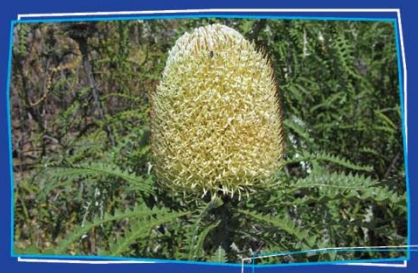
Vegetation, Flora, Fauna and Environmental Considerations Report

Shire of Esperance 2022-23 Strategic Purpose Permit
Site B – Myrup Road Blackspot



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February 2023

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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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 Myrup Road Blackspot project in 2022-23 as part of their Strategic Purpose Permit application.

The Shire of Esperance endeavours to maintain a high level of road safety, being proactive in identifying high risk road designs and progressively upgrading them. The Shire of Esperance manages the largest road network of any local government in Western Australia, encompassing a total of 4 593 km of road. The Shire of Esperance is submitting 'Myrup Road Blackspot' project as Site C under the '2023 Strategic Purpose Permit' (Figure 1), for the purpose of road widening during a road reconstruction for public safety.

Myrup Road is particularly narrow resulting in safety issues during heavy vehicle passing's. Myrup Road requires widening to maintain the RAV requirement of MRWA for the safety of road users. This road is classified as a local distributor road on the Shire road network providing a vital link to shire east to access Esperance industrial area, airport and Esperance Coolgardie Hwy. Traffic counts showing a major impact of heavy vehicle occupied and it is an approved RAV and Bus route.

To complete these works, native vegetation up to 2m from the current road footprint on both sides of the road is required to be cleared, increasing the active road footprint to 17m. This requires clearing of 0.67 ha of native vegetation. To mitigate impact of clearing vegetation, where feasible clearing will not occur to the full permitted width, conserving vegetation.

The proposed works are located around 20 km north of Esperance, within the Shire of Esperance managed road reserve of Myrup Rd. Specifically, it is along from Myrup Road at straight line kilometre (SLK) 4 - 8.90 (Main Roads, 2022). A point within the proposed clearing permit area is 6263433.54m N, 400583.28m E (UTM Zone 51 H, GDA94).

The Shire of Esperance's two Environmental Scientists completed the site assessment on Myrup Road Blackspot on the 20th October and 21st October 2022.

A total of 155 vascular plant taxa from 115 plant genera and 43 plant families were recorded within the Myrup Road Blackspot survey area during the 2022 survey. The majority of taxa was recorded within the Myrtaceae (25 taxa), Poaceae (15 taxa), Fabaceae (15 taxa), and Proteaceae (11 taxa) families (Appendix 1). This total included 100 native species and 55 introduced (weed) species.

No threatened and 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 Myrup Road Blackspot 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 Myrup Road Blackspot survey area.

A total of 0.051 ha of the EBPC listed 'Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia (Kwongkan)' Threatened Ecological Community (TEC) will be cleared within Site B - Myrup Road Blackspot. A total of 0.033 ha within the project was consistent with the State Listed Priority Ecological Community (PEC) 'Swamp Yate (*Eucalyptus occidentalis*) woodland in seasonally-inundated basins'. No other TECs or PECs were located within

Site B - Myrup Road Blackspot.

The site contains suitable foraging habitat for the EPBC listed Carnaby's Cockatoo (*Calyptorhynchus latirostis*). Approximately 0.064 hectares ha of native foraging habitat will be cleared. Several other species with potentially suitable habitat were listed in the desktop searches, southern death adder, Peregrine Falcon, (*Falco peregrinus) and* Quenda, (*Isoodon fusciventer)* were particularly likely to utilise the site given suitability in habitat and close proximity in previous occurrence records.

Two of the vegetation communities mapped and species recorded in the Myrup Road Blackspot survey area were consistent with the historical mapping of Beard (1976). Two of the vegetation communities had been heavily disturbed and could not be assigned to any Beard vegetation association.

Should the development of Myrup Road Blackspot project go ahead, the following recommendations are made as a means of minimizing the impacts of infrastructure activities on the flora, vegetation and fauna values in the area;

- Minimise clearing to the minimum amount required
- Avoid larger habitat trees (larger trees and trees with hollows) wherever possible;
- Maintain existing drainage systems, spoon drains and ensuring tracks and other infrastructure areas to avoid disrupting or diverting historic water flow patterns;
- Minimise soil disturbance during clearing and practice standard vehicle hygiene to ensure introduced (exotic) species do not become established within the 'Myrup Road Blackspot' survey area;
- Implement a management plan to prevent the spread of *Acacia pycnantha*, a serious environmental weed; and
- Minimize all threatening processes to native vegetation.

These have been addressed in the attached Weed and Dieback plan and/or Rehabilitation Plan, and provided these measures are implemented, there should be no impediments to the widening of Myrup Road Blackspot.

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 'Myrup Road Blackspot' project as Site B under the '2022-23 Strategic Purpose Permit' (Figure 1), for the purpose of road widening for public safety.

1.1 Location and Scope of Project

The proposed works are located around 20 km north of Esperance, within the Shire of Esperance managed road reserve of Myrup road. Specifically, it along Myrup Road at straight line kilometre (SLK) 4 - 8.90 (Main Roads, 2022). A point within the proposed clearing permit area is 6263433m N, 400583m E (UTM Zone 51 H, GDA94).

To complete these works, native vegetation up to 2m from the current road footprint on both sides of the road is required to be cleared, increasing the active road footprint to 17m. This requires clearing of 0.67 ha of native vegetation. To mitigate impact of clearing vegetation, where feasible clearing will not occur to the full permitted width, conserving vegetation.

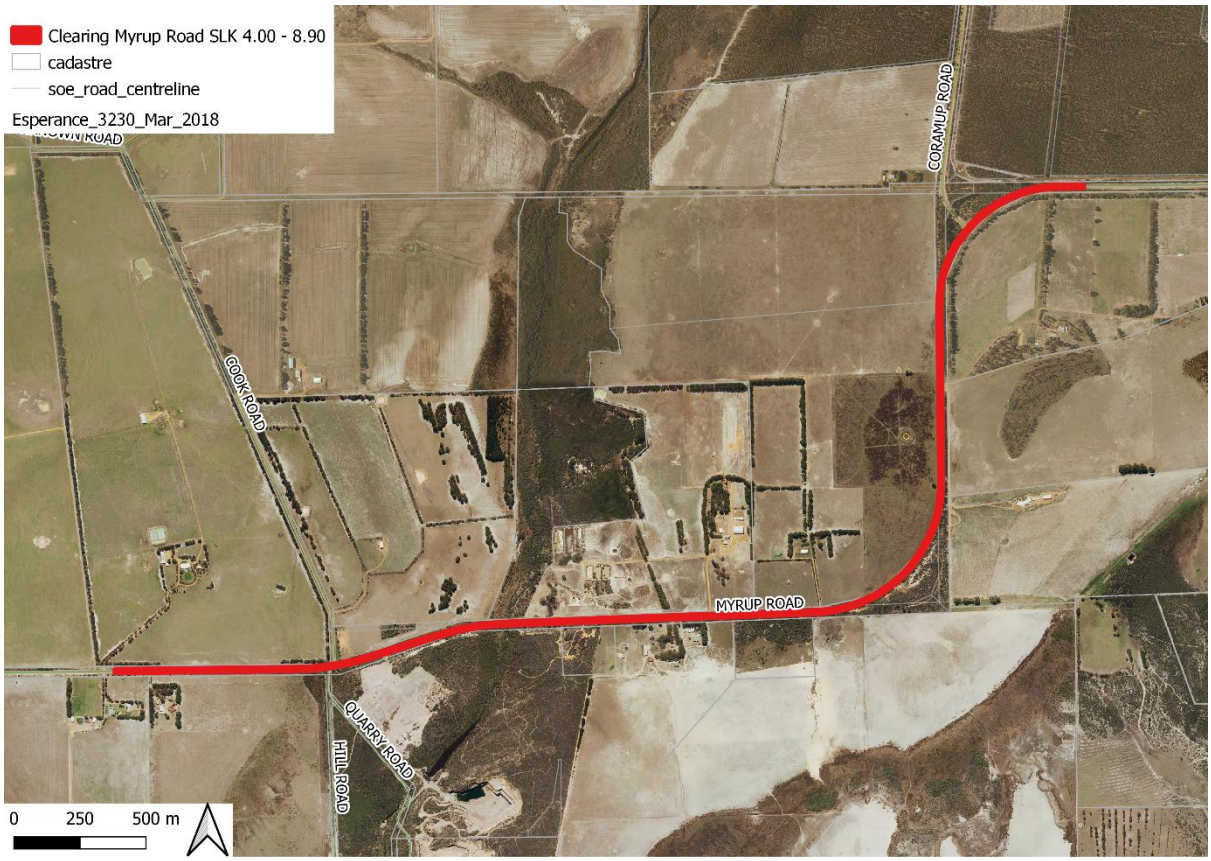

Figure 1. Location of 'Site B - Myrup Road Blackspot'. The project was from Myrup Road SLK 4 - 8.91.

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 Myrup Road Blackspot survey area including:

- Undertake a desktop study of the flora, fauna and vegetation of the Myrup Road Blackspot 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 Myrup Road Blackspot survey area;
- Undertake a detailed survey of the Myrup Road Blackspot 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 Myrup Road Blackspot survey area;
- Define and map the location of any threatened and priority flora located within the Myrup Road

Blackspot 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 for:

- WA Herbarium data (WAH) (DBCA, 2022d)
- Threatened and Priority Flora Database (TPFL) (DBCA, 2022c)
- DBCA's Esperance District Threatened Flora spatial dataset (DBCA, 2022e)
- Threatened and Priority Ecological Communities (DBCA, 2021)
- Threatened, specially protected and priority fauna (DBCA, 2022f)
- Black cockatoo roost and breeding sites (DBCA 2022g)

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 Myrup Road Blackspot 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 (1976)
- 2020 Vegetation Extent by State-wide 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 (Esperance 2018)
- Atlas of Living Australia database
- Hydrographic Catchments (DWER)
- Crown Reserves (Landgate)

3.2 Field Survey

A detailed field assessment of the flora and vegetation of the Myrup Road Blackspot survey area was undertaken by Shire of Esperance botanists from 20th October to 21st October 2022, in accordance with methods outlined in Technical Guidance – Flora and vegetation surveys for environmental impact assessment (EPA 2016). All botanists 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 Myrup Road Blackspot survey area. The road was used as a continuous transect. Vegetation up to 5 meters from the edge of the existing road's back-slope was assessed to accurately cover the 2 m width proposed clearing permit area. recording all species, and collecting all but the very common, well known species.

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 Myrup Road Blackspot was also constructed.

All species unknown in the field were collected, pressed and dressed in accordance with WAH instructions, and later identified by SOE's three Botanists, using keys, WA Herbarium's Florabase, literature and the Esperance District Herbarium. Nomenclature of the species recorded is in accordance with the WAH.

The vegetation communities of 'Site B – Myrup Road Blackspot' was assessed for the presence a TEC or PEC (DBCA 2018) comparing that to descriptions in approved conservation advice for these communities.

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.

PEC's do not have published approved conservation advice. Comparison of the vegetation community occurred using 'Priority Ecological Communities for Western Australia, Version 33 (DBCA 2022)' definitions.

As Site B – Myrup Road Blackspot is a long linear site, quadrant-based data was not used to determine if the site meet the TEC definitions, this was due to the inability to site an appropriately sized quadrant (As per Table 1, Technical Guidance – Flora and vegetation surveys for Environmental Impact Assessment (EPA 2016) within the narrow road verge area.

Only a basic fauna survey was conducted as per EPA (2020) guidelines. Observations of fauna presence, such as call sounds, footprints and scats were noted, and the area assessed for suitability of habitat within 'Site B – Myrup Road Blackspot' for fauna species identified in the desktop survey. Carnaby's Black Cockatoo (*Calyptorhynchus latirostris)* feeding, roosting and nesting habitat was also assessed using EPBC Act referral guidelines (2022).

3.3 Survey Timing

According to Table 3 in the Technical Guidance – Flora and vegetation surveys for Environmental Impact Assessment (EPA 2016), the primary survey timing for the South-west and Interzone Botanical Province is Spring (September-November). As all surveys at Myrup Road Blackspot were conducted in October, it falls within this period. The surveys were timed, where possible, to align with peak flowering periods of conservation significant flora with the potential to occur in the Myrup Road Blackspot 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 community was assessed during the field survey. Broad vegetation types defined by structure and composition were recorded and described using the National Vegetation Information System (NVIS) (ESCAVI 2003) 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 1: 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 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 (1976).
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:** Botanists had extensive experience working within the Shire of Esperance and wider areas. Two of the botanists have consistently worked within this bioregion for more than 15 years. Botanists were familiar

	with flora 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 botanists by means of foot-traverse along the edge of the road and into roadside vegetation 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). All 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 Myrup Road Blackspot survey area has no recorded fire or flooding events.

4 DESKTOP ASSESSMENT RESULTS

4.1 Climate

The Esperance climate is described as Mediterranean, characterised by cool wet winters and dry warm summers (BoM 2022). The area receives an average annual rainfall of 618 mm. The Shire of Esperance received an unusually high level of rainfall in 2022 resulting in an extended flowering period.

4.2 Catchment

'Site B – Myrup Road Blackspot' is present within the Bandy Creek catchment area. It is located approximately 7.7km from the coast.

4.3 Geology, Soils and Topography

A single geological unit was identified within 'Site B – Myrup Road Blackspot, by Schoknecht et al. (2004). It is described as "Tertiary marine sediments of the Pallinup formation".
Within the area, there has been three soil types recorded. These include:

- Grey deep sandy duplex (gravelly) soils with associated duplex sandy gravels and minor pale deep sands and shallow gravels.
- Gravelly, yellow mottled sandy duplex soils over gravel layer at 30-80cm.
- Pale deep sands.

During the field survey, topography was observed to be dominated by gently undulating plains. Using Schnoknect et al. (2004), the project topography is mapped at a fine scale, traversing two topographic areas. These include

- Gently undulating plain, 1-3% slope.
- Level plain, <1% slope.

4.4 Regional Vegetation

The site is located within the Interim Biogeographic Regionalisation for Australia (IBRA; Thackway & Cresswell 1995) Esperance Plains 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 two vegetation associations (VA) within the 'Site B – Myrup Road Blackspot' (Table 2). Esperance 6048 has seen widespread clearing with 14% of its pre-European extent remaining, this vegetation association is also poorly represented in conservation estate with only 0.89% protected. Esperance 931 is well represented having 45% of its original extent remaining and 33% of its Esperance extent remaining.

Table 2. Vegetation associations mapped by Beard (1973) within the 'Site B – Myrup Road Blackspot', and statistics on pre-European remaining areas.

Vegetation Association		
Name	Esperance_6048	Esperance_931
Description	Shrublands; banksia scrub-heath on sandplains	Medium woodland; yate
Area mapped within site (ha)	0.065	0.054
Total remaining	14.21	44.95
Pre-European extent in IBRA region ESP2 (%)	14.16	42.06
Pre-European extent in LGA (%)	14.16	32.95
Current extent conserved in IUCN area (%)	0.89	6.37

4.5 Surrounding Land Use

The area directly included in the clearing permit application 'Site B – Myrup Road Blackspot' is currently intact and vegetated 40 - 220m wide road, managed by the Shire of Esperance. The current road footprint occupies 17m. The surrounding land use is mainly agricultural with a neighbouring quarry. The area is within rural zoning.

The closest conservation reserve to the site was Reserve 15231 (Woody Lake Nature Reserve), This reserve makes up part of the "Lake Warden" Ramsar site and was 1.75km form the project area. Several other conservation vested reserves were within 5km of the site:

- Mullet Lake Nature Reserve (Lake Warden Ramsar site) – Reserve 23825 – 3.76 km away.
- Shark Lake Nature Reserve – Reserve 31197 – 4.06 km away.
- Lake Warden Nature Reserve (Lake Warden Ramsar site) - Reserve 32257 - 4.91 km away.

4.6 Potential Threatened and Priority Flora

One species of threatened flora (TF) and 48 priority flora (PF) were recorded within a 20 km radius of the proposed impact site (Appendix 2). Of these, no TF species and 16 PF species had suitable known associated habitat that corresponded with vegetation communities and soil type of 'Site B – Myrup Road Blackspot' 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 B – Myrup Road Blackspot' project area. The EPBC listed 'Subtropical and Temperate Coastal Saltmarsh' Priority Ecological Community (PEC) was identified by the desktop study as being 6.7km from 'Site B – Myrup Road Blackspot'.

4.8 Potential Threatened and Priority Fauna

47 conservation listed fauna were listed within a 20 km radius of the proposed impact site (Appendix 3), an additional 29 species were listed as 'may occur' by the EPBC Protected matters tool. Of these, 24 species were listed as migratory.

4.9 *Phytophthora* Dieback

Dieback Information Delivery and Management System (DIDMS; GAIA Resources, SCNRM & State NRM 2022) data shows positive *Phytophthora cinnamomi* Dieback sample 30 metres away from the clearing footprint. Numerous other positive *Phytophthora cinnamomi* samples are present within the general area.

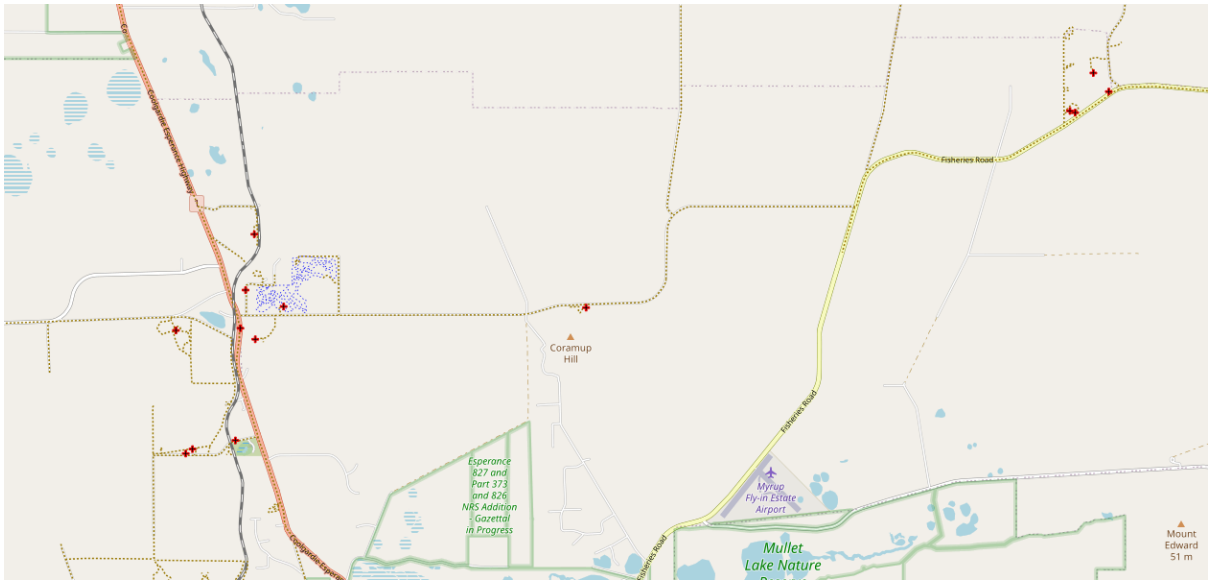

Figure 2. Map of *Phytophthora cinnamomi* disease points. Disease points in red. (DIDMS; GAIA Resources, SCNRM & State NRM 2022).

5 FIELD SURVEY RESULTS AND DISCUSSION

5.1 Flora

A total of 155 vascular plant taxa from 115 plant genera and 43 plant families were recorded within the Myrup Road Blackspot survey area during the 2022 survey. The majority of taxa was recorded within the Myrtaceae (25 taxa), Poaceae (15 taxa), Fabaceae (15 taxa), and Proteaceae (11 taxa) families (Appendix 1). This total included 100 native species and 55 introduced (weed) species.

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:

- Some of the invasive grasses and herbs were not identified down to species level due to time constraints and lack of reproductive material, for example, *Brassica sp., Trifolium sp., Lolium sp.*

5.2 Threatened and Priority Flora

No Threatened Flora species or Priority Flora species were identified during the flora survey.

5.3 Weeds

There was significant weed invasion across the site with *Leptospermum laevigatum* being the most serious weed, having formed dense thickets throughout large sections of the road reserve, this is a priority environmental weed in the Shire of Esperance's Environmental Weed Strategy 2009-2018.

Other priority environmental weeds at the site include *Acacia pycnantha* and *Acacia dealbata. Asparagus asparagoides* a Weed of National Significance (WONS) was also present. Freesia's (*Freesia X alba*) were also present. Agricultural weeds such as *Lupinus cosentinii, Brassica sp., Briza maxima, Briza minor, Lolium sp., Bromus spp*., etc were also a significant problem within the road reserve, with large sections of historically cleared land invaded by these weeds. Overall, 50 invasive

species were identified within the project area (Appendix 1).

Weed specimen's that resulted in a range extension were sent to the WAH. Four species were collected that resulted in range extensions, these include:

- *Acacia iteaphylla* (Accession #9857; KSW19622, Specimen retained). Specimen was new to the Shire of Esperance & Esperance Plains IBRA region and a 395km eastern range extension.
- *Lupinus cosentinii* (Accession #9841; KSW16022, Specimen retained). Specimen was new to the Shire of Esperance & Recherche IBRA subregion and a 255km eastern range extension.
- *Aizoon pubescens (*Accession #10048; KSW22422, Specimen retained). Specimen was new to the Shire of Esperance & Esperance Plains IBRA region and a 395km Eastern range extension.
- *Dischisma sp.* (Accession #10048; KSW22522, Specimen retained). This specimen did not match either of the Dischisma that are known to be naturalized in Western Australia, potentially a new introduction.

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.

Six non-native species had been planted in the road reserve by neighboring landowners, though these do not appear to have naturalized, these include *Callistemon phoeniceus* and *Melaleuca nesophila.*

5.4 Dieback

Large sections of the site were missing proteaceous species and confirmed *Phytophthora cinnamomi* samples were found along Myrup road just outside of the project area. Sections of the road reserve still have proteaceous species constituting a major vegetative component and would be highly susceptible to further spread of dieback.

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 and again after leaving the site.

5.7 Vegetation Communities

Four vegetation communities were identified within the 'Site B – Myrup Road Blackspot', as defined by structure and composition (Table 4). It is believed that the Beard (1973) vegetation associations identified in Section 4.4 are an appropriate match for two of the vegetation types observed. The other two vegetation types were too heavily modified to be assigned an appropriate Beard vegetation association.

Table 3. Vegetation communities identified within proposed 'Site B – Myrup Road Blackspot' project area.

Type	Description	Figure	Closest Matching Beard Vegetation Association	Area (ha)
A	Shrubland – Vegetation structure lost	4	N/A – Heavily modified vegetation type	0.206
B	Scattered *Nuytsia* over mixed shrubland with *Lambertia inermis, Eucalyptus pleurocarpa, Acacia cyclops, Adenanthos cuneatus*	5	Esperance_6048	0.065
C	Introduced *Eucalyptus* over *Acacia pycnantha* with some remnant vegetation	6	N/A – Heavily modified vegetation type	0.058
D	*Eucalyptus occidentalis* over *Melaleuca cuticularis* and *Callitris drummondii* with *Gahnia* and *Taxandria callistachys*	7	Esperance_931	0.054

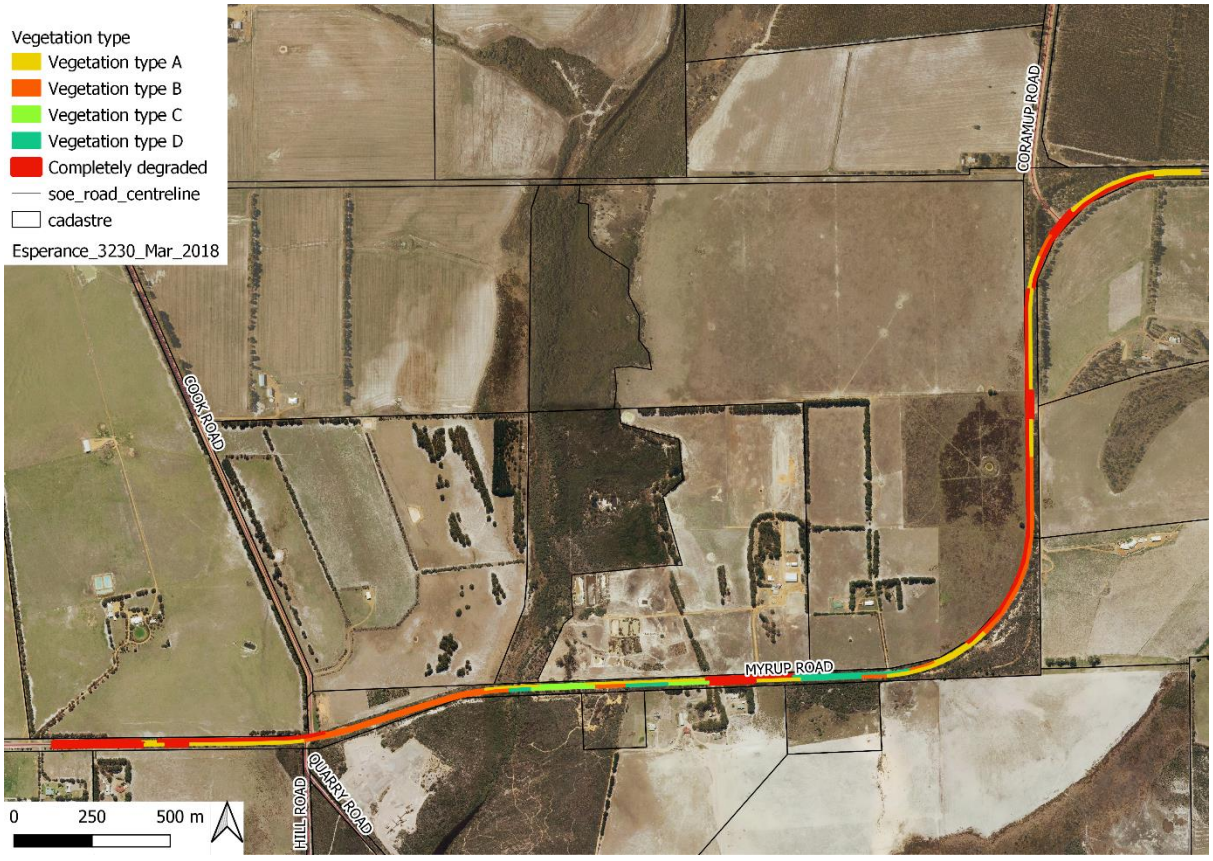

Figure 3. Vegetation types within 'Site B – Myrup Road Blackspot'.

Figure 4. Vegetation type A identified in 'Site B – Myrup Road Blackspot' project, described as 'Shrubland – Vegetation structure lost'.

Figure 5. Vegetation type B identified in 'Site B – Myrup Road Blackspot' project, described as 'Scattered *Nuytsia* over mixed shrubland with *Lambertia inermis, Eucalyptus pleurocarpa, Acacia cyclops, Adenanthos cuneatus'.*

Figure 6. Vegetation type C identified in 'Site B – Myrup Road Blackspot' project, described as 'Introduced *Eucalyptus* over *Acacia pycnantha* with some remnant vegetation'.

Figure 7. Vegetation type D identified in 'Site B – Myrup Road Blackspot' project, described as '*Eucalyptus occidentalis* over *Melaleuca cuticularis* and *Callitris drummondii* with *Gahnia and Taxandria callistachys'*.

Figure 8. Completely degraded vegetation in 'Site B – Myrup Road Blackspot' project.

5.8 Vegetation Condition

Vegetation condition varied from very good to completely degraded (Table 4). The site had experienced historical clearing for fence lines and crossovers, weed invasion from neighbouring agricultural and rural residential properties, Phytophthora dieback infection, verge mowing and planting of non-native plants. Vegetation structure had been severely impacted within large sections of the site.

Several areas were in a very good condition, these areas bordered remnant vegetation and had experienced less disturbance from neighbouring landowners.

Table 4. Quantifying vegetation to be cleared by vegetation type and condition.

Vegetation Type	Excellent	Very Good	Good	Degraded	Completely Degraded	Total Area (ha)
A	-	0.012	-	0.194	-	**0.206**
B	-	0.013	0.042	0.010	-	**0.065**
C	-	-	0.046	0.012	-	**0.058**
D	-	0.047	0.007	-	-	**0.054**
Completely degraded	-	-	-	-	0.288	**0.288**
Total Area (ha)	**-**	**0.072**	**0.095**	**0.216**	**0.288**	**0.671**

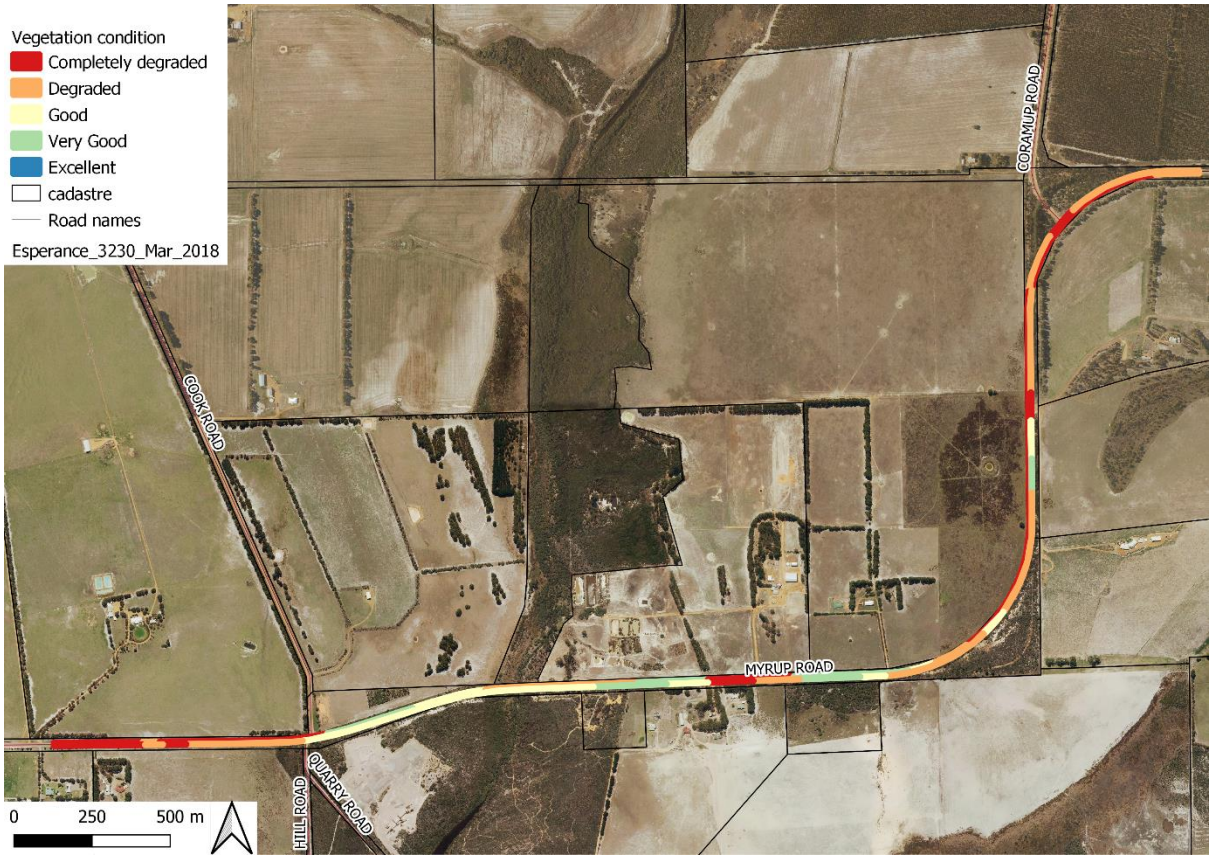

Figure 9. Vegetation condition across 'Site B –Myrup Road Blackspot' project, ranging from a very good condition to a completely degraded condition.

5.9 Threatened Ecological Communities

One vegetation community, described as 'Scattered *Nuytsia* over mixed shrubland with *Lambertia inermis, Eucalyptus pleurocarpa, Acacia cyclops, Adenanthos cuneatus*' met criteria to be considered as the Threatened Ecological Community (TEC) 'Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia (Kwongkan)'. However, due to degrading factors, only areas within these vegetation communities in good condition or better were considered as Kwongkan TEC (Figure 10). In total, 0.051 ha of vegetation was considered as Kwongkan TEC within 'Site B – Myrup Road Blackspot' area.

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 Priority Ecological Community (PEC) (DBCA 2018). Vegetation type D, described as '*Eucalyptus occidentalis* over *Melaleuca cuticularis* and *Callitris drummondii* with *Gahnia* and *Taxandria callistachys*'. This vegetation type was assessed against the original description given during the nomination of the Swamp Yate PEC (Table 5), one occurrence was consistent with the PEC description A total of 0.033ha of clearing will occur within this vegetation type.

Table 5. Comparison between potential occurrences 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 types D 'Site B – Myrup Road Blackspot'

Swamp Yate (*Eucalyptus occidentalis*) woodlands in seasonally inundated clay basins with intact understorey and fringing vegetation	**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**
Vegetation type D: Occurrence 1 (SLK 5.48-5.55 south)	i) Occurs on valley floor ii) Occurrence surrounds a creek line rather than basin iii) Occurrence is seasonally inundated	Occurrence Is not dominated by *Eucalyptus occidentalis*. Melaleuca cuticularis was dominant tree within occurrence.	Dense sedge layer dominated by *Gahnia spp*.	Taxandria callistachys was present within vegetation type.	No 0.007
Vegetation type D: Occurrence 2 (SLK 5.86-5.99 south) Occurrence was remnant patch which would have been connected to occurrence 1	i)Does not occur on valley floor ii)Occurrence is not in a basin iii)Occurrence is not seasonally inundated	Handful of *Eucalyptus occidentalis* trees were present.	Sedge layer with Restiads was present in occurrence.	Understorey was mixed and were not wetland associated.	No 0.014
Vegetation type D: Occurrence 3 (SLK 6.39-6.76)	i) Does not occur on valley floor ii)Occurs in roughly circular basin ii)Is seasonally inundated	Occurrence was dominated by *Eucalyptus occidentalis* and contained a *Melaleuca cuticularis* dominated understory.	Dense sedge layer was present dominated by *Gahnia spp.*	Taxandria callistachys was present in vegetation type. Callitris drummondii is frequently associated with waterlogged soils.	Yes 0.033

Figure 10. Mapped occurrences of PECs and TECs within 'Site B – Myrup Road Blackspot' project.

5.10 Fauna

Of the species identified within the Desktop survey, only seven have potentially suitable habitat within the proposed clearing permit area.

During the field survey several bird species were observed including *Manorina flavigula* (Yellow Throated Miner), *Grallina cyanoleuca* (Mudlark), *Rhipidura leucophrys* (Willy Wagtail), *Cracticus sp. Tiliqua rugosa* (Bobtail lizard) and snake skins were also observed during the survey.

Rabbit warrens were observed within the site, it is also highly likely that foxes and other invasive fauna are present at the site.

5.10.1 Southern death adder, *Acanthophis antarcticus*, Priority Three

There was an occurrence record of the Quenda was seen 1.34km 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 snake is an ambush predator which hides under leaf litter or burrows in sand while waiting for prey. The site had suitable vegetation with dense shrubland though lacked significant leaf litter. The sandy soil at the site is potentially suitable for burrowing. The site also contained a range of suitable prey items including small birds. No evidence of the species was seen during the survey.

5.10.2 Chuditch, *Dasyurus geoffroii,* VU

The Chuditch was listed in the EPBC protected matters tool, the species was listed 'species or species habitat may occur' in the Species Profile and Threats Database (DCCEEW). The closest occurrence record for this species from the DBCA threatened fauna database was 64km from the project area.

The Chuditch's current habitat is described as mostly in Jarrah (*Eucalyptus marginata*) forests and woodlands, Mallee shrublands and heathlands. Both Vegetation types B and D are potentially suitable habitat for the species. Vegetation between SLK 4.72 and 5.86 borders large sections of intact bushland and Cowaramup Creek, these sections of bushland would be the most likely to be utilised by the species, a total of 0.132ha of vegetation will be cleared within this section of road.

A key threat to the survival of the species is predation by feral cats and foxes, both of which are highly likely to occur within Myrup road, decreasing the likelihood that the site will be utilised by this species.

No evidence of the Chuditch was observed during the field survey, however these nocturnal predators would be unlikely to be observed during daylight hours.

5.10.3 Peregrine Falcon, *Falco peregrinus,* OS

Confirmed records of the Peregrine falcon were present 3.66km from the survey site, these records were from 2014. The Peregrine falcon has home ranges of 20-30 square kilometres, making it certain that this species has hunted in the immediate vicinity of 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 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.

The Peregrine Falcon is listed as nesting in recesses of cliff faces, tree hollows or in the large abandoned nests of other birds. The site provides potentially suitable nesting habitat in Vegetation types C and D both of which have Eucalyptus trees suitable for nesting, though no nests were observed within during the survey. Clearing in vegetation types C and D includes a total of 0.112 ha of clearing.

5.10.4 Quenda, *Isoodon fusciventer,* P4

An occurrence record of a Quenda was seen 1.71km from the project area in nearby private property. This occurrence record was from 2010 and was for single animal recorded via remote camera.

The Quenda habitat is described as "Scrubby, often swampy, vegetation with dense cover up to 1 m high, often feeds in adjacent forest and woodland that is burnt on a regular basis and in areas of pasture and cropland lying close to dense cover". Large sections of the project area are suitable for this species with Vegetation types B and D in a very good condition having dense vegetation cover suitable for this species, this equates to 0.06ha of suitable vegetation being cleared. Coramup Creek also intersects the project area, providing excellent habitat connectivity to nearby Nature reserves.

Threats to this species include predation by foxes, feral cats, habitat loss and habitat fragmentation. Clearing of 0.67ha of vegetation will marginally increase habitat fragmentation for this species in the

area. Foxes & feral cats are likely present within the area threatening the species.

5.10.5 Western Brush Wallaby, *Notamacropus irma,* P4

An occurrence record of the Western Brush Wallaby was 10.52km from the project area, however this record was from 1954 and had a listed geographical uncertainty of 50km with the record being derived from historical written sources. No additional records surrounding the Esperance townsite have been recorded. All other Esperance occurrence records for this species are within Cape Arid National Park, Lake Shaster Nature Reserve and R2788 (Moir Rock). Due to being a large mammal this species is unlikely to go unnoticed in rural residential areas of Myrup.

Due to the current occurrence records it is highly unlikely that the Western Brush Wallaby is utilising the site.

The habitat for the species is described as "areas of Mallee and heathland and are uncommon in wet sclerophyll forests. They prefer tall open forests that supply good grazing. They particularly favour open, seasonally damp flat areas with low grasses and open scrubby brushes." Some of Vegetation type B may have been suitable habitat for these species if they occurred within the region.

5.10.6 Dibbler, *Parantechinus apicalis,* EN

The Dibbler was listed in the EPBC protected matters tool, the species was listed as being in the buffer zone for the 'species or species habitat may occur area' in the Species Profile and Threats Database. There was a single record for this species on Gunton island within the Recherche Archipelago Nature Reserve. The single record is the result of a translocation, there is no naturally occurring records of this species within the Shire of Esperance.

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 overall being lower than 1ha the foraging quality scoring tool was not undertaken as it is only suitable for habitat over 1ha (Appendix 11)

Given that the site did not:

- contain any nesting sites or large trees with hollows;
- contain night roosting areas;
- the amount of high-quality foraging habitat was less than 1 ha;

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

Vegetation type B provided potentially suitable foraging habitat for Carnaby's Black Cockatoo due to the presence of large fruited Hakeas and Banksias. There was a total of 0.064 hectares of Vegetation type B in good or better condition being cleared that could be suitable foraging grounds for Carnaby's Black Cockatoo.

6 REVIEW OF 10 CLEARING PRINCIPLES FOR NATIVE VEGETATION

The 'Site B – Myrup Road Blackspot' project may be at 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.

Biodiversity at this site is high with 100 native species recorded over 4 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.

Several conservation listed fauna had potential to lose habitat due to this project. Particularly Carnaby's Black Cockatoo, Quenda and the Peregrine Falcon.

The vegetation contains foraging habitat for Carnaby's Black Cockatoo due to the presence of vegetation high in Proteaceous species, a total of 0.064 ha of suitable foraging ground is likely to be cleared.

The Quenda had confirmed records 1.71km from the project area and was highly likely to inhabit the immediate vicinity of the site. 0.06ha of particularly suitable vegetation is being cleared.

The Peregrine Falcon had confirmed records 3.4km from the site and the entire site could be potential hunting grounds for the bird. A total of 0.112 ha of potential nesting grounds may be cleared.

The Chuditch was on the EPBC protected matters tool desktop fauna list, however the closest known record was 64km away from the project area. The site had potentially suitable habitat for the species totalling 0.132ha of potentially suitable habitat.

The Western Brush Wallaby, had a geographically inaccurate historical record 10km from the survey site, all other Esperance records were in Lake Shaster Nature Reserve or Cape Arid National park.

The Dibbler was on the EPBC protected matters tool desktop fauna list, however the only record within Esperance was a translocation within the Recherche Archipelago Nature Reserve.

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

No threatened or priority species were recorded during the survey.

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.

0.54 hectares of vegetation to be cleared met the definition of Kwongkan TEC, other areas within the site failed to meet the definition of Kwongkan TEC.

0.033 ha of vegetation was consistent with the 'Swamp Yate, Eucalyptus occidentalis, woodlands in seasonally inundated clay basins in the South Coast of Western Australia' PEC.

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.

The immediate surroundings of the site were highly cleared agricultural land, with the intact vegetation within the site likely playing contributing to ecological linkages in the area. Given the small extent of clearing only minor reductions in ecological connectivity will result from the project.

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.

Vegetation type D was growing in association with Coramup creek and several winter wet areas. A total of 0.054ha of vegetation within vegetation type D is likely to be cleared. An additional 0.003ha of the degraded vegetation type A was also growing in association with Coramup Creek.

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

Vegetation within this area will be providing limited function as windbreaks and erosion control for the agricultural areas surrounding it, clearing of 0.67ha of vegetation will potentially have a minor impact on wind erosion surrounding the project.

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.

The closest conservation reserve to the site was Reserve 15231, Woody Lake Nature Reserve, which is part of the Lake Warden Ramsar site. This was 1.75km form the project area. Several other conservation vested reserves were within 5km of the site:

- Mullet Lake Nature Reserve – Reserve 23825 – (Lake Warden Ramsar site) 3.76 km away.
- Shark Lake Nature Reserve – Reserve 31197 – 4.06 km away.
- Lake Warden Nature Reserve - Reserve 32257 - (Lake Warden Ramsar site) 4.91 km away.

Coramup Creek feeds directly into the Lake Warden wetland system and is likely an important ecological connection to the Ramsar site. There is minimal clearing surrounding the creekline, with a total of 208 square metres of vegetation is being cleared within 50 metres of Coramup creek.

Clearing of the rest of vegetation is unlikely to have any significant impacts on the ecological 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.

Given the small amount of clearing there is unlikely to be any significant impact quality of surface or groundwater.

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.

Given the small amount of clearing there is unlikely to be any significant impact to the incidence or intensity of flooding.

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 and at the completion of the project so as not to transfer dieback from this site to other sites.
- Works to be carried out in the dry(summer) months to minimise spread of dieback
- Follow up spraying of emergent roadside weeds.

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 as a botanist 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	Two years' experience as a Botanist in the region (as of April 2023)
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 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

9 REFERENCES

Atlas of Living Australia database < s >

Adams E. (2012), *Shire of Esperance Threatened and Priority Flora: Field guide,* unpublished for the Department of Environment and Conservation

Beard J.S. (1973), *The vegetation of the Esperance and Malcom areas, Western Australia, 1:250 000 series*, Vegmap Publications Perth

Biosecurity and Agriculture Management Regulations 2013, <https://www.legislation.wa.gov.au/legislation/statutes.nsf/main_mrtitle_13043_homepage.html>

Bureau of Meteorology 2022, *Climate statistics for Australian sites*.http://www.bom.gov.au/climate/averages/tables/ca_wa_names.shtml

Commonwealth of Australia (2014), *Approved Conservation Advice for Proteaceae Dominated Kwongkan Shrublands of the southeast coastal floristic province of Western Australia*, Department of Agriculture, Water and the Environment, http://www.environment.gov.au/biodiversity/threatened/communities/pubs/126-conservation-advice.pdf>

Commonwealth of Australia, *Environmental Protection and Biodiversity Conservation Act 1999* (Cth), <https://www.legislation.gov.au/Details/C2022C00214>

Department of Agriculture, Water and the Environment (2022) *Referral guideline for 3 WA threatened black cockatoo species, Carnaby's Cockatoo (Zanda latirostris), Baudin's Cockatoo (Zanda baudinii) and the Forest Red-tailed Black-cockatoo (Calyptorhynchus banksii naso)* <https://www.dcceew.gov.au/sites/default/files/documents/referral-guideline-3-wa-threatened-black-cockatoo-species-2022.pdf>

Department of Biodiversity, Conservation and Attractions (2018) *List of Threatened Ecological Communities Endorsed by the Western Australian Minister for Environment* <https://www.dpaw.wa.gov.au/images/plants-animals/threatened-species/threatened_ecological_communities_endorsed_by_the_minister_for_the_environment_june_2018.pdf>

Department of Biodiversity, Conservation and Attractions 2020, *Conservation codes for Western Australian flora and fauna*, Government of Western Australia. <https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities>

Department of Biodiversity, Conservation and Attractions (2021), *Threatened Ecological Communities and Priority Ecological Communities Search Results, for Boundaries and Buffers,15_1121EC,* Government of Western Australia. [11/11/2021].

Department of Biodiversity, Conservation and Attractions (2022a) *Florabase, The Flora of Western Australia Online* (and collections housed at the WA Herbarium).<https://florabase.dpaw.wa.gov.au/search/advanced.>

Department of Biodiversity, Conservation and Attractions (2022b), *Priority Ecological Communities for*

Western Australia Version 33, Government of Western Australia

Department of Biodiversity, Conservation and Attractions (2022c), *Threatened and Priority Flora Database (TPFL) spatial dataset, 45-0522FL,* Government of Western Australia. [26/5/2022]

Department of Biodiversity, Conservation and Attractions (2022d), *Western Australia Herbarium spatial dataset, 45-0522FL,* Government of Western Australia. [26/5/2022]

Department of Biodiversity, Conservation and Attractions (2022e), *Esperance District Threatened and Priority Flora spatial dataset,* Government of Western Australia [01/03/2022]

Department of Biodiversity, Conservation and Attractions (2022f), Threatened and Priority Fauna Database, FAUNA#7454, Government of Western Australia. [26/5/2022]

Department of Biodiversity, Conservation and Attractions (2022g), *Carnaby's Roosting site database*, FAUNA#7454, Government of Western Australia. [26/5/2022]

Department of Climate Change, Energy, the Environment and Water (2022), *EPBC Act Protected Matters Search Tool* <https://www.dcceew.gov.au/environment/epbc/protected-matters-search-tool> [December 2022]

Department of Climate Change, Energy, the Environment and Water (2022), *EPBC Act List of Threatened Ecological Communities*. < https://www.environment.gov.au/cgi-bin/sprat/public/publiclookupcommunities.pl>

Department of Climate Change, Energy, the Environment and Water (2022), *EPBC Act List of threatened fauna*, Commonwealth of Australia. < https://www.environment.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl?wanted=fauna >

Department of Climate Change, Energy, the Environment and Water (2022), *EPBC Act List of Threatened Threatened Flora*. < https://www.environment.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl?wanted=flora>

Department of Climate Change, Energy, the Environment and Water, (2022), *EPBC Act: Protected Matters Search Tool*, Commonwealth of Australia. <https://www.dcceew.gov.au/environment/epbc/protected-matters-search-tool />

Department of Environment and Energy (2017), *Australian Vegetation Attribute Manual Version 7.0* <https://www.dcceew.gov.au/sites/default/files/documents/australian-vegetation-attribute-manual-v70.pdf>

Department of Parks and Wildlife (2018), *2018 Statewide Vegetation Statistics (formerly the CAR Reserve Analysis – Full Report',* Government of Western Australia

Department of Primary Industries and Regional Development 2022, *Western Australian Organism List*. <https://www.agric.wa.gov.au/organisms>

Department of Water and Environmental Regulation (2014) *A guide to the assessment of applications to clear native vegetation, Under Part V Division 2 of the Environmental Protection Act 1986*.

Department of Water and Environmental Regulations (2022), *Procedure: Native vegetation clearing permits*, <https://dwer.wa.gov.au/procedure/native-vegetation-clearing-permit> [December 2022]

Environmental Protection Authority (EPA) (2016), *Technical Guidance, Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia*, Government of Western Australia. <http://www.epa.wa.gov.au/policies-guidance/technical-guidance-flora-and-vegetation-surveys-environmental-impact-assessment>

Environmental Protection Authority 2020, *Technical Guidance – Terrestrial vertebrate fauna surveys for Environmental Impact Assessment*, EPA, Western Australia. <https://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/EPA-Technical-Guidance-Vertebrate-Fauna-Surveys.pdf>

Environmental Protection Authority, (2016*) Environmental Factor Guideline: Flora and Vegetation,* EPA, Western Australia.

Field, C (2009) *Environmental Weed Strategy 2009-2018*, Shire of Esperance

GAIA Resources, State NRM and South Coast Natural Resource Management (2018), *Dieback Information Delivery and Management Service, DIDMS*. < https://didms.gaiaresources.com.au/> [December 2022]

Keighery, B.J. (1994). *Bushland plant survey. A guide to plant community survey for the community*. Wildflower Society of WA (Inc.). Nedlands, Western Australia.

Main Roads of Western Australia (2022), *Standard Line Kilometres online application*, Government of Western Australia. < https://mrapps.mainroads.wa.gov.au/gpsslk>

Schoknecht, N., Tille, P. and Purdie, B. (2004) *Soil Landscape Mapping in south-western Australia*, Resource Management Technical Report 20, Department of Agriculture WA.

Thackway R, Cresswell ID, Shorthouse D, Ferrier S, Hagar T, Pressey T, Wilson P, Fleming M, Howe D, Morgon G, Young P, Copley P, Peters D, Wells P, Miles I, Parkes D, McKenzie N, Thackway R, Kitchin M & Bullen F (1995), *Interim Biodigeographic Regionalisation for Australia: A framework for setting priorities in the National Reserves System Cooperative Program, Australia Nature Conservation Agency*. < https://www.environment.gov.au/system/files/resources/4263c26f-f2a7-4a07-9a29-b1a81ac85acc/files/ibra-framework-setting-priorities-nrs-cooperative-program.pdf >

Western Australian Government, Biosecurity and Agriculture Management Act 2007, <https://www.legislation.wa.gov.au/legislation/statutes.nsf/main_mrtitle_2736_homepage.html>

Western Australian Government, *Biodiversity Conservation Act 2016* https://www.legislation.wa.gov.au/legislation/statutes.nsf/law_a147120.html

Western Australian Government, *Biodiversity Conservation Act 2016 Biodiversity Conservation (Species) Order 2022*, Government Gazette, WA, 30 September 2022, <https://www.dpaw.wa.gov.au/images/Biodiversity%20Conservation%20Listing%20of%20Native%20Species%20Flora%20Order%202022.pdf>

Western Australian Government, *Biodiversity Conservation Regulations 2018*.

<https://www.legislation.wa.gov.au/legislation/statutes.nsf/law_s50938.html>

Western Australian Government, Landgate, < https://www0.landgate.wa.gov.au/>

Overhue, T.D., Snell, L.J., Johnston, D.A.W. (1993), *Esperance Land Resource Survey, Western Australia*, Department of Agriculture

10 APPENDICES

Appendix 1: Incidental species list

Table 5: Species recorded within 'Site B – Myrup Road Blackspot' project'.

Family	Genus	Species	Weed	Herbarium Reference
Aizoaceae	*Aizoon*	*pubescens*	X	KSW22422 ACC 10048
Aizoaceae	*Carpobrotus*	*virescens*		
Aizoaceae	*Brassica*	*sp.*	X	
Anarthriaceae	*Anarthria*	*scabra*		
Apiaceae	*Trachymene*	*pilosa*		
Asparagaceae	*Asparagus*	*asparagoides*	X	
Asparagaceae	*Laxmannia*	*minor*		
Asparagaceae	*Lomandra*	*hastilis*		
Asphodelaceae	*Chamaescilla*	*corymbosa*	X	
Asphodelaceae	*Tricoryne*	*elatior*		
Asteraceae	*Cotula*	*turbinata*	X	
Asteraceae	*Gamochaeta*	*calviceps*	X	
Asteraceae	*Gamochaeta*	*calviceps*	X	
Asteraceae	*Hypochaeris*	*radiata*	X	
Asteraceae	*Sonchus*	*oleraceus*	X	
Asteraceae	*Ursinia*	*anthemoides*	X	
Asteraceae	*Vellereophyton*	*dealbatum*	X	
Brassicaceae	*Brassica*	*sp.*	X	
Brassicaceae	*Raphanus*	*raphanistrum*	X	
Campanulaceae	*Wahlenbergia*	*capensis*	X	
Caryophyllaceae	*Petrorhagia*	*dubia*	X	
Caryophyllaceae	*Polycarpon*	*tetraphyllum*	X	
Caryophyllaceae	*Silene*	*gallica*	X	
Casuarinaceae	*Allocasuarina*	*humilis*		
Casuarinaceae	*Allocasuarina*	*thyoides*		
Casuarinaceae	*Casuarina*	*obesa*	X	
Centrolepidaceae	*Centrolepis*	*polygyna*		
Crassulaceae	*Crassula*	*exserta*		
Cyperaceae	*Caustis*	*dioica*		
Cyperaceae	*Cyperus*	*tenellus*	X	
Cyperaceae	*Ficinia*	*nodosa*		
Cyperaceae	*Gahnia*	*trifida*		
Cyperaceae	*Lepidosperma*	*gracile*		
Cyperaceae	*Lepidosperma*	*aff. squamata*		
Cyperaceae	*Lyginia*	*imberbis*		

Cyperaceae	*Machaerina*	*juncea*		
Cyperaceae	*Schoenus*	*brevisetis*		
Cyperaceae	*Tricostularia*	*aphylla*		
Cyperaceae	*Tricostularia*	*compressa*		
Dilleniaceae	*Hibbertia*	*racemosa*		
Dilleniaceae	*Hibbertia*	*ulicifolia*		
Dilleniaceae	*Hibbertia*	*verrucosa*		
Droseraceae	*Drosera*	*australis*		
Droseraceae	*Drosera*	*drummondii*		
Droseraceae	*Drosera*	*glanduligera*		
Droseraceae	*Drosera*	*leucoblasta*		
Ericaceae	*Leucopogon*	*assimilis*		
Ericaceae	*Leucopogon*	*carinatus*		
Ericaceae	*Leucopogon*	*obovatus ssp. obovatus*		
Ericaceae	*Lysinema*	*ciliatum*		
Ericaceae	*Styphelia*	*epacridis*		
Ericaceae	*Styphelia*	*sp. Coujinup*		
Fabaceae	*Acacia*	*cochlearis*		
Fabaceae	*Acacia*	*cyclops*		
Fabaceae	*Acacia*	*dealbata*	X	
Fabaceae	*Acacia*	*iteaphylla*	X	KSW19622 ACC9857
Fabaceae	*Acacia*	*maxwellii*		
Fabaceae	*Acacia*	*myrtifolia*		
Fabaceae	*Acacia*	*saligna*		
Fabaceae	*Agonis*	*flexuosa*	X	
Fabaceae	*Aotus*	sp. Esperance		
Fabaceae	*Chamaecytisus*	*palmensis*	X	
Fabaceae	*Jacksonia*	*spinosa*		
Fabaceae	*Lupinus*	*cosentinii*	X	KSW16022 ACC9841
Fabaceae	*Ornithopus*	*sativus*	X	
Fabaceae	*Ornithopus*	*compressus*	X	
Fabaceae	*Trifolium*	sp.	X	
Geraniaceae	*Pelargonium*	*capitatum*	X	
Haemodoraceae	*Conostylis*	*seorsifolia subsp. seorsifolia*		
Haemodoraceae	*Haemodorum*	*spicatum*		
Haloragaceae	*Glischrocaryon*	*angustifolium*		
Hemerocallidaceae	*Agrostocrinum*	*scabrum*		
Hemerocallidaceae	*Dianella*	*revoluta*		
Iridaceae	*Freesia*	*alba X*	X	
Iridaceae	*Patersonia*	*lantana*		
Iridaceae	*Romulea*	*rosea*	X	

Juncaceae	*Juncus*	*capitatus*		
Juncaceae	*Juncus*	*microcephalus*		
Juncaceae	*Juncus*	*pallidus*		
Campanulaceae	*Monopsis*	*debilis*	X	
Loranthaceae	*Nuytsia*	*floribunda*		
Lythraceae	*Lythrum*	*hyssopifolia*	X	
Myrtaceae	*Astartea*	*astarteoides*		
Myrtaceae	*Austrobaeckea*	*fascifolia*		
Myrtaceae	*Callistemon*	*phoeniceus*	Planted	
Myrtaceae	*Calothamnus*	*gracilis*		
Myrtaceae	*Corymbia*	*porrecta*	planted	
Myrtaceae	*Cyathostemon*	*ambiguus*		
Myrtaceae	*Eucalyptus*	*conglobata*		
Myrtaceae	*Eucalyptus*	*forrestiana*	planted	
Myrtaceae	*Eucalyptus*	*incrassata*		
Myrtaceae	*Eucalyptus*	*leptocalyx*		
Myrtaceae	*Eucalyptus*	*micranthera*		
Myrtaceae	*Eucalyptus*	*petiolaris*		
Myrtaceae	*Leptospermum*	*laevigatum*	X	
Myrtaceae	*Leptospermum*	*maxwellii*		
Myrtaceae	*Melaleuca*	*cuticularis*		
Myrtaceae	*Melaleuca*	*lanceolata*		
Myrtaceae	*Melaleuca*	*nesophila*	planted	
Myrtaceae	*Melaleuca*	*striata*		
Myrtaceae	*Melaleuca*	*undulata*		
Myrtaceae	*Metrosideros*	*excelsa*	planted	
Myrtaceae	*Metrosideros*	*polymorpha*	planted	
Myrtaceae	*Micromyrtus*	*elobata*		
Myrtaceae	*Phymatocarpus*	*maxwellii*		
Myrtaceae	*Taxandria*	*spathulata*		
Myrtaceae	*Verticordia*	*vicinella*		
Onagraceae	*Oenothera*	*drummondii*	X	
Onagraceae	*Oenothera*	*stricta*	X	
Orchidaceae	*Disa*	*bracteata*	X	
Orchidaceae	*Microtis*	*media*		
Orchidaceae	*Thelymitra*	*graminea*		
Orobanchaceae	*Orobanche*	*minor*	X	
Pinaceae	*Pinus*	*pinaster*	X	
Poaceae	*Austrostipa*	*scabra*		
Poaceae	*Avelina*	*michelii*		
Poaceae	*Briza*	*maxima*	X	
Poaceae	*Briza*	*minor*	X	
Poaceae	*Bromus*	*diandrus*	X	
Poaceae	*Bromus*	*diandrus*	X	

Poaceae	*Bromus*	*hordeaceus*	X	
Poaceae	*Ehrharta*	*calycina*	X	
Poaceae	*Lolium*	sp.	X	
Poaceae	*Neurachne*	*alopecuroidea*		
Poaceae	*Pennisetum*	*clandestinum*	X	
Poaceae	*Pentameris*	*airoides*		
Poaceae	*Schismus*	*barbatus*	X	
Poaceae	*Vulpia*	*fasciculata*		
Polygalaceae	*Comesperma*	*polygala*		
Proteaceae	*Adenanthos*	*cuneatus*		
Proteaceae	*Banksia*	*nutans*		
Proteaceae	*Banksia*	*speciosa*		
Proteaceae	*Conospermum*	*teretifolium*		
Proteaceae	*Hakea*	*corymbosa*		
Proteaceae	*Hakea*	*sulcata*		
Proteaceae	*Hakea*	*cinerea*		
Proteaceae	*Isopogon*	*polycephalus*		
Proteaceae	*Lambertia*	*inermis*		
Proteaceae	*Synaphea*	*media*		
Proteaceae	*Synaphea*	*petiolaris*		
Restionaceae	*Chordifex*	*crispatus*		
Restionaceae	*Hypolaena*	*humilis*		
Restionaceae	*Loxocarya*	*striata*		
Restionaceae	*Hypolaena*	*exsulca*		
Restionaceae	*Hypolaena*	*fastigiata*		
Rhamnaceae	*Spyridium*	*globulosum*		
Sapindaceae	*Dodonaea*	*caespitosa*		
Sapindaceae	*Dodonaea*	*ceratocarpa*		
Scrophulariaceae	*Dischisma*	*sp.*	X	KSW22522 ACC 10048
Solanaceae	*Solanum*	*nigrum*	X	
Thymelaeaceae	*Pimelea*	*brachyphylla*		
Thymelaeaceae	*Pimelea*	*ferruginea*		
Thymelaeaceae	*Pimelea*	*imbricata var. piligera*		
Xanthorrhoeaceae	*Xanthorrhoea*	*platyphylla*		

Appendix 2: Description of Threatened and Priority Flora Species with the Potential to occur within the Myrup Road Blackspot Survey Area

Table 6. Threatened or priority flora identified by the desktop study to be present within a 20 km radius of 'Site B – Myrup Road Blackspot' project area.

Species	Conservation Status	Associated Habitat	Likely to occur	Distance from site (km)
Beyeria physaphylla	P1	Recently burned areas. Mallee eucalypt woodland in association with: Melaleuca tuberculata var. macrophylla, M. pulchella, Eucalyptus kessellii, E. rigens, E. halophila, Hakea cinerea, and Phymatocarpus maxwellii.	No	16.27
Cyathostemon sp. Esperance (A. Fairall 2431)	P1	Only two records – Salt Lake and sandy gravel.	No	10.68
Darwinia sp. Gibson (R.D. Royce 3569)	P1	Margins of salt lakes and road verges on grey-brown sandy loam and white sand, with M. cuticularis, M. brevifolia, leucopogon and samphire	No	15.32
Eucalyptus foliosa	P1	Small area in Gibson/Scaddan. Grey/white sandy clay flats adjacent to salt lakes	No	8.87
Hibbertia carinata	P1	Well drained gravelly sand, yellow sand with gravel.	No	7.53
Lobelia archeri	P1	Non-calcerous sand hill. After fire. Requires open space		16.61
Schoenus sp. Grey Rhizome (K.L. Wilson 2922)	P1	Sandy clay, sand	Potentially	10.86
Stenanthera lacsilaria	P2	Grey-white fine sand over clay on the margins of salt lakes, associated with Myrtaceous shrubs and halophytes.	No	16.67
Comesperma griffinii	P2	Yellow or grey sand on plains. Scattered across WA. Assoc veg by Verticordia, fabaceae sp.	Potentially	12.15
Goodenia exigua	P2	Bare areas. Plain. Grey clay. Associated species Melaleuca cuticularis, Centrolepis humillima, Baumea juncea, Wilsonia humilis.	No	10.93
Hibbertia turleyana	P2	Sandy soil maybe seasonally inundated in banksia heathland or mallee shrubland (recorded at Helms Arboretum and Gibson, Speddingup East Rd)	Potentially	4.91
Leucopogon corymbiformis	P2	Deep sandy soil. Heath	No	5.53
Myriophyllum muelleri	P2	Aquatic plants. Lagoons.	No	8.61

Paracaleana parvula	P2	Deep white sands in Mallee heath with Banksia media	No	9.26
Patersonia inaequalis	P2	Sandy clay, lateritic or granitic sand. Cape Le Grande, Helms Arboretum.	Potentially	15.81
Tecticornia indefessa	P2	Margin of a salt lake in conservation reserve north of Esperance. White to brown/grey sand near the edge of a salt lake	No	4.32
Adelphacme minima	P3	Open woodland with scattered Nuytsia, Eucalyptus and Banksia. Common sandplain Kwongkan. Banksia speciosa with Anarthria. Well drained pale grey sands	Potentially	10.66
Astartea reticulata	P3	Restricted to damp areas/seasonal wetlands – including road futters	Potentially	16.91
Austrobaeckea uncinella	P3	Yellow or white sand, clay loam. Edges of salt lakes, salt creeks, sandplains.	No	3.94
Austrostipa mundula	P3	Plain, road verge. Grey sand.	Potentially	18.33
Brachyloma mogin	P3	Various soil types including brown sandy loam, grey clayey sand and swamp flats. Mostly recorded outside of Esperance Area.	Potentially	13.85
Comesperma calcicola	P3	Calcareous or semi-saline clay loams, limestone – areas around saline waters	Potentially	3.49
Commersonia rotundifolia	P3	Eucalyptus platypus woodland over Acacia shrubland. Clay Loam Soil. Esperance region specimens are geographically inaccurate.	No	15.32
Dampiera sericantha	P3	Sand sometimes with gravel. Associated with plains.	Potentially	3.67
Dampiera triloba	P3	Michael Hislop has advised that the Esperance records of this species are incorrect.	No	10.41
Daviesia pauciflora	P3	Various habitats including flats. Associated with deep sands, white or grey sand over laterite or limestone.	Potentially	4.80
Eucalyptus famelica	P3	Across coastal and subcoastal Hopetoun and Esperance area. Tolerates saline waterlogged soils in open Mallee community	No	12.50
Eucalyptus semiglobosa	P3	Grows on white sand over laterite, silty sand on edge of granite shelf, and limestone. Recorded on hillslopes, gullies, and cliffs.	No	0.85

Galium leptogonium	P3	Occurs in eastern NSW, eastern and south-central Victoria, central-eastern South Australia, southern Queensland and southern Western Australia. Grows in forest, woodland and grassland, often growing from rock crevices.	Potentially	19.98
Gonocarpus pycnostachyus	P3	Various habitats – disturbed firebreaks, deep sand or clay soils. Wet depressions, granite rocks. Various associated habitat	Potentially	11.24
Hopkinsia adscendens	P3	Sand. Dry or seasonally damp habitats along streams.		10.68
Kunzea salina	P3	White sand over clay at the margins of salt lakes. Typically found at the bottom of sand dune rises gently from lake floor between a community of Tecticornia and Melaleuca /Eucalyptus shrubland.	No	10.57
Lepidium fasciculatum	P3	Open Mallee with mid-dense heath. Undulating sandplains. Wide and scattered distribution. Mostly recorded south	No	10.68
Leucopogon interruptus	P3	Grey sand over granite. Variety of habitats.	Potentially	16.72
Persoonia scabra	P3	White sand or sandy loam, granite or limestone. Shrubland.	Potentially	12.16
Pityrodia chrysocalyx	P3	Salmon Gums/ Grass Patch area. Sandplains with yellow sands. Associated with Eucalyptus Mallee woodlands with Banksia media and Hakea sp.	No	11.15
Pterostylis faceta	P3	Various habitats – Melaleuca Mallee scrubland, Granite, sandy loam	No	12.37
Styphelia rotundifolia	P3	Mallee or Heath. Wide variety of habitats. Often associated with gravel.	Potentially	11.05
Banksia prolata subsp. calcicola	P4	Limestone directly on the coast	No	10.68
Caladenia arrecta	P4	Grows on loam, gravel, and laterite. Associated with moist conditions.	No	15.32
Eucalyptus dolichorhyncha	P4	Small areas south of Salmon gums flats or slightly rising ground with whitish to yellowish sandy clay soil	No	15.32
Eucalyptus preissiana subsp. lobata	P4	Coastal limestone rises and sand dunes	No	9.88
Eucalyptus x missilis	P4	Associated with sand over limestone or granite. Recorded on coastal sites.	No	11.14
Frankenia glomerata	P4	Incorrect GPS location for record. Salt lakes.	No	10.72

Grevillea baxteri	P4	Prefers shrubby heathland with an acid sandy soil usually overlaying heavier soils. Associated with highly diverse Proteaceous shrublands.	No	7.74
Kennedia beckxiana	P4	Grows in association with granite boulders and granitic gravel.	No	18.89
Anigozanthos bicolor subsp. minor	T	Moist sandy soil in heath communities. Has been found in shallow soils near granite outcrops.	no	16.85

Appendix 3: Description of Threatened and Priority Fauna Species with the Potential to occur within the Myrup Road Blackspot Survey Area

Threatened or priority Fauna identified by the desktop study to be present within a 20 km radius of 'Site B – Myrup Road Blackspot' project area using the DBCA Threatened and Priority Fauna dataset (DBCA, 2022f) and using the EPBC Act Protected Matters Report.
Nt. Acronyms used in the table include critically endangered (CR) and endangered (EN), Vulnerable (VU), other specially protected (OS), Priority (P), Migratory (MI).

Scientific Name	Common Name	WA cons. status	EPBC status	Dist (km)	EPBC protected matters tool	Habitat	Likely to occur
Acanthophis antarcticus	Southern Death Adder	P3		11.34		Forests and woodlands, grasslands and heath	Yes
Actitis hypoleucos	Common Sandpiper	MI	MI	1.79		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	8.04		Mostly occur over inland plains but sometimes above foothills or in coastal areas. Also 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.	No
Arctocephalus forsteri	New Zealand Fur-seal, Long-nosed Fur-seal	OS		11.35		Marine	No
Ardenna carneipes	Flesh-footed Shearwater	VU	MI	1.79		Marine and occasionally inshore waters	No
Ardenna tenuirostris	Short-tailed shearwater	MI	MI	16.55		Marine	No
Arenaria interpres	Ruddy turnstone	MI	MI	9.26		Coastal regions with exposed rock coast lines or coral reefs. They also lives near platforms and shelves, often with shallow tidal pools and rocky,	No

						shingle or gravel beaches	
Balaenoptera borealis	Sei Whale	EN	MI		X	Marine	No
Balaenoptera musculus	Blue Whale	EN	EN		X	Marine	No
Balaenoptera physalus	Fin Whale	EN	VU		X	Marine	No
Botaurus poiciloptilus	Australasian Bittern	EN	EN		X	Shallow vegetated freshwater or brackish swamps	No
Calidris acuminata	Sharp-tailed sandpiper	MI	MI	1.79		Grassy edges of shallow inland freshwater wetlands. They are also found around sewage farms, flooded fields, mudflats, mangroves, rocky shores and beaches.	No
Calidris alba	sanderling	MI	MI	1.79		Forages at sandy beaches at the edge of the waves, on sandbars and spits. They roost on bare sand in the dunes or behind piles of kelp.	No
Calidris canutus	Red Knot	EN	EN	7.16	X	On the coast in sandy estuaries with tidal mudflats.	No
Calidris ferruginea	Curlew Sandpiper	CR	MI	1.79	X	Intertidal mudflats of estuaries, lagoons, mangroves, as well as beaches, rocky shores and around lakes, dams and floodwaters.	No
Calidris melanotos	Pectoral Sandpiper	MI	MI	4.78		Coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire.	No
Calidris ruficollis	Red-necked stint	MI	MI	1.79		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.	No
Calidris tenuirostris	Great knot	CR	MI	9.26	X	Intertidal mudflats and sandflats in sheltered coasts, including bays harbours and estuaries	No
Calyptorhynchus latirostris	Carnaby's cockatoo	EN	EN	1.39	X	Kwongkan shrub or heathland. Presence of Hakea, Banksia and Pine species indicate potential feeding	Potentially

						habitat.	
Carcharias taurus (west coast population)	Grey Nurse Shark (west coast population)	VU	VU		X	Marine	No
Carcharodon carcharias	White Shark, Great White Shark	VU	VU		X	Marine	No
Caretta caretta	Loggerhead Turtle	EN	EN		X	Marine	No
Cereopsis novaehollandiae grisea	Cape Barren Goose, Recherche Cape Barren goose	VU	VU	1.79	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.	No
Charadrius bicinctus	Double-banded Plover	MI	MI	13.89		Littoral, estuarine and fresh or saline terrestrial wetlands and also saltmarsh, grasslands and pasture	No
Charadrius leschenaultii	Greater sand plover, large sand plover	VU	MI	5.29	X	Intertidal flats of sheltered embayments, lagoons or estuaries.	No
Charadrius mongolus	Lesser Sand Plover	EN	MI	13.89		Intertidal sandflats and mudflats in estuaries or beaches, or in shallow ponds in saltworks	No
Chelonia mydas	Green Turtle	VU	VU		X	Marine	No
Dasyurus geoffroii	Chuditch, Western Quoll	VU	VU		X	Open forest, low open forest, woodland, and open shrub	Potentially
Dermochelys coriacea	Leatherback Turtle	VU	EN	7.31	X	Marine	No
Diomedea antipodensis	Antipodean Albatross	EN	VU			Marine	No
Diomedea dabbenena	Tristan Albatross	CR	EN			Marine	No
Diomedea epomophora	Southern Royal Albatross	VU	VU			Marine	No
Diomedea exulans	Wandering Albatross	VU	VU	14.39	X	Marine	No
Diomedea sanfordi	Northern Royal Albatross	EN	EN		X	Marine	No
Elanus scriptus	Letter-winged kite	P4		1.79		Arid and semi-arid open, shrubby or grassy country	No

Eubalaena australis	southern right whale	VU	EN	9.43	X	Marine	No
Falco hypoleucos	Grey Falcon	VU	VU		X	Arid and semi-arid zones where rainfall is less than 500mm. Timbered lowland plains, particularly acacia shrublands that are crossed by tree-lined water courses	No
Falco peregrinus	Peregrine falcon	OS		3.66		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	Potentially
Galeorhinus galeus	School Shark		Conse rvation Depen dent		X	Marine	No
Halobaena caerulea	Blue Petrel		VU		X	Marine	No
Hydroprogne caspia	Caspian Tern	MI	MI	1.79		Usually forages in open wetlands, including lakes and rivers.	No
Isoodon fusciventer	Quenda	P4		1.71		Scrubby, often swampy, vegetation with dense cover up to 1 m high, often feeds in adjacent forest and woodland that is burnt on a regular basis and in areas of pasture and cropland lying close to dense cover	Potentially
Leipoa ocellata	Malleefowl	VU	VU	5.60	X	Semi-arid shrub lands and low woodlands dominated by mallee and/or acacia.	No
Limosa lapponica	Bar-tailed Godwit	MI	MI	1.79	X	Coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays	No
Macronectes giganteus	Southern Giant-Petrel	MI	EN		X	Marine	No
Macronectes halli	Northern Giant Petrel		VU		X	Marine	No
Neophoca cinerea	Australian Sea-lion	EN	EN	9.54	X	Marine	No
Notamacropus irma	Western Brush Wallaby	P4		10.52		Found in some areas of Mallee and heathland and	Potentially

						are uncommon in wet sclerophyll forests. They prefer tall open forests that supply good grazing. They particularly favour open, seasonally damp flat areas with low grasses and open scrubby brushes.	
Numenius madagascariensis	Eastern Curlew, Far Eastern Curlew	MI	CR		X	Marshy and swampy wetlands and lakeshores.	No
Numenius phaeopus	Whimbrel	MI	MI	16.55		Found mainly on the coast, on tidal and estuarine mudflats, especially near mangroves.	No
Oceanites oceanicus	Wilson's storm-petrel	MI	MI	16.55		Marine	No
Oxyura australis	Blue-billed duck	P4		1.79		Prefers freshwater swamps, with dense vegetation including Typha; although it has appeared in lignum swamps in more coastal areas	No
Pachyptila turtur subantarctica	Fairy Prion (southern)		VU		X	Marine	No
Parantechinus apicalis	Dibbler	EN	EN		X	Dibblers seem to prefer vegetation with a dense canopy greater than 1 m high which has been unburnt for at least 10 years or more. In some locations, the presence of Proteaceous and Myrtaceous flowering shrubs may also be important.	Potentially
Plegadis falcinellus	Glossy Ibis	MI	MI	4.44		Fresh water marshes at the edges of lakes and rivers, lagoons, flood-plains, wet meadows, swamps, reservoirs, sewage ponds, rice-fields and cultivated areas under irrigation	No
Pluvialis fulva	Pacific Golden Plover	MI	MI	13.89		Beaches, mudflats and sandflats and in sheltered areas including harbours, estuaries and lagoons.	No
Pluvialis squatarola	Grey Plover	MI	MI	4.87		Inhabit sheltered embayment's, 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.	No
Pterodroma mollis	Soft-plumaged Petrel		VU			Marine	No

Puffinus huttoni	Hutton's Shearwater	EN		16.55		Marine	No
Rhincodon typus	Whale Shark	MI	VU			Marine	No
Stercorarius antarcticus lonnbergi	Brown Skua, Subantarctic skua	P4		9.54		Marine	No
Sternula nereis nereis	Australian Fairy Tern	VU	VU			Nests on sheltered sandy beaches, spits and banks above the high tide line and below vegetation. The subspecies has been found in embayments of a variety of habitats including offshore, estuarine or lacustrine (lake) islands, wetlands and mainland coastline. The bird roosts on beaches at night.	No
Thalassarche carteri	Indian Yellow-nosed Albatross	EN	VU			Marine	No
Thalassarche cauta cauta	Shy albatross	VU	MI	16.55	X	Marine	No
Thalassarche chlororhynchos	Atlantic yellow-nosed albatross	MI	MI	7.94		Marine	No
Thalassarche impavida	Campbell Albatross, Campbell Black-browed Albatross	VU	VU		X	Marine	No
Thalassarche melanophris	Black-browed Albatross	EN	VU		X	Marine	No
Thalassarche steadi	White-capped Albatross		VU		X	Marine	No
Thalasseus bergii	Crested Tern	P4	MI	1.79		Marine	No
Thinornis rubricollis	Hooded Plover, Hooded Dotterel	MI and P4		1.79		Inhabits ocean beaches and the edges of near-coastal and inland salt-lakes.	No
Thunnus maccoyii	Southern Bluefin Tuna		Conse rvation depen dent		X	Marine	No
Tringa brevipes	Grey-tailed Tattler	MI	MI	7.16		Common in large tidal flat systems.	No
Tringa glareola	Wood Sandpiper	MI	MI	4.78		Inland shallow freshwater wetlands	No

Tringa nebularia	Common Greenshank	MI	MI	1.79		Coastal and inland, in estuaries and mudflats, mangrove swamps and lagoons, and in billabongs, swamps, sewage farms and flooded crops.	No
Tringa stagnatilis	Marsh Sandpiper	VU	MI	5.44		Commonly seen singly, or in small to large flocks in fresh or brackish (slightly salty) wetlands.	No
Westralunio carteri	Carter's Freshwater Mussel	VU	VU	9.54		Found in slower flowing fresh water where sediments are stable and soft enough to allow the species to burrow	No

Appendix 4: 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

OS - Species otherwise in need of special protection (other specially protected)	Species otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act). Currently only fauna are listed as species otherwise in need of special protection.

Appendix 5: 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 6: 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 7: 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 8: 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 9: 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 10: 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 11: 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 12: EPBC Act Protected Matters Report

Listed Threatened Ecological Communities

				Presence
Community Name	**Threatened Category**	**Rank**	**Text**	**Buffer Status**
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	Class	Simple Presence	Presence Text	Threatened Category	Migratory Status
Thunnus maccoyii	Southern Bluefin Tuna	Fish	Likely	Species or species habitat likely to occur within area	Conservation Dependent	
Galeorhinus galeus	School Shark, Eastern School Shark, Snapper Shark, Tope, Soupfin Shark	Shark	May	Species or species habitat may occur within area	Conservation Dependent	
Numenius madagascariensis	Eastern Curlew, Far Eastern Curlew	Bird	Likely	Species or species habitat likely to occur within area	Critically Endangered	Migratory
Limosa lapponica menzbieri	Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit	Bird	Known	Species or species habitat known to occur within area	Critically Endangered	
Calidris tenuirostris	Great Knot	Bird	Known	Roosting known to occur within area	Critically Endangered	Migratory
Calidris ferruginea	Curlew Sandpiper	Bird	Known	Species or species habitat known to occur within area	Critically Endangered	Migratory
Balaenoptera musculus	Blue Whale	Mammal	May	Species or species habitat may occur within area	Endangered	Migratory
Diomedea dabbenena	Tristan Albatross	Bird	May	Species or species habitat may occur within area	Endangered	Migratory
Parantechinus apicalis	Dibbler	Mammal	Likely	Species or species habitat likely to occur within area	Endangered	
Neophoca cinerea	Australian Sea-lion, Australian Sea Lion	Mammal	Likely	Species or species habitat likely to occur within area	Endangered	
Macronectes giganteus	Southern Giant-Petrel, Southern Giant Petrel	Bird	May	Species or species habitat may occur within area	Endangered	Migratory

Eucalyptus insularis	Twin Peak Island Mallee	Plant	Likely	Species or species habitat likely to occur within area	Endangered	
Anigozanthos bicolor subsp. minor	Little Kangaroo Paw, Two-coloured Kangaroo Paw, Small Two-colour Kangaroo Paw	Plant	Known	Species or species habitat known to occur within area	Endangered	
Lambertia echinata subsp. echinata	Prickly Honeysuckle	Plant	Likely	Species or species habitat likely to occur within area	Endangered	
Ricinocarpos trichophorus	Barrens Wedding Bush	Plant	May	Species or species habitat may occur within area	Endangered	
Thalassarche cauta	Shy Albatross	Bird	Likely	Foraging, feeding or related behaviour likely to occur within area	Endangered	Migratory
Caretta caretta	Loggerhead Turtle	Reptile	Likely	Breeding likely to occur within area	Endangered	Migratory
Dermochelys coriacea	Leatherback Turtle, Leathery Turtle, Luth	Reptile	Likely	Breeding likely to occur within area	Endangered	Migratory
Eubalaena australis	Southern Right Whale	Mammal	Known	Breeding known to occur within area	Endangered	Migratory (as Balaena glacialis australis)
Calidris canutus	Red Knot, Knot	Bird	May	Species or species habitat may occur within area	Endangered	Migratory
Diomedea sanfordi	Northern Royal Albatross	Bird	May	Species or species habitat may occur within area	Endangered	Migratory
Botaurus poiciloptilus	Australasian Bittern	Bird	Likely	Species or species habitat likely to occur within area	Endangered	
Zanda latirostris	Carnaby's Black Cockatoo, Short-billed Black-cockatoo	Bird	Known	Breeding known to occur within area	Endangered (listed as Calyptorhynchus latirostris)	
Balaenoptera borealis	Sei Whale	Mammal	May	Species or species habitat may occur within area	Vulnerable	Migratory
Pachyptila turtur subantarctica	Fairy Prion (southern)	Bird	May	Species or species habitat may occur within area	Vulnerable	
Balaenoptera physalus	Fin Whale	Mammal	May	Species or species habitat may occur within area	Vulnerable	Migratory

Cereopsis novaehollandiae grisea	Cape Barren Goose (south-western), Recherche Cape Barren Goose	Bird	Known	Breeding known to occur within area	Vulnerable	
Thalassarche melanophris	Black-browed Albatross	Bird	Likely	Foraging, feeding or related behaviour likely to occur within area	Vulnerable	Migratory
Carcharodon carcharias	White Shark, Great White Shark	Shark	Known	Foraging, feeding or related behaviour known to occur within area	Vulnerable	Migratory
Macronectes halli	Northern Giant Petrel	Bird	Likely	Foraging, feeding or related behaviour likely to occur within area	Vulnerable	Migratory
Leipoa ocellata	Malleefowl	Bird	Likely	Species or species habitat likely to occur within area	Vulnerable	
Falco hypoleucos	Grey Falcon	Bird	Likely	Species or species habitat likely to occur within area	Vulnerable	
Thalassarche steadi	White-capped Albatross	Bird	May	Species or species habitat may occur within area	Vulnerable	Migratory
Thalassarche carteri	Indian Yellow-nosed Albatross	Bird	Likely	Species or species habitat likely to occur within area	Vulnerable	Migratory
Halobaena caerulea	Blue Petrel	Bird	May	Species or species habitat may occur within area	Vulnerable	
Chelonia mydas	Green Turtle	Reptile	May	Species or species habitat may occur within area	Vulnerable	Migratory
Charadrius leschenaultii	Greater Sand Plover, Large Sand Plover	Bird	May	Species or species habitat may occur within area	Vulnerable	Migratory
Carcharias taurus (west coast population)	Grey Nurse Shark (west coast population)	Shark	Likely	Species or species habitat likely to occur within area	Vulnerable	
Diomedea exulans	Wandering Albatross	Bird	Likely	Foraging, feeding or related behaviour likely to occur within area	Vulnerable	Migratory
Diomedea epomophora	Southern Royal Albatross	Bird	May	Species or species habitat may occur within area	Vulnerable	Migratory
Eucalyptus merrickiae	Goblet Mallee	Plant	Known	Species or species habitat known to occur within area	Vulnerable	
Pterodroma mollis	Soft-plumaged Petrel	Bird	May	Species or species habitat may occur within area	Vulnerable	

Rhincodon typus	Whale Shark	Shark	May	Species or species habitat may occur within area	Vulnerable	Migratory
Dasyurus geoffroii	Chuditch, Western Quoll	Mammal	May	Species or species habitat may occur within area	Vulnerable	
Sternula nereis nereis	Australian Fairy Tern	Bird	Known	Foraging, feeding or related behaviour known to occur within area	Vulnerable	
Thalassarche impavida	Campbell Albatross, Campbell Black-browed Albatross	Bird	May	Species or species habitat may occur within area	Vulnerable	Migratory
Diomedea antipodensis	Antipodean Albatross	Bird	Likely	Foraging, feeding or related behaviour likely to occur within area	Vulnerable	Migratory

Appendix 13: Traffic Count Data – Myrup Road

MetroCount Traffic Executive
Daily Classes

DailyClass-186 -- English (ENA)

Datasets:

Site:	**[604_000019_000200] Myrup Road East of Coolgardie Esperance Highway**
Attribute:	RURAL
Direction:	6 - West bound A>B, East bound B>A. **Lane:** 0
Survey Duration:	0:00 Wednesday, 9 November 2016 => 13:02 Monday, 12 December 2016,
Zone:	
File:	604_000019_000200 0 2016-12-12 1302.EC0 (Plus)
Identifier:	KB36ZZHF MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default axle (v5.02)
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**0:00 Wednesday, 9 November 2016 => 13:02 Monday, 12 December 2016**
(33.5437)	
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range:	10 - 160 km/h.
Direction:	North, East, South, West (bound), P = East, Lane = 0-16
Separation:	Headway > 0 sec, Span 0 - 100 metre
Name:	Default Profile
Scheme:	Vehicle classification (AustRoads94)
Units:	Metric (metre, kilometre, m/s, km/h, kg, tonne)
In profile:	Vehicles = 4960 / 4986 (99.48%)

Daily Classes

DailyClass-186

Site: 604_000019_000200.0.1WE
Description: **Myrup Road East of Coolgardie Esperance Highway**
Filter time: **0:00 Wednesday, 9 November 2016 => 13:02 Monday, 12 December 2016**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) Headway(>0) Span(0 - 100) Lane(0-16)

Monday, 14 November 2016

	1	2	3	4	5	6	7	8	9	10	11	12	Total
Mon	139	5	33	3	3	1	0	0	2	2	13	0	201
(%)	69.2	2.5	16.4	1.5	1.5	0.5	0.0	0.0	1.0	1.0	6.5	0.0	
Tue	162	8	35	1	0	1	0	1	0	1	22	0	231
(%)	70.1	3.5	15.2	0.4	0.0	0.4	0.0	0.4	0.0	0.4	9.5	0.0	
Wed	145	3	31	8	5	0	0	0	4	3	12	0	211
(%)	68.7	1.4	14.7	3.8	2.4	0.0	0.0	0.0	1.9	1.4	5.7	0.0	
Thu	146	12	26	9	2	0	0	1	1	4	7	0	208
(%)	70.2	5.8	12.5	4.3	1.0	0.0	0.0	0.5	0.5	1.9	3.4	0.0	
Fri	142	11	13	8	0	1	3	0	16	13	17	0	224
(%)	63.4	4.9	5.8	3.6	0.0	0.4	1.3	0.0	7.1	5.8	7.6	0.0	
Sat	121	6	17	0	0	0	4	0	0	0	7	0	155
(%)	78.1	3.9	11.0	0.0	0.0	0.0	2.6	0.0	0.0	0.0	4.5	0.0	
Sun	100	11	6	2	0	0	5	0	2	4	10	0	140
(%)	71.4	7.9	4.3	1.4	0.0	0.0	3.6	0.0	1.4	2.9	7.1	0.0	

Average daily volume

Entire week													
	136	8	23	4	1	0	2	0	4	4	13	0	196
(%)	69.7	4.1	11.8	2.3	0.7	0.2	0.9	0.1	1.8	2.0	6.4	0.0	
Weekdays													
	147	8	28	6	2	1	1	0	5	5	14	0	215
(%)	68.3	3.6	12.8	2.7	0.9	0.3	0.3	0.2	2.1	2.1	6.6	0.0	
Weekend													
	111	9	12	1	0	0	5	0	1	2	9	0	148
(%)	74.9	5.8	7.8	0.7	0.0	0.0	3.1	0.0	0.7	1.4	5.8	0.0	

*** - Incomplete**

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*