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Esperance
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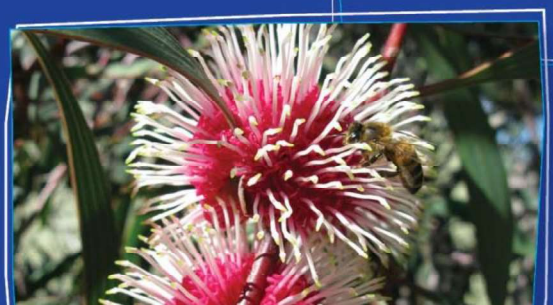

Acknowledgement of country

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 their continuing connection to land, waters and community. We pay our respect to their Elders past, present and emerging and we extend that respect to other Aboriginal Australians today.

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13. EPBC Act Protected Matters Report

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 (Commonwealth)
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 WA)
TEC: Threatened Ecological Community
TF: Threatened Flora (Under BC Act)
TPFL: Threatened and Priority Flora Database (DBCA)
WAH: Western Australian Herbarium (PERTH)
WAOL: Western Australian Organism List

1 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 'Shao Lu and Orleans Road Intersection' project for inclusion in the 2023/24 strategic purpose permit application.

A total of 192 vascular plant taxa from 133 plant genera and 51 plant families were recorded within the Shao Lu and Orleans Road Intersection survey area during the 2022 survey. The majority of taxa was recorded within the Myrtaceae (23 taxa), Proteaceae (22 taxa), Fabaceae (19 taxa), Poaceae (11 taxa) and Asteraceae (9 taxa) families (Appendix 1). This total included 169 native species and 23 introduced (weed) species.

Two vegetation types were distinguished and described during the field survey, consisting of Vegetation Type A: Scattered *Eucalyptus angulosa* over mixed heath with myrtaceous and *Allocasuarina* shrubs; and Vegetation Type B: Scattered *Eucalyptus occidentalis* over mixed *Melaleuca* shrubland with *Hakea cinerea*. Overall, the vegetation communities mapped and species recorded in the Shao Lu and Orleans Road Intersection 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 1047: Scattered *Eucalyptus angulosa* over mixed heath with myrtaceous and Allocasuarina shrubs. Vegetation type B did not match VA 1047 or any other nearby vegetation association, the Beard vegetation association mapping too broad to capture this slight change in vegetation type.

Two priority flora species pursuant to the Biodiversity Conservation Act (2016) and as listed by the Department of Biodiversity, Conservation and Attractions (DBCA) were recorded within the 'Shao Lu and Orleans Road Intersection' survey area. No plant taxa listed as Threatened pursuant to Schedule 1 of the Environment Protection and Biodiversity Conservation (EPBC) Act 1999 were recorded during the survey within the proposed 'Shao Lu and Orleans Road Intersection' survey area.

Table 1: Summary of Priority flora species recorded in Site A – Shao Lu and Orleans Road Intersection project area.

Species	Conservation code	Total plants	Total taking
Persoonia spathulata	P2	84	1
Styphelia rotundifolia	P3	2	0

The EBPC listed 'Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia (Kwongkan)' Threatened Ecological Community (TEC) was not present within Site A - Shao Lu and Orleans Road Intersection.

The site contains some limited foraging habitat for the EPBC listed Carnaby's cockatoo (*Calyptorhynchus latirostis*). Of the species identified within the Desktop survey, the Fork-tailed swift, Grey falcon and Peregrine falcon also had suitable habitat within the proposed clearing permit area.

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:

- All vehicles and construction equipment to be cleaned prior to start of the project.
- Works to be carried out in the dry(summer) months to minimise spread of dieback.

- Follow up spraying of emergent roadside weeds where gravel has been sourced from farmland to prevent weeds coming into the weed free areas.
- Ripping and revegetation of old road alignment using topsoil and vegetation from the new alignment.

These have been addressed within the rehabilitation plan (section 7.1), and provided these measures are implemented, there should be no impediments to the upgrade of the Shao Lu and Orleans Road Intersection.

1 Introduction

The Shire of Esperance endeavors 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 'Shao Lu and Orleans Road Intersection' project as Site A under the '2023/24 Strategic Purpose Permit' (Figure 1), for the purpose of intersection upgrades.

1.1 Location and Scope of Project

The proposed works are located 103 km east of Esperance, within the Shire of Esperance managed road reserves of Orleans Road and Shao-Lu Road. It is locating at straight line kilometre (SLK) 13.19 to 13.38 Orleans road and SLK 3.02 to 3.18 of Shao Lu Road (Main Roads, 2024). A point within the proposed clearing permit area is 6268982.4m N, 490391.1m E (UTM Zone 51 H, GDA94).

Orleans Road – Shao-Lu Road Intersection is particularly narrow and sharply bends resulting in safety issues. The intersection requires realigning to a standard T-junction configuration in order to provide a clear indication of right of way to road users. This is particularly important to maintain the safety of road users during the busy harvest period. This road is classified as a Restricted Vehicle Access (RAV 7) Route by Main Road Western Australia. This intersection provides a vital link to properties and access roads in north east of Howick region. While there are no traffic counts available at this particular location, traffic counts obtained in the general area show a majority of heavy vehicles during the harvest period.

To complete these works clearing of 0.672 ha of native vegetation is required. To mitigate impact of clearing vegetation, 0.848 ha of the previous alignment will be ripped and rehabilitated using topsoil and vegetative burden from the cleared areas.

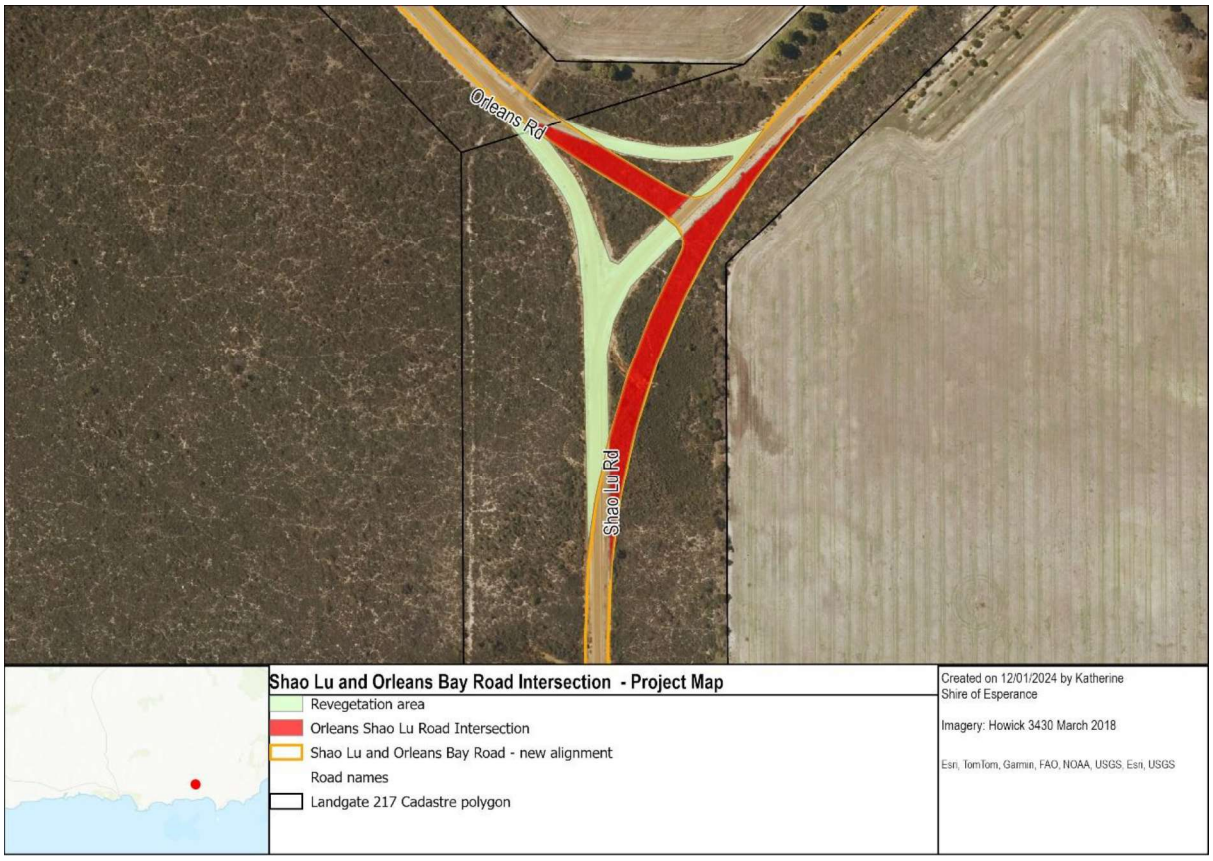

Figure 1. Location of 'Site A – Shao Lu and Orleans Road Intersection'

1.2 Environmental Legislation and Guidelines

The Commonwealth (federal) legislation relevant to this survey is the:

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

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

- 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);
- Environmental Protection Act 1986 (EP Act);

Western Australian guidelines relevant to this survey are the:

- 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)
- Technical Guidance - Terrestrial vertebrate fauna surveys for environmental impact assessment (EPA, 2020)

International Agreements relevant to this survey are the:

- 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)
- 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 'Shao Lu and Orleans Road Intersection' survey area including:

- Undertake a desktop study of the flora, fauna and vegetation of the 'Shao Lu and Orleans Road Intersection' survey area, with an emphasis on threatened and priority flora, threatened and priority ecological communities (TECs and PECs) and Threatened and Priority fauna;
- Review the historical literature of the 'Shao Lu and Orleans Road Intersection' survey area;
- Undertake a detailed survey of the 'Shao Lu and Orleans Road Intersection' survey area, and collect and identify the vascular plant species present;

- Review the conservation status of the vascular plant species recorded by reference to current literature and listings by the Department of Biodiversity, Conservation and Attractions (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;
- Define and map the vegetation communities in the 'Shao Lu and Orleans Road Intersection' survey area;
- Define and map the location of any threatened and priority flora located within the 'Shao Lu and Orleans Road Intersection' survey area;
- Define any management issues related to flora, fauna and vegetation values;
- Provide recommendations on the local and regional significance of the vegetation communities; and
- Prepare a report summarising the findings.

3 METHODS

3.1 Desktop Assessment

A desktop assessment with a 20km buffer zone was conducted using DBCA datasets sourced under agreement. These data sources are listed below:

- WA Herbarium data (WAH)
- Threatened and Priority Flora Database (TPFL)
- DBCA's Esperance District Threatened Flora spatial dataset
- Threatened and Priority Ecological Communities
- Threatened, specially protected and priority fauna
- Black cockatoo roost and breeding sites

In addition, the EPBC Act Protected Matters Search Tool, was also checked to identify the possible occurrence of threatened and priority flora, fauna and threatened and priority ecological communities within the Shao Lu and Orleans Road Intersection area. Search parameters were 'by polygon' and a 20 km buffer was applied to the search area; standard used in this IBRA subregion.

In addition, historical documentation and state datasets including:

- Vegetation mapping of the region, principally that of Beard (1973)
- 2020 Vegetation Extent by Statewide Pre-European mapping statistics
- Soil landscape mapping (DAFWA)
- Dieback Information Data Management System (DIDMS) (Gaia Resources)
- Shire of Esperance Weed Mapping Data
- Existing site digital orthophotos (Howick 2018)
- Atlas of Living Australia database
- Hydrographic Catchments (DWER)

- Crown Reserves (Landgate)

3.2 Field Survey

The site was initially inspected on 28th of March 2022, by Julie Waters and Katherine Walkerden, Shire of Esperance's Environmental Coordinator and Environmental Officer. A general assessment of possible ecological impacts included historical clearing, impact of fire regimes, regeneration from disturbance, waterlogging, senescence, weeds, erosion, sedimentation, invasive fauna, *Phytophthora* Dieback, and illegal dumping of rubbish.

A detailed field assessment of the flora and vegetation of the 'Shao Lu and Orleans Road Intersection' survey area was undertaken by Julie Waters and Katherine Walkerden on the 7th of October 2022 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 and priority flora consisted of traversing by foot the entire 'Shao Lu and Orleans Road Intersection' survey area. The survey was conducted prior to designs for the intersection being produced, as a result a significantly larger area was surveyed to allow various potential designs. Staff used Qfield devices loaded with road reserve boundaries and walked in a zig-zag fashion over survey site (at approximately at 10m intervals) recording all species, and collecting all but the very common, well known species. A large area was surveyed to accommodate various potential designs.

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 particularly focused on, and extensively searched. 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 'Shao Lu and Orleans Road Intersection' 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 three Environmental staff, using keys, WA Herbarium's Florabase, literature and 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 A – Shao Lu and Orleans Road Intersection' was assessed for the presence a TEC or PEC (DBCA 2023c). 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 Environmental Protection and Biodiversity Conservation Act 1999 listed 'Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia (Kwongkan)' TEC. 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).

3.3 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 'Shao Lu and Orleans Road Intersection' survey area.

The 2022 spring rainfall was above average, and hence spring flowering continued for an extended period in 2022.

3.4 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. Overall, an assessment of environmental impacts to Department of Water and Environmental Regulation's (DWER) biodiversity values were inspected and valued.

3.5 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's (1973) vegetation 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 constraint:** Adequate resources were made available by Shire of Esperance to complete the surveys.
Competency/experience of team carrying out survey; experience in the bioregion surveyed	**Not a limitation:** Staff had extensive experience working within the Shire of Esperance and wider areas. Two of the Environmental 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 foot-traverse between vegetation quadrat 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 constraint.** 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). Surveys have been conducted in October which falls within this period. Rainfall in 2022 was above average, and continued well into December.
Disturbances (fire/flood/clearing)	**Not a limitation:** The 'Shao Lu and Orleans Road Intersection' survey area exhibits minimal levels of disturbance, mainly from past fire events.

4 DESKTOP ASSESSMENT RESULTS

4.1 Climate

The Condingup climate is described as Mediterranean, characterised by cool wet winters and dry warm summers (BoM 2022). The area receives an average annual rainfall of 616 mm (1996-2020). The Shire of Esperance received an unusually high level of rainfall in 2022 resulting in an extended flowering period.

4.2 Catchment

'Site A Shao Lu and Orleans Road Intersection' is present within the Blackboy Creek catchment area. It is located approximately 18km from the coastline.

4.3 Geology, Soils and Topography

A single geological unit was identified within 'Site A – Shao Lu and Orleans Road Intersection', by Schoknecht et al. (2004). It is described as: "Deep tertiary sediments of the Pallinup formation overlying proterzoic granite".

Within the area, there has been one soil type recorded. It is described as: "Alkaline grey deep sandy duplex soils and grey deep sandy (gravelly) duplex soils with associated pale deep sands".

Within the area the topography is described as "Level plain with occasional subdued sand sheets" by Schoknecht et al. (2004).

4.4 Regional Vegetation

The site is located within the Esperance Plains Interim Biogeographic Regionalisation for Australia (IBRA; Thackway & Cresswell 1995) region and Recherche sub-region (Esp2). The Esp2 region is described as: "Proteaceae Scrub and Mallee heaths on sandplain overlying Eocene sediments, rich in endemics. Herbfields and heaths (rich in endemics) on abrupt granite and quartzite ranges that rise from the plan. Eucalyptus woodlands occur in gullies and alluvial foot-slopes".

Beard (1973) mapped vegetation association (VA) Esperance 1047 within 'Site A – Shao Lu and Orleans Road Intersection' area (Table 2). Esperance 1047 retains a large percentage of its pre-European extent, with 85% of its original extent remaining and 64% of its current extent being within conservation estate.

Table 2. Vegetation associations mapped by Beard (1973) within the 'Site A – Shao Lu and Orleans Road Intersection', and statistics on pre-European remaining areas.

Vegetation Association	**Esperance 1047**
Description	Shrublands; *Eucalyptus incrassata* mallee-heath
Area mapped within site (ha)	0.672 ha – entire site.
Pre-European extent (%)	84.96
Pre-European extent in IBRA sub-region ESP2 (%)	85.22
Pre-European extent in LGA (%)	84.96

Current extent conserved in IUCN area (%)	64.47
Pre-European extent conserved in IUCN area (%)	54.85

4.5 Surrounding Land Use

The area directly included in the clearing permit application 'Site A – Shao Lu and Orleans Road Intersection' is two currently intact and vegetated 100 m wide road reserves, managed by the Shire of Esperance. The surrounding land use is agricultural, a gravel reserve (Reserve 32802) neighbours the road reserve. The area is within rural zoning.

The site was 8.3km from Reserve 32800 the closest Conservation reserve and was 10km from Cape Arid National Park (Reserve 24047). No other Conservation vested reserves were within 10km of the site.

4.6 Potential Threatened and Priority Flora

Three threatened flora (TF) and 31 priority flora (PF) were recorded within a 20 km radius of the proposed impact site (Appendix 3). Of these, one TF species and seven PF species had suitable known associated habitat that corresponded with vegetation communities and soil type of 'Site A – Shao Lu and Orleans Road Intersection' project.

4.7 Potential Threatened and Priority Ecological Communities

The desktop study identified the Environmental Protection and Biodiversity Conservation (EPBC) Act 1999 listed threatened ecological community (TEC) 'Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia (Kwongkan)' within 'Site A – Shao Lu and Orleans Road Intersection' project area. No other TEC's or priority ecological communities (PEC) were identified by the desktop study as being within 'Site A – Shao Lu and Orleans Road Intersection' or within a 20 km buffer of the site.

4.8 Potential Threatened and Priority Fauna

24 conservation listed fauna were recorded within a 20 km radius of the proposed impact site (Appendix 4)). An additional 29 conservation listed fauna had no known records within 20km of the site but were listed in the EPBC Protected Matters Tool.

4.9 *Phytophthora* Dieback

Dieback Information Delivery and Management System (DIDMS; GAIA Resources, SCNRM & State NRM 2022) data shows the closest positive *Phytophthora cinnamomi* is 5 km from the project area along Fisheries Road.

5 FIELD SURVEY RESULTS AND DISCUSSION

5.1 Flora

A total of 192 vascular plant taxa from 133 plant genera and 51 plant families were recorded within the

'Shao Lu and Orleans Road Intersection' survey area during the 2022 survey. The majority of taxa was recorded within the Myrtaceae (23 taxa), Proteaceae (22 taxa), Fabaceae (19 taxa), Poaceae (11 taxa) and Asteraceae (9 taxa) families. This total included 169 native species and 23 introduced (weed) species (see Appendix 1 for the complete incidental species list).

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, Cassytha sp.; and *Centaurium sp*.,
- The plant material collected could not be determined to a known taxon. For example, Lepidosperma (as species are currently undergoing taxonomic revision).

5.2 Threatened and Priority Flora

The targeted flora survey identified two PF species, *Persoonia spathulata* (Priority 2) and *Styphelia rotundifolia* (Priority 3). Only *Persoonia spathulata* was within the proposed clearing permit footprint. Queries of spatial datasets were requested specifically for these species, to interrogate impact of proposed works on species sustainability (DBCA 2022c; DBCA 2022d; DBCA 2022a). *Persoonia spathulata was* not recorded on the TPFL database.

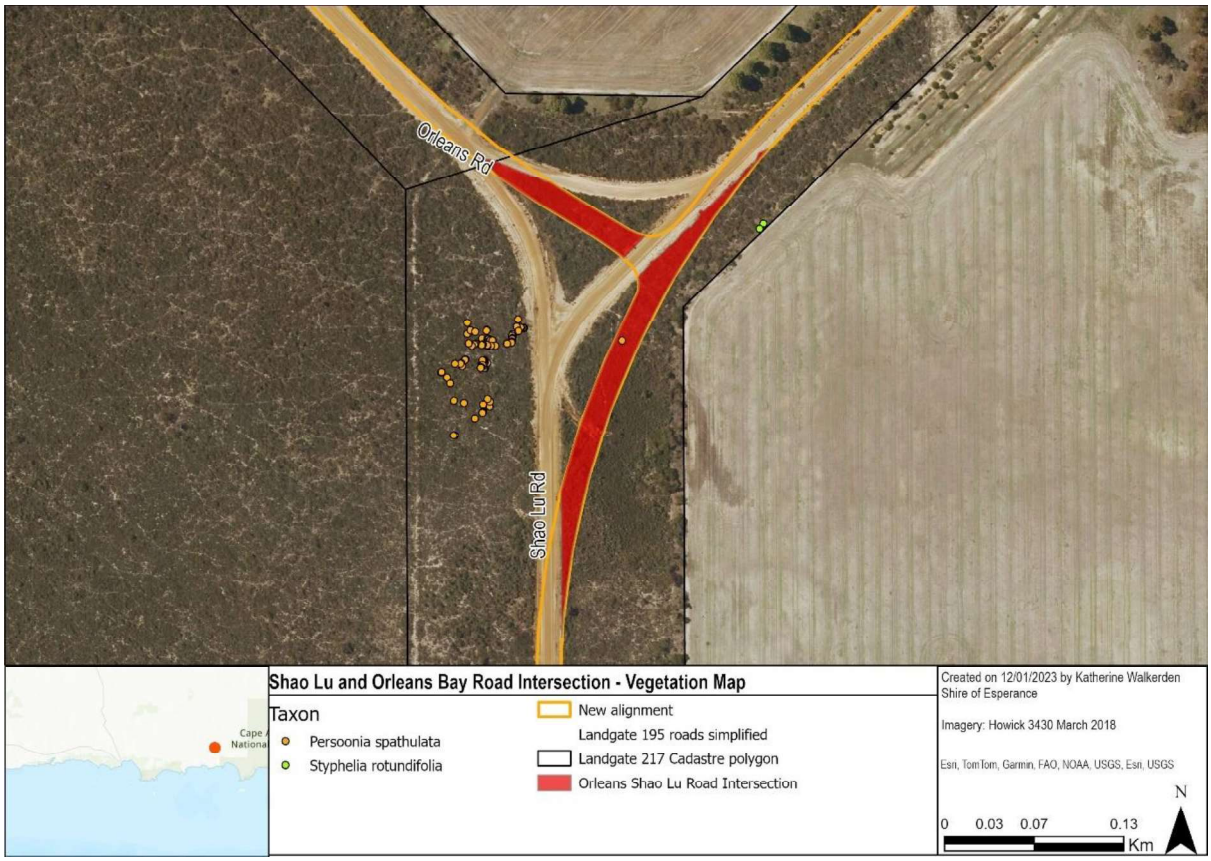

Figure 2. Location of priority flora within and surrounding 'Site A – Shao Lu and Orleans Road Intersection' project.

5.2.1 *Persoonia spathulata,* Priority 2

A specimen of *Persoonia spathulata* was sent to the WA Herbarium for identification confirmation (PERTH 09583068). It was confirmed as *Persoonia spathulata* by Mike Hislop on the 10th of January 2023. A Threatened and Priority Reporting Form (TPFL) was completed and sent to Department of Biodiversity, Conservation and Attractions (DBCA) District Flora Conservation Officer and Species and Communities Branch on 12/05/2023 (Appendix 2). If proposed works occur, 1 plant will be impacted upon, from a population total of 84.

A large area was surveyed to accommodate various potential designs for the project, occurrences of *Persoonia spathulata* and *Styphelia rotundifolia* were provided to the Shire of Esperance design team prior to the design of the project, the final design was able to avoid all except one *Persoonia spathulata* plant.

Excluding the population recorded for his project *Persoonia spathulata* had a total of 7 herbarium records, 3 records were from unallocated crown land, 1 record was from Cape Arid National Park, 1 was from Tjaltjraak Boodja Park (Reserve 41097), 1 record was from private land and the final was from the dog fence reserve (Reserve 54056). The species was moderately widespread with a 100km East to West range and a 93km North to South range, there was large gaps within the its range which included large areas of unallocated crown land where additional populations may be found.

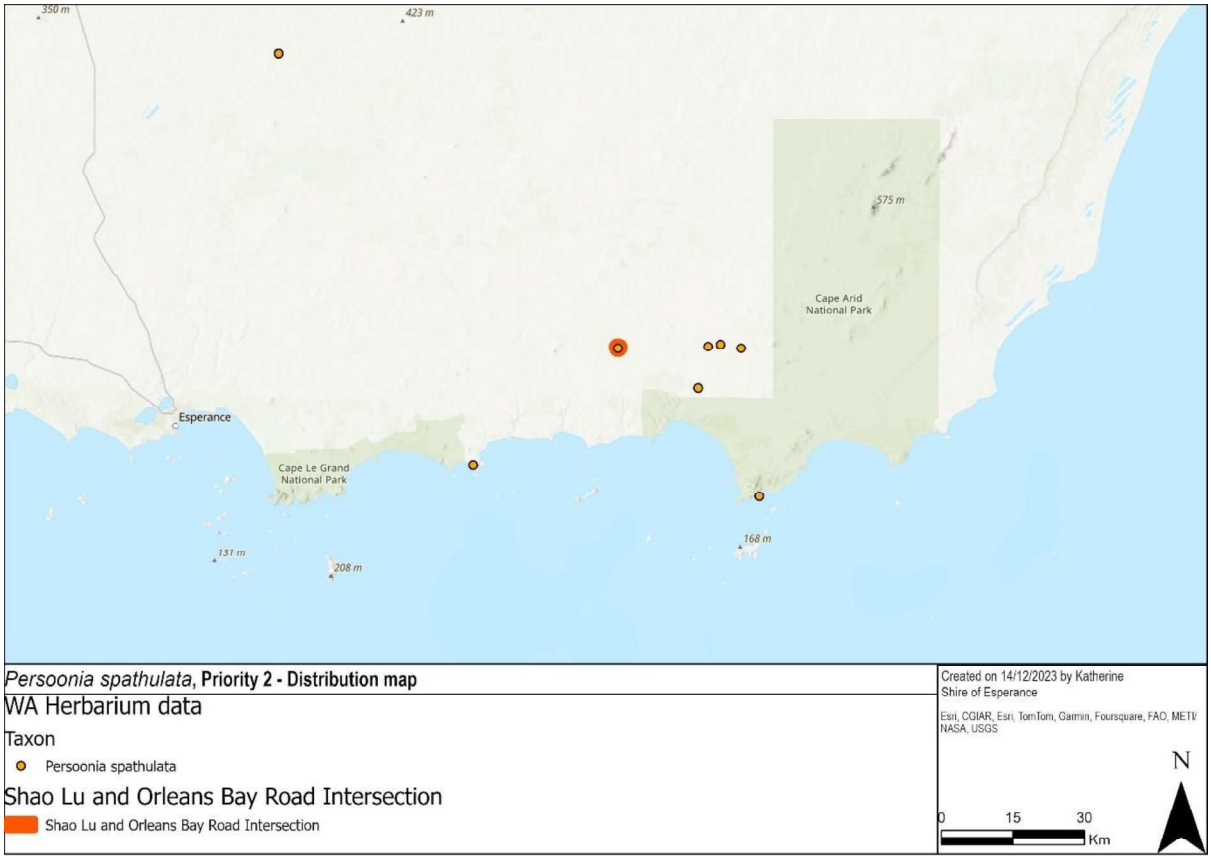

Figure 3. Known records of Priority 2 species *Persoonia spathulata* across a 168km East to West geographic range and a 95km North to South geographic range (DBCA 2022).

5.2.2 *Styphelia rotundifolia,* Priority 3

A specimen of *Styphelia rotundifolia* was sent to the WA Herbarium for identification confirmation (KSW13922; Accession #7883 with specimen retained). It was confirmed as *Styphelia rotundifolia* by Mike Hislop on 7th of October 2022. A Threatened and Priority Reporting Form (TPFL) was completed and sent to Department of Biodiversity, Conservation and Attractions (DBCA) District Flora Conservation Officer and Species and Communities Branch on the 12/05/2023 (Appendix 2). If proposed works occur, no plants will be impacted upon.

5.3 Weeds

Within the project area weeds were limited to grasses and herbs only occurring at the edge of road shoulders, weeds were not a serious issue within the site. Overall, 23 invasive species were identified within the project area (Appendix 8.1). Several Tuarts, *Eucalyptus gomphocephala* had been planted by the neighboring landowner, these species did not appear to be naturalizing. It is highly likely that proposed works will increase the distribution of weeds and degrade vegetation along the entire road reserve where works occur. Ideally, regular wash downs during the course of works to remove weed seeds or follow up herbicide control of invasive species needs to occur.

Weed specimen's that resulted in a range extension were sent to the WAH. A single weed range extension was present: *Vulpia bromoides* (Accession 10048; KSW22722, Specimen retained). The weed was new to the Shire of Esperance & Recherche IBRA subregion and a 300km eastern range extension.

Weed management strategies are currently being discussed operationally, such as spraying material stockpiles in agricultural private property prior to use and periodic spraying of road verges for a 12-month period after road construction.

5.4 Phytophthora Dieback

The vegetation within 'Site A – Shao Lu and Orleans Road Intersection' had 22 proteaceous species present, proteaceous plants were healthy and had no signs of dieback infection. Given the species composition present at the site, the vegetation is highly susceptible to dieback introduction.

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. However, there is always a possibility that proposed works will extensively spread *P. cinnamomi* dieback due to proposed works.

5.7 Vegetation Communities

Two vegetation communities were identified within the 'Site A – Shao Lu and Orleans Road Intersection', as defined by structure and composition (Table 3). It is believed that the Beard (1973) vegetation association Esperance_1047 described as 'Scattered *Eucalyptus angulosa* over mixed heath with myrtaceous and Allocasuarina shrubs' is an appropriate match for vegetation type A. Vegetation type B did not match Esperance_1047 or any other nearby vegetation association, the

Beard vegetation association generally did not map fine scale vegetation association like vegetation type B.

Table 3. Vegetation communities identified within proposed 'Site A – Shao Lu and Orleans Road Intersection' project area.

Type	Description	Figure	Closest Matching Beard Vegetation Association	Area (ha)
A	Scattered *Eucalyptus angulosa* over mixed heath with myrtaceous and *Allocasuarina* shrubs.	5	Esperance_1047 - Shrublands; Eucalyptus incrassata Mallee-heath	0.409
B	Scattered *Eucalyptus occidentalis* over mixed *Melaleuca* shrubland with *Hakea cinerea*.	6	None	0.263

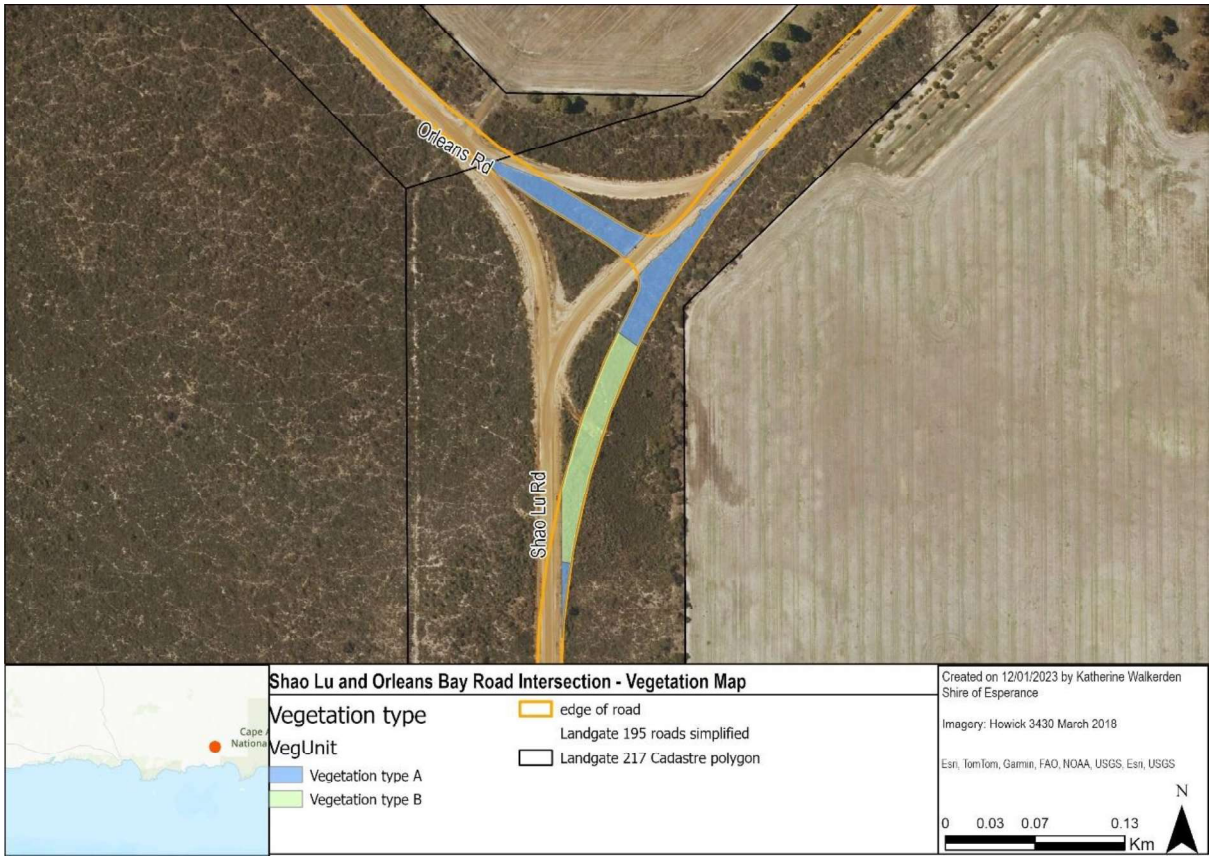

Figure 4. Vegetation types within the 'Site A – Shao Lu and Orleans Road Intersection' area.

Figure 5. Vegetation type A identified in 'Site A – Shao Lu and Orleans Road Intersection' project, described as 'Scattered *Eucalyptus angulosa* over mixed heath with myrtaceous and *Allocasuarina* shrubs'.

Figure 6. Vegetation type B identified in 'Site A – Shao Lu and Orleans Road Intersection' project, described as 'Scattered *Eucalyptus occidentalis* over mixed *Melaleuca* shrubland with *Hakea cinerea*.'.

5.8 Vegetation Condition

Vegetation was in an excellent condition with little to no weeds present within the whole 'Site A – Shao Lu and Orleans Road Intersection' site, there were some minor weeds mainly located on the edge of the road within the existing maintenance zone. No signs of recent fire activity were observed, and the vegetation appeared long-unburnt (>15 years). There was also no evidence of historical disturbance within the vegetation.

5.9 Threatened Ecological Communities

'Site A – Shao Lu and Orleans Road Intersection' was assessed to see if it met the composition criterion within the approved conservation advice for the EPBC Act 1999 listed 'Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia (Kwongkan)' TEC. Three 10m x 10m quadrats were conducted to determine whether proteaceous cover reached 30% within either of the vegetation types within 'Site A – Shao Lu and Orleans Road Intersection'. Two quadrats were within vegetation type A, both of these quadrats fell well under the 30% threshold required to be considered Kwongkan TEC. Vegetation type B had one quadrat, which had 15% proteaceous ground cover due to *Banksia nivea* and 4% mid-storey and 8% overstory due to *Hakea cinerea*. Neither vegetation type met criteria to be considered Kwongkan TEC (Appendix 2).

The vegetation community described as 'Swamp Yate, *Eucalyptus occidentalis*, woodlands in seasonally inundated clay basins in the South Coast of Western Australia' is listed as a PEC (DBCA 2023c). Within the 'Site A – Shao Lu and Orleans Road Intersection' project area, vegetation type B was described as 'Scattered *Eucalyptus occidentalis* over mixed *Melaleuca* shrubland with *Hakea cinerea*.' Vegetation type B was compared to the Swamp Yate PEC and listing documentation criteria and determined not to be this PEC.

Table 4. Comparison between potential occurrence of the Swamp Yate PEC and listing documentation criteria 'Swamp Yate, *Eucalyptus occidentalis*, woodlands in seasonally inundated clay basins in the South Coast of Western Australia' (Appendix 14) within vegetation type B 'Site A – Shao Lu and Orleans Road Intersection'.

Criterion 1: Abiotic Factors i) Occurs on valley floor; ii) Basin is more or less circular; iii) Seasonally inundated.	**Criterion 2:** Centre of basin inhabited by *Eucalyptus occidentalis* low woodland (often with an understory of *Melaleuca cuticularis*).	**Criterion 4:** Fringing the wetland is *dense rushes and sedges.*	**Criterion 3:** Peripheral to the central basin is a waterlogged zone of *E. occidentalis* associated with heath to open scrub and/or small trees. *Melaleuca calycina*, *M. glaberrima, M. incana, M. pulchella*, *Taxandria callistachys*;	**Swamp Yate PEC (Yes / No)** **Area (ha) within Site**

i) Vegetation type occurred in low lying areas ii) Basin was roughly circular iii) Vegetation type was not seasonally inundated	The vegetation only contained very scattered *Eucalyptus occidentalis* within a melaleuca shrubland and could not be considered "woodland"	There were no fringing rush/sedges	This was a water logged zone that contained *Melaleuca calycina*, *M. glaberrima, and M. pulchella*	No

5.10 Fauna

Of the species identified within the desktop survey, only the Fork-tailed swift, Grey falcon and Peregrine falcon have suitable habitat within the proposed clearing permit area.

During the field survey the various bird calls were heard. Rabbit warrens were present within the broader area, which were observed during the initial broader flora survey. It is highly likely that rabbits, foxes and feral cats are present throughout the area.

5.10.1 Southern death adder, *Acanthophis antarcticus,* P3

The closest record of this species was 13.61km from the project area.

This species is found in a wide variety of well-drained habitats, including rainforests and wet sclerophyll forests, woodland, shrublands, grasslands and coastal heathlands, preferring sites with deep fixed leaf litter. The vegetation types within the project area were suitable for this species but lacked deep leaf litter that the species utilises.

5.10.2 Fork-tailed swift, *Apus pacificus,* MI

The closest known record of this species was 15.95km from the project area.

In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas. They often occur over cliffs and beaches and also over islands and sometimes well out to sea. They also occur over settled areas, including towns, urban areas and cities. They mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They are also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes. It is likely that the entire project area has potentially suitable hunting grounds.

5.10.3 Recherche Cape Barren goose, *Cereopsis novaehollandiae grisea,* VU

The closest known record of this species was 19.08km from the project area.

Cape Barren Geese are known for feeding on grasses and herbs and some seeds, there was limited foraging potential at the site, nearby agricultural areas are likely to provide excellent forage opportunity with high levels of introduced grasses and legumes which the species is known to forage.

Cape Barren Geese are known to roost on Islands within the Recherche Archipelago and are not known to breed or roost on the mainland. Given the distance of the site to the Recherche Archipelago it is unlikely that the site would be utilised by the cape barren goose.

5.10.4 Grey falcon, *Falco hypoleucos,* VU

The closest know record of this species was 18.58km from the project area.

The Grey Falcon is listed as occurring in most habitats, from rainforests to the arid zone, and at most altitudes, from the coast to alpine areas. It requires abundant prey and secure nest sites, and prefers coastal and inland cliffs or open woodlands near water. It is likely that the entire project area has potentially suitable hunting grounds.

None of the vegetation being cleared within the project area provides suitable nesting habitat for this species.

5.10.5 Peregrine falcon, Falco peregrinus, Other Specially Protected

The closest know record of this species was 13.77km from the project area.

The Peregrine Falcon is listed as occurring in most habitats, from rainforests to the arid zone, and at most altitudes, from the coast to alpine areas. It is likely that the entire project area has potentially suitable hunting grounds.

Peregrines Falcons prefer high cliff edges as nest sites or occasionally tree hollows or disused stick nests of other birds. None of the vegetation being cleared within the project area provides suitable nesting habitat for this species.

5.10.6 Western ground parrot, *Pezoporus flaviventris,* CR

The closest know record of this species was 13.23km from the project area.

The species habitat is described as coastal heathland habitat with a diverse range of low-growing shrubs. They feed on or near the ground in dense vegetation, foraging for an array of seeds, nuts, flower buds, and other plant material. It is reliant on long-unburnt patches of heathland (burnt 40 years or more ago) for shelter and breeding.

Nearby records were centered around Yokinup Bay and Poison Creek within Cape Arid National Park. All present within large areas of remnant vegetation. The vegetation is unlikely to be suitable habitat for this species given the distance from the coast.

5.10.7 Carnaby's Black Cockatoo, *Calyptorhynchus latirostris*, threatened fauna

The Shire of Esperance Black Cockatoo assessment was conducted in accordance with the EPBC Act referral guidelines for three threatened black cockatoo species: Carnaby's Cockatoo *Calyptorhynchus*

latirostris (Endangered), Baudin's Cockatoo *Calyptorhynchus baudinii* (Endangered) and Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso* (Vulnerable) (Department of Agriculture, Water and the Environment, 2022). Due to total vegetation being lower than 1ha the foraging quality scoring tool was not undertaken as it is only suitable for habitat over 1ha (Appendix 11).

Both vegetation types provided some foraging habitat due to the presence of proteaceous species.

Given that:

- the site did not contain any nesting sites or large trees with hollows;
- the site did not contain night roosting areas;
- the amount of high-quality foraging habitat was less than 1 ha; and
- the site had low quality (1-4) habitat under 10ha,

a referral for assessment and approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is unlikely to be required.

6 REVIEW OF 10 CLEARING PRINCIPLES FOR NATIVE VEGETATION

The 'Site A – Shao Lu and Orleans Road Intersection' project is likely to be at variance variance to some of the clearing principles that the Department of Water and Environmental Regulations (DWER) assess applications, as listed under Schedule 5 of the Environmental Protection Act 1986 (DWER 2019).

6.1 Principle (a) Native vegetation should not be cleared if it comprises a high level of biological diversity.

Likely at Variance. Biodiversity at this site was very high with 189 native species recorded over two vegetation communities.

6.2 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 at Variance. The vegetation contains foraging habitat for Carnaby's Black Cockatoo due to the presence of vegetation with Proteaceous species. Due to the low amount of clearing referral for assessment and approval under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) is unlikely to be required

The site contained suitable hunting habitat for the Peregrine Falcon, Grey Falcon and Fork-tailed swift.

6.3 Principle (c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.

Not at variance. Two priority species were identified during the surveys, only *Persoonia spathulata* was present within the final 'Site A – Shao Lu and Orleans Road Intersection' design, with only a single *Persoonia spathulata* plant proposed to be cleared during project. Given that the total population is at least 84 plants there is unlikely be any significant impacts to the population.

6.4 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. Neither the Kwonkgan TEC or Swmp Yate PEC were present at the site, no other TEC's or PEC's were relevant to the study area.

6.5 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.

Not at variance. The immediate surroundings of the site were highly cleared agricultural land and the large intact unallocated crown reserve 32802. The sites intact vegetation is likely to contribute to ecological linkages in the area. However, given the amount of vegetation being cleared, amount of revegetation being conducted and that it's within 200m and 100m wide road reserves there is unlikely to be any significant impact to habitat connectivity.

6.6 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. Vegetation in this area was not growing in association with watercourses or wetlands. A small section of vegetation type B appeared prone to winter waterlogging.

6.7 Principle (g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

Not at variance. Vegetation within this area will be providing limited function as windbreaks and erosion control for the agricultural areas surrounding it. However, given the amount of vegetation being cleared, amount of revegetation being conducted and that it's within 200m and 100m wide road reserves there is unlikely to be any significant impact on land degradation.

6.8 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.

Not at variance. The project is 8.3km away from Reserve 32800, the nearest conservation reserve. Given the distance from conservation areas, the amount of vegetation being cleared, amount of revegetation being conducted and that it's within 200m and 100m wide road reserves there is unlikely to be any significant impact to connectivity to these reserves.

6.9 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.

Not at variance. Given the amount of vegetation being cleared, amount of revegetation being conducted and that it's within 200m and 100m wide road reserves there is unlikely to be any significant impact on water quality.

6.10 Principle (j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.

Not at variance. Given the amount of vegetation being cleared, amount of revegetation being conducted and that it's within 200m and 100m wide road reserves there is unlikely to be any significant impact on flood risk.

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

- All vehicles and construction equipment to be cleaned prior to start of the project.
- Works to be carried out in the dry(summer) months to minimise spread of dieback.
- Follow up spraying of emergent roadside weeds where gravel has been sourced from farmland to prevent weeds coming into the weed free areas.
- Ripping and revegetation of old road alignment and spreading with topsoil and cleared vegetation from the new alignment.

7.1 Avoidance and mitigation measures

A large area was initially surveyed to accommodate various possible designs, during the initial survey *Persoonia spathulata* was observed and a comprehensive targeted search was performed for this species. Spatial data from the targeted search was provided to the Shire of Esperance Design Team, allowing the project area to avoid all but a single plant.

Revegetation will be conducted after the completion of the project with the current alignment being ripped and revegetated during the project, the new alignment reduces the total road footprint by a significant margin allowing a larger revegetation area (0.848 ha) than clearing area (0.672 ha).

7.2 Revegetation plan

To meet the objectives of a successful scientific-based Revegetation Plan for 'Shao Lu and Orleans Road Intersection', numerous factors need to be considered and will be implemented, including the reference site, weed control, pest and disease hygiene practices, site preparation, species selection, completion criteria, monitoring and adaptive management practices in the need of contingency measures. These are outlined in Sections 7.1.1 to 7.1.7, with key points highlighted below:

- Revegetation works will consist of ripping the old road alignment and then spreading the stockpiled cleared vegetation and topsoil from the new alignment, containing the natural stored soil seed bank.

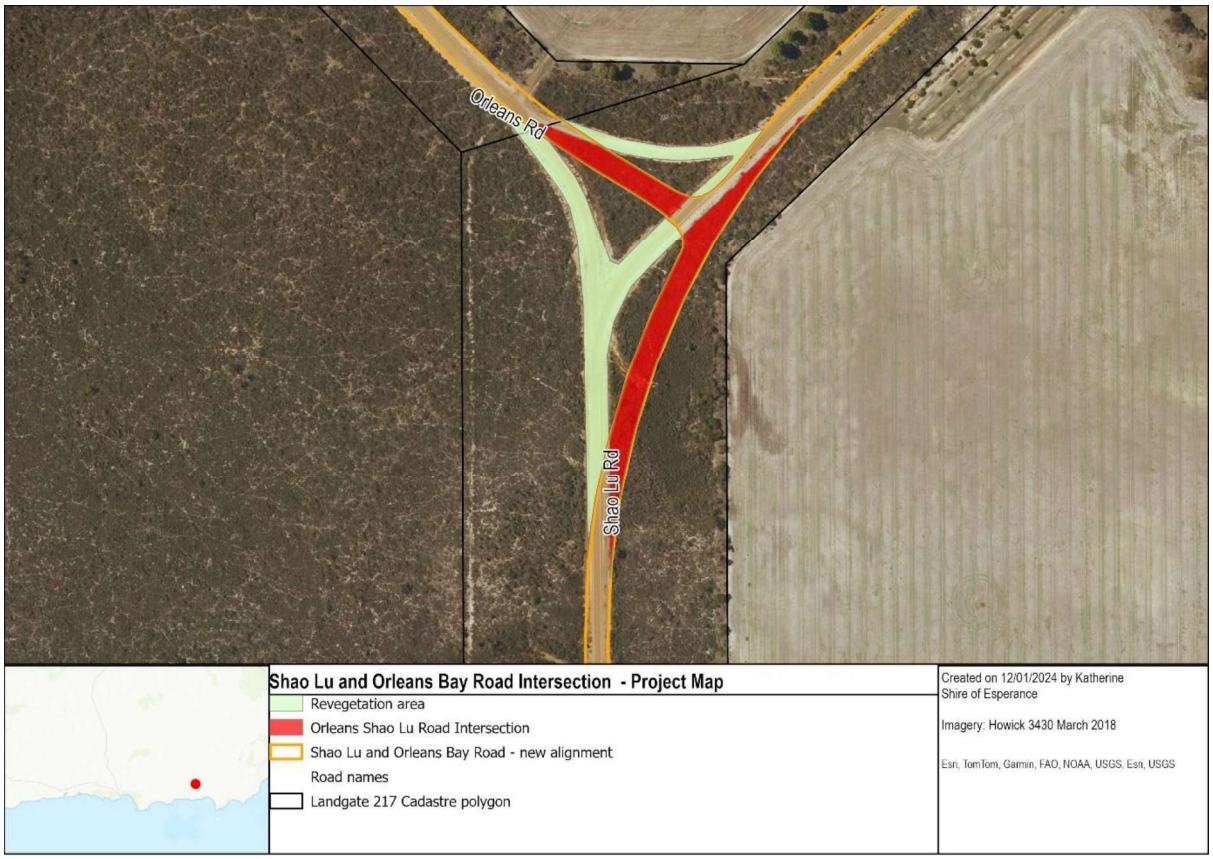

Figure 7. Area of old alignment which will be rehabilitated after clearing for the project.

7.2.1 Rehabilitation Methodology

A loader will be used to remove vegetation and , topsoil. This valuable layer that contains large reservoirs of the soil seed bank and live clonal tissue will be stockpiled temporarily for rehabilitation after the new alignment can take vehicle traffic.

The closed tracks site will be ripped to a depth of 200-350mm deep to break up the old gravel road surface and topsoil from the new alignment clearing spread over the area. No direct tube stock planting or direct seeding will occur immediately, and only be used as a contingency technique if this method fails.

7.2.2 Weed Control

There was very little weed burden present within the project are. Regular wash downs during the course of works to remove weed seeds will be conducted and follow up herbicide control of invasive species will be conducted if required.

7.2.3 Disease Hygiene Management

There are a large number of plant pathogens that can be spread by moving infected soil and plant material. Specifically, of focus is *Phytophthora* dieback, such as *P. cinnamomi*. Data shows the closest positive *Phytophthora cinnamomi* is 5 km form the project area along Fisheries Road. Hygiene measures to minimise the risk of diseases are a standard part of Shire of Esperance's practices when clearing vegetation, including:

- All machinery, plant and equipment shall be free of soil and vegetative matter prior to entering and leaving the site.
- The movement of soil shall be avoided in wet conditions.

7.2.4 Completion criteria

A high species richness was present at the site, due to a much larger area being surveyed than the final project area species richness cannot be directly compared between pre-clearing and post-clearing species richness. Drone aerials and return of the dominant species (*Eucalyptus angulosa*) will be used for determining revegetation success.

Table 5. Completion criteria following the SMART (specific, measurable, achievable, relevant, time-bound) principles for the rehabilitation of the old alignment of Shao Lu and Orleans Road Intersection.

Criterion	Baseline Floristic data	Completion Target	Completion Criteria
1	*Eucalyptus angulosa* was the dominant species within Vegetation A.	*Eucalyptus angulosa* is present within areas with suitable soil types, without water logging.	*Eucalyptus angulosa* has returned to the rehabilitation areas (Vegetation type A) within 2 years.
2	Vegetation cover as present in pre-clearing drone aerials	A majority of vegetation cover has returned.	Drone aerial showing 60% of pre-clearing coverage within 6 years.

7.2.5 Monitoring

Monitoring of the rehabilitated area following gravel extraction will determine if completion criteria have been successful and if contingency measures are required (Section 7.2.6). The methodology for monitoring will involve onsite visual assessments to determine whether revegetation has been implemented as planned and that completion criteria have been met, as outlined in Table 4. Monitoring will occur annually by the Shire of Esperance's Environmental Officers, who have a tertiary level education in Environmental Science. Monitoring will coincide with the inspection period of the calendar year Annual Compliance report for the Shire of Esperance 2023/24 strategic purpose permit, normally conducted between January and March. Drone aerials will begin five years after revegetation has occurred. This will continue until rehabilitation has been deemed successful.

7.2.6 Contingency measures

Where the rehabilitation is deemed unsuccessful by comparison to the completion criteria (Section 7.2.5), contingency measures will be undertaken, until the completion criteria are met sufficiently. This is an adaptive process and dependent on what completion criteria has failed. A few standard techniques are outlined below:

- 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.
- If listed environmental weeds exist in the site then herbicide and or manual control will be applied to affected areas.

7.2.7 Species selection

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 2022 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 or Reserve 32802.

8 LIST OF PERSONNEL

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

Name	Julie Waters
Position	Environmental Coordinator
Project Involvement	Desktop and Field Survey, Specimen Identification, GIS Mapping Data Interpretation and Report writing
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

Name	Katherine Walkerden
Position	Environmental Officer
Project Involvement	Desktop and Field Survey, Specimen Identification, GIS Mapping, Data Interpretation and Report writing
Qualifications	BSc, MEnvSc
Experience	Three years' experience doing botanical surveys in the region.
Scientific Licence	FT61000788

Name	Rosamund Mary Hoggart
Position	Environmental Assistant
Project Involvement	Specimen Identification
Qualifications and Experience	BSc (Hons)Ag
	15 years' experience as a volunteer 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

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10 APPENDICES

Appendix 1: Incidental species list

Family	Genus	Species	Weed	WA Conservation Status	Herbarium Reference
Anarthriaceae	*Anarthria*	*humilis*			
Anarthriaceae	*Anarthria*	*laevis*			
Anarthriaceae	*Anarthria*	*scabra*			
Apiaceae	*Daucus*	*glochidiatus*			
Apiaceae	*Platysace*	*effusa*			
Apiaceae	*Xanthosia*	*huegelii*			
Asparagaceae	*Lomandra*	*mucronata*			
Asparagaceae	*Thysanotus*	*patersonii*			
Asteraceae	*Argentipallium*	*niveum*			
Asteraceae	*Dittrichia*	*graveolens*	X		
Asteraceae	*Erigeron*	*bonariensis*	X		
Asteraceae	*Euchiton*	*sphaericus*			
Asteraceae	*Hyalosperma*	*demissum*			
Asteraceae	*Pterochaeta*	*paniculata*			
Asteraceae	*Siloxerus*	*filifolius*			
Asteraceae	*Ursinia*	*anthemoides*	X		
Asteraceae	*Vellereophyton*	*dealbatum*	X		
Boraginaceae	*Halgania*	*anagalloides*			
Brassicaceae	*Raphanus*	*raphanistrum*	X		
Casuarinaceae	*Allocasuarina*	*humilis*			
Casuarinaceae	*Allocasuarina*	*lehmanniana subsp. ecarinata*			
Casuarinaceae	*Allocasuarina*	*thuyoides*			
Centrolepidaceae	*Aphelia*	*sp. Albany*			
Centrolepidaceae	*Centrolepis*	*aristata*			
Centrolepidaceae	*Cyperus*	*tenellus*			
Chenopodiaceae	*Enchylaena*	*tomentosa*			
Crassulaceae	*Crassula*	*exserta*			
Cupressaceae	*Callitris*	*roei*			
Cyperaceae	*Caustis*	*dioica*			
Cyperaceae	*Cyathochaeta*	*equitans*			
Cyperaceae	*Gahnia*	*ancistrophylla*			
Cyperaceae	*Isolepis*	*hystrix*	X		
Cyperaceae	*Isolepis*	*marginata*			
Cyperaceae	*Lepidosperma*	*sp.*			
Cyperaceae	*Lepidosperma*	*squamatum*			
Cyperaceae	*Mesomelaena*	*stygia*			

Cyperaceae	*Mesomelaena*	*tetragona*			
Cyperaceae	*Schoenus*	*laevigatus*			
Cyperaceae	*Schoenus*	*odontocarpus*			
Cyperaceae	*Tricostularia*	*aphylla*			
Dilleniaceae	*Hibbertia*	*gracilipes*			
Droseraceae	*Drosera*	*drummondii*			
Droseraceae	*Drosera*	*glanduligera*			
Droseraceae	*Drosera*	*leucoblasta*			
Droseraceae	*Drosera*	*moorei*			
Droseraceae	*Drosera*	*neesii*			
Ericaceae	*Acrotriche*	*cordata*			
Ericaceae	*Leucopogon*	*carinatus*			
Ericaceae	*Leucopogon*	*obovata*			
Ericaceae	*Leucopogon*	*sp. Coujinup*			
Ericaceae	*Leucopogon*	*carinatus*			
Ericaceae	*Leucopogon*	*parviflorus*			
Ericaceae	*Lysinema*	*ciliatum*			
Ericaceae	*Styphelia*	*rotundifolia*		P3	KSW13922 ACC9783
Euphorbiaceae	*Stachystemon*	*virgatus*			
Fabaceae	*Acacia*	*aemula*			
Fabaceae	*Acacia*	*cochlearis*			
Fabaceae	*Acacia*	*cyclops*			
Fabaceae	*Acacia*	*gonocarpa*			
Fabaceae	*Acacia*	*pachyphylla*			
Fabaceae	*Acacia*	*pulchella*			
Fabaceae	*Bossiaea*	*preissii*			
Fabaceae	*Chorizema*	*obtusifolium*			
Fabaceae	*Daviesia*	*apiculata*			
Fabaceae	*Daviesia*	*Incrassata*			
Fabaceae	*Daviesia*	*teretifolia*			
Fabaceae	*Dillwynia*	*uncinata*			
Fabaceae	*Eutaxia*	*major*			
Fabaceae	*Gastrolobium*	*spinosum*			
Fabaceae	*Gompholobium*	*knightianum*			
Fabaceae	*Gompholobium*	*marginatum*			
Fabaceae	*Ornithopus*	*compressus*			
Fabaceae	*Templetonia*	*sulcata*			
Fabaceae	*Trifolium*	*sp.*	X		
Gentianaceae	*Centaurium*	*sp.*	X		
Geraniaceae	*Erodium*	*crinitum*			
Goodeniaceae	*Coopernookia*	*strophiolata*			
Goodeniaceae	*Dampiera*	*lavandulacea*			

Goodeniaceae	*Dampiera*	*parviflora*			
Goodeniaceae	*Goodenia*	*concinna*			
Goodeniaceae	*Goodenia*	*incana*			
Goodeniaceae	*Goodenia*	*pterigosperma*			
Goodeniaceae	*Goodenia*	*scapigera*			
Goodeniaceae	*Lechenaultia*	*formosa*			
Haemodoraceae	*Conostylis*	*seorsifolia subsp. Seorsifolia*			
Haemodoraceae	*Haemodorum*	*discolor*			
Haemodoraceae	*Tribonanthes*	*violacea*			
Haloragaceae	*Glischrocaryon*	*roei*			
Hemerocallidaceae	*Agrostocrinum*	*scabrum*			
Hemerocallidaceae	*Chamaescilla*	*corymbosa*			
Hemerocallidaceae	*Dianella*	*brevicaulis*			
Hemerocallidaceae	*Stawellia*	*gymnocephala*			
Iridaceae	*Patersonia*	*occidentalis*			
Juncaceae	*Juncus*	*capitatus*			
Juncaceae	*Juncus*	*microcephalus*	X		
Lamiaceae	*Microcorys*	*barbata*			
Lauraceae	*Cassytha*	*sp.*			
Lentibulariaceae	*Utricularia*	*tenella*			KSW13822 ACC9783
Loganiaceae	*Logania*	*micrantha*			
Loganiaceae	*Phyllangium*	*divergens*			
Loranthaceae	*Nuytsia*	*floribunda*			
Malvaceae	*Malva*	*parviflora*	X		
Myrtaceae	*Beaufortia*	*empetrifolia*			
Myrtaceae	*Calothamnus*	*gracilis*			
Myrtaceae	*Calytrix*	*decandra*			
Myrtaceae	*Calytrix*	*leschenaultii*			
Myrtaceae	*Conothamnus*	*aureus*			
Myrtaceae	*Cyathostemon*	*ambiguus*			
Myrtaceae	*Darwinia*	*vestita*			
Myrtaceae	*Eucalyptus*	*conglobata*			
Myrtaceae	*Eucalyptus*	*extrica*			
Myrtaceae	*Eucalyptus*	*gompholobium*	X		
Myrtaceae	*Eucalyptus*	*leptocalyx*			
Myrtaceae	*Leptospermum*	*maxwellii*			
Myrtaceae	*Leptospermum*	*spinosum*			
Myrtaceae	*Melaleuca*	*calycina*			
Myrtaceae	*Melaleuca*	*glaberrima*			
Myrtaceae	*Melaleuca*	*hamata*			
Myrtaceae	*Melaleuca*	*pulchella*			

Myrtaceae	*Melaleuca*	*scabra*			
Myrtaceae	*Melaleuca*	*suberosa*			
Myrtaceae	*Melaleuca*	*tuberculata*			
Myrtaceae	*Phymatocarpus*	*maxwellii*			
Myrtaceae	*Taxandria*	*spathulata*			
Myrtaceae	*Verticordia*	*minutiflora*			
Orchidaceae	*Caladenia*	*discoidea*			
Orchidaceae	*Caladenia*	*marginata*			
Orchidaceae	*Disa*	*bracteata*	X		
Orchidaceae	*Diuris*	*laxiflora*			
Orchidaceae	*Elythranthera*	*brunonis*			
Orchidaceae	*Microtis*	*media*			
Orchidaceae	*Pterostylis*	*recurva*			
Orchidaceae	*Thelymitra*	*antennifera*			
Orchidaceae	*Thelymitra*	*benthamiana*			
Orchidaceae	*Thelymitra*	*graminea*			
Orobanchaceae	*Orobanche*	*minor*	X		
Phyllanthaceae	*Phyllanthus*	*calycina*			
Pittosporaceae	*Billardiera*	*fusiformis*			
Poaceae	*Amphipogon*	*turbinatus*			
Poaceae	*Austrostipa*	*hemipogon*			
Poaceae	*Briza*	*maxima*	X		
Poaceae	*Briza*	*minor*	X		
Poaceae	*Elymus*	*repens*	X		
Poaceae	*Eragrostis*	*curvula*	X		
Poaceae	*Lolium*	*sp.*	X		
Poaceae	*Neurachne*	*alopecuroidea*			
Poaceae	*Polygon*	*monspeliensis*	X		
Poaceae	*Rytidosperma*	*setaceum*			
Poaceae	*Vulpia*	*bromoides*	X		KSW22722 ACC10048
Polygalaceae	*Comesperma*	*ciliatum*			
Polygonaceae	*Rumex*	*vesicarius*	X		
Primulaceae	*Lysimachia*	*arvensis*	X		
Proteaceae	*Banksia*	*armata*			
Proteaceae	*Banksia*	*nivea*			
Proteaceae	*Banksia*	*obtusa*			
Proteaceae	*Banksia*	*pulchella*			
Proteaceae	*Banksia*	*repens*			
Proteaceae	*Banksia*	*tenuis*			
Proteaceae	*Banksia*	*obovata*			
Proteaceae	*Grevillea*	*pleurojuga subsp. superba*			

Proteaceae	*Hakea*	*cinerea*			
Proteaceae	*Hakea*	*corymbosa*			
Proteaceae	*Hakea*	*laurina*			
Proteaceae	*Hakea*	*nitida*			
Proteaceae	*Hakea*	*obliqua*			
Proteaceae	*Hakea*	*pandanicarpa*			
Proteaceae	*Hakea*	*prostrata*			
Proteaceae	*Hakea*	*sulcata*			
Proteaceae	*Hakea*	*trifurcata*			
Proteaceae	*Hakea*	*varia*			
Proteaceae	*Isopogon*	*polycephalus*			
Proteaceae	*Persoonia*	*spathulata*			PERTH09583068
Proteaceae	*Petrophile*	*teretifolia*			
Proteaceae	*Synaphea*	*petiolaris*			
Restionaceae	*Chordifex*	*laxus*			
Restionaceae	*Hypolaena*	*exsulca*			
Restionaceae	*Lepidobolus*	*chaetocephalus*			
Rhamnaceae	*Cryptandra*	*myriantha*			
Rhamnaceae	*Cryptandra*	*pungens*			
Rhamnaceae	*Stenanthemum*	*notiale*			
Rubiaceae	*Opercularia*	*vaginata*			
Rutaceae	*Boronia*	*spathulata*			
Rutaceae	*Boronia*	*crassifolia*			
Rutaceae	*Cyanothamnus*	*ramosus subsp. anethifolia*			
Rutaceae	*Micromyrtus*	*elobata subsp. elobata*			
Solanaceae	*Solanum*	*nigrum*	X		
Stylidiaceae	*Levenhookia*	*pusilla*			
Stylidiaceae	*Stylidium*	*perpusillum*			
Stylidiaceae	*Stylidium*	*piliferum*			
Thymelaeaceae	*Pimelea*	*angustifolia*			
Violaceae	*Hybanthus*	*epacroides*			
Xanthorrhoeaceae	*Xanthorrhoea*	*platyphylla*			

Appendix 2: Kwongkan Quadrats

Quadrat 1. Vegetation type A: Centre Island (GDA Zone 51H 490429mE 6269068mN)

Family	Taxon	Kwongkan indicator species	May occur in TEC	Coverage (m^2)
Asparagaceae	*Laxmania*			
Casuarinaceae	*Allocasuarina humilis*		X	
Casuarinaceae	*Allocasuarina lehmanniana subsp. ecarinata*			
Euphorbiaceae	*Stachystemon virgatus*			
Fabaceae	*Daviesia teretifolia*		X	
Goodeniaceae	*Dampiera lavandulacea*			
Myrtaceae	*Calothamnus gracilis*		X	
Myrtaceae	*Cyathostemon ambiguus*			
Myrtaceae	*Eucalyptus angulosa*			
Myrtaceae	*Melaleuca scabra*		X	
Myrtaceae	*Melaleuca suberosa*		X	
Poaceae	*Neurachne alopecuroidea*			
Proteaceae	*Banksia nivea*	X	X	0.5
Proteaceae	*Hakea prostrata*		X	2
Proteaceae	*Petrophile fastigiata*		X	4 (dead) 0.5 (alive)
Proteaceae	*Synaphea media*			0.2
Rhamnaceae	*Cryptandra sp.*			

Quadrat 2. Vegetation type A: Eastern side of road (GDA Zone 51H 490461mE 6269022mN)

Family	Taxon	Kwongkan indicator species	May occur in TEC	Coverage (m^2)
Apiaceae	*Platysace effusa*			
Casuarinaceae	*Allocasuarina lehmannii subsp. ecarinata*			
Cyperaceae	*Caustis dioica*			
Dilleniaceae	*Hibbertia gracilipes*			
Ericaceae	*Leucopogon carinatus*			
Ericaceae	*Styphelia woodsii*			
Euphorbiaceae	*Stachystemon virgatus*			
Fabaceae	*Acacia aemula*			
Fabaceae	*Bossiaea preissii*			
Fabaceae	*Gastrolobium sp.*			
Myrtaceae	*Conothamnus aureus*		X	
Myrtaceae	*Eucalyptus angulosa*			
Myrtaceae	*Melaleuca scabra*		X	

Myrtaceae	*Melaleuca suberosa*		X	
Myrtaceae	*Melaleuca tuberculata*		X	
Proteaceae	*Banksia nivea*	X	X	2
Proteaceae	*Banksia repens*		X	2.5
Proteaceae	*Hakea nitida*	X	X	5
Proteaceae	*Hakea prostrata*		X	1.5
Proteaceae	*Persoonia spathulata*			0.1

Quadrat 3. Vegetation type B (GDA Zone 51H 490427mE 6268949mN)

Family	**Taxon**	**Kwongkan indicator species**	**May occur in TEC**	**Coverage (m^2)**
Anarthriaceae	*Anarthria scabra*			
Cyperaceae	*Lepidosperma sp.*			
Myrtaceae	*Cyathostemon ambiguus*			
Myrtaceae	*Eucalyptus occidentalis*			
Myrtaceae	*Melaleuca scabra*		X	
Myrtaceae	*Melaleuca suberosa*		X	
Myrtaceae	*Melaleuca tuberculata*		X	
Myrtaceae	*Melaleuca calycina*			
Myrtaceae	*Melaleuca pulchella*		X	
Myrtaceae	*Melaleuca hamata*			
Proteaceae	*Banksia nivea*	X	X	15
Proteaceae	*Hakea cinerea*	X	X	8
Proteaceae	*Hakea varia*			4
Restionaceae	*Hypolaena sp.*			

Appendix 3: TPFL Forms

Persoonia spathulata – P2

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.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-plants

TAXON: Persoonia spathulata **TPFL Pop. No:**

OBSERVATION DATE: 07/10/2022 **CONSERVATION STATUS:** P2 **New population** ☒

OBSERVER/S: Katherine Walkerden **PHONE** 0416558774

ROLE: Environemntal 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):

Shao Lu and Orleans Bay road intersection. South Western side of intersection.

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: 490336

Long / Easting: 6268933

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): 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	39			
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: 0%

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)
•			
•			
•			

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 (M.tetragona)

1. Proteacous and Myrtaceous heath. Associated spceies included: Banksia repens, Calothamnus quadrifidus, Banksia pulchella, Mesomolaena stygia
2.
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:

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: FT61000787 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 licening 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: KSW20122 ACC9857 WA Herb. ☒ Regional Herb. ☐ District Herb. ☐ Other:

LODGEMENT: WA Herb Lodgement No:

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: 12/05/2023

Styphelia rotundifolia – P3

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.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-plants

TAXON: Styphelia rotundifolia **TPFL Pop. No:**

OBSERVATION DATE: 7/10/2022 **CONSERVATION STATUS:** P3 **New population** ☒

OBSERVER/S: Katherine walkerden **PHONE** 0416558774

ROLE: Environmental Officer **ORGANISATION:** Shire fo 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):

Orleans Road and Shao-lu Road Intersection. Eastern side of intersection, near edge of road reserve.

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: 490545
Long / Easting: 6269073.9
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): 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	2			
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: %

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)
•			
•			
•			

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 (M.tetragona)

1. Dense Melaleuca and Phymatocarpos maxwellii dowinated shrubland with Lepidosperma understorey. Associated species include Melaleuca pulchella, Melaleuca hamata, Melaleuca suberosa
2.
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: Plants were growing near edge of firebreak.

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 licening 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: KSW13922 ACC9783 WA Herb. ☒ Regional Herb. ☐ District Herb. ☐ Other:

LODGEMENT: WA Herb Lodgement No:

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

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

Submitter of Record: Katherine Walkerden Role: Environmnetal Officer Signed: Date: 12/05/2023

Appendix 3: Description of Threatened and Priority Flora Species with the Potential to occur within the Shao Lu and Orleans Road Intersection Survey Area

Threatened or priority flora identified by the desktop study to be present within a 20 km radius of 'Site A – Shao Lu and Orleans Road Intersection' project area, using Threatened and Priority Flora Reporting (TPFL; DBCA 2022c), WA Herbarium (DBCA 2022d) and Esperance District Threatened Flora (DBCA 2022a).
Nt. Acronyms used in the table include priority flora (P), threatened flora (TF), Biodiversity Conservation (BC) Act 2018, Environmental Protection and Biodiversity Conservation (EPBC) Act 1999, critically endangered (CN) and endangered (EN).

Species	Conservation Status	Associated Habitat	Likely to occur	Distance from site (km)
Scaevola archeriana	P1	Mixed habitat – yellow sands with mixed mallee or limestone.	No	11.50
Andersonia carinata	P2	Grows on white sand, and gravelly lateritic soils. No WA Herbarium records close to Esperance.	No	14.11
Astartea eobalta	P2	Edge of wet depressions or fresh water swamps. Associated with sedgelands, Astartea asteroides, Taxandria callistachys	No	18.92
Caesia viscida	P2	Grows on Aeolian sand, low dunes, and loamy sand over lateritic gravel.	Yes	17.28
Calectasia jubilaea	P2	Plain; white sand. Most records note recent fire.	No	16.50
Eucalyptus sweedmaniana	P2	Grows in association with granite boulders and granitic gravel.	No	12.24
Leucopogon corymbiformis	P2	Scattered Nuytsia floribunda and Banksia speciosa over mixed Myrtaceous & Proteaceous heath. Sandy soil.	Yes	14.89
Melaleuca viminea subsp. appressa	P2	Near creeks or wet depressions in clayey soils, possibly associated with granite	No	17.87
Paracaleana parvula	P2	Deep white sands in mallee heath with Banksia media	No	12.93
Persoonia spathulata	P2	Grows in deep sandy soils, with other Proteaceae species.	Yes	18.64
Spyridium mucronatum subsp. multiflorum	P2	Mallee Woodlands, in gravelly loam or clay soils.	No	16.59
Acacia nitidula	P3	Granitic sandy gravelly soils. Amongst granite boulders.	No	8.90
Eucalyptus creta	P3	Mallee country preferring heavy brown clay loam. Normally dominant.	No	5.92
Eucalyptus semiglobosa	P3	White sand over laterite, silty sand on edge of granite shelf, limestone. Hillslopes, gullies and cliffs	No	12.59

Gonocarpus pycnostachyus	P3	seasonal wet depressions and pools on granite rocks.	No	9.00
Hibbertia hamata	P3	hillsides, inland granite outcrops, low shrubland, bare areas and heath. Grows in grey sand over granite.	No	10.54
Lasiopetalum parvuliflorum	P3	Sand, gravelly loam. Generally associated with wet areas	No	12.46
Leucopogon florulentus	P3	White/grey or yellow sands, sandy clay, gravelly lateric soils. Mostly recorded west of Hopetoun, likely error in database	No	18.10
Melaleuca dempta	P3	Hakea, Melaleuca dominated shrublands. Present on range of soil types – loams, clay, salt pans. Mostly associated with salt lakes.	No	14.74
Persoonia scabra	P3	White sand or sandy loam, granite or limestone. Shrubland.	Yes	7.38
Pterostylis faceta	P3	Various habitats – Melaleuca Mallee scrubland, Granite, sandy loam	No	13.50
Stylidium roseonanum	P3	Prefers swamps. Mostly records occur in the west, towards Albany.	No	11.43
Caladenia arrecta	P4	Grows on loam, gravel, and laterite. Associated with moist conditions.	No	16.64
Grevillea baxteri	P4	Prefers shrubby heathland with an acid sandy soil usually overlaying heavier soils. Associated with highly diverse Proteaceous shrublands.	No	6.20
Isopogon alcicornis	P4	Grows in sandy soils and skeletal loam on granite. Occupies various habitats including sandhills, salt lakes and sandplains.	Yes	6.31
Kennedia beckxiana	P4	Grows in sand and loam on granite hills and outcrops.	No	11.29
Microtis quadrata	P4	Widespread and various habitats and soil types, however mostly associated with wetter areas.	Yes	13.70
Myriophyllum petraeum	P4	Strictly confined to ephemeral rock pools on granite outcrops.	No	12.51
Stachystemon vinosus	P4	Various habitats including sandplains and rock crevices on breakaways. Prefers fine loamy sand and stony soils.	Yes	14.05
Trithuria australis	P4	Annual herb, associated with wetter areas. All WA Herbarium records area a long way from Esperance. likely error in database	No	7.46

Anigozanthos bicolor subsp. minor	T	Moist sandy soil in heath communities. Has been found in shallow soils near granite outcrops.	Yes	9.00
Lambertia echinata subsp. echinata	T	Below and between rock outcrops, slopes, hill crests. Grows in gravelly sandy loam, brown sandy loam, white-grey sand, granite, laterite. Only associated with Cape Le Grand National Park.	No	15.53
Myoporum velutinum	T	Associated with creek banks. Grows in sandy soils.	No	10.32

Appendix 4: Description of Threatened and Priority Fauna Species with the Potential to occur within the Shao Lu and Orleans Road Intersection Survey Area

Scientific Name	Common Name	WA Cons stat	EPBC stat	Dist (km)	EPBC protected matters tool	Habitat	Likely to occur
Acanthophis antarcticus	Southern death adder	P3		13.61		This species is found in a wide variety of well-drained habitats, including rainforests and wet sclerophyll forests, woodland, shrublands, grasslands and coastal heathlands, preferring sites with deep fixed leaf litter.	Yes
Actitis hypoleucos	Common Sandpiper	MI	MI	3.17		Utilises a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats	No
Apus pacificus	Fork-tailed swift	MI	MI	15.95		In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas. They often occur over cliffs and beaches and also over islands and sometimes well out to sea. They also occur over settled areas, including towns, urban areas and cities. They mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They are also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes.	Yes
Ardenna tenuirostris	Short-tailed shearwater	MI	MI	18.64		Headlands and islands covered with tussocks and succulent vegetation.	No
Balaenoptera musculus	Blue Whale	EN			X	Marine	No
Botaurus poiciloptilus	Australasian bittern	EN	EN	13.80	X	The Australasian bittern inhabits shallow (less than 30cm deep), permanent freshwater and brackish swamps or lagoons	No

						that are densely vegetated (e.g. tall reeds, sedges, lignum). They also inhabit bore drains with tussocky vegetation and occasionally saltmarsh. They use temporary pools when population densities are high and deep swamps when breeding	
Calidris alba	Sanderling	MI	MI	18.28		In Australia, the species is almost always found on the coast, mostly on open sandy beaches exposed to open sea-swell, and also on exposed sandbars and spits, and shingle banks, where they forage in the wave-wash zone and amongst rotting seaweed.	No
Calidris canutus	Red Knot, Knot	EN			X	intertidal mudflats, sandflats and sandy beaches of sheltered coasts, in estuaries, bays, inlets, lagoons and harbours; sometimes on sandy ocean beaches or shallow pools on exposed wave-cut rock platforms or coral reefs. They are occasionally seen on terrestrial saline wetlands near the coast, such as lakes, lagoons, pools and pans, and recorded on sewage ponds and saltworks, but rarely use freshwater swamps. They rarely use inland lakes or swamps.	No
Calidris ferruginea	Curlew sandpiper	CR	MI		X	Intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters.	No
Calidris ruficollis	Red-necked stint	MI	MI	17.85		Coastal areas, including in sheltered inlets, bays, lagoons and estuaries with intertidal mudflats, often near spits, islets and banks and, sometimes, on protected sandy or coralline shores. Occasionally they have been recorded on exposed or	No

						ocean beaches, and sometimes on stony or rocky shores, reefs or shoals. They also occur in saltworks and sewage farms; saltmarsh; ephemeral or permanent shallow wetlands near the coast or inland, including lagoons, lakes, swamps, riverbanks, waterholes, bore drains, dams, soaks and pools in saltflats. They sometimes use flooded paddocks or damp grasslands. They have occasionally been recorded on dry gibber plains, with little or no perennial vegetation.	
Calyptorhynchus latirostris	Carnaby's black cockatoo	EN	EN	10.29	X	Uncleared and remnant areas of woodland, shrubland and kwongan heath dominated by proteaceous species. They breed in the semiarid and subhumid interior eucalypt woodlands, principally dominated by Salmon Gum Eucalyptus salmonophloia or Wandoo Eucalyptus wandoo	Yes
Carcharodon carcharias	White Shark, Great White Shark	VU			X	Marine	No
Caretta caretta	Loggerhead Turtle	EN			X	Marine	No
Cereopsis novaehollandiae grisea	Recherche Cape Barren goose	VU	VU	19.08	X	During breeding season (May-June), found in grassy areas, tussock grass of bushes. During rest of year, found on beaches, coastal pastures and on the shores of brackish lakes.	Yes
Charadrius leschenaultii	Greater Sand Plover, Large Sand Plover	VU			X	They mainly occur on sheltered sandy, shelly or muddy beaches with large intertidal mudflats or sandbanks, as well as sandy estuarine lagoons, and inshore reefs, rock platforms, small rocky islands or sand cays on coral reefs. They are occasionally recorded on near-coastal saltworks and saltlakes, including marginal saltmarsh, and on brackish swamps.	No
Chelonia mydas	Green Turtle	VU			X	Marine	No

Dasyurus geoffroii	Chuditch, western quoll	VU	VU		X	Jarrah *Eucalyptus marginata* forests and woodlands, Mallee shrublands and heathlands	No
Dermochelys coriacea	leatherback turtle	VU	EN		X	Marine	No
Diomedea antipodensis	Antipodean Albatross	VU			X	Marine	No
Diomedea dabbenena	Tristan Albatross	VU			X	Marine	No
Diomedea epomophora	Southern Royal Albatross	VU			X	Marine	No
Diomedea exulans	Wandering Albatross	VU			X	Marine	No
Diomedea sanfordi	Northern Royal Albatross	VU			X	Marine	No
Eubalaena australis	southern right whale	VU	EN	19.72	X	Marine	No
Falco hypoleucos	grey falcon	VU		18.58	X	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.	Yes
Falco peregrinus	Peregrine falcon	OS		13.77		Most habitats, from rainforests to the arid zone, and at most altitudes, from the coast to alpine areas	Yes
Halobaena caerulea	Blue Petrel	VU			X	Marine	No
Hydroprogne caspia	Caspian Tern	MI	MI	17.85		Sheltered coastal embayments (harbours, lagoons, inlets, bays, estuaries and river deltas) and those with sandy or muddy margins are preferred. They also occur on near-coastal	No

						or inland terrestrial wetlands that are either fresh or saline, especially lakes (including ephemeral lakes), waterholes, reservoirs, rivers and creeks. They also use artificial wetlands, including reservoirs, sewage ponds and saltworks. In offshore areas the species prefers sheltered situations, particularly near islands, and is rarely seen beyond reefs	
Leipoa ocellata	Malleefowl	VU	VU		X	Shrublands and low woodlands dominated by mallee and are associated with Broombush, Melaleuca uncinata	No
Limosa lapponica	Bar-tailed godwit	MI	MI	18.27	X	Coastal areas	No
Macronectes giganteus	Southern Giant-Petrel, Southern Giant Petrel	EN			X	Marine	No
Macronectes halli	Northern Giant Petrel	VU			X	Marine	No
Neophoca cinerea	Australian Sea-lion, Australian Sea Lion	VU			X	Marine	No
Notamacropus eugenii derbianus	Tammar wallaby	P4		10.10		Dense, low vegetation for daytime shelter and open grassy areas for feeding. This species inhabits coastal scrub, heath, dry sclerophyll forest and thickets in mallee and woodland. Only Esperance occurences are from Middle and North Twin Peak Islands, nearby record was from 1899 and had inaccurate GPS location, location was described as “Middle and Twin Peak Islands”.	No

Numenius madagascariensis	Eastern curlew	CR	CR		X	Intertidal mudflats	No
Oxyura australis	Blue-billed duck	P4		13.48		Fresh to saline, deep permanent open wetlands and deep, densely vegetated lakes.	No
Pachyptila turtur subantarctica	Fairy Prion (southern)	VU			X	Marine	No
Parantechinus apicalis	Dibbler	EN			X	There was a single Esperance single record for this species on Gunton island within the Recherche Archipelago Nature Reserve. The single record was the result of a translocation, there is no naturally occurring records of this species within the Shire of Esperance.	No
Petrogale lateralis hacketti	Recherche black-footed rock-wallaby	VU	VU	16.56		Taxon is restricted to Recherche archipelago. There was a 1976 record with location listed as recherche archipelago, the specimen has had incorrect coordinates manually added to the specimen.	No
Pezoporus flaviventris	Western ground parrot	CR	CR	13.23	X	low, dry or swampy near-coastal heathland. It usually occurs in habitat that has remained unburnt for long periods of time. It mainly flies at dawn or dusk and mostly eats small seeds. It is only known from two locations in the far south-west of Western Australia: Fitzgerald River National Park and Cape Arid National Park / Nuytsland Nature Reserve.	Yes
Pluvialis fulva	Pacific golden plover	MI	MI	18.43		Coastal regions, though there are also a number of inland records (in all states), sometimes far inland and usually along major river systems. In Western Australia, the species is seldom recorded along the southern or south-western coasts, but is more widespread along the Pilbara and Kimberley coasts between North-West Cape and the Northern Territory border.	No

Pluvialis squatarola	Grey plover	MI	MI	18.43		Coastal areas, where they usually inhabit sheltered embayments, estuaries and lagoons with mudflats and sandflats, and occasionally on rocky coasts with wave-cut platforms or reef-flats, or on reefs within muddy lagoons. They also occur around terrestrial wetlands such as near-coastal lakes and swamps, or salt-lakes. The species is also very occasionally recorded further inland, where they occur around wetlands or salt-lakes	No
Pterodroma mollis	Soft-plumaged Petrel	VU			X	Marine	No
Rhincodon typus	Whale Shark	VU			X	Marine	No
Thalassarche carteri	Indian Yellow-nosed Albatross	VU			X	Marine	No
Thalassarche cauta	Shy Albatross	EN			X	Marine	No
Thalassarche chrysostoma	Grey-headed albatross	VU	EN	19.16		Marine	No
Thalassarche impavida	Campbell Albatross, Campbell Black-browed Albatross	VU			X	Marine	No
Thalassarche steadi	White-capped Albatross	VU			X	Marine	No
Thalasseus bergii	Crested tern	MI	MI	17.85		Coastal areas throughout Australia. They are seldom seen on inland waterways, preferring islands, beaches, lakes and inlets	No
Thinornis rubricollis	Hooded plover, hooded dotterel	P4		7.39		Predominantly on ocean beaches; at times on adjacent reef platforms, coastal inlets and lakes. and the edges of near-	No

						coastal and inland salt-lakes that may be hundreds of kilometres from the coast	
Thunnus maccoyii	Southern Bluefin Tuna	CD			X	Marine	No
Tringa nebularia	Common greenshank	MI	MI	13654.83316		Occurs in all types of coastal and inland wetlands.	No

Appendix 5: State Threatened and Priority Flora and Fauna Definitions

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 6: 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 7: 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 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 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 8: 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 9: Commonwealth Definition of Threatened Ecological Communities

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

Listing Category Code	Explanation of Category
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 10: 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 11: Definition of Vegetation Condition Scale

For the south west and interzone botanical provinces

Condition Rating Description	Condition Rating Description
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 12: Carnaby's Cockatoo foraging habitat scoring template

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

Starting score	**Carnaby's Cockatoo**	
10	**Start at a score of 10** if your site is native shrubland, kwongan heathland or woodland, dominated by proteaceous plant species such as *Banksia* spp. (including *Dryandra* 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)**
Foraging potential	**-2**	**Subtract 2** from your score if there is no evidence of feeding debris on your site.
Connectivity	**-2**	**Subtract 2** from your score if you have evidence to conclude that there is no other foraging habitat within 1km of your site.
Proximity to breeding	**-2**	**Subtract 2** if you have evidence to conclude that your site is more than 12km from breeding habitat.
Proximity to roosting	**-1**	**Subtract 1** if you have evidence to conclude that your site is more than 20km from a known night roosting habitat.
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 preferred food plants present.
Total score	**Enter score**	
Other considerations for assessment of foraging habitat	- The presence, extent and density (including foliage cover and flowering density) of all plant species that provide foraging, including non-native food sources used - The distribution and size of foraging habitat in proximity (e.g. up to 12 km) to the impact site. - Site degradation (such as cleared, disturbed or degraded areas). - The fire history of the impact site. - Landscape characteristics around the impact site, including details of roosting and breeding habitat in proximity (e.g. up to 20km for roosting and 12km for breeding); and - The location and details of watering points that could support the use of the foraging habitat.	
Appraisal	To support your habitat score, you should provide an overall appraisal of the habitat on the impact site and within 20km of the impact area to clearly explain and justify the score. It should include discussion on the foraging habitat's proximity to other resources (e.g. exact distance to proximate resources), frequency of use of proximate sites, the degree of evidence and description of vegetation type and condition.	

Appendix 13: EPBC Act Protected Matters Report

Listed Threatened Ecological Communities

				Presence	
Community ID	**Community Name**	**Threatened Category**	**Rank**	**Text**	**Buffer Status**
126	Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia	Endangered	Likely	Community likely to occur within area	In feature area

Listed Threatened Species

Scientific Name	Common Name	Simple Presence	Presence Text	Threatened Category	Migratory Status	Buffer Status
Thunnus maccoyii	Southern Bluefin Tuna	Likely	Species or species habitat likely to occur within area	Conservation Dependent		In buffer area only
Numenius madagascariensis	Eastern Curlew, Far Eastern Curlew	May	Species or species habitat may occur within area	Critically Endangered	Migratory	In feature area
Limosa lapponica menzbieri	Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit	Known	Species or species habitat known to occur within area	Critically Endangered		In buffer area only

Pezoporus flaviventris	Western Ground Parrot, Kyloring	Likely	Species or species habitat likely to occur within area	Critically Endangered		In buffer area only
Calidris ferruginea	Curlew Sandpiper	May	Species or species habitat may occur within area	Critically Endangered	Migratory	In feature area
Balaenoptera musculus	Blue Whale	May	Species or species habitat may occur within area	Endangered	Migratory	In buffer area only
Diomedea sanfordi	Northern Royal Albatross	May	Species or species habitat may occur within area	Endangered	Migratory	In buffer area only
Diomedea dabbenena	Tristan Albatross	May	Species or species habitat may occur within area	Endangered	Migratory	In buffer area only
Parantechinus apicalis	Dibbler	Likely	Species or species habitat likely to occur within area	Endangered		In buffer area only
Neophoca cinerea	Australian Sea-lion, Australian Sea Lion	Known	Breeding known to occur within area	Endangered		In buffer area only
Macronectes giganteus	Southern Giant-Petrel, Southern Giant Petrel	May	Species or species habitat may occur within area	Endangered	Migratory	In buffer area only
Caretta caretta	Loggerhead Turtle	Likely	Breeding likely to occur within area	Endangered	Migratory	In buffer area only
Dermochelys coriacea	Leatherback Turtle, Leathery Turtle, Luth	Likely	Breeding likely to occur within area	Endangered	Migratory	In buffer area only
Anigozanthos bicolor subsp. minor	Little Kangaroo Paw, Two-coloured Kangaroo Paw,	Known	Species or species habitat known to occur within area	Endangered		In feature area

	Small Two-colour Kangaroo Paw					
Lambertia echinata subsp. echinata	Prickly Honeysuckle	Likely	Species or species habitat likely to occur within area	Endangered		In feature area
Ricinocarpos trichophorus	Barrens Wedding Bush	May	Species or species habitat may occur within area	Endangered		In buffer area only
Eubalaena australis	Southern Right Whale	Known	Breeding known to occur within area	Endangered	Migratory (as Balaena glacialis australis)	In buffer area only
Thalassarche cauta	Shy Albatross	Likely	Foraging, feeding or related behaviour likely to occur within area	Endangered	Migratory	In buffer area only
Calidris canutus	Red Knot, Knot	May	Species or species habitat may occur within area	Endangered	Migratory	In buffer area only
Botaurus poiciloptilus	Australasian Bittern	May	Species or species habitat may occur within area	Endangered		In feature area
Zanda latirostris	Carnaby's Black Cockatoo, Short-billed Black-cockatoo	Known	Species or species habitat known to occur within area	Endangered (listed as Calyptorhynchus latirostris)		In feature area
Thalassarche melanophris	Black-browed Albatross	Likely	Foraging, feeding or related behaviour likely to occur within area	Vulnerable	Migratory	In buffer area only
Carcharodon carcharias	White Shark, Great White Shark	Known	Foraging, feeding or related behaviour known to occur within area	Vulnerable	Migratory	In buffer area only

Pachyptila turtur subantarctica	Fairy Prion (southern)	May	Species or species habitat may occur within area	Vulnerable		In buffer area only
Macronectes halli	Northern Giant Petrel	Likely	Foraging, feeding or related behaviour likely to occur within area	Vulnerable	Migratory	In buffer area only
Leipoa ocellata	Malleefowl	Likely	Species or species habitat likely to occur within area	Vulnerable		In feature area
Falco hypoleucos	Grey Falcon	Known	Species or species habitat known to occur within area	Vulnerable		In feature area
Chelonia mydas	Green Turtle	May	Species or species habitat may occur within area	Vulnerable	Migratory	In buffer area only
Halobaena caerulea	Blue Petrel	May	Species or species habitat may occur within area	Vulnerable		In buffer area only
Thalassarche carteri	Indian Yellow-nosed Albatross	Likely	Species or species habitat likely to occur within area	Vulnerable	Migratory	In buffer area only
Charadrius leschenaultii	Greater Sand Plover, Large Sand Plover	May	Species or species habitat may occur within area	Vulnerable	Migratory	In buffer area only
Thalassarche steadi	White-capped Albatross	May	Species or species habitat may occur within area	Vulnerable	Migratory	In buffer area only
Rhincodon typus	Whale Shark	May	Species or species habitat may occur within area	Vulnerable	Migratory	In buffer area only

Diomedea exulans	Wandering Albatross	Likely	Foraging, feeding or related behaviour likely to occur within area	Vulnerable	Migratory	In buffer area only
Diomedea epomophora	Southern Royal Albatross	May	Species or species habitat may occur within area	Vulnerable	Migratory	In buffer area only
Cereopsis novaehollandiae grisea	Cape Barren Goose (south-western), Recherche Cape Barren Goose	Known	Breeding known to occur within area	Vulnerable		In feature area
Pterodroma mollis	Soft-plumaged Petrel	May	Species or species habitat may occur within area	Vulnerable		In buffer area only
Thalassarche impavida	Campbell Albatross, Campbell Black-browed Albatross	May	Species or species habitat may occur within area	Vulnerable	Migratory	In buffer area only
Diomedea antipodensis	Antipodean Albatross	Likely	Foraging, feeding or related behaviour likely to occur within area	Vulnerable	Migratory	In buffer area only
Dasyurus geoffroii	Chuditch, Western Quoll	May	Species or species habitat may occur within area	Vulnerable		In feature area
Sternula nereis nereis	Australian Fairy Tern	Known	Foraging, feeding or related behaviour known to occur within area	Vulnerable		In buffer area only

Appendix 14: Swamp Yate (*Eucalyptus occidentalis*) woodland in seasonally-inundated basins - Community Description

Description obtained from: Ecologia for Grange Resources Limited (2008) Southdown Magnetite Proposal. Regional Flora and vegetation assessment. Unpublished Report

Swamp Yate (*Eucalyptus occidentalis*) woodland in seasonally-inundated basins

Community Description

The centre of these sumplands was usually inhabited by Swamp Yate (*Eucalyptus occidentalis*) low woodland often with an understorey of the Saltwater Paperbark (*Melaleuca cuticularis*). Peripheral to the central seasonally-inundated basin of these wetlands there was often a waterlogged zone of E. occidentalis associated with *Kunzea recurva* heath to open scrub and/or the small trees *Melaleuca preissiana* and *Banksia littoralis* and a number of mallees (primarily *Eucalyptus decipiens subsp. adesmophloia*). Fringing the wetland there was usually an *Anarthria laevis* sedgeland. However in the wetlands where there was shallow laterite, the sedgeland was usually replaced with a Pericalymma ellipticum heath.

The understorey shrubs of this vegetation were typically very open. *Melaleuca cuticularis, Kunzea recurva* and *Hakea nitida* generally formed an open tall shrub layer. *Hakea denticulata, Hakea laurina, Hakea varia, Exocarpos sparteus, Agonis theiformis, Lambertia inermis* and *Nuytsia floribunda* were also sometimes present in the seasonally waterlogged areas fringing the sumplands. Other common shrub taxa, recorded at low density across the sampled sites were *Isopogon trilobus, Acacia pulchella var. glaberrima, Taxandria spathulata, Astartea glomerosa, Astartea aspera, Beaufortia empetrifolia, Melaleuca concinna* and *Conothamnus aureus*. Other mid and low shrub species recorded at lower abundance included *Acacia biflora, Acacia luteola, A. subcaerulea, Adenanthos cuneatus, Banksia baueri, Banksia dryandroides, Bossiaea praetermissa, Daviesia inflata, Dryandra falcata, Dryandra mucronulata subsp. mucronulata, Dryandra tenuifolia var. tenuifolia, Gompholobium confertum, Hibbertia lineata, Leucopogon conostephioides, Melaleuca subtrigona, Petrophile squamata subsp. squamata, Petrophile media, Spyridium majoranifolium, Stirlingia anethifolia and Thomasia stelligera. The perennial herbs Villarsia parnassifolia, Anthotium humile, Stylidium corymbosum, Goodenia filiformis* and *Velleia trinervis* were abundant in the wetlands in good condition. These herbs inhabited the shallowly-inundated zone of the wetland and were most apparent when the water receded and the herbs were in flower in late summer. A dense ground layer was generally present in the seasonally waterlogged fringe of the sumplands and this was dominated by rushes and sedges including *Anarthria laevis, Baumea juncea, Gahnia ancistrophylla, Lepidosperma striatum, Schoenus laevigatus, Schoenus subfascicularis and Tricostularia compressa.* A suite of native grasses was also recorded including *Amphipogon amphipogonoides, Austrostipa hemipogon, Cyperochloa hirsuta, Deyeuxia quadriseta and Neurachne alopecuroidea.* Naturalised alien grasses and herbs were prevalent in the more disturbed wetlands and these included **Aira caryophyllea, *Cirsium vulgare, *Conyza parva, *Conyza sumatrensis, *Hordeum leporinum, *Hypochaeris glabra, Juncus pallidus,*Lagurus ovatus, *Pennisetum clandestinum, *Pseudognaphalium luteoalbum, *Rumex crispus, *Solanum nigrum* and **Vulpia myuros var. megalura*