
Lauraceae	*Cassytha*	*melantha*	Large Dodder Laurel			

Family	Genus	Species	Common Name	Invasive	WA Conservation Status	Herbarium Reference
Loganiaceae	*Logania*	*micrantha*				
Malvaceae	*Alyogyne*	*hakeifolia*	Native Hibiscus			
Malvaceae	*Lasiopetalum*	*rosmarinifolium*				
Myrtaceae	*Austrobaeckea*	*latens*				
Myrtaceae	*Beaufortia*	*micrantha*	Little Bottlebrush			
Myrtaceae	*Beaufortia*	*schaueri*	Pink Beaufortia			
Myrtaceae	*Calothamnus*	*gibbosus*				
Myrtaceae	*Calytrix*	*lechenaultii*				
Myrtaceae	*Cyathostemon*	*ambiguus*				
Myrtaceae	*Cyathostemon*	*baeckeaceus* subsp. *baeckeaceus*				
Myrtaceae	*Eucalyptus*	*connexa*				
Myrtaceae	*Eucalyptus*	*ecostata*	Silver Mallee			
Myrtaceae	*Eucalyptus*	*flocktoniae*	Merrit			
Myrtaceae	*Eucalyptus*	*forrestiana*	Forrest's Marlock			KSW01223, Acc 10411
Myrtaceae	*Eucalyptus*	*incrassata*	Ridge-fruited Mallee			
Myrtaceae	*Eucalyptus*	*kessellii* subsp. *eugnosta*	Jerdacuttup Mallee			
Myrtaceae	*Eucalyptus*	*phaenophylla*	White Mallee			
Myrtaceae	*Eucalyptus*	*phenax*	Green Dumosa Mallee			
Myrtaceae	*Eucalyptus*	*pleurocarpa*	Tjaltjraak			
Myrtaceae	*Kunzea*	*micromera*				
Myrtaceae	*Melaleuca*	*acuminata*				
Myrtaceae	*Melaleuca*	*carrii*				

Family	Genus	Species	Common Name	Invasive	WA Conservation Status	Herbarium Reference
Myrtaceae	*Melaleuca*	*glaberrima*				
Myrtaceae	*Melaleuca*	*hamata*				
Myrtaceae	*Melaleuca*	*lateriflora*				
Myrtaceae	*Melaleuca*	*rigidifolia*				
Myrtaceae	*Melaleuca*	*sapientes*				
Myrtaceae	*Melaleuca*	*scabra*				
Myrtaceae	*Melaleuca*	*subfalcata*				
Myrtaceae	*Melaleuca*	*tuberculata* subsp. *macrophylla*				
Myrtaceae	*Micromyrtus*	*elobata* subsp. *elobata*				
Myrtaceae	*Micromyrtus*	*imbricata*				
Myrtaceae	*Rinzia*	*communis*	Mallee Rinzia			
Myrtaceae	*Verticordia*	*acerosa* subsp. *preissii*				
Myrtaceae	*Verticordia*	*inclusa*				
Olacaceae	*Olax*	*benthamiana*				
Orchidaceae	*Cyanicula*	*aperta*	Western Tiny Blue Orchid			
Orchidaceae	*Prasophyllum*	sp.	Leek Orchid			
Orchidaceae	*Pterostylis*	*mutica*	Midget Greenhood			
Orchidaceae	*Pterostylis*	*recurva*	Jug Orchid			
Orchidaceae	*Pterostylis*	*sargentii*	Frog Greenhood			
Orchidaceae	*Pterostylis*	*vittata*	Banded Greenhood			
Pittosporaceae	*Billardiera*	*coriacea*				

Family	Genus	Species	Common Name	Invasive	WA Conservation Status	Herbarium Reference
Pittosporaceae	*Billardiera*	*venusta*				
Pittosporaceae	*Marianthus*	*bicolor*	Painted Marianthus			
Poaceae	*Austrostipa*	*hemipogon*				
Poaceae	*Austrostipa*	*scabra*	Speargrass			
Poaceae	*Eragrostis*	*curvula*	African Lovegrass	X		
Poaceae	*Hordeum*	sp.	Barley Grass	X		
Poaceae	*Neurachne*	*alopecuroidea*	Foxtail Mulga Grass			
Poaceae	*Schismus*	*arabicus*	Arabian Grass	X		
Polygalaceae	*Comesperma*	*virgatum*	Milkwort			
Proteaceae	*Banksia*	*armata*	Prickly Dryandra			
Proteaceae	*Banksia*	*media*	Southern Plains Banksia			
Proteaceae	*Grevillea*	*pectinata*	Comb-leaved Grevillea			
Proteaceae	*Hakea*	*corymbosa*	Cauliflower Hakea			
Proteaceae	*Hakea*	*ilicifolia*				
Proteaceae	*Hakea*	*laurina*	Pincushion Hakea			
Proteaceae	*Hakea*	*lissocarpha*				
Proteaceae	*Hakea*	*newbeyana*				
Proteaceae	*Isopogon*	*polycephalus*	Clustered Coneflower			
Proteaceae	*Isopogon*	sp. Fitzgerald River				
Proteaceae	*Persoonia*	*helix*				
Proteaceae	*Petrophile*	*fastigiata*				
Proteaceae	*Petrophile*	*squamata* subsp. Northern				

Family	Genus	Species	Common Name	Invasive	WA Conservation Status	Herbarium Reference
Restionaceae	*Desmocladus*	*myriocladus*				
Rhamnaceae	*Cryptandra*	*nutans*				
Rhamnaceae	*Spyridium*	*minutum*				
Rhamnaceae	*Trymalium*	*elachophyllum*				
Rutaceae	*Boronia*	*baeckeoides*				
Rutaceae	*Boronia*	*crassifolia*				
Rutaceae	*Boronia*	*crenulata*	Aniseed Boronia			
Rutaceae	*Boronia*	*inornata*	Desert Boronia			
Rutaceae	*Phebalium*	*obovatum*				
Santalaceae	*Exocarpos*	*aphyllus*	Broom Ballart			
Santalaceae	*Santalum*	*acuminatum*	Quandong			
Santalaceae	*Solanum*	*nigrum*	Blackberry Nightshade	X		
Santalaceae	*Leptomeria*	*pachyclada*				
Sapindaceae	*Dodonaea*	*divaricata*				

Appendix 2: Incidental species list – Fauna

Note: DP* relates to species listed as Declared Pests under the *Biosecurity and Agricultural Management Act 2007* (BAM Act).

Class	Family	Species	Vernacular	WA Status	EPBC Act Status	Introduced	Observation Method
Aves	Acanthizidae	*Acanthiza apicalis*	Inland thornbill	LC			
Aves	Acanthizidae	*Smicrornis brevirostris*	Weebill	LC			
Aves	Artamidae	*Cracticus torquatus*	Grey butcherbird or kwadalang	LC			
Aves	Cacatuidae	*Zanda latirostris*	Carnaby's black-cockatoo or manitch	EN	EN		Foraging evidence - chewed Banksia cones
Aves	Campephagidae	*Coracina novaehollandiae*	Black-faced cuckoo-shrike	LC			
Aves	Casuariidae	*Dromaius novaehollandiae*	Emu or waitch	LC			Tracks and scats
Aves	Columbidae	*Phaps elegans*	Brush bronzewing	LC			Seen
Aves	Hirundinidae	*Petrochelidon nigricans*	Tree martin	LC			
Aves	Locustellidae	*Cincloramphus cruralis*	Brown songlark	LC			
Aves	Maluridae	*Malurus pulcherrimus*	Blue-breasted fairy-wren	LC			Seen
Aves	Meliphagidae	*Anthochaera carunculata*	Red wattlebird	LC			Seen
Aves	Meliphagidae	*Anthochaera lunulata*	Western wattlebird	LC			Seen
Aves	Meliphagidae	*Lichmera indistincta*	Brown honeyeater	LC			Heard
Aves	Meliphagidae	*Manorina flavigula*	Yellow-throated miner	LC			Seen
Aves	Meliphagidae	*Phylidonyris novaehollandiae*	New Holland honeyeater or bandiny	LC			Seen
Aves	Monarchidae	*Crallina cyanoleuca*	Magpie-lark	LC			Seen
Aves	Pardalotidae	*Pardalotus striatus*	Striated pardalote or wida-wida	LC			Heard
Aves	Psittaculidae	*Barnadius zonarius*	Australian ringneck or darlmooluk	LC			Seen

Class	Family	Species	Vernacular	WA Status	EPBC Act Status	Introduced	Observation Method
Aves	Psittaculidae	*Purpureicephalus spurius*	Red-capped parrot or charrill	LC			Seen
Insecta	Pieridae	*Delias arganippe*	Red-spotted jezebel butterfly	LC			Seen
Mammalia	Canidae	*Canis familiaris*	Domestic dog or dwert	Introduced		X	Tracks
Mammalia	Canidae	*Vulpes vulpes*	European red fox	Declared Pest		X	
Mammalia	Felidae	*Felis catus*	Feral cat	Declared Pest		X	Scats and tracks, killed bird
Mammalia	Leporidae	*Oryctolagus cuniculus*	European rabbit	Declared Pest		X	Diggings and warrens, scats
Mammalia	Macropodidae	*Macropus fuliginosus*	Western grey kangaroo or yonga	LC			Bones, tracks, scats
Mammalia	Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked echidna or nyingarn	LC			Diggings into ant mounds
Reptilia	Elapidae	*Echiopsis curta*	Bardick	LC			Seen
Reptilia	Elapidae	*Notechis scutatus*	Tiger snake	LC			Seen
Reptilia	Elapidae	*Psuedonia affinis*	Dugite	LC			Seen
Reptilia	Scincidae	*Acritoscincus trilineatus*	Southwestern cool skink	LC			Seen
Reptilia	Scincidae	*Menetia greyii*	Common dwarf skink	LC			Seen
Reptilia	Varanidae	*Varanus rosenbergi*	Southern heath monitor or karda	LC			Seen and tracks

Appendix 3: Threatened and Priority Flora Report Form

Department of Biodiversity, Conservation and Attractions

Threatened and Priority Flora Report Form

Version 1.4 March 2021

Please complete as much of the form as possible, with emphasis on those sections bordered in black. For information on how to complete the form please refer to the Threatened & Priority Flora Report Form (TPRF) manual on the DBCA website at www.dbca.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-plants

TAXON: Acrotriche platycarpa **TPFL Pop. No:**

OBSERVATION DATE: 14/07/2023 **CONSERVATION STATUS:** P1 **New population** ☒

OBSERVER/S: Katherine Walkerden, Kahree Garnut **PHONE** 90831518

ROLE: Environmental Officer **ORGANISATION:** Shire of Esperance

EMAIL: Katherine.Walkerden@esperance.wa.gov.au

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place):

River Road Reserve from SLK 15.57-16.51.

Reserve No:

DBCA DISTRICT: Esperance **LGA:** Esperance Land manager present: ☒

DATUM: GDA94 / MGA94 ☒ AGD84 / AMG84 ☐ WGS84 ☐ Unknown ☐

COORDINATES: (If UTM coords provided, **Zone** is also required) DecDegrees ☐ DegMinSec ☐ UTMs ☐

Lat / Northing: 305206

Long / Easting: 6295246

ZONE: 51

METHOD USED: GPS ☒ Differential GPS ☐ Map ☐

No. satellites: Map used:

Boundary polygon captured: ☐ Map scale:

LAND TENURE:

Nature reserve ☐	Timber reserve ☐	Private property ☐	Rail reserve ☐	Shire road reserve ☒
National park ☐	State forest ☐	Pastoral lease ☐	MRWA road reserve ☐	Other Crown reserve ☐
Conservation park ☐	Water reserve ☐	UCL ☐	SLK/Pole ____ to ____	Specify other:

AREA ASSESSMENT: Edge survey ☐ Partial survey ☐ Full survey ☒ Area observed (m²):

EFFORT: Time spent surveying (minutes): 360 No. of minutes spent / 100 m²:

POP'N COUNT ACCURACY: Actual ☒ Extrapolation ☐ Estimate ☐ Count method: (Refer to field manual for list)

WHAT COUNTED: Plants ☒ Clumps ☐ Clonal stems ☐

TOTAL POP'N STRUCTURE:	Mature:	Juveniles:	Seedlings:	Totals:
Alive	15			
Dead				

Area of pop (m²):

Note: Pls record count as numbers (not percentages) for database.

QUADRATS PRESENT: No. Size Data attached ☐ Total area of quadrats (m²):

Summary Quad. Totals: Alive

REPRODUCTIVE STATE: Clonal ☐ Vegetative ☐ Flowerbud ☐ Flower ☒

Immature fruit ☐ Fruit ☐ Dehisced fruit ☐ Percentage in flower: 80%

CONDITION OF PLANTS: Healthy ☒ Moderate ☐ Poor ☐ Senescent ☐

COMMENT:

THREATS - type, agent and supporting information: Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. **Specify agent** where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme. Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)	Current Impact (N-E)	Potential Impact (L-E)	Potential Threat Onset (S-L)
•			
•			
•			

Please return completed form to Species And Communities Program DBCA,
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 OR email to: flora.data@dbca.wa.gov.au

RECORDS: Please forward to **Flora Administrative Officer**, Species and Communities Program.

Record entered by:_____ Sheet No.:_____ Record Entered In Database ☐

Department of Biodiversity, Conservation and Attractions

Threatened and Priority Flora Report Form

Version 1.4 March 2021

HABITAT INFORMATION:

LANDFORM:	ROCK TYPE:	LOOSE ROCK: (on soil surface; eg gravel, quartz fields)	SOIL TYPE:	SOIL COLOUR:	DRAINAGE:
Crest ☐	Granite ☐	0-10% ☐	Sand ☐	Red ☐	Well drained ☒
Hill ☐	Dolerite ☐	10-30% ☐	Sandy loam ☐	Brown ☐	Seasonally inundated ☐
Ridge ☐	Laterite ☐	30-50% ☐	Loam ☐	Yellow ☐	Permanently inundated ☐
Outcrop ☐	Ironstone ☐	50-100% ☐	Clay loam ☐	White ☐	Tidal ☐
Slope ☒	Limestone ☐		Light clay ☐	Grey ☐	
Flat ☐	Quartz ☐		Peat ☐	Black ☐	
Open depression ☐	Specify other:		Specify other:	Specify other:	
Drainage line ☐					
Closed depression ☐					
Wetland ☐					

Specific **Landform** Element: (Refer to field manual for additional values)

CONDITION OF SOIL: Dry ☐ Moist ☐ Waterlogged ☐ Inundated ☐

VEGETATION CLASSIFICATION*:
Eg: 1. Banksia woodland (B. attenuata, B. ilicifolia); 2. Open shrubland (Hibbertia sp., Acacia spp.); 3. Isolated clumps of sedges (Mstetragona)

1. Mixed Mallee over *Banksia media* Open Shrubland
2. Scattered Mallee over mixed proteaceous and myrtaceous heath.
3.
4.

ASSOCIATED SPECIES:
Other (non-dominant) spp

* Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 *Australian Soil and Land Survey Field Handbook* guidelines – refer to field manual for further information and structural formation table.

CONDITION OF HABITAT: Pristine ☐ Excellent ☒ Very good ☐ Good ☒ Degraded ☐ Completely degraded ☐

COMMENT: A majority of the population was within excellent condition vegetation, 1 plant was near a firebreak where vegetation was in a good condition.

FIRE HISTORY: **Last Fire:** Season/Month: Year: **Fire Intensity:** High ☐ Medium ☐ Low ☐ No signs of fire ☒

FENCING: Not required ☒ Present ☐ Replace / repair ☐ Required ☐ Length req'd:

ROADSIDE MARKERS: Not required ☒ Present ☐ Replace / reposition ☐ Required ☐ Quantity req'd:

OTHER COMMENTS: (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.)

FLORA AUTHORISATION / LICENCE No: FT61000788 Note if only observing plants (i.e. no specimens or plant material is taken), then no authorisation/licence is required. For further information on authorisation and licensing requirements see the Threatened Flora and Wildlife Licensing pages on DBCA's website. Any actions carried out under authorisations/licences should be recorded above in the OTHER COMMENTS section.

SPECIMEN: Collectors No: KSW01123 KSW01323 WA Herb. ☒ Regional Herb. ☐ District Herb. ☐ Other:

LODGEMENT: WA Herb Lodgement No: ACC# 10411

ATTACHED: Map ☐ Mudmap ☐ Photo ☐ GIS data ☒ Field notes ☐ Other:

COPY SENT TO: Regional Office ☐ District Office ☒ Other:

Submitter of Record: Katherine Walkerden Role: Environmental officer Signed: Date: 10/01/2023

Please return completed form to **Species And Communities Program** DBCA,
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 **OR** email to: flora.data@dbca.wa.gov.au
RECORDS: Please forward to **Flora Administrative Officer,** Species and Communities Program.
Record entered by: Sheet No.: Record Entered in Database ☐

Appendix 4: Desktop Results of Threatened and Priority Flora Species

Threatened or Priority flora identified in the desktop study to be present within a 20 km radius of 'Site B – 'River Road Gravel Pits'' project area (TPFL; DBCA 2023a), WA Herbarium (DBCA 2023d) and Esperance District Threatened Flora (DBCA 2023b).

Species	Conservation Status	Associated Habitat	Likely to Occur	Distance from site (km)
Acacia diminuta	P1	Mixed Mallee over Melaleuca dominated shrubland. Sand, sandy loam, sandy clay.	Yes	13.00
Brachyloma nguba	P1	Open Mallee woodland and Mallee scrub. sandy clay, shallow sandy loam.	Yes	15.74
Melaleuca similis	P1	Mallee heath, Mallee shrubland or tall shrubland with scattered Mallee. Sand or sandy loam. Mostly restricted to Cascade district.	Yes	10.94
Philotheca gardneri subsp. globosa	P1	Mallee (*Eucalyptus pleurocarpa* or *E. tetraptera*) over heath or low heath, Sandy loam over gravel. Frequent in rehabilitated gravel pits.	No	19.82
Scaevola archeriana	P1	Tall to low shrubland. Sand, sandy loam soils. Occasionally associated with disturbance.	Yes	16.39
Stenanthera lacsalaria	P1	Grey-white fine sand over clay on the margins of salt lakes.	No	14.68
Synaphea sp. Jilakin Flat Rocks Rd (R. Butcher et. al RB200)	P1	Low Mallee woodland or Mallee and *Allocasuarina huegeliana* woodland. Sand, sandy loam or sandy clay, typically over laterite. Typically associated with disturbance.	No	19.58

Species	Conservation Status	Associated Habitat	Likely to Occur	Distance from site (km)
Acacia amyctica	P2	Mallee woodlands. Well-drained loams and sandy clay plains. Frequently associated with disturbance.	Yes	14.92
Amanita inculta	P2	Variety of habitats. Herbarium records vague on habitat descriptions.	Yes	16.70
Bentleya diminuta	P2	Mostly recorded on disturbed road edges. Associated with Mallee of mixed composition. Recorded on various soil types, including sandy clay loam, gravel and limestone.	Yes	11.55
Dampiera orchardii	P2	Sand, adjacent to salt lakes, embankment of saline playa lakes.	No	14.36
Persoonia brevirhachis	P2	White or yellow sand, gravelly sandy soils. Single outlying record in Munglinup, previously unrecorded in the shire of Esperance.	No	16.10
Streptoglossa sp. South Coast (R.M. Hoggart 16/1113)	P2	Two known populations, one in Cascade and another in Cape Arid NP. Mallee or low shrubs. Cape Arid record collected 3 years after fire.	No	16.17
Acacia singula	P3	Lake King area single population in Cascade area, Gravelly sand over laterite, white or yellow sand. Rises, hilltops.	No	13.89
Commersonia rotundifolia	P3	*Eucalyptus platypus* woodland over Acacia shrubland. Clay loam soil. Esperance region specimens are geographically inaccurate.	No	16.26
Cryptandra polyclada subsp. *polyclada*	P3	Associated with sandplains. Mallee with shrubland-heath species. Recorded in disturbed areas.	No	13.34

Species	Conservation Status	Associated Habitat	Likely to Occur	Distance from site (km)
Daviesia pauciflora	P3	Various habitats including flats. Associated with deep sands, white or grey sand over laterite or limestone.	No	15.85
Eremophila chamaephila	P3	Open Mallee woodland with limestone.	No	12.64
Eucalyptus famelica	P3	Associated with coastal dunes on low ground, saline waterlogged soils. Associated vegetation is open Mallee community.	No	14.92
Goodenia laevis subsp. *laevis*	P3	Woodland with Melaleuca shrubland. Associated with disturbance.	Yes	13.70
Levenhookia pulcherrima	P3	Wide geographic distribution and associated range of vegetation and soil types. Frequently associated with fire.	No	14.92
Mirbelia densiflora	P3	Stony loam and loamy sand. Small ridges, breakaways and undulating plains.	No	16.36
Persoonia scabra	P3	Well drained sand. Mallee or *Banksia media* over heath.	No	17.42
Eucalyptus stoatei	P4	Associated with Mallee and Eucalyptus woodland. Grows on sand over clay, gravelly clay, and sandy loam clay.	Yes	1.89
Grevillea aneura	P4	Grows in heath or Mallee scrub. Sand, gravelly sand, sandy loam over laterite. Common n rehabilitated gravel pits.	Yes	12.86
Gyrostemon ditrigynus	P4	Grows on sand, sandy clay and loam. Plains and low ironstone ridges. Associated with fire.	No	12.06

Species	Conservation Status	Associated Habitat	Likely to Occur	Distance from site (km)
Lepidium pseudotasmanicum	P4	Various habitats - loam, granite, sand, creek. Scattered across WA. Cascade record was associated growing along a creek line.	No	14.93
Pultenaea calycina subsp. *proxena*	P4	Cascade area, Sandy clay or loam, with gravel. Moderate slopes, adjacent to creek beds.	No	10.45
Stachystemon vinosus	P4	Mallee over shrubland or heath. Sandplains and rock crevices on breakaways. Prefers fine loamy sand and stony soils. Frequently found in rehabilitated gravel pits and burned areas.	Yes	17.40
Conostylis lepidospermoides	T	Proteaceous heath. Sand over laterite or clay.	No	15.40
Hypocalymma magnificum	T	Mallee over dense Melaleuca shrubland. shallow sandy soil over granite. Only known from a small area within Cascade.	No	16.42
Stenanthera localis	T	Mallee woodland with *Banksia media*. Sandy loam. Only known from a small area within Cascade district.	Yes	14.40

Appendix 5: Desktop Results of Threatened and Priority Fauna

Class	Family	Species Name	Vernacular Name	EPBC Act Status	BC Act Status	Preferred Habitat	Likelihood of Occurrence (Post-survey)
Aves	Cacatuidae	*Zanda latirostris*	Carnaby's black-cockatoo or manitch	EN	EN	Eucalypt forest and woodland, using large hollows in mature trees of Wandoo, Tuart, Jarrah, Marri, York Gum, River Red Gum and Salmon Gum to breed. Feeds on proteaceous heath, shrublands and mallee across the south-west.	**Present.** Suitable foraging habitat present with evidence of species foraging.
Aves	Psittaculidae	*Platycercus icterotis* subsp. *xanthogenys*	Inland western rosella or bardinar	Not listed	P4	Semi-arid southern interior; Wheatbelt region, Ravensthorpe and Great Western Woodlands, Frank Hann NP. Eucalyptus and Allocasuarina woodlands and scrubs, especially *Eucalyptus salmonophloia*, E. wandoo, and *Allocasuarina huegeliana*. Eats seeds and blossoms of *E. eremophila*, E. wandoo, *Allocasuarina huegeliana*, *Glischrocaryon flavescens, Olearia revoluta*, and *Melaleuca acuminata*. Nests in small tree hollows of Salmon Gum, Wandoo and York Gum (entrance 48-105 mm wide), 2-25 m off ground, from Aug-Nov.	**Likely.** Suitable foraging and marginal breeding habitat present.
Reptilia	Pythonidae	*Morelia imbricata*	Southwestern carpet python or wackul	Not listed	NT	Widespread but patchy across SW WA; woodlands, heaths and rocky outcrops, offshore islands. Threatened by urban development, bushfire, feral predators, and habitat destruction.	**Likely.** Suitable hunting habitat present.
Aves	Megapodidae	*Leipoa ocellata*	Malleefowl or gnow	VU	VU	Mallee and heathland featuring a dense shrubland understorey providing abundant leaf litter for nest mound-building.	**Likely.** Suitable foraging habitat, unsuitable for nesting due to proximity to disturbances and feral predators. Likely used as a movement corridor.
Mammalia	Macropodidae	*Notamacropus irma*	Western brush wallaby or kwoora	Not listed	P4	Mallee and heathland. Particularly favours seasonally-inundated open woodlands and scrubby thickets.	**Likely.** Suitable foraging and diurnal habitat in all vegetation types, likely used as a movement corridor.
Mammalia	Dasyuridae	*Dasyurus geoffroii*	Chuditch or western quoll	VU	VU	Currently restricted to south-western WA, with population strongholds in dry sclerophyll forest and dry woodland and mallee-heath, namely in Lake Magenta NR, Southern Forests, Julimar State Forest, and Fitzgerald River NP. Require hollow logs, earth burrows, and occasionally hollowed-out termite mounds for daytime shelter / nesting. Hollow tree bases occasionally used. Diet is broad and consists largely of small mammals, amphibians, small reptiles, invertebrates, freshwater crustaceans, small birds. Occupies even high-quality habitats at low densities due to territorial behaviour - female habitats extend over core areas of 55-120 ha and don't overlap, whilst male territories extend over 400 ha or more and overlap. Although meso-predator, chuditch threatened by raptor and feral fox predation, drowning in dam nets, injury in traps set-up for foxes or rabbits, and previously deliberate shooting by landholders. Recently re-introduced to AWC Mt Gibson Sanctuary (2022).	**Possible.** Marginal hunting habitat present, however may be impacted by high presence of feral predators.
Mammalia	Macropodidae	*Notamacropus eugenii* subsp. *derbianus*	Tammar wallaby	Not listed	P4	Low dense scrub vegetation for diurnal shelter, open grassy areas for feeding. Coastal scrub, heath, dry sclerophyll forest, and mallee and woodland thickets. Crepuscular; rests in scrub during day and venture into open areas after dark. Able to drink sea water or go without fresh water for long periods. Solitary except for females with young.	**Possible.** Suitable habitat for movement corridor.

Class	Family	Species Name	Vernacular Name	EPBC Act Status	BC Act Status	Preferred Habitat	Likelihood of Occurrence (Post-survey)
Reptilia	Elapidae	*Acanthophis antarcticus*	Southern death adder	Not listed	P3	Deep leaf litter where it can ambush unsuspecting prey such as frogs, lizards, and small mammals. Wide habitat range across southern and eastern part of the Shire of Esperance; grasslands, open woodland, scrub and heathland, preferring undisturbed habitat. Breeds in late summer where females give birth to live young.	**Possible.** Suitable hunting habitat present in deep leaf litter and vegetative debris.
Aves	Meropidae	*Merops ornatus*	Rainbow bee-eater	MI, MA	P2	Migrates to Papua New Guinea and eastern Indonesia for non-breeding period. Occurs mainly in open forests and woodlands, and mallee, shrublands and lightly-timbered areas, coastal sand dunes, mangroves, often where in close proximity to permanent water. Also occurs in grasslands, and particularly in arid or semi-arid areas, riparian, floodplain or wetland vegetation assemblages. Often occurs in cleared and agricultural landscapes, such as farmlands, roadside vegetation, quarries, mines and gravel pits where they often breed. Breed in Australia between August and January, where they lay eggs into a nest burrow channelling directly into bare aeolian sand. Threatened by feral predators, cane toads, goannas and brown snakes, and nest trampling or flooding. Mainly feeds on airborne insects such as bees, wasps, beetles, moths, butterflies, dragonflies, ants and beetles, and will occasionally take earthworms, spiders, and tadpoles.	**Possible.** Suitable foraging habitat observed within survey area.
Aves	Anatidae	*Cereopsis novaehollandiae* subsp. *grisea*	Recherche Cape Barren Goose	VU	VU	During winter breeds on the larger vegetated Islands of the Recherche Archipelago. Forages on herb fields (especially of *Carpobrotus virescens*) and grasslands along the southern coastline between Munglinup and Israelite Bay / Cape Arid. Prefers beaches, pasture, and rocky outcrops, with known visitation to Pink Lake and Red Islet. Has been observed in town, as well as Cape Arid, Stokes National Park, and Cape le Grand during the summer feeding months, particularly on maintained lawns, golf courses, and ornamental lakes.	Unlikely
Aves	Ardeidae	*Botaurus poiciloptilus*	Australasian bittern	EN	EN	Fresh and brackish swamplands with fringes dominated by rushes, sedges and reeds, or cutting grass.	Unlikely
Aves	Scolopacidae	*Calidris acuminata*	Sharp-tailed sandpiper	VU	Not listed	Breeds in northern Siberia in June to August, before migrating to Australia and NZ for non-breeding season. Widespread in both inland and coastal locations of fresh and saline habitats. Widespread from Cape Arid to Carnarvon. Utilises fresh to hypersaline aquatic environments; edges of mudflats, sewage ponds, wetlands, and inundated pastures. Roosts on rocky and sandy beaches, and wetland vegetation. Omnivorous; diet of seeds, worms, molluscs, crustaceans, and insects.	Unlikely
Aves	Scolopacidae	*Calidris ferruginea*	Curlew sandpiper	CR	CR	Coastal bays and inlets, coastal and sub-coastal plains. Prefer intertidal mudflats, estuarine bays and lagoons, saltworks and sewage ponds. Occasionally observed inland around ephemeral and permanent lakes, dams, waterholes and bore drains.	Unlikely
Mammalia	Dasyuridae	*Parantechinus apicalis*	Dibbler or wyalung	EN	EN	Crepuscular carnivore feeding primarily on ground-dwelling insects, small lizards, birds and mammals. Prefers long-unburnt habitat. Requires dense leaf litter under dense low shrubland dominated by genera such as Banksia, where it also drinks nectar and berries. Diurnal, resting in raised dray of twigs and grasses. Population in Fitzgerald River NP possibly expanding into Munglinup area.	Unlikely

Class	Family	Species Name	Vernacular Name	EPBC Act Status	BC Act Status	Preferred Habitat	Likelihood of Occurrence (Post-survey)
Mammalia	Muridae	*Psuedomys shortridgei*	Heath mouse or dayang	EN	EN	Lowland heath, woodlands and sclerophyll forests. Shelter in shallow burrows, typically nocturnal and sometimes diurnal. Young born over summer months. Prefers long-unburnt vegetation with complex understorey of tall scrubland associated with mallee trees and climax heath assemblages, where adequate foliage cover establishes after a burn. Dependent on highly-productive recently-burnt patches of heathland habitat and relocate when resources diminish. Former range included the Esperance Shire, however populations now only known from Fitzgerald River NP and Munglinup, from which individuals may disperse into SOE land.	Unlikely
Aves	Accipitridae	*Pandion haliaetus*	Osprey	MI	Not listed	Littoral and coastal habitats and terrestrial wetlands, as well as offshore islands. Sometimes travel inland along major rivers, especially in northern Australia. Require extensive areas of open fresh, brackish or saline water for hunting. Foraging habitat include inshore waters, reefs, coastal cliffs, beaches, estuaries, mangrove swamps, broad rivers, reservoirs, large lakes, and waterholes. Favours fish, especially mullet, but will occasionally take molluscs, insects, reptiles and mammals. Adult ospreys often resident around breeding territories. Conspicuous nests consist of a large stack of sticks up to 2 m in diameter and 2.5 m deep, either on the ground or high in tree.	Unlikely
Aves	Scolopacidae	*Tringa nebularia*	Common greenshank	MI	Not listed	Most abundant in southern WA September to March; breeds in Northern Hemisphere in boreal summer. Shallow freshwater claypans, lagoons, swamps, river pools, dams and sewage ponds; saline or brackish estuaries, mangroves, lakes, samphire flats, reef flats and saltworks ponds.	Unlikely
Aves	Acanthizidae	*Aphelocephala leucopsis*	Southern whiteface	VU	Not listed	Open Acacia or eucalypt woodlands or shrublands with grassy understorey on plains, foothills, ranges and lowlands.	Unlikely
Aves	Falconidae	*Falco hypoleucos*	Grey falcon	VU	VU	The distribution of this species is restricted largely to areas of the highest annual average temperatures where there is an average annual rainfall of less than 500 mm. It favours lightly timbered and untimbered lowland plains that are crossed by tree-lined watercourses. It uses the abandoned nests of other bird species, particularly corvids.	Unlikely
Mammalia	Dasyuridae	*Myrmecobius fasciatus*	Numbat or walpurti	EN	EN	Eucalypt woodlands with abundant woody debris, particularly seeking hollow-bearing logs for shelter and nesting sites. Forages in lightly treed or shrubby clearings where termites are active. Unsuccessful translocation to Cocanarup Timber Reserve; last known female died in 2011. Known translocated population persisting in Dragon Rocks NR, between Hyden and Newdegate, however connectivity of this population to other significant refugia is very limited.	Unlikely

Appendix 6: State Threatened and Priority Flora and Fauna Definitions

Sourced from DBCA (2020).

Category	Definition
T – Threatened	Taxa that have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such (Schedules 1 to 4 of the Wildlife Conservation (Rare Flora) Notice under the WC Act). Threatened flora are further ranked by the DBCA to align with IUCN Red List categories and criteria: **CR:** Critically Endangered – considered to be facing an extremely high risk of extinction in the wild (Schedule 1); **EN:** Endangered – considered to be facing a very high risk of extinction in the wild (Schedule 2); or **VU:** Vulnerable – considered to be facing a high risk of extinction in the wild (Schedule 3). **EX:** Presumed Extinct – taxa that have been adequately searched for and there is no reasonable doubt that the last individual has died (Schedule 4)
P1 – Priority 1 (Poorly known taxa)	Taxa that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.
P2 – Priority 2 (Poorly known taxa)	Taxa that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.
P3 – Priority 3 (Poorly known taxa)	Taxa that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Taxa may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.
P4 – Priority 4 (Rare, Near Threatened and other taxa in need of monitoring)	**1. Rare** - Taxa that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands. **2. Near Threatened** - Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. **3.** Taxa that have been removed from the list of threatened species during the past five years for reasons other than taxonomy

Appendix 7: Commonwealth Definition of Threatened Flora and Fauna Species (Environment Protection and Biodiversity Conservation, EPBC Act 1999)

Category Code	Category
Ex	**Extinct** Taxa which at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.
ExW	**Extinct in the Wild** Taxa which is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
CE	**Critically Endangered** Taxa which at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
E	**Endangered** Taxa which is not critically endangered and it is facing a very high risk of extinction in the wild in the immediate or near future, as determined in accordance with the prescribed criteria.
V	**Vulnerable** Taxa which is not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
CD	**Conservation Dependent** Taxa which at a particular time if, at that time, the species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.

Appendix 8: State Definition of Threatened Ecological Communities

Category Code	Category
PTD	**Presumed Totally Destroyed** An ecological community will be listed as Presumed Totally Destroyed if there are no recent records of the community being extant and either of the following applies: (i) records within the last 50 years have not been confirmed despite thorough searches or known likely habitats or; (ii) all occurrences recorded within the last 50 years have since been destroyed.
CE	**Critically Endangered** An ecological community will be listed as Critically Endangered when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future, meeting any one of the following criteria: (i) The estimated geographic range and distribution has been reduced by at least 90% and is either continuing to decline with total destruction imminent, or is unlikely to be substantially rehabilitated in the immediate future due to modification; (ii) The current distribution is limited ie. highly restricted, having very few small or isolated occurrences, or covering a small area; (iii) The ecological community is highly modified with potential of being rehabilitated in the immediate future.
E	**Endangered** An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. The ecological community must meet any one of the following criteria: (i) The estimated geographic range and distribution has been reduced by at least 70% and is either continuing to decline with total destruction imminent in the short-term future, or is unlikely to be substantially rehabilitated in the short-term future due to modification; (ii) The current distribution is limited i.e. highly restricted, having very few small or isolated occurrences, or covering a small area; (iii) The ecological community is highly modified with potential of being rehabilitated in the short-term future.
V	**Vulnerable** An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing high risk of total destruction in the medium to long term future. The ecological community must meet any one of the following criteria: (i) The ecological community exists largely as modified occurrences that are likely to be able to be substantially restored or rehabilitated; (ii) The ecological community may already be modified and would be vulnerable to threatening process, and restricted in range or distribution; (iii) The ecological community may be widespread but has potential to move to a higher threat category due to existing or impending threatening processes.

Appendix 9: State Definition of Priority Ecological Communities

Category Code	Category
P1	**Poorly-known ecological communities** Ecological communities with apparently few, small occurrences, all or most not actively managed for conservation (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) and for which current threats exist.
P2	**Poorly-known ecological communities** Communities that are known from few small occurrences, all or most of which are actively managed for conservation (e.g. within national parks, conservation parks, nature reserves, State forest, unallocated Crown land, water reserves, etc.) and not under imminent threat of destruction or degradation.
P3	**Poorly known ecological communities** (i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or: (ii) Communities known from a few widespread occurrences, which are either large or within Significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or; (iii) Communities made up of large, and/or widespread occurrences, that may or not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing and inappropriate fire regimes.
P4	Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.
P5	**Conservation Dependent ecological communities** Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

Appendix 10: Commonwealth Definition of Threatened Ecological Communities

Three categories exist for listing threatened ecological communities under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.

Category Code	Description
Critically endangered	If, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future.
Endangered	If, at that time, it is not critically endangered and is facing a very high risk of extinction in the wild in the near future.
Vulnerable	If, at that time, it is not critically endangered or endangered, and is facing a high risk of extinction in the wild in the medium term future.

Appendix 11: Categories and Control of Declared (Plant) Pests in Western Australia

Control Category	Control Measures
C1 (Exclusion) '(a) Category 1 (C1) — Exclusion: if in the opinion of the Minister introduction of the declared pest into an area or part of an area for which it is declared should be prevented' Pests will be assigned to this category if they are not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State.	In relation to a category 1 declared pest, the owner or occupier of land in an area for which an organism is a declared pest or a person who is conducting an activity on the land must take such of the control measures specified in subregulation (1) as are reasonable and necessary to destroy, prevent or eradicate the declared pest.
C2 (Eradication) '(b) Category 2 (C2) — Eradication: if in the opinion of the Minister eradication of the declared pest from an area or part of an area for which it is declared is feasible'. Pests will be assigned to this category if they are present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.	In relation to a category 2 declared pest, the owner or occupier of land in an area for which an organism is a declared pest or a person who is conducting an activity on the land must take such of the control measures specified in subregulation (1) as are reasonable and necessary to destroy, prevent or eradicate the declared pest.
C3 (Management) '(c) Category 3 (C3) — Management: if in the opinion of the Minister eradication of the declared pest from an area or part of an area for which it is declared is not feasible but that it is necessary to — (i) alleviate the harmful impact of the declared pest in the area; or (ii) reduce the number or distribution of the declared pest in the area; or (iii) prevent or contain the spread of the declared pest in the area.' Pests will be assigned to this category if they are established in Western Australia but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest.	In relation to a category 3 declared pest, the owner or occupier of land in an area for which an organism is a declared pest or a person who is conducting an activity on the land must take such of the control measures specified in subregulation (1) as are reasonable and necessary to — (a) alleviate the harmful impact of the declared pest in the area for which it is declared; or (b) reduce the number or distribution of the declared pest in the area for which it is declared; or (c) prevent or contain the spread of the declared pest in the area for which it is declared.

Appendix 12: Definition of Vegetation Condition Scale

For the south west and interzone botanical provinces

Condition Rating	Definition
Pristine (1)	Pristine or nearly so, no obvious signs of disturbance
Excellent (2)	Vegetation structure intact; disturbance affecting individual species; weeds are non-aggressive species.
Very Good (3)	Vegetation structure altered; obvious signs of disturbance For example, disturbance to vegetation structure caused by repeated fires; the presence of some more aggressive weeds; dieback; logging; & grazing.
Good (4)	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; & grazing
Degraded (5)	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; &grazing.
Completely Degraded (6)	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 13: Carnaby's Black-Cockatoo Foraging Habitat Scoring Template

Adapted from Tables A1 and A2 of Department of Agriculture, Water and the Environment (2022).

Note that only areas within proposed clearing area are assessed.

Starting Score	Carnaby's black-cockatoo
10	Start at a score of 10 if your site is native shrubland, Kwongkan heathland or woodland, dominated by proteaceous plant species such as *Banksia* spp., *Hakea* spp. and *Grevillea* spp., as well as native eucalypt woodland and forest that contains foraging species, within the range of the species, including along roadsides and parkland cleared areas. Also includes planted native vegetation. ***This tool only applies to sites equal to or larger than 1 hectare in size.**

Attribute	Subtractions	Context adjustor (attributes reducing functionality of foraging habitat)	Site performance
Foraging potential	-2	**Subtract 2** from your score if there is no evidence of feeding debris on your site.	Feeding evidence present in Vegetation Type B only. **None recorded in A (-2).**
Connectivity	-2	**Subtract 2** from your score if you have evidence to conclude that there is no other foraging habitat within 12 km of your site.	All sites are connected to other foraging habitat.
Proximity to breeding	-2	**Subtract 2** if you have evidence to conclude that your site is more than 12 km from breeding habitat.	**No breeding sites within 12 km (-2).**
Proximity to roosting	-1	**Subtract 1** if you have evidence to conclude that your site is more than 20 km from a known night roosting habitat.	No known roost sites within 20 km.
Impact from significant plant disease	-1	**Subtract 1** if your site has disease present (e.g. *Phytophthora* spp. or Marri canker) and the disease is affecting more than 50%of the preferred food plants present.	No signs of Phytophthora dieback or other disease.
Total score			**Vegetation A:** 5/10 **Vegetation B:** 7/10
Appraisal		High-quality foraging habitat present in Vegetation Type B. Low-quality foraging habitat in Vegetation Type A	**High: 1.25 ha** **Low: 3.88 ha**

Appendix 14: EPBC Act Protected Matters Report

Listed Threatened Ecological Communities

		Presence	
Community Name	**Threatened Category**	**Rank**	**Text**
Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia	Endangered	Likely	Community likely to occur within area
Eucalypt Woodlands of the Western Australian Wheatbelt	Critically Endangered	Likely	Community in buffer only

Listed Threatened Species

Scientific Name	Common Name	Simple Presence	Threatened Category	Migratory Status
Calidris ferruginea	Curlew Sandpiper	May	Critically Endangered	Migratory
Botaurus poiciloptilus	Australasian Bittern	May	Endangered	
Conostylis lepidospermoides	Sedge Conostylis	Likely	Endangered	
Anigozanthos bicolor subsp. minor	Small Two-colour Kangaroo Paw	Likely	Endangered	
Zanda latirostris	Carnaby's Black Cockatoo	Likely	Endangered	
Leipoa ocellata	Malleefowl	May	Vulnerable	
Aphelocephala leucopsis	Southern Whiteface	May	Vulnerable	
Dasyurus geoffroii	Chuditch, Western Quoll	Likely	Vulnerable	
Falco hypoleucos	Grey Falcon	May	Vulnerable	
Cereopsis novaehollandiae grisea	Recherche Cape Barren Goose	Likely	Vulnerable	
Calidris acuminata	Sharp-tailed Sandpiper	May	Vulnerable	Migratory
Tringa nebularia	Common Greenshank,	May	Endangered	
Myrmecobius fasciatus	Numbat	May	Endangered	
Parantechinus apicalis	Dibbler	Likely	Endangered	
Pseudomys shortridgei	Heath Mouse, Dayang, Heath Rat	May	Endangered	
Eremophila denticulata subsp. denticulata	Fitzgerald Eremophila	May	Vulnerable	
Hypocalymma sp. Cascade		Known	Endangered	
Rhizanthella johnstonii	South Coast Underground Orchid	Likely	Critically Endangered	
Ricinocarpos trichophorus	Barrens Wedding Bush	May	Endangered	
Tringa nebularia	Common Green Shank	May	Endangered	Migratory