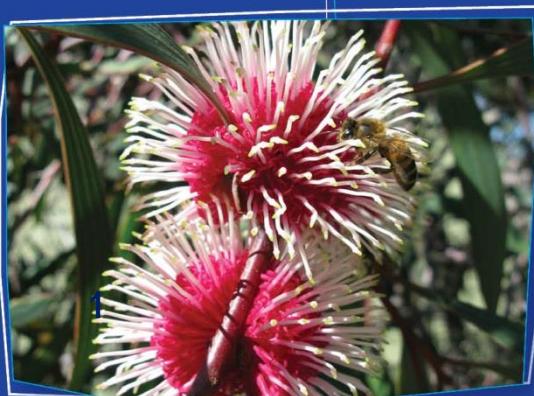


# Vegetation, Flora, Fauna and Environmental Considerations, and Targeted Flora Report

Shire of Esperance Strategic Purpose Permit 2021/22  
Site B – Cascade Road Bend



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## 1 Executive Summary

This 'Vegetation, Flora, Fauna and Environmental Considerations and Targeted Flora Report' has been undertaken in accordance with the 'Environmental Protection Authority (EPA) Technical Guidance, Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia (2016)' as part of the application to the Department of Water and Environmental Regulations (DWER) to clear 0.125 ha of native vegetation for the purpose reconstruction of a two lane sealed section of Cascade Rd, in compliance with road standard STD00022.

## 2 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 'Site B – Cascade Road Bend' project as Site B under the '2022 Strategic Purpose Permit' (Figure 1).

The proposed works are located approximately 51 km north-west of Esperance, within the Shire of Esperance managed road reserve of Cascade Rd. Specifically, it is located from 7.54 km to 8.91 km east of Coomalbidgup Rd, at straight line kilometre (SLK) 12.95 to 14.67 (Main Roads 2021). A point within the proposed clearing permit area is -33.57387 S, 122.45648 E or 6284023 m N, 356745 m E (UTM Zone 51 H, GDA94).

This road is classified as a regional distributor servicing the north western agricultural region with traffic composition of up to 30% heavy vehicles during peak periods. The Shire of Esperance has adopted the safe system principles approach to road design, as such the new road will incorporate sealed shoulders which will increase the seal width to 8m and batter slopes adjacent to shoulders which are flattened to 1:6 to incorporate a recoverable clear zone.

To complete these works, native vegetation up to 4.5m from the current road footprint on both sides of the road is required to be cleared, increasing the active road footprint to 21m. The road footprint is already at a width of 21m at most points except along the salt lake present within the project area. The project constitutes clearing 0.125ha 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 proposed 'Site B - Cascade Road Bend', map depicting area of vegetation clearance.

### 3 Environmental Background

#### 3.1 Scope

The removal of native vegetation to 21 meters of road footprint has the potential to affect a multiple environmental factors.

Possible impacts include;

- Threatened Flora (TF) and Priority Flora (PF).
- Threatened fauna, specifically, potential feeding, nesting and roosting habitat of endangered Carnaby's Black Cockatoo, *Calyptorhynchus latirostris*.
- Threatened Ecological communities (TEC) and Priority Ecological Communities (PEC), specifically the Environmental Protection and Biodiversity Conservation (EPBC) Act 1999 listed 'Proteaceae Dominated Kwongan Shrublands of the Southeast Coastal Floristic Province of Western Australia' (Kwongan) TEC.

Assessing these impacts involves two approaches; desktop study and field survey. The desktop study gathered background information on the target area. The field survey allows for detailed understanding of vegetation communities, targeted flora surveys for possible TF or PF, environmental condition, presence of PEC and TEC, and overall potential impact of clearing.

#### 3.2 Catchment

'Site B – Cascade Road Bend' is present within the Coobidge Creek sub catchment within the Lake Gore catchment area. It is located approximately 23km from the coast.

### 3.3 Climate

The Esperance climate is described as Mediterranean, characterised by cool wet winters and dry warm summers (BoM 2020). The area receives an average annual rainfall of 618 mm.

### 3.4 Geology

Two geological unit was identified within 'Site B – Cascade Road Bend', by Schoknecht et al. (2004). It is described as "Quartz and gypsum dunes and mounds (kopi); may include minor silt, sand, gravel, and clay flats adjacent to playas; locally includes some playa sediments" and "Sand or gravel plains; quartz sand sheets commonly with ferruginous pisoliths or pebbles, minor clay; local calcrete, laterite, silcrete, silt, clay, alluvium, colluvium, aeolian sand."

### 3.5 Soils

The soil of 'Site B – Cascade Road Bend' is broadly defined as duplex soils (yellow sand over gravel) (Schnoknecht et al. 2004). Within the area, there has been three soil types recorded. These include:

- Gravelly, yellow mottled sandy duplex soils over gravel layer at 30-80cm
- Gravelly, yellow mottled duplex soil with < 30 cm of sand over gravel layer
- Saline wet soils with minor grey deep sandy duplex soils

### 3.6 Topography

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

### 3.7 Vegetation

The site is located within the Interim Biogeographic Regionalisation for Australia (IBRA; Thackway & Cresswell 1995) Esperance Plains region (Esp2) and Recherche sub-region. The Esperance Plains 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 plain. Eucalyptus woodlands occur in gullies and alluvial foot-slopes".

Beard (1973) mapped one vegetation associations (VA) within the 'Site B – Cascade Road Bend' (Table 1), Esperance\_5048, described as "shrublands; Banksia and Lambertia scrub". Whilst this vegetation type has been highly cleared, it is reasonably well represented within the conservation reserve system.

**Table 1.** Vegetation associations mapped by Beard (1973) within the 'Site B – Cascade Road Bend', and statistics on pre-European remaining areas.

Nt. Acronyms used include Interim Biogeographic Regionalisation of Australia (IBRA), Eastern Mallee bioregion (MaL01), local government area (LGA) and International Union of Conservation Nature (IUCN).

Vegetation Association	
Name	Esperance_5048
Description	Shrublands; Banksia and Lambertia scrub
Area mapped within site (ha)	5.331 ha
Pre-European extent in Esperance Plains IBRA region Esp2 (%)	3.71%
Pre-European extent in LGA (%)	3.72 %
Current extent conserved in IUCN area (%)	1.95%

### 3.8 Land use

The area directly included in the clearing permit application 'Site B – Cascade Road Bend' is currently intact and vegetated road reserve ranging from 100 m to 650m wide, managed by the Shire of Esperance. The current road footprint occupies approximately 25 m. The surrounding land use is dominated by agricultural cropping land. The area is within rural zoning.

## 4 Methodology

### 4.1 Desktop study

A desktop study was completed prior to any site visit. Geographical Information System (GIS) review existing

- Existing site digital orthophotos, as sourced from LandGate (2018).
- Western Australian Local Government Association's (WALGA) 'Local Government Mapping (LGMap 2020)' program was used to assess spatial information of geology, topography, soil profiles, native and planted vegetation, water bodies and Interim Biogeographical Regionalisation for Australia (IBRA; Thackway & Cresswell 1995) classification system
- Data provided by Department of Biodiversity, Conservation and Attractions (DBCA) and Western Australian Herbarium in July/August 2020 was used to assess threatened flora (TF), priority flora (PF), and threatened (TEC) and priority (PEC) ecological communities within 20 km radius of the site. Specifically, spatial data included;
  - WAHerb extract (DBCA 2021f).
  - Threatened and Priority Reporting (TPFL; DBCA 2021d).
  - Esperance District Threatened Flora (DBCA 2021a).
  - TEC and PEC 'Likely to Occur' buffer and boundary areas (DBCA 2021e).
  - Department of Agriculture, Water and the Environment Protected Matters Search Tool
  - Index of Biodiversity Surveys for Assessment (IBSA).
- To assess fauna, the following databases were searched with a 20km buffer from the center of the site (-33.57387 S, 122.45648 E);
  - Department of Biodiversity, Conservation and Attractions (DBCA) and Western Australian Museum (WAM) NatureMap data portal
  - DBCA Threatened and Priority Fauna database
  - BirdLife Australia's Atlas and Birddata datasets
  - Department of Agriculture, Water and the Environment Protected Matters Search Tool
  - Atlas of Living Australia database
  - Index of Biodiversity Surveys for Assessment (IBSA).

### 4.2 Field investigation: possible ecological impacts

The site was initially inspected on 19 July 2021, by Julie Waters and Katherine Walkerden the Shire of Esperance's Environmental Coordinator and Environmental Officer. An assessment of possible ecological impacts included historical clearing, artificial water way constructions, impact of fire regimes, regeneration from disturbance, waterlogging, senescence, weeds, erosion, sedimentation, invasive fauna, *Phytophthora cinnamomi* Dieback, and illegal dumping of rubbish.

Vegetation community was also assessed during the field survey. Broad vegetation types defined by structure and composition were recorded and described. Condition of vegetation was assessed using Keighery (1994) categories, as 'Excellent', 'Very Good', 'Good', 'Degraded' or 'Completely Degraded'. This illustrates how healthy vegetation is, determined by number of dead or dying plants, weed cover and other forms of degradation. 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.

Only a very basic fauna survey was conducted as per EPA (2020) guidelines. Observations of fauna presence, such as call sounds, footprints and scats were also noted, and the area assessed for suitability of endangered Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) feeding, roosting and nesting habitat. Additionally, species that corresponded with suitable habitat within 'Site B – Cascade Road Bend' identified in the desktop 20 km radius search were assessed, including the threatened species *Leipoa ocellata* (mallee fowl).

#### **4.3 Field investigation: Assessing Threatened and Priority Ecological Communities**

The vegetation community of 'Site B – Cascade Road Bend' was assessed for the presence a TEC or PEC (DBCAs 2018, 2021X), specifically 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 32 (DBCAs 2021b)' definitions.

#### **4.4 Field Investigation: Targeted flora survey**

The targeted flora survey was undertaken following the Environmental Protection Authority's (EPA) 'Technical Guidance, Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia (2016)'. The entirety of the proposed impact area was surveyed on foot on 19 July 2021 and again on 15 September 2021 by Julie Waters and Katherine Walkerden, Shire of Esperance's Environmental Coordinator and Environmental Officer. Due to the timing, the majority of species were flowering, decreasing the likelihood of missing species. 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 proposed 21m wide clearing permit area. Suitable associated habitat for TF or PF identified in the desktop study were particularly focused on, and extensively searched.

Due to the high diversity and complexity of Esperance's flora, all species were recorded to compile an incidental species list (Appendix 8.1, Table 6). All species unknown in the field were collected and identified exsitu, using keys, WA Herbarium's Florabase (DBCAs 2021c), manuals and Esperance District Herbarium, to ensure no TF or PF were missed. Material was collected under Julie Waters' and Katherine Walkerden's Regulation 61, Biodiversity Conservation Regulations 2018 Licences for Flora Taking, FT61000787 and FT61000788. Any species that were unable to be identified were submitted to the WA Herbarium for identification.

For any PF or TF species identified in the desktop survey as possible to occur, scans of pressed specimens from the local Esperance District Herbarium were taken into the field. Any flora thought to be TF or PF was formally collected, counted and mapped using a Panasonic FS-G1 Toughpad with the program ROAM or a GPS Garmin GPS64. Specimens were then lodged with the WA Herbarium for

formal verification. When PF were confirmed, TPFL forms were completed and submitted to the DBCA's District Conservation Officer, and Species and Communities Branch.

## 5 Results and Discussion

### 5.1 Ecological Impact

#### 5.1.1 Vegetation Communities

Two vegetation communities were identified within the 'Site B – Cascade Road Bend', as defined by structure and composition (Table 2). The incidental flora list identified a total of 135 native species and 9 weeds across all vegetation communities. It is believed that the Beard (1973) vegetation associations identified in Section 3.7 are an appropriate match for one of the vegetation types observed. The other vegetation type was not mapped by Beard.

**Table 2.** Vegetation communities identified within proposed 'Site B – Cascade Road' project area.

Type	Description	Figure	Closest Matching Beard Vegetation Association	Area to be cleared(ha)
A	<i>Melaleuca brevifolia</i> and <i>M. cuticularis</i> dominated salt lake fringe with <i>Eucalypts angulosa</i> and <i>Acacia cyclops</i>	3	VA 27 - Low woodland; paperbark ( <i>Melaleuca</i> sp.)	0.125
B	Scattered Mallee over mixed low proteaceous dominated shrubland with Fabaceae and Goodeniaceae shrubs.	4	VA 5048 - Shrublands; banksia and lambertia scrub-heath in the Esperence Plains Region	No clearing to occur in this veg type



**Figure 2.** Vegetation types within the 'Site B – Cascade Road Bend' area, from SLK 12.95 km to 14.67 along Cascade Road.



**Figure 3.** Vegetation type A identified in 'Site B – Cascade Road Bend' project, described as '*Melaleuca brevifolia* and *M. cuticularis* dominated salt lake fringe with *Eucalypts angulosa* and *Acacia cyclops*.'

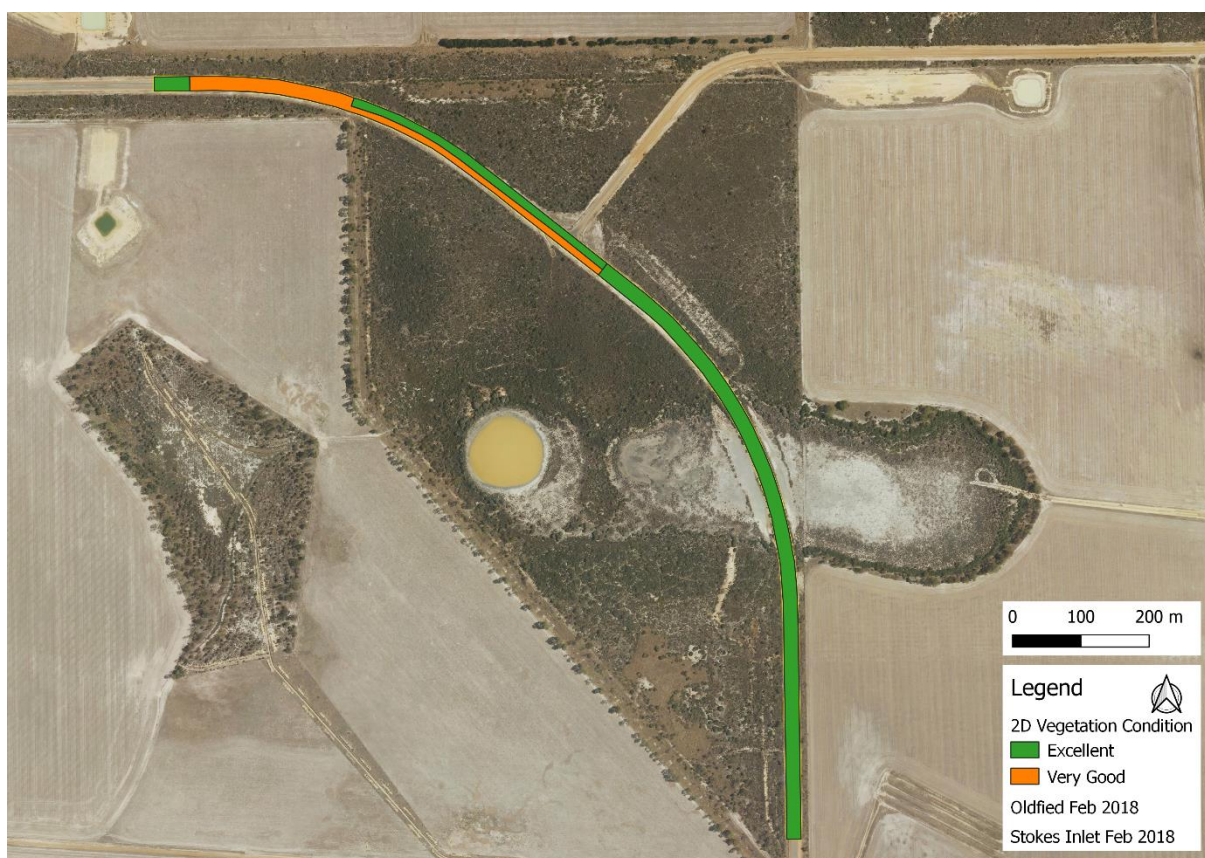


**Figure 4.** Vegetation type B identified in 'Site B – Cascade Road Bend' project, described as 'Scattered Mallee over mixed proteaceous dominated shrubland with Fabaceae and Goodeniaceae shrubs.'



## 5.2 Vegetation Condition

The majority of the site was on Excellent or very good condition. Previous road work and some minor weed infestation were degrading factors. There was no evidence of any fires in the area. There was minimal weed invasion across the entirety of the proposed 'Site B – Cascade Road Bend' area. Overall, nine invasive species were identified within the project area (Appendix 8.1). Of these, the serious concern were Bridal Creeper, veldt grass and Victorian tea tree. The biological control bridal creeper rust fungus was spread at the site in winter 2021. It is highly likely that proposed works will increase the distribution of weeds and degrade vegetation along the entire road reserve where works occur. Ideally, regular wash downs during the course of works to remove weed seeds or follow up herbicide control of invasive species needs to occur. However, this will be extremely expensive to employ contractors and mobilise equipment, which may not be feasible with given budgets. The area to be cleared (0.125ha) was all in excellent condition.



**Figure 7.** Vegetation condition across 'Site B – Cascade Road Bend' project, ranging from Very Good to Excellent condition, due to primarily to degradation from weed invasion.

## 5.3 *Phytophthora* Dieback

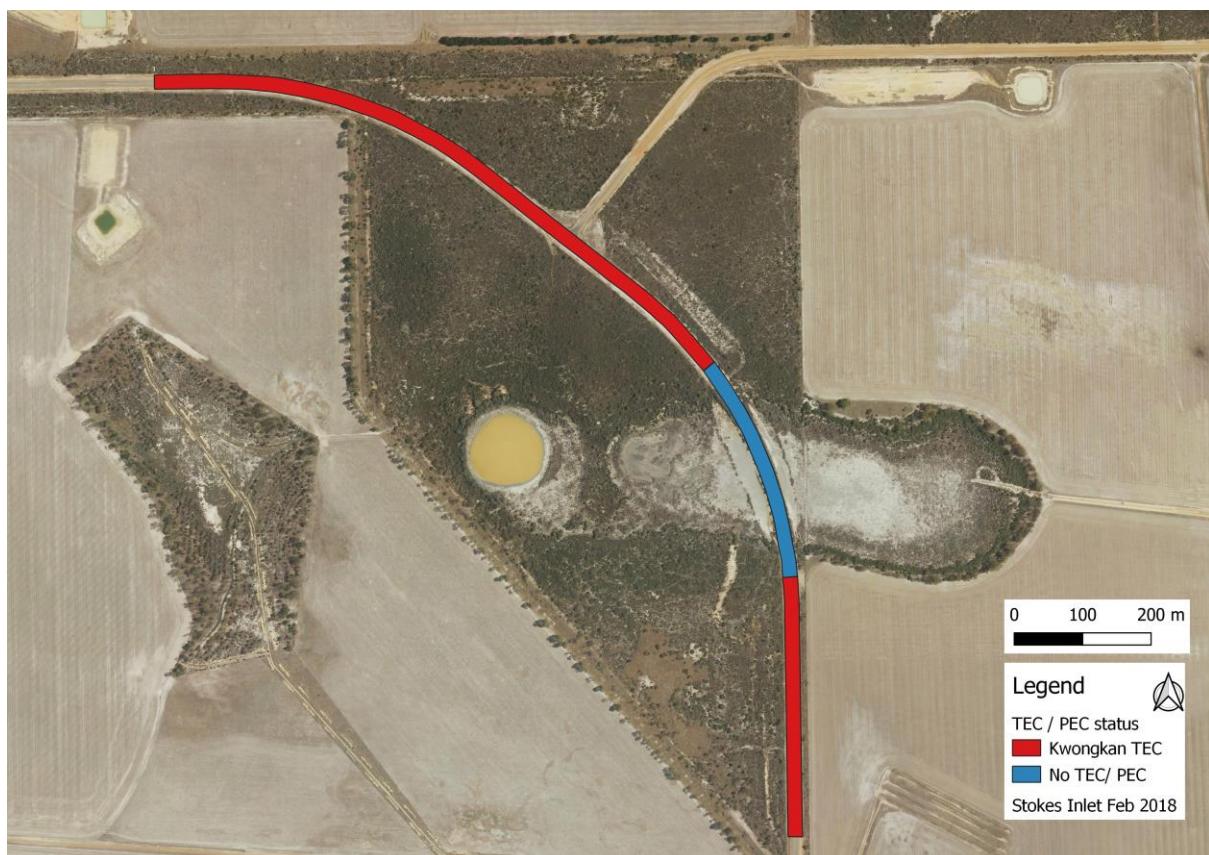
Dieback Information Delivery and Management System (DIDMS; GAIA Resources, SCNRM & State NRM 2021) data shows neither positive nor negative *Phytophthora cinnamomi* or other *Phytophthora* sp. Dieback sample results in the immediate area. There is dieback susceptible vegetation within the area but no areas that appeared to be infected by *Phytophthora* sp.. Based on Dieback Management Plans prepared for Shire of Esperance road construction and management projects. Proposed works will be conducted using appropriate hygiene measures to limit spreading of the disease, including clearing in dry conditions and clean down of vehicles and machinery before entering the site. However, there is always a possibility that proposed works will spread *P. cinnamomi* dieback along Cascade

Road due to proposed works.

#### 5.4 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 – Cascade Road Bend' project area. No other TEC's or priority ecological communities (PEC) were identified by the desktop study as being within 'Site B – Cascade Road Bend' or within a 20 km buffer of the site.

Vegetation type B described as 'Scattered Mallee over mixed proteaceous dominated shrubland with Fabaceae and Goodeniaceae shrubs' met the criteria to be considered as Kwongkan TEC. The presence of Kwongkan TEC was considered when selecting the road profile and the areas with Kwongkan TEC were currently wide enough to meet the road requirements. No clearing of Kwongkan TEC will occur.



**Figure 8.** Vegetation type B in very good or excellent condition met threatened ecological community (TEC) 'Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia (Kwongkan)' within 'Site B – Cascade Road Bend' project.

#### 5.5 Threatened and Priority Flora

Two threatened flora (TF) and 30 priority flora (PF) were recorded within a 20 km radius of the proposed impact site (Table X; DBCA 2021a, DBCA 2021d, DBCA 2021f). Of these, 22 PF species had suitable known associated habitat that corresponded with vegetation communities and soil type of 'Site B – Cascade Road Bend' project. No confirmed records, indicating known populations were directly located within the clearing permit area.

**Table 3.** Threatened or priority flora identified by the desktop study to be present within a 20 km radius of 'Site B – Cascade Road Bend' project area, using Threatened and Priority Flora Reporting (TPFL; DBCA 2021d), WA Herbarium (DBCA 2021f) and Esperance District Threatened Flora (DBCA 2021a). Nt. Acronyms used in the table include priority flora (P), threatened flora (TF), Biodiversity Conservation (BC) Act 2018, Environmental Protection and Biodiversity Conservation (EPBC) Act 1999, critically endangered (CN) and endangered (EN).

Species	Conservation Status	Associated Habitat	Likely to occur
<i>Anigozanthos bicolor</i> subsp. <i>minor</i>	TF	Moist sandy soil in heath communities, shallow soil near granite outcrops. Flowers best after disturbance or fire.	No
<i>Lambertia echinata</i> subsp. <i>echinata</i>	TF	Only known in Cape Le Grande NP in dense Chittick thickets.	No
<i>Caladenia longifimbriata</i>	P1	Seasonal creeks.	Unlikely
<i>Hydrocotyle</i> sp. <i>Vigintimilia</i>	P1	Associated with swamps and low-lying depressions.	Possible
<i>Leucopogon remotus</i>			
<i>Leucopogon</i> sp. <i>Lake Magenta</i>	P1	Undulating plains and slopes. Sand and loamy sand, sometimes over laterite.	Possible
<i>Persoonia flexifolia</i>	P1	Lateritic soils with granitic rock. River banks.	No
<i>Acacia amyctica</i>	P2	Salmon Gums area on well-drained loams and sandy clay plains with <i>Eucalyptus flocktoniae</i> low woodland.	Unlikely
<i>Astroloma</i> sp. <i>Grass Patch</i>	P2	Edge of salt lakes.	Possible
<i>Caesia viscida</i>	P2	Aeolian sand. Low dunes.	Unlikely
<i>Darwinia</i> sp. <i>Mt Ragged</i>	P2	Brown loamy sand, quartzite, granite. Outcrops, steep ridges, rocky slopes.	Unlikely
<i>Eucalyptus litorea</i>	P2	Calcareous sand, sandy clay loam & stones. Leeward of primary dunes, around salt lakes.	Unlikely
<i>Hydrocotyle papilionella</i>	P2	Grey to brown sand. Salt lake edges, flats, granite outcrops.	Possible
<i>Melaleuca viminea</i> subsp. <i>appressa</i>	P2	Shallow sand over clay. Near creeks or wet depressions.	Unlikely
<i>Patersonia inaequalis</i>	P2	Sandy clay, lateritic or granitic sand.	Possible
<i>Thysanotus brachiatus</i>	P2	Grey sand.	Possible
<i>Acacia bartlei</i>	P3	Salmon Gums area, waterlogged depressions in brown/grey sandy clay. Tolerates low level salinity.	Unlikely
<i>Astroloma microphyllum</i>	P3	Grey/white sand, sandy loam, clay.	Possible

<i>Austrobaeckea uncinella</i>	P3	Edge of salt lakes	Possible
<i>Bossiaea flexuosa</i>	P3	Deep sandy soil.	Possible
<i>Brachyloma mogin</i>	P3	Various soil types including brown sand loam, grey clayey sand and swamp flats. Mostly recorded outside of Esperance Area.	Possible
<i>Conostephium marchantiorum</i>	P3	White/grey sand. Plains, creeklines, edges of salt lakes.	Possible
<i>Dampiera sericantha</i>	P3	Sand, sometimes gravel. Plains.	Possible
<i>Daviesia pauciflora</i>	P3	Deep sands	Possible
<i>Eucalyptus dolichorrhyncha</i>	P3	Sandy clay flats	Unlikely
<i>Eucalyptus foliosa</i>	P3	Grey/white sandy clay. Flat adjacent to salt lakes.	Possible
<i>Goodenia laevis</i> subsp. <i>laevis</i>	P3	Scattered distribution throughout Eastern Mallee Bioregion. Germination stimulated by mechanical disturbance.	Possible
<i>Hopkinsia adscendens</i>	P3	Sand. Dry or seasonally damp habitats along streams.	Possible
<i>Hydrocotyle eichleri</i>	P3	Grey to brown sand. Salt lake margins.	Possible
<i>Isopogon alcicornis</i>	P3	Eucalyptus woodland with low sedge and scattered ground cover Banksia. Grey/brown sandy loams in Mallee shrubland.	Possible
<i>Kunzea salina</i>	P3	Directly associated with salt lake periphery.	Yes
<i>Leucopogon remotus</i>	P3	Banksia media woodland and near salt lakes	Unlikely
<i>Melaleuca dempta</i>	P3	White to brown clayey sand or clay. Salt lake edges.	Possible
<i>Opercularia acolytantha</i>	P3	White/grey or yellow sandy loam/sand often over laterite. Plains and flats.	Possible
<i>Persoonia cymbifolia</i>	P3	Sandy soils. On flats or in rock crevices.	Possible
<i>Pterostylis faceta</i>	P3	Various habitats – Melaleuca Mallee scrubland, Granite, sandy loam	Possible

No Threatened or priority species, were identified within the clearing footprint.

The only notable collection was a range extension of *Acacia moirii* subsp. *dasycarpa*, which was collected and verified at the WA Herbarium (Accession 9306; KSW5821). Confirmed by Mike Hislop on 27/1/2022 (specimen not retained).

## 5.6 Fauna

Within a 20 km radius of the 'Site B – Cascade Road Bend', Seven species that are threatened fauna,

priority fauna and fauna protected under international agreement have been recorded (Table 4). Five of these species have suitable habitat within the proposed clearing permit area.

**Table 4.** Potential threatened, priority and protected under international agreement fauna recorded within a 20 km radius of the proposed 'Site B – Cascade Road Bend' (Naturemap, 2021). Nt. Acronyms used include priority (P), threatened (T), and protected under international agreement (IA).

Scientific Name	Common Name	Conservation Status	Likelihood of occurring	Associated habitat
<i>Calyptorhynchus latirostris</i>	Carnaby's Cockatoo	T	Yes	Kwongkan shrub or heathland. Presence of Hakea, Banksia and Pine species indicate potential feeding habitat.
<i>Leipoa ocellata</i>	Malleefowl	T	Yes	Semi-arid shrub lands and low woodlands dominated by mallee and/or acacia.
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	IA	Yes	Prefers the grassy edges of shallow inland freshwater wetlands.
<i>Calidris ruficollis</i>	Red-necked Stint	IA	Unlikely	Found on the coast, in sheltered inlets, bays, lagoons, estuaries, intertidal mudflats and protected sandy or coralline shores.
<i>Tringa nebularia</i>	Common Greenshank	IA	Yes	Found both on the coast and inland, in estuaries and mudflats, mangrove swamps and lagoons
<i>Oxyura australis</i>	Blue-billed Duck	P4	Unlikely	Generally spend time alone in small concealed bays within vegetation or communally in large exposed rafts far from the shore.
<i>Thinornis rubricollis</i>	Hooded Plover	P4	Possible	Mainly inhabits ocean beaches, occasionally inhabits inland lakes.

During the field survey several species of common birds were observed. Additionally, two Black Winged stilts (*Himantopus himantopus*) were sighted and photographed about 50 metres off of the permit area in neighbouring wetlands. Carnaby's Cockatoos were sighted feeding on Pine trees adjacent to the permit area. A Mallee black-backed snake was photographed during the Flora survey with the identification being confirmed by Emma Adams (DBCA Esperance District, Conservation Officer). Invasive fauna were also present, with a fox seen crossing Cascade Rd during the Flora survey. The carcass of a feral cat was found on Cascade Road about 1km south of the permit area.

**Table 5.** Fauna observed during field surveys for 'Site B – Cascade Road Bend'

Scientific Name	Common Name	Method of observation	Invasive
<i>Himantopus himantopus</i>	Black winged Stilt	Visual & photographs	No
<i>Manorina flavigula</i>	Yellow-throated Miner	Visual	
<i>Cracticus torquatus</i>	Grey Butcherbird	Visual	No
<i>Cracticus tibicen</i>	Australian Magpie	Visual	No

<i>Suta nigriceps</i>	Mallee black-backed snake	Visual & photographs	No
<i>Macropus fuliginosus</i>	Western grey Kangaroo	Animal tracks	No
<i>Anas superciliosa</i>	Pacific Black Duck	Visual	No
<i>Vulpes vulpes</i>	Red Fox	Visual	Yes
<i>Felis catus</i>	Cat	Roadkill near site	Yes



**Figure X:** Black Winged stilts (*Himantopus himantopus*) observed during flora surveys.



**Figure X:** Mallee black-backed snake (*Suta nigriceps*) observed during flora surveys.

### 5.6.1 Carnaby's Black Cockatoo, *Calyptorhynchus latirostris*, threatened fauna

Carnaby's Black Cockatoo's are unlikely to nest within the 'Site B – Cascade Road Bend' project area, as no large trees are present with hollows. Carnaby's Cockatoos were sighted feeding on Pine trees adjacent to the permit area. Carnaby's Black Cockatoos forage on Proteaceae species nuts, such as Hakea or Banksia species. Vegetation type B, described as 'Scattered Mallee over mixed low proteaceous dominated shrubland with Fabaceae and Goodeniaceae shrubs', would likely provide additional opportunistic foraging grounds.

## 6 Conclusion; assessment of Department of Water and Environmental Regulations clearing principles

The 'Site B – Cascade Road Bend' 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).

**Table 6.** Shire of Esperance Assessment against Clearing Principles of the proposed 'Site B – Cascade Road Bend'.

Assessment against Clearing Principles	Conclusion
Principle (a) Native vegetation should not be cleared if it comprises a high level of biological diversity.	Biodiversity at this site is high with 135 native species recorded over two vegetation communities
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.	The vegetation contains foraging habitat for Carnaby's Black Cockatoo due to the presence of vegetation high in Proteaceous species. This foraging habitat is anticipated to be not directly associated with roosting or nesting habitat. No other threatened or priority fauna species are likely to be impacted upon.
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 flora species were observed in the area.
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.	Kwongkan TEC was present at the site but due to the width of the road where the Kwongkan TEC occurs no clearing is required.
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 area is within a approximately 55 ha piece of remnant vegetation surrounded by highly cleared agricultural land, with the intact vegetation within the site likely playing contributing to ecological linkages in the area. However the amount of vegetation being cleared and the fact that this 55ha road reserve

	remnant will still exist as a wildlife corridor after road widening does not constitute being a significant impact. Beard Vegetation Association 5048 is a highly cleared vegetation type and poorly represented within the conservation reserve system.
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.	Part of the clearing permit area, vegetation type A, was growing in association with a wetland. This includes up to 0.125 ha of wetland fringing vegetation.
Principle (g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	Given that this area already has a road running through it there is unlikely to be significant further land degradation. There is no acid sulfate soil risk.
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 project is 4.7km south of the closest Conservation Reserve 36183. It is unlikely to have any impacts on this
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.	There may be some temporary impacts to the surface water quality in the adjacent lake during construction works, however given that there is already a road and culverts in place adjacent to this wetland there is unlikely to be any additional significant long term impacts.
Principle (j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.	The project is unlikely to have any significant impacts on flooding in the area.

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## 8 Appendix

### 8.1 Incidental species list

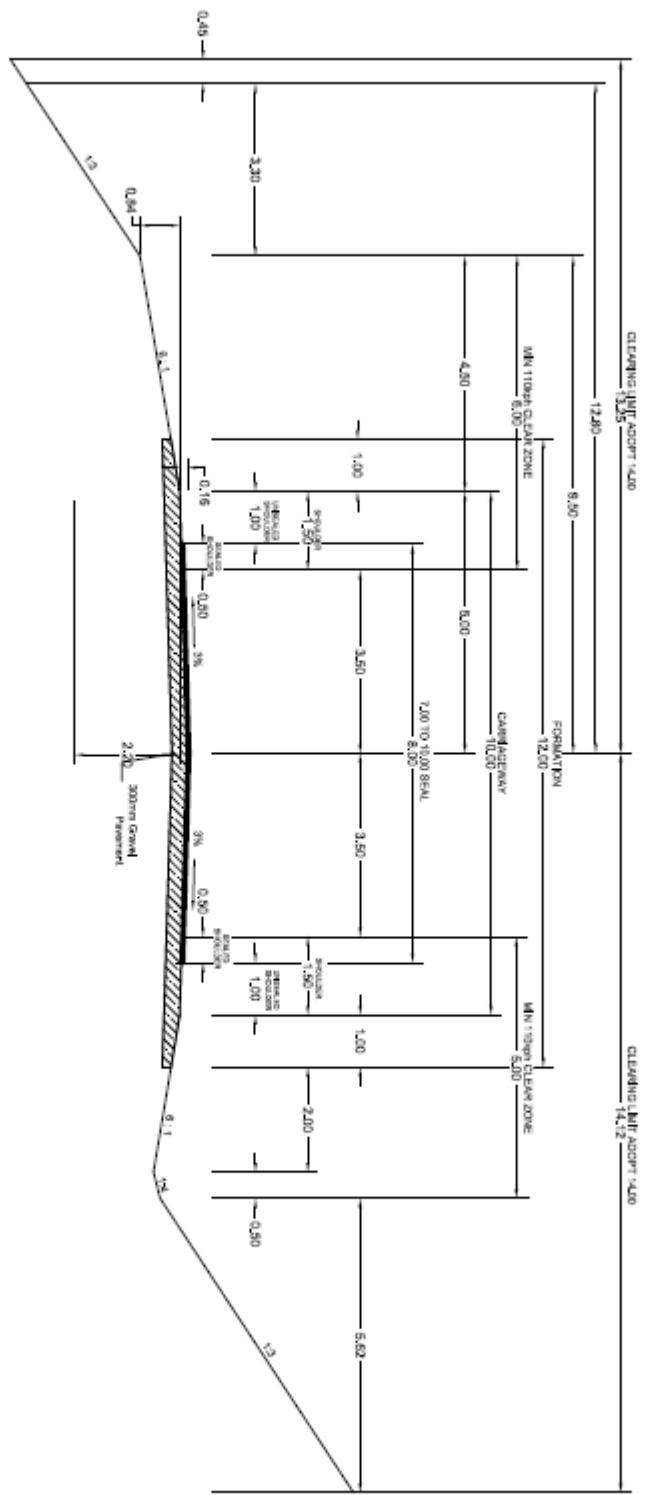
Family	Genus	Species	Common Name	Weed	Herbarium Reference
Aizoaceae	<i>Carpobrotus</i>	<i>virescens</i>	Pigface		
Anarthriaceae	<i>Anarthria</i>	<i>laevis</i>			
Apiaceae	<i>Trachymene</i>	<i>pilosa</i>			
Asparagaceae	<i>Asparagus</i>	<i>asparagoides</i>	Bridal creeper	x	
Asparagaceae	<i>Laxmannia</i>	<i>brachyphylla</i>			
Asparagaceae	<i>Laxmannia</i>	<i>omnifertilis</i>			
Asparagaceae	<i>Lomandra</i>	<i>collina</i>			
Asparagaceae	<i>Lomandra</i>	<i>effusa</i>			
Asparagaceae	<i>Lomandra</i>	<i>hastilis</i>			
Asteraceae	<i>Brachyscome</i>	<i>ciliaris</i>			
Asteraceae	<i>Millotia</i>	<i>tenuifolia var tenuifolia</i>	Soft Millotia		
Asteraceae	<i>Pterochaeta</i>	<i>paniculata</i>	Woolly Waitzia		
Asteraceae	<i>Vellereophyton</i>	<i>dealbatum</i>		x	
Casuarinaceae	<i>Allocasuarina</i>	<i>humilis</i>			
Casuarinaceae	<i>Allocasuarina</i>	<i>thuyoides</i>			

Chenopodiaceae	<i>Atriplex</i>	<i>undulata</i>	Wavy Leaf Saltbush	x	KSW1022 ACC9388 Retained by herbarium
Cyperaceae	<i>Caustis</i>	<i>dioica</i>			
Cyperaceae	<i>Chaetospora</i>	<i>curvifolia</i>			
Cyperaceae	<i>Chordifex</i>	<i>sphacelatus</i>			
Cyperaceae	<i>Schoenus</i>	<i>subflavus</i>			
Cyperaceae	<i>Gahnia</i>	<i>trifida</i>			
Cyperaceae	<i>Lepidosperma</i>	<i>squamatum</i>			
Cyperaceae	<i>Mesomelaena</i>	<i>stygia</i> subsp <i>stygia</i>			
Cyperaceae	<i>Mesomelaena</i>	<i>tetragona</i>			
Cyperaceae	<i>Schoenus</i>	<i>laevigata</i>			
Cyperaceae	<i>Schoenus</i>	<i>brevisetis</i>			
Dilleniaceae	<i>Hibbertia</i>	<i>acerosa</i>			
Dilleniaceae	<i>Hibbertia</i>	<i>oligantha</i>			
Dilleniaceae	<i>Hibbertia</i>	<i>psilocarpa</i>			
Dilleniaceae	<i>Hibbertia</i>	<i>verrucosa</i>			
Droseraceae	<i>Drosera</i>	<i>drummondii</i>			
Droseraceae	<i>Drosera</i>	<i>glanduligera</i>			
Droseraceae	<i>Drosera</i>	<i>macranthera</i>			
Droseraceae	<i>Drosera</i>	<i>neesii</i>	Jewel Rainbow		
Droseraceae	<i>Drosera</i>	<i>trichocaulis</i>			
Ericaceae	<i>Andersonia</i>	<i>macrantha</i>			
Ericaceae	<i>Leucopogon</i>	<i>fimbriatus</i>			
Ericaceae	<i>Lysinema</i>	<i>ciliatum</i>	Curry plant		
Euphorbiaceae	<i>Monotaxis</i>	<i>paxii</i>			
Fabaceae	<i>Acacia</i>	<i>aemula</i>			
Fabaceae	<i>Acacia</i>	<i>cyclops</i>	Coastal Wattle		
Fabaceae	<i>Acacia</i>	<i>delphina</i>	Dolphin Wattle		
Fabaceae	<i>Acacia</i>	<i>gonophylla</i>			
Fabaceae	<i>Acacia</i>	<i>moirii</i> subsp. <i>dasycarpa</i>			KSW5821 ACC9306
Fabaceae	<i>Aotus</i>	<i>sp. Esperance</i>			
Fabaceae	<i>Daviesia</i>	<i>teretifolia</i>			
Fabaceae	<i>Eutaxia</i>	<i>inuncta</i>			
Fabaceae	<i>Gastrolobium</i>	<i>spinosum</i>			
Fabaceae	<i>Gompholobium</i>	<i>knightianum</i>			
Fabaceae	<i>Jacksonia</i>	<i>alata</i>			
Fabaceae	<i>Jacksonia</i>	<i>condensata</i>			
Fabaceae	<i>Jacksonia</i>	<i>venosa</i>			
Fabaceae	<i>Medicago</i>	<i>sp.</i>		x	
Fabaceae	<i>Ornithopus</i>	<i>sativus</i>	Yellow serradella	x	
Fabaceae	<i>Pultenaea</i>	<i>indira</i> ssp <i>indira</i>			

Frankeniaceae	<i>Frankenia</i>	<i>tetrapetala</i>			
Goodeniaceae	<i>Dampiera</i>	<i>lavandulacea</i>			
Goodeniaceae	<i>Dampiera</i>	<i>parvifolia</i>			
Goodeniaceae	<i>Goodenia</i>	<i>incana</i>	Hoary Goodenia		
Goodeniaceae	<i>Goodenia</i>	<i>pterigosperma</i>			
Goodeniaceae	<i>Goodenia</i>	<i>trinervis</i>			
Haemodoraceae	<i>Conostylis</i>	<i>phathyrantha</i>			
Haemodoraceae	<i>Conostylis</i>	<i>seorsifolia</i> subsp. <i>seorsifolia</i>			
Haemodoraceae	<i>Haemodorum</i>	<i>discolor</i>	Bloodroot		
Hemerocallidaceae	<i>Johnsonia</i>	<i>acaulis</i>			
Iridaceae	<i>Patersonia</i>	<i>lanata</i>			
Iridaceae	<i>Patersonia</i>	<i>occidentalis</i>	Purple Flag		
Juncaceae	<i>Juncus</i>	<i>pallidus</i>			
Loranthaceae	<i>Nuytsia</i>	<i>floribunda</i>	Moodja		
Malvaceae	<i>Lawrenzia</i>	<i>squamata</i>			
Myrtaceae	<i>Beafortia</i>	<i>micranthera</i>			
Myrtaceae	<i>Calothamnus</i>	<i>gracilis</i>			
Myrtaceae	<i>Calytrix</i>	<i>leschenaultii</i>			
Myrtaceae	<i>Chamelaucium</i>	<i>ciliatum</i>			
Myrtaceae	<i>Conothamnus</i>	<i>aureus</i>			
Myrtaceae	<i>Cyathostemon</i>	<i>ambiguus</i>			
Myrtaceae	<i>Darwinia</i>	<i>vestita</i>	Pom Pom Darwinia		
Myrtaceae	<i>Eucalyptus</i>	<i>angulosa</i>	Ridge Fruited Mallee		
Myrtaceae	<i>Eucalyptus</i>	<i>micranthera</i>	Alexander River mallee		
Myrtaceae	<i>Eucalyptus</i>	<i>oleosa</i>	Red mallee		
Myrtaceae	<i>Eucalyptus</i>	<i>uncinata</i>	Hook Leaved mallee		
Myrtaceae	<i>Eucalyptus</i>	<i>pleurocarpa</i>	Talerack		
Myrtaceae	<i>Leptospermum</i>	<i>laevigatum</i>	Victorian Tea tree	x	
Myrtaceae	<i>Leptospermum</i>	<i>maxwellii</i>			
Myrtaceae	<i>Leptospermum</i>	<i>erubescens</i>	Roadside Tea tree		
Myrtaceae	<i>Melaleuca</i>	<i>brevifolia</i>			
Myrtaceae	<i>Melaleuca</i>	<i>cuticularis</i>	Salt Water Paper bark		
Myrtaceae	<i>Melaleuca</i>	<i>glaberrima</i>			
Myrtaceae	<i>Melaleuca</i>	<i>pulchella</i>	Claw flower		
Myrtaceae	<i>Melaleuca</i>	<i>scabra</i>			
Myrtaceae	<i>Melaleuca</i>	<i>tuberculata</i> subsp. <i>macrophylla</i>			

Myrtaceae	<i>Micromyrtus</i>	<i>elobata</i>			
Myrtaceae	<i>Phymatocarpus</i>	<i>maxwellii</i>			
Myrtaceae	<i>Taxandria</i>	<i>spathulata</i>			
Myrtaceae	<i>Verticordia</i>	<i>inclusa</i>			KSW2122 ACC9388
Myrtaceae	<i>Verticordia</i>	<i>minutiflora</i>			
Myrtaceae	<i>Rinzia</i>	<i>icosandra</i>	Recherche Mainland Rinzia		
Orchidaceae	<i>Caladenia</i>	<i>flava</i>			
Orchidaceae	<i>Cyanicula</i>	<i>aperta</i>			
Orchidaceae	<i>Disa</i>	<i>bracteata</i>		x	
Orchidaceae	<i>Diuris</i>	<i>conspicillata</i>			
Orchidaceae	<i>Diuris</i>	<i>setacea</i>	Bristly Donkey Orchid		
Orchidaceae	<i>Elythranthera</i>	<i>brunonis</i>	Enamel Orchid		
Orchidaceae	<i>Pterostylis</i>	<i>vittata</i>	Banded Greenhood		
Orchidaceae	<i>Thelymitra</i>	<i>graminea</i>			
Pinaceae	<i>Pinus</i>	<i>pinaster</i>		x	
Pittosporaceae	<i>Billardiera</i>	<i>fusiformis</i>	Australian Bluebell		
Pittosporaceae	<i>Billardiera</i>	<i>lehmanniana</i>	Kurup		
Poaceae	<i>Ehrharta</i>	<i>calycina</i>	Veldt Grass	x	
Poaceae	<i>Neurachne</i>	<i>alopeкуроidea</i>	Foxtail Mulga Grass		
Primulaceae	<i>Anagallis</i>	<i>arvensis</i>	Pimpernel	x	
Proteaceae	<i>Adenanthos</i>	<i>cuneatus</i>	Jug flower		
Proteaceae	<i>Banksia</i>	<i>armata</i>	Prickly Dryandra		
Proteaceae	<i>Banksia</i>	<i>media</i>	Southern Plains Banksia		
Proteaceae	<i>Banksia</i>	<i>obovata</i>	Wedge-leaved Dryandra;		
Proteaceae	<i>Banksia</i>	<i>obtusa</i>	Shining Honeypot		
Proteaceae	<i>Banksia</i>	<i>repens</i>	Creeping Banksia		
Proteaceae	<i>Hakea</i>	<i>denticulata</i>	Stinking Roger		
Proteaceae	<i>Hakea</i>	<i>cinerea</i>	Ashy Hakea		
Proteaceae	<i>Hakea</i>	<i>corymbosa</i>	Cauliflower Hakea		
Proteaceae	<i>Hakea</i>	<i>pandanearpa subsp. pandanearpa</i>	Cricket Ball Hakea		
Proteaceae	<i>Hakea</i>	<i>prostrata</i>			
Proteaceae	<i>Hakea</i>	<i>trifurcata</i>	Two leaf Hakea		

Proteaceae	<i>Isopogon</i>	<i>formosa</i>	Rose coneflower		
Proteaceae	<i>Isopogon</i>	<i>polycephalus</i>	Clustered coneflower		
Proteaceae	<i>Lambertia</i>	<i>inermis</i> var. <i>inermis</i>	Chittick		
Proteaceae	<i>Lambertia</i>	<i>inermis</i> var. <i>drummondii</i>			
Proteaceae	<i>Petrophile</i>	<i>fastigiata</i>			
Proteaceae	<i>Synaphea</i>	<i>favosa</i>			
Proteaceae	<i>Synaphea</i>	<i>oligantha</i>			
Proteaceae	<i>Synaphea</i>	<i>Petiolaris</i> subsp. <i>petiolaris</i>			KSW0922 ACC9388 Retained by Herbarium
Restionaceae	<i>Chordifex</i>	<i>crispatus</i>			
Restionaceae	<i>Chordifex</i>	<i>sphacelatus</i>			
Restionaceae	<i>Desmocladius</i>	<i>lateriflorus</i>			
Restionaceae	<i>Desmocladius</i>	<i>parthenicus</i>			
Restionaceae	<i>Hypolaena</i>	<i>exsulca</i>			
Restionaceae	<i>Lepidobolus</i>	<i>chaetocephalus</i>			
Rutaceae	<i>Cyanothamnus</i>	<i>ramosus</i> subsp. <i>anethifolius</i>			KSW2222 ACC9388



**NOTES**

Assumptions:  
 1. Straight Road Alignment  
 2. 2 metre W  
 3. Traffic Volume less than 7500PD  
 4. 110km/h Speed Zone

Scale	Horizontal	Vertical
Drawn	1:100	1:10
Checked		
Drawn		
Checked		

**SHIRE OF ESPERANCE**

TYPICAL RURAL ROAD CROSS SECTION  
 BITUMEN SEAL SURFACE  
 7.0 TO 10.0 METRE SEAL - CLEARING LIMITS  
 ESPERANCE

M. Nisak Director Asset Management
23/04/2020
STD000022
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