Reserve 27355

Lot 80, Fisheries Road, Neridup

Reserve Biodiversity Assessment Report

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1. Introduction

Reserve 27355 'Lot 80, Fisheries Road, Neridup' is a large (99.73 ha) and ecologically-diverse reserve situated 16 km west from the Condingup townsite. The reserve's purpose is currently listed as 'Parkland'. The regional landscape is highly fragmented due to agricultural clearing for broadacre cropping, livestock grazing and forestry plantations. The reserve is surrounded by highly cleared agricultural land and Tasmanian Blue Gum plantations.

A reserve assessment was completed on the 18/10/2023 by Shire of Esperance (SOE) Environmental Officers Katherine Walkerden and Kahree Garnaut, and SOE Environmental Coordinator Julie Waters. The reserve assessment has been completed as part of the 'Local Biodiversity and Native Vegetation Management Project', funded by the State Natural Resource Management (NRM) Program, through the Western Australian Local Government Association (WALGA) to gather baseline biodiversity data on LGA reserves throughout the state, which in the longer term will help plan for the retention, protection and management of local biodiversity.

Table 1. Basic reserve information.

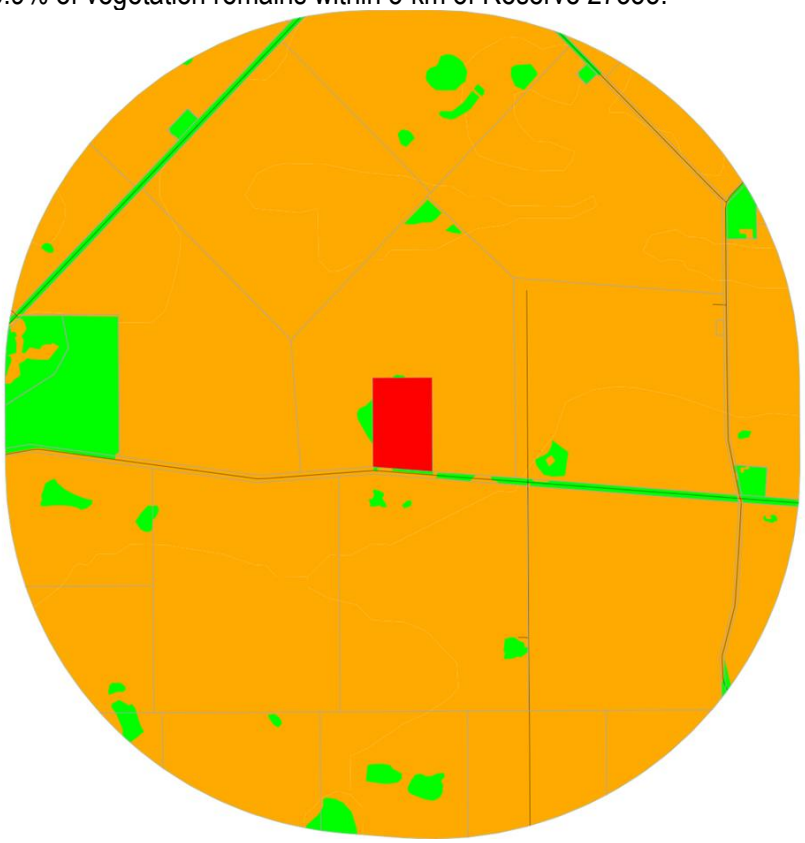
Reserve Name:	Unnamed	**Reserve number:**	27355
Named Features:	None	**NRM Region:**	South Coast
Location Number:	Lot 80	**Shire:**	Esperance
Vesting:	Shire of Esperance	**Nearest Towns:**	Condingup
Current Purpose:	Parkland	**Nearest Roads:**	Fisheries Road, (Meyer Road and Coolinup Road)
Zoning:	Public Open Space	**Map Reference:**	440138 m E 6266985 m N
Area of Reserve:	99.73 ha	**IBRA Sub Region:**	Recherche

Figure 1. Map showing regional context of Reserve 27355.

2. Desktop Assessment

Prior to surveying Reserve 27355, a shapefile of the reserve area was processed through the SOE Desktop Environmental Impacts Spatial Interrogation Program (DEISIP). This program interrogates a number of Local, State and Federal spatial datasets to assess environmental values of any given project area.

Table 2. Desktop assessment results.

Landform	Gently undulating plain, 1-3% slope and Seasonally inundated shallow depression
Soils	• 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 • Grey shallow sandy duplex soils with some alkaline grey shallow sandy duplexes • Wet soils and semi-wet soils
Geology / Regolith	Tertiary marine sediments of the Pallinup formation
Catchment	Esperance Coast Catchment.
Vegetation remaining within 5km (%)	6.9% of vegetation remains within 5 km of Reserve 27355.  Map of remnant vegetation within a 5 km buffer produced by DEISIP. Reserve is highlighted in red, remnant vegetation is in green and cleared vegetation is in orange, road centrelines are in black and cadastre boundaries are in grey.
Threatened and Priority flora (Appendix 3)	No TF or PF species had confirmed populations within Reserve 27355. 5 TF and 46 PF were recorded within 20 km of the Reserve 27355.

Threatened and Priority Ecological Communities	The EPBC Act-listed 'Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia (Kwongkan)' TEC / PEC was returned in the desktop assessment as occurring within Reserve 27355.
Threatened and Priority Fauna (Appendix 4)	No conservation-listed fauna had confirmed records from within the Reserve 27355. Thirty-four conservation-listed (threatened, priority, migratory or otherwise specially-protected) fauna had been recorded within a 20 km radius of Reserve 27355.
Closest Conservation Reserve	3.44 km from Coolinup Nature Reserve (Reserve 27354), which is managed by the DBCA.
Aboriginal Heritage	The closest Registered Aboriginal Heritage Sites were situated approximately 8 km from the project area at Mt Hawes. There were no recorded heritage sites within the project area.

Reserve 27355 is mapped as forming a component of a single Beard Vegetation Association, namely Esperance 47, which is typified by a *Eucalyptus pleurocarpa* mallee over a heathland. Esperance 47 has been subject to extensive historical clearing, with only 35.86% of its original pre-European extent remaining within Western Australia. It is inadequately represented within the IUCN CAR reserve system, where only 17.68% of the current extent protected under conservation covenant. Additionally, Esperance 47 is classified as 'extensively-cleared' within the Shire of Esperance LGA and Recherche IBRA subregion, with only 13.43% and 15.06% of the pre-European extent remaining, respectively.

Table 3. Vegetation association within Reserve 27355 by percentage of pre-European extent remaining.

Vegetation Association	Esperance 47
Description	Shrublands; tallerack mallee-heath
Pre-European extent remaining	35.86%
Pre-European extent remaining within the **Shire of Esperance**	13.43%
Pre-European extent remaining within the **Recherche IBRA Sub-region**	15.06%
Pre- European extent in land protected for conservation	17.68%

3. Reserve Field Assessment

Reserve 27355 was surveyed by the Shire of Esperance Environmental Services team on 18/10/2023 during a set of reserve biological surveys being completed as part of the Local Biodiversity and Native Vegetation Management Project. Environmental specialist surveyors involved in the surveys included Katherine Walkerden (Environmental Officer), Julie Waters (Environmental Coordinator), and Kahree Garnaut (Environmental Officer) participated in the surveys.

3.1 Vegetation Types

Within Reserve 27355, a total of 95.86 ha of native vegetation extent was determined to be present, with the remaining 3.87 ha comprised of previously cleared or bare areas, such as perimeter firebreaks and a managed powerline service corridor bisecting the reserve. Two distinct vegetation communities were distinguished based on variation in vegetative structure and floristic composition (Table 4). Field relevé data were analysed to produce Level 5 vegetation descriptions for each distinct vegetation type, based on the National Vegetation Information System (NVIS) guidelines presented in the *Australian Vegetation Attribute Manual Version 7* (DEE 2017). Refer to Figure 2 for a map of vegetation types across Reserve 27355.

Table 4. Vegetation communities identified within Reserve 27355.

Type	Description	Figure	Area (ha)	Diversity (native species)
A	*Eucalyptus occidentalis* woodland over dense *Anarthria laevis* sedgeland	6-8	71.64	94 species out of 114 (84.46%)
B	Scattered *Nuytsia floribunda* over Myrtaceous and Proteaceous mallee-heath	9-12	24.22	96 out of 107 (89.72%)

It is believed that the Beard (1973) Vegetation System Association identified in the desktop (Esperance 47) is an appropriate match for Vegetation Type B, as it presents as a mallee-shrubland with the mallee stratum dominated by *Eucalyptus pleurocarpa*. Vegetation Type A does not match and would be better suited to Beard VSA Esperance 931 (medium woodland; yate).

NVIS level 5 definitions are provided below:

Vegetation Type A: *Eucalyptus occidentalis* woodland over dense *Anarthria laevis* sedgeland

U^ Eucalyptus occidentalis\^tree\7\d: M^^ Melaleuca cuticularis, Hakea nitida, Melaleuca calycina\^shrubs\5\i; G^^ Anarthria laevis, Lepidosperma squamata, Gahnia trifida\^sedges\1,2\d.

Vegetation Type B: *Scattered Nuytsia floribunda over Myrtaceous and Proteaceous mallee-heath*

U^ Nuytsia floribunda, Eucalyptus pleurocarpa\^tree, mallee\6\bc: M^^ Phymatocarpus maxwellii, Allocasuarina humilis, Taxandria spathulata\^shrubs\3\i: G^^ Caustis dioica, Mesomelaena tetragona, Mesomelaena stygia\^sedges\1\r.

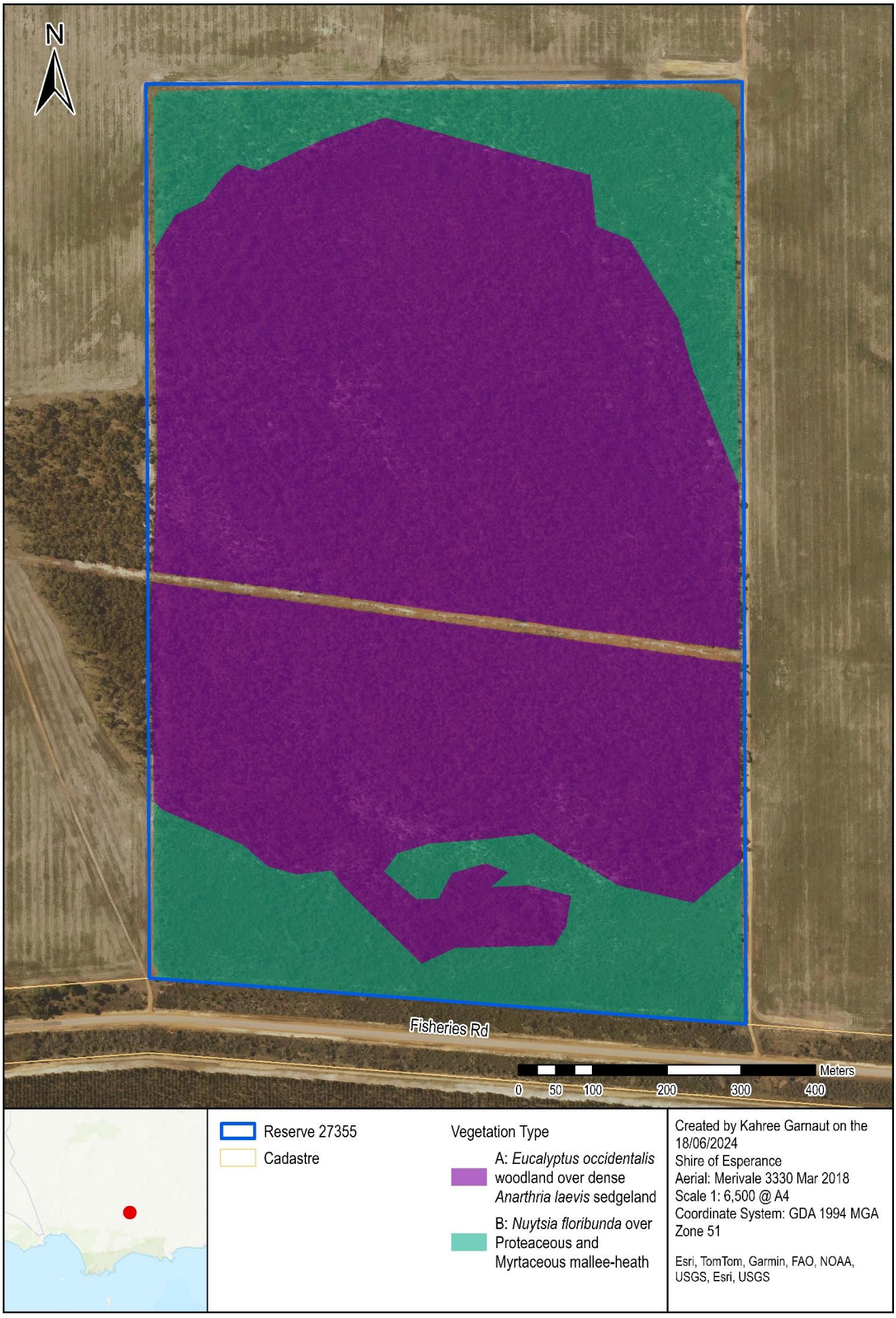


Figure 2. Vegetation types present within Reserve 27355.

3.2 Vegetation Condition

Within Reserve 27355, vegetation condition varied between Degraded and Excellent (Keighery 1994), with the majority (66.66 ha) in Excellent condition. Vegetation Type A was primarily in a Very Good or Excellent condition, with only 2.94 ha in a Degraded condition. The main disturbance resulting in this degradation of vegetation within Vegetation Type A was the construction and maintenance of the powerline maintenance zone bisecting the vegetation association. Vegetation Type B was predominantly in a Very Good or Excellent condition, with the disturbed areas concentrated around the reserve margins where agricultural weed invasion and historical clearing had occurred. A total of 3.87 ha was in a completely degraded condition and had no vegetation type assigned to it.

Table 5. Quantifying vegetation by vegetation type and condition (ha).

Vegetation Type	Area (ha)					
	Excellent	Very Good	Good	Degraded	Completely Degraded	Total
A	57.64	11.06	-	2.94	0	**71.64**
B	9.02	13.16	-	2.04	0	**24.22**
Completely degraded	-	-	-	-	3.87	**3.87**
Total	**66.66**	**24.22**	**-**	**2.98**	**3.87**	**99.73**

Vegetation Type A was bisected by powerlines, beneath which a 10 m wide firebreak is maintained for access and bushfire risk mitigation. This area was slashed in 2004 and is maintained periodically. This has subsequently encouraged establishment of agricultural weeds such as perennial grasses and Blackberry Nightshade, and also become a dumping ground for unwanted rural supplies, such as rolls of fencing. There was evidence of historical ruminant grazing within the Swamp Yate woodland, with several bovine bones observed within areas of the vegetation type with a grassy understorey. These sheep and cattle likely entered the reserve as escapees from the surrounding grazing paddocks, and the incidence of their grazing is presumably infrequent.

Vegetation Type B was primarily degraded by *Gaudium laevigatum* (Victorian Tea Tree) establishment in the south-west corner, and the intrusion of agricultural grasses, notably *Eragrostis curvula* (African Lovegrass) and *Ehrharta calycina* (Perennial Veldt Grass), from the reserve boundary with surrounding grazing land.

Refer to Table 6 for a summary of indicators for vegetation health observed within Reserve 27355.

Table 6. Vegetation health indicators identified in the field.

Vegetation Health Indicators	Present	Comments
Numerous tree stumps (not from logging)		
Dead or dying species		
Obvious reduction of tree canopies (e.g. staghorns)		
Heavy leaf/stem damage by insects (e.g. lerps, stem borers)		
Diseases/pests suspected		
Drought/lowering of groundwater table suspected		
Flooding/rise in groundwater table suspected		

Figure 3. Vegetation condition within Reserve 27355.

3.3 Flora

A total of 197 vascular plant taxa, representative of 125 genera and 46 families, were recorded within Reserve 27355. Of these, 169 were native species and 28 were introduced. The plurality of taxa were representative of the Myrtaceae (29 taxa), Fabaceae (25 taxa), Poaceae (16 taxa), Cyperaceae (14 taxa), Proteaceae (14 taxa) and Asteraceae (12 taxa) families (see Appendix 1 for the complete incidental species list).

A *Lepidosperma* sp. specimen (KSW15023) was submitted to the WA Herbarium (WAH) to assist with genus-wide taxonomic review.

- *Lepidosperma sp.* (Accession 10921; KSW15023).

Specimens resulting in range extensions were forwarded to the WA Herbarium:

- *Helichrysum leucopsideum* (Accession 10722; KSW14723, Specimen retained), representing a southern range extension by approximately 40 km, into the Recherche IBRA sub-region.

Specimens unknown to surveyors were collected and verified at the WAH as non-threatened species, such as *Stachystemon aff. brachyphyllus* (Accession 10985; KSW01424). Stachystemon aff. Brachyphyllus was an anomalous specimen with Mike Hislop describing the specimen as "An anomalous collection, closest to S. brachyphyllus but differing in several potential significant respects: longer leaves and capsules, longer and finer pedicels, generally fewer stamens and differently coloured anthers."

3.4 Priority Flora

One taxon of priority-listed flora was detected within Reserve 27355, namely the Priority 3 shrub, *Acacia bartlei,* known colloquially as Bartle's Wattle. Within the reserve, *Acacia bartlei* was recorded to occur within Vegetation Type A in Excellent condition, within the mapped extent of the P3-listed Swamp Yate PEC.

Table 7. Summary of Priority Flora identified within Reserve 27355 and / or its immediate vicinity.

Taxon	WA Status	No. of Plants Observed	Associated Vegetation Type(s)
Acacia bartlei	P3	Not counted in the field	A

***Acacia bartlei* – P3 – KSW14923**

Acacia bartlei was found within Vegetation Type A on within an area of Excellent condition vegetation near the western boundary, within the Swamp Yate PEC. The exact location was recorded and is depicted in Figure 4. A specimen was forwarded to the WA Herbarium. This finding suggests a southward range extension of approximately 20 km into the Recherche IBRA subregion.

Figure 4. Priority Flora recorded within Reserve 27355.

3.4 Weeds

Weed establishment and spread is concern to the vegetative health of Reserve 27355, with the majority of weeds located within the disturbed reserve margins and firebreak, with the extent of perennial agricultural grasses highly indicative of vegetation condition. All twenty-eight introduced flora were listed as 'Permitted' under Schedule 11 of the BAM Act, and are regarded as environmental weeds in the Esperance region. Of these, the most concerning species threatening the ecological integrity of the reserve were sub-tropical agricultural grasses such as *Avena barbata, Ehrharta calycina, Hordeum* sp., *Lolium* sp., and *Vulpia bromoides,* and the highly-invasive shrub, *Gaudium laevigatum*. *Gaudium laevigatum* is listed as a priority weed for management on the *Shire of Esperance 2009 – 2018 Environmental Weed Strategy* (Field 2008). The slow-growing *Pinus pinaster* poses a latent threat to the reserve, as the establishment and naturalisation of this species tends to result in the formation of monocultures with a relatively absent understorey. No WoNS or Declared Pests were recorded within Reserve 27355.

Within Vegetation Type A, there were 22 weed species present, predominantly within the Asteraceae and Poaceae families. Perennial Veldt Grass (*Ehrharta calycina*) posed a significant threat to the vegetative health in the understorey in degraded areas, particularly along the firebreak in the middle where it was spreading into the less-disturbed cores of the reserve. Annual grasses were observed to be sparsely covering the seasonally-inundated basins of Vegetation Type A.

Within Vegetation Type B, there were eight weed species present, with weed cover highest along the disturbed margins of the reserve such as the northern boundary. A young *Pinus pinaster* tree was growing within this vegetation type, possibly from a seed cone dropped by a foraging Carnaby's black cockatoo. Invasive agricultural grasses such as *Ehrharta calycina* and *Avena barbata* posed the highest environmental threat to the vegetative health of Vegetation Type B.

Several non-endemic Australian native trees had been planted by neighboring landowners as forestry crops or paddock windbreaks; these include Tuart (*Eucalyptus gomphalocephala*) and Tasmanian Blue Gum (*E. globosa*). However, these species did not appear to be naturalising in the area or within Reserve 27355.

A weed range extension was recorded for Ferngrass, *Catapodium rigidum* (KSW14823), representing an increase in range extension approximately 50 km to the east.

3.1 Threatened and Priority Ecological Communities

The Kwongkan TEC / PEC, listed as Endangered under the EPBC Act and Priority 3 under the BC Act, was determined to be present within Reserve 27355, represented solely by Vegetation Type B: Scattered *Nuytsia floribunda* over Proteaceous and Myrtaceous mallee-heath, which was considered to meet diagnostic criteria for Kwongkan TEC as presented in the ecological community's *Approved Conservation Advice* (DoE 2015). However, due to several degrading factors, primarily weed disturbance, only areas of these vegetation types in Good or better condition were included in the Kwongkan TEC (Figure 5). Reserve 27355 is situated within the Southeast Coastal Floristic Province. Within Vegetation Type B, there were 16 Proteaceous floral taxa present, of which 9 were diagnostic Kwongkan TEC species. Additionally, Proteaceous species demonstrated > 30% cover across the midstorey strata of Vegetation Type B. Therefore, Vegetation Type B satisfies the diagnostic characteristics criterion for consideration as part of the EN TEC. A total of 22.18 ha of Kwongkan TEC meeting 'High' condition category criteria was determined to occur within Reserve 27355.

Table 8. Proteaceous species present within Vegetation Type B.

Taxon	Kwongkan TEC Diagnostic Species
Adenanthos cuneatus	**Yes**

Taxon	Kwongkan TEC Diagnostic Species
Banksia armata	**Yes**
Banksia nivea	**Yes**
Banksia obovata	**Yes**
Banksia repens	**Yes (Fitzgerald)**
Grevillea oligantha	No
Hakea corymbosa	**Yes**
Hakea laurina	No
Hakea nitida	**Yes**
Hakea prostrata	No
Hakea trifurcata	**Yes**
Hakea varia	No
Isopogon polycephalus	**Yes**
Petrophile fastigiata	No
Petrophile squamata subsp. *northern*	No

The P3 'Swamp Yate (*Eucalyptus occidentalis)* woodlands in seasonally-inundated clay basins (South Coast) PEC was also determined to be present within the reserve, represented by Vegetation Type A: *Eucalyptus occidentalis* woodland in Good or better condition. This PEC is broadly described as 'Yate woodlands with intact understorey and fringing vegetation'. The *Eucalyptus occidentalis* woodland present was continuous and circular in shape, forming a moderately dense canopy (30-70% cover) that created an overstorey to a species-rich shrubland midstorey and sedgeland/ heath understorey. The clay-rich soil was present in a circular basin, the centre of which showed signs of seasonal inundation (mosses, annual grasses, abundance of calling frogs indicating wetland habitat, dried algae marks on tree trunks showing inundation levels). The below-average rainfall experienced over the winter of 2023 in Esperance likely contributed to a shorter inundation phase of the Swamp Yate woodland. A total of 68.70 ha of Swamp Yate PEC was mapped within the reserve.

Refer to Figure 5 for the mapped extent of the Kwongkan TEC / PEC and Swamp Yate PEC within Reserve 27355.

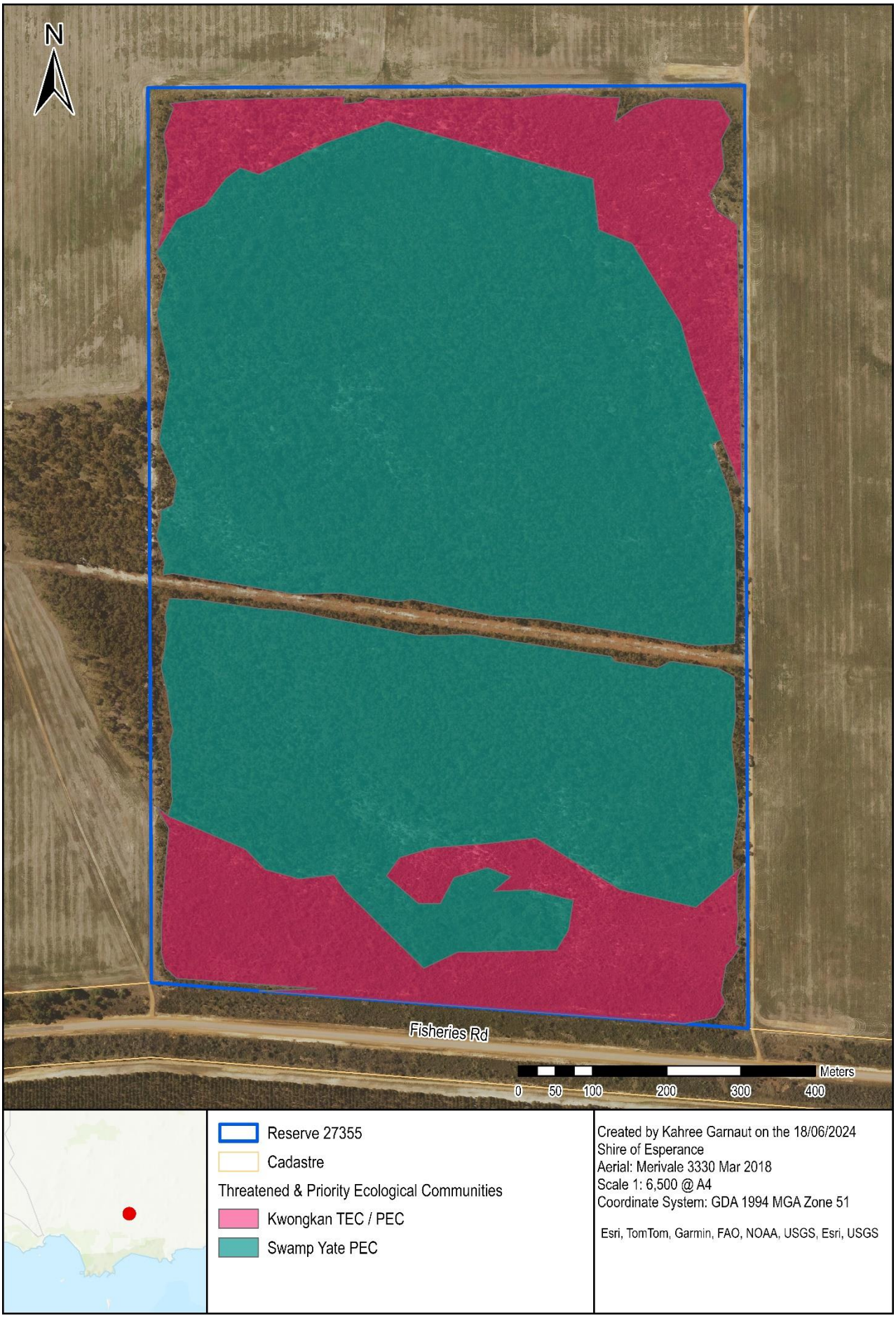


Figure 5. Extent of Kwongkan TEC / PEC and Swamp Yate PEC within Reserve 27355.

3.2 Fauna

During the field survey, 40 faunal taxa were detected directly (i.e. through animal sightings) or indirectly (i.e. observation of their traces). Refer to Appendix 2 for the full species list. Of the 40 species detected, 34 were native fauna, including the Priority 4-listed quenda (*Isoodon obesulus fusciventer*), which was detected indirectly via observation of diggings, suitably-sized runnels through the understorey, and abundance of suitable swampland habitat with fungal food resources. The remaining six fauna were introduced, namely the laughing dove (*Spilopelia sengalensis*), feral European honey bee (*Apis mellifera*), domestic cattle (*Bos taurus*), domestic sheep (*Ovis aries*), the European red fox (*Vulpes vulpes*), and European rabbit (*Oryctolagus cuniculus*). The latter two species are recognised as Declared Pests – Category 3 Management under the BAM Act.

The traces of domestic sheep and cattle within the reserve consisted of bones, skulls and old scats, indicating that these animals are unlikely to be actively inhabiting the reserve. It is likely that these domestic livestock strayed into the reserve when a fenceline was down, and potentially perishing from eating toxin-rich native peas (*Gastrolobium* spp.). It is also possible that the wedge-tailed eagle observed may have dropped predated animal remains into the reserve. No tracks or fresh scats were seen, and the fenceline currently is in intact condition. The feral honey bees were observed to have established hives in several mature *Melaleuca cuticularis* trunks in the swampland areas of the reserve.

On approach to Reserve 27355 at 9:15 am, approximately 30 Carnaby's black cockatoos (*Zanda latirostris*) were sighted foraging in a large Maritime Pine (*Pinus pinaster*) on the Fisheries Road reserve approximately 4 km west of the site near the intersection with Jims Oven Road. These charismatic cockatoos are listed as Endangered under both the EPBC Act and BC Act.

Table 9. Native Fauna and Fungi Habitat field checklist.

Habitat	y/n	Comments
Areas of trees (with or without understorey)	Y	
Areas of dense understorey vegetation	Y	
Tree hollows in old mature trees	Y	
Dead branches as perches for hunting/ look outs	Y	
Dead vegetation for fungi/invertebrate habitat (leaf litter, branches/logs)	Y	
Large fallen logs on the ground	Y	
Granite or other natural rocky outcrops	N	
Moss beds for fungi habitat	Y	
Wetlands or waterways	Y	Seasonally-inundated clay basin of Swamp Yate woodland

3.4 Carnaby's Black Cockatoo

Carnaby's black cockatoo (*Zanda latirostris*) was identified in the desktop fauna survey to be likely / possibly occurring within Reserve 27355, with records known from within 2.07 km and the closest known roosting site located 7.25 km away. A flock of approximately 10 Carnaby's black cockatoos were sighted approximately 10 km west of the reserve along Fisheries Road. Due to the lack of mature eucalypt woodlands to form suitable breeding habitat for the black cockatoos in the Esperance region, the species generally present during the non-breeding season between January and July. During these months, the Carnaby's black cockatoo forage extensively on coastal heath, coastal woodlands and proteaceous shrublands, often returning to mature Tuart trees or Maritime Pine plantations to roost overnight.

No Carnaby's black cockatoos were sighted within the reserve during the survey, and no traces were observed. This may also be due to the survey occurring during the species' peak breeding period, where they tend to be at breeding sites in old-growth eucalypt woodlands in the Fitzgerald Biosphere or

Wheatbelt. Suitable foraging habitat was determined to occur for the species within Vegetation Type A and B, and suitable night-roosting habitat in Vegetation Type A. In total, 90.88 ha of 'High' quality foraging habitat and 68.70 ha of night roosting habitat was identified within Reserve 27355 for the Carnaby's black cockatoo. Refer to details presented in the subsections below.

Carnaby's Black Cockatoo Foraging Habitat Assessment

Within Vegetation Type A, there were at least 15 suitable foraging species, including *Banksia nivea, Hakea laurina, H. nitida, H. varia, Eucalyptus occidentalis, E. leptocalyx, E. tumida, Melaleuca cuticularis, Melaleuca hamata, Melaleuca pulchella*, *Phymatocarpus maxwellii*, and wattles such as *Acacia cyclops* and *A. cochlearis*. The clovers *Trifolium campestre* and *T. glomeratum* may also provide supplementary foraging resources for the Carnaby's black cockatoo within Vegetation Type A. A total of 68.70 ha of suitable foraging habitat is available within Vegetation Type A in 'Good' or better condition.

Within Vegetation Type B, there were at least XX suitable foraging species, including *Banksia armata, B. nivea, B. obovata, B. repens, Grevillea oligantha, Hakea corymbosa, H. nitida, Isopogon polycephalus, Petrophile fastigiata*, *Eucalyptus angulosa, E. connexa, E. uncinata, E. pleurocarpa, Melaleuca cuticularis, M. pulchella, M. tuberculata*, *Apectospermum spinescens*, Allocasuarina humilis, A. thuyoides, Jacksonia capitata, Acacia myrtifolia, and A. cyclops. The herbs *Medicargo* sp., *Trifolium campestre* and *Geranium solanderi* may provide supplementary forage. A total of 22.18 ha of suitable foraging habitat is available within Vegetation Type B in 'Good' or better condition.

Proximity to foraging habitat

Reserve 27355 is situated within an extensively cleared and intensively cultivated agricultural landscape primarily used for cattle and sheep grazing, and extensive timber plantations. Isolated remnants of native vegetation remain in the immediate landscape, tending to surround natural lakes and watercourses, and various medium-sized undeveloped reserves. Cape Le Grand National Park is located approximately 14.83 km south of the reserve, which presents vast areas of high-quality foraging habitat for the cockatoos. The various *Pinus pinaster* and *Eucalyptus globosa* plantations within 12 km of the reserve, as well as *Pinus pinaster* windbreaks and native vegetation remnants provide additional foraging habitat. Approximately 68.70 ha of suitable roosting habitat was provided by Vegetation Type A.

Proximity to roosting habitat

Within the Esperance region, Carnaby's Black Cockatoo are known to use the canopies of established Maritime Pine (*Pinus pinaster*) plantations and paddock windbreaks to roost overnight, as well as groves of large Tuart (*Eucalyptus gomphalocephala)* and old-growth Swamp Yate (*E. occidentalis*). These species often provide important foraging material for the birds, as well as tending to occur near reliable freshwater sources, such as farm dams, lakes, rivers, or livestock drinking troughs. Reserve 27355 is located 7.247 km from a known roost site in the Merivale area.

Within Reserve 27355, the large circular basin of old-growth *Eucalyptus occidentalis* provided ample roosting habitat for the Carnaby's black cockatoo. This is enhanced by the positioning of over 900 ha of established Tasmanian Blue Gum (*Eucalyptus globulus*) plantations directly to the south of the reserve on the other side of Fisheries Rd, within which Carnaby's black cockatoos have been recorded. Additionally, an approximately 38 ha *Pinus pinaster* plantation is located approximately 5.45 km north-east of the reserve.

Water resources

Numerous drinking water sources are present within a 12 km radius of the site; namely several farm dams, livestock troughs in adjacent pasture paddocks, and scattered natural lakes.

3.5 Threats (to nature conservation values)

Agricultural grasses and shrubs (i.e. *Gaudium laevigatum*) pose the most significant risk to vegetative degradation in the reserve from the disturbed margins. Edge effects in remnants of native vegetation commonly involve a margin of disturbed / degraded vegetation from weed invasion, however as long as vegetative condition is maintained in the core and disturbance factors are managed, it is unlikely that these weeds will spread further into the reserve. The juvenile *Pinus pinaster* may establish into a large tree that initiates a new cluster, which would in turn shade out the kwongkan understorey. The prickly herb, *Cirsium vulgare*, was observed to be establishing densely along the disturbed margins of the firebreak alongside *Malva parviflora*.

No evidence of Phytophthora dieback was observed within the reserve, with susceptible species observed in both vegetation types at with acceptable coverage. No dead individuals were sighted that indicated a possible emergence of Phytophthora dieback. Therefore, standard hygiene protocols (such a as vehicle cleanliness and footwear hygiene) must be adhered to by any visitors and workers entering the reserve to prevent the introduction of this devastating plant disease.

Historic grazing by bovines (domestic sheep and cattle) within the reserve appears to be insignificant, suggesting that this occurrence is infrequent. It can be interpreted that this would be characteristic of escaped livestock venturing into the reserve and opportunistically foraging on native and introduced grasses and sedges.

Increased grazing pressures on vegetation by introduced rabbits was observed to be potentially problematic within areas of vegetation in Very Good or worse condition. Feral rabbit grazing pressure tends to target highly-palatable native species, especially grasses and emerging seedlings, reducing the ability for plants to recruit. This leaves bare ground open for erosion from rabbit diggings and space for disturbance-opportunist weeds to establish.

At least six large rusted coils of wire fencing had been dumped along the firebreak. These each would weigh over 100 kg, and litter the landscape. If left, they may attract future dumping. Additionally, lengths of dysfunctional fencing along the southern boundary pose a risk to wildlife, with the loose wire strands potentially ensnaring a kangaroo or emu.

4. Reserve Assessment Summary

Reserve 27355 'Lot 80, Fisheries Road, Neridup' is an ecologically diverse reserve with two vegetation types, namely Vegetation Type A: *Eucalyptus occidentalis* woodland, and Vegetation Type B: Mallee and *Nuytsia floribunda* over kwongkan shrubland. A total of 169 native flora species were recorded during the field survey, including the P3 *Acacia bartlei*, listed under the BC Act.

The reserve contained substantial areas (22.18 ha) of the EPBC Act-listed 'Proteaceae Dominated Kwongkan Shrublands of the southeast coastal floristic province of Western Australia (Kwongkan)' TEC. The reserve contained a significant area (68.70 ha) of the BC Act-listed 'Swamp Yate, *Eucalyptus occidentalis*, woodlands in seasonally inundated clay basins in the South Coast of Western Australia (Swamp Yate)' PEC in Good or Excellent condition.

Thirty-four native fauna species were recorded during the surveys, including the Priority 4-listed quenda (*Isoodon obesulus fusciventer*). Reserve 27355 provided significant foraging and roosting habitat (90.88 ha) for the Carnaby's black cockatoo (*Zanda latirostris*), which is listed as Endangered under both the EPBC Act and the BC Act. Suitable habitat for the central long-eared bat (*Nyctophilus major tor*, P3), jewelled sandplain Ctenotus (*Ctenotus gemmula*, P3), southern death adder (*Acanthophis antarcticus*, P3), western brush wallaby (*Notamacropus irma*, P4), and peregrine falcon (*Falco peregrinus*, OS) was determined to occur within Reserve 27355.

Reserve 27355 is connected to surrounding native vegetation via extensive blocks of *Eucalyptus globosa* (Tasmanian Blue Gum) plantations across Fisheries Road to the south, which are interspersed with uncultivated natural wetlands and surrounding riparian habitat. Whilst the plantations do not form native vegetation, they offer a permeable matrix for wildlife to inhabit and migrate through due to their provision of dense leaf litter and twiggy debris, ample canopy for roosting and foraging, and shelter from raptors. Ultimately, this mosaic of plantations and native vegetation connects Reserve 27355 to the extensive Cape Le Grand National Park and Tjaltjraak Boodja Park. Vegetated road reserves provide additional movement corridors. There is very little vegetation connectivity to the north, with extensive agricultural paddocks buffering between smaller remnants.

The reserve was primarily in an Excellent condition, with the most problematic weed issues occurring around the perimeter of the reserve, within the maintained firebreak bisecting Vegetation Type A, and along the margin with the Fisheries Road reserve. The most problematic weeds present include *Ehrharta calycina, Gaudium laevigatum, Eragrostis curvula* and *Cirsium vulgare.*

4.1 Recommendations for Management

After inspecting the reserve, the following management actions were recommended:

- Removal of *Pinus pinaster* from Vegetation Type B in southern component of the reserve;
- Control of *Cirsium vulgare* and *Malva parviflora* along firebreak;
- Removal of coils of wire fencing and other miscellaneous large debris from the maintained firebreak bisecting the swamp;
- Management of *Gaudium laevigatum* in Fisheries Road reserve bordering southern reserve to prevent establishment within Reserve 27355; and
- Removal of all dysfunctional fencing along southern boundary.

5. Photos

Figure 6. Vegetation Type A: *Eucalyptus occidentalis* Woodland over *Anarthria laevis* Sedgeland. *Photo taken by Katherine Walkerden on the 18th of October 2023.*

Figure 7. Vegetation Type A illustrating change in understorey between seasonally-inundated (bare leaf litter with annual grasses) and marginal seasonally-damp soil (thicker sedges). *Photo taken by Kahree Garnaut on the 18th of October 2023.*

Figure 7. *Ficinia marginata* and *Juncus pallidus* dominating seasonally-inundated component of Vegetation Type A. *Photo taken by Kahree Garnaut on the 18th of October 2018.*

Figure 8. *Melaleuca cuticularis* entering midstorey in seasonally-damp and seasonally-inundated areas of Vegetation Type A. *Photo taken by Kahree Garnaut on the 18th of October 2023.*

Figure 9. Vegetation Type B: Mallee and *Nuytsia floribunda* over kwongkan shrubland. *Photo taken by Katherine Walkerden on the 18th of October 2023.*

Figure 10. Mallee emerging within Vegetation Type B, close to small pocket of Vegetation Type A in the southern half of the reserve. *Photo taken by Katherine Walkerden on the 18th of October 2023.*

Figure 11. Vegetation Type B within Reserve 27355. *Photo taken by Katherine Walkerden on the 18th of October 2023.*

Figure 12. Vegetation Type B within Reserve 27355, showing intrusion of *Ehrharta calycina* from the remnant edges. *Photo taken by Kahree Garnaut on the 18th of October 2023.*

Figure 13. Slashed firebreak beneath powerlines bisecting Reserve 27355 within Vegetation Type A, illustrating intensity of weed invasion and rusting coils of wire. *Photo taken by Kahree Garnaut on the 18th of October 2023.*

Figure 14. Actively used wedge-tailed eagle (*Aquila audax*) nest within mature *Eucalyptus occidentalis* along edge of firebreak bisecting the swamp yate woodland. An adult eagle was sighted. *Photo taken by Julie Waters on the 18th of October 2023.*

Figure 15. Highly-invasive shrub, *Gaudium laevigatum* establishing in disturbed road reserve adjacent to Reserve 27355. *Photo taken by Katherine Walkerden on the 18th of October 2023.*

Figure 16. Feral bee hive within a dead *Eucalyptus occidentalis* trunk in the core of the reserve. *Photo taken by Kahree Garnaut on the 18th of October 2024.*

Appendix 1: Incidental Flora Species List

Flora identified to occur within Reserve 27355.

Family	Scientific Name	Common Name	Invasive	WA Status	Herbarium Reference	Vegetation Type A	Vegetation Type B
Anarthriaceae	*Anarthria humilis*					X	
	Anarthria laevis					X	
	Lyginia imberbis						X
Apiaceae	*Platysace effusa*						
	Xanthosia huegelii					X	
Araliaceae	*Trachymene pilosa*	Native Parsnip				X	
Asparagaceae	*Laxmannia minor*	Paperlily				X	
	Lomandra mucronata	Mat Rush				X	
	Thysanotus patersonii					X	
Asteraceae	*Blennospora drummondii*	Dwarf Beauty-heads				X	
	Cirsium vulgare	Spear Thistle	*			X	
	Erigeron bonariensis	Tall Fleabane	*			X	
	Helichrysum leucopsideum	Satin Everlasting			KSW14723	X	
	Hyperchaeris glabra	Hairy Flatweed	*				X
	Hyperchaeris radicata	Flat Weed	*			X	
	Pseudognaphalium luteoalbum	Jersey Cudweed	*			X	
	Pterochaeta paniculata	Wool Waitzia				X	
	Senecio glossanthus	Slender Groundsel				X	
	Senecio quadridentatus	Cotton Fireweed				X	
	Sonchus oleraceus	Common Sowthistle	*			X	X
	Ursinia anthemoides	Solar Fire	*			X	

Family	Scientific Name	Common Name	Invasive	WA Status	Herbarium Reference	Vegetation Type A	Vegetation Type B
Casuarinaceae	*Allocasuarina humilis*	Dwarf Sheoak					X
	Allocasuarina lehmanniana subsp. ecarinata						X
	Allocasuarina thuyoides	Horned Sheoak					X
Centrolepidaceae	*Centrolepis aristata*	Pointed Centrolepis					X
Convolvulaceae	*Wilsonia humilis*	Silky Wilsonia				X	
Cyperaceae	*Caustis dioica*	Chinese Puzzle					X
	Chorizandra enodis	Black Bristle Rush				X	
	Eleocharis acuta	Common Spikerush				X	
	Ficinia marginata					X	
	Gahnia ancistrophylla	Hook-leaved Sedge				X	X
	Gahnia trifida	Coast Saw-sedge				X	
	Lepidosperma leptostachyum					X	
	Lepidosperma sp.				KSW15023	X	
	Lepidosperma squamata						X
	Mesomelaena stygia	Stygian's Sedge				X	X
	Mesomelaena tetragona	Semaphore Sedge					X
	Schoenus caespititius	Tufted Bog-rush				X	
	Schoenus subfascicularis					X	
	Tricostularia compressa	Clustered Tricostularia					X
Dilleniaceae	*Hibbertia acerosa*	Needle-leaved Guineaflower			KSW15123	X	
	Hibbertia andrewsiana						X
	Hibbertia gracilipes	Slender Guineaflower					X
	Hibbertia ulicifolia					X	

Family	Scientific Name	Common Name	Invasive	WA Status	Herbarium Reference	Vegetation Type A	Vegetation Type B
Droseraceae	*Drosera drummondii*					X	
	Drosera leucoblasta	Wheel Sundew					X
	Drosera neesii	Jewel Rainbow				X	X
Ericaceae	*Lysinema ciliatum*	Curry and Rice					X
Euphorbiaceae	*Monotaxis paxii*						X
	Stachystemon aff. brachyphyllus				KSW01424		X
	Stachystemon virgatus						X
Fabaceae	*Acacia bartlei*	Bartle's Wattle		P3	KSW14923	X	
	Acacia cochlearis	Rigid Wattle				X	
	Acacia cyclops	Red-eyed Wattle				X	
	Acacia gonophylla	Rasp-stemmed Wattle				X	X
	Acacia lasiocarpa var. *bracteolata*					X	X
	Acacia maxwellii	Prostrate Umbrella Bush				X	
	Acacia myrtifolia						X
	Acacia pachyphylla					X	
	Acacia pulchella var. *goadbyi*					X	
	Acacia subcaerulea	Blue-barked Acacia				X	
	Bossiaea preissii	Fiery-flowered Bossiaea				X	X
	Chorizema aciculare	Needle-leaved Chorizema					X
	Chorizema obtusifolium	Flame Pea					X
	Daviesia dilatata					X	

Family	Scientific Name	Common Name	Invasive	WA Status	Herbarium Reference	Vegetation Type A	Vegetation Type B
	Daviesia teretifolia						X
Fabaceae	*Gompholobium knightianum*	Knight's Wedge-pea					X
	Gompholobium marginatum						X
	Gompholobium polymorphum	Twining Gompholobium				X	X
	Jacksonia capitata	Dogwood					X
	Kennedia sp. South Coast	South Coast Kennedia				X	
	Medicago sp.					X	
	Ornithopus compressus	Yellow Serradella	*				X
	Templetonia retusa	Cockies' Tongues					
	Trifolium campestre	Hop Clover	*			X	X
	Trifolium glomeratum	Cluster Clover	*			X	
Geraniaceae	*Geranium solanderi*	Native Geranium				X	
	Pelargonium littorale	Seaside Geranium				X	
Goodeniaceae	*Coopernookia strophiolata*	Sticky Coopernookia				X	
	Dampiera lavandulacea					X	X
	Dampiera parvifolia						X
	Dampiera sacculata	Weeping Dampiera				X	X
	Goodenia concinna	Elegant Goodenia				X	
	Goodenia incana	Hoary Goodenia					X
	Goodenia trinervis	Yellow Velleia				X	
	Goodenia viscosa	Viscid Goodenia				X	
	Lechenaultia formosa	Red Leschenaultia					X
Haemodoraceae	*Anigozanthos rufus*	Red Kangaroo Paw					X
	Conostylis seorsifolia subsp. *seorsifolia*					X	

Family	Scientific Name	Common Name	Invasive	WA Status	Herbarium Reference	Vegetation Type A	Vegetation Type B
	Tribonanthes violacea	Cloaked-anther Plant				X	
Haloragaceae	*Glischrocaryon angustifolium*	Golden Pennants				X	X
Hemerocallidaceae	*Chamaescilla corymbosa*	Blue Squill					
	Dianella revoluta	Blue Flax Lily				X	
	Stypandra glauca	Blind Grass					
	Tricoryne elatior	Yellow Autumn Lily					X
Iridaceae	*Patersonia lanata*	Woolly Patersonia					X
	Patersonia occidentalis	Purple Flag				X	
Juncaceae	*Juncus pallidus*	Pale Rush				X	
Lauraceae	*Cassytha glabella forma dispar*	Devil's Twine				X	
Linaceae	*Linum marginale*	Wild Flax				X	
Loganiaceae	*Logania micrantha*						X
Loranthaceae	*Nuytsia floribunda*	Moodjar					X
Malvaceae	*Alyogyne* sp. Hutt River	Blue Heeler				X	
	Malva parviflora	Marshmallow	*			X	
	Thomasia macrocalyx	Paper-flower				X	
Myrtaceae	*Apectospermum spinescens*	Spiny Tea Tree					X
	Austrobaeckea latens					X	
	Beaufortia schaueri	Pink Beaufortia					X
	Calothamnus gracilis	Slender Net Bush					X
	Calytrix decandra	Pink Starflower					X
	Calytrix leschenaultii	Posy Starflower					X
	Conothamnus aureus						X
	Cyathostemon ambiguus					X	X

Family	Scientific Name	Common Name	Invasive	WA Status	Herbarium Reference	Vegetation Type A	Vegetation Type B
Myrtaceae	*Eucalyptus angulosa*	Southern Ridge-fruited Mallee					X
	Eucalyptus connexa						X
	Eucalyptus leptocalyx	Hopetoun Mallee				X	
	Eucalyptus occidentalis	Swamp Yate				X	
	Eucalyptus pleurocarpa	Tallerack					X
	Eucalyptus tumida					X	X
	Eucalyptus uncinata	Hook-leaved Mallee					X
	Gaudium laevigatum	Victorian Tea Tree	*				X
	Melaleuca calycina						
	Melaleuca cuticularis	Saltwater Paperbark				X	
	Melaleuca glaberrima						X
	Melaleuca hamata	Broombush				X	
	Melaleuca pentagona var. *latifolia*	Little Penta Honey-myrtle				X	
	Melaleuca pulchella	Claw Honey-myrtle				X	
	Melaleuca scabra	Rough Honey-myrtle					X
	Melaleuca striata	Sand Honey-myrtle					X
	Melaleuca suberosa	Corky Honey-myrtle					X
	Melaleuca thapsina					X	
	Melaleuca tuberculata						X
	Micromyrtus elobata subsp. *elobata*						X
	Phymatocarpus maxwellii					X	X
	Taxandria spathulata						X
	Verticordia minutiflora						X

Family	Scientific Name	Common Name	Invasive	WA Status	Herbarium Reference	Vegetation Type A	Vegetation Type B
Orchidaceae	*Caladenia marginata*	White Fairy Orchid				X	
	Caladenia sp.					X	
	Disa bracteata	South African Weed Orchid	*			X	
	Diuris concinna	Elegant Donkey Orchid				X	
	Lyperanthus serratus	Rattle Beaks				X	X
	Microtis media	Common Mignonette Orchid				X	
	Thelymitra graminea	Shy Sun Orchid				X	
	Thelymitra sp.	A Sun Orchid					X
Oxalidaceae	*Oxalis corniculata*	Creeping Wood Sorrel	*			X	
Papaveraceae	*Fumaria capreolata*	White Fumitory	*			X	
Pinaceae	*Pinus pinaster*	Maritime Pine	*				X
Pittosporaceae	*Billardiera fusiformis*	Australian Bluebell				X	
	Billardiera speciosa	Coastal Bluebell					X
Poaceae	*Austrostipa hemipogon*	Half-bearded Speargrass				X	
	Austrostipa mollis	Soft Speargrass				X	
	Avena barbata	Bearded Oat	*				
	Briza maxima	Blowfly Grass	*			X	
	Briza minor	Shiver Grass	*			X	
	Catapodium rigidum	Ferngrass			KSW14823	X	
	Ehrharta calycina	Perennial Veldt Grass	*			X	
	Hordeum sp.	Barley Grass	*			X	
	Lachnagrostis filiformis	Blowngrass				X	
	Lagurus ovatus	Hare's Tail Grass	*			X	

Family	Scientific Name	Common Name	Invasive	WA Status	Herbarium Reference	Vegetation Type A	Vegetation Type B
Poaceae	*Lolium sp.*	Ryegrass	*				X
	Neurachne alopecuroidea	Foxtail Mulga Grass				X	X
	Poa pratensis	Kentucky Bluegrass	*			X	
	Rostraria pumila	Tiny Bristle Grass				X	
	Rytidosperma setacea	Bristly Wallaby Grass					X
	Vulpia bromoides	Squirrel Tail Fescue	*			X	
Polygalaceae	*Comesperma ciliatum*	Twining Comesperma				X	
	Comesperma virgatum	Milkwort				X	
Primulaceae	*Lysimachia arvensis*	Scarlet Pimpernel	*			X	X
Proteaceae	*Adenanthos cuneatus*	Coastal Jugflower					X
	Banksia armata	Prickly Dryandra					X
	Banksia nivea	Honeypot Dryandra				X	X
	Banksia obovata	Wedge-leaved Banksia					X
	Banksia repens	Creeping Banksia					X
	Grevillea oligantha	Few-flowered Grevillea					X
	Hakea corymbosa	Cauliflower Hakea					X
	Hakea laurina	Pincushion Hakea				X	
	Hakea nitida	Frog Hakea				X	X
	Hakea prostrata	Wavy-leaved Hakea					X
	Hakea varia	Variable-leaved Hakea				X	X
	Isopogon polycephalus	Clustered Coneflower					X
	Petrophile fastigiata						X
	Petrophile squamata subsp. *northern*						X
Restionaceae	*Desmocladus castaneus*						X
	Hypolaena exsulca					X	

Family	Scientific Name	Common Name	Invasive	WA Status	Herbarium Reference	Vegetation Type A	Vegetation Type B
Rhamnaceae	*Cryptandra pungens*						X
Rubiaceae	*Opercularia vaginata*	Dog Weed				X	X
Rutaceae	*Boronia crassifolia*						X
	Boronia spathulata						X
Santalaceae	*Exocarpos sparteus*	Broom Ballart					
Sapindaceae	*Dodonaea caespitosa*	Horny Hop-bush				X	
Solanaceae	*Solanum nigrum*	Blackberry Nightshade	*			X	
Stylidiaceae	*Stylidium calcaratum*	Book Triggerplant				X	
	Stylidium ecorne	Foot Triggerplant				X	
	Stylidium turleyae	Turley's Stylidium				X	
Thymelaeaceae	*Pimelea angustifolia*	Narrow-leaved Pimelea				X	
Xanthorrhoaceae	*Xanthorrhoea platyphylla*	Balga					X

Appendix 2: Incidental Fauna Species List

Fauna determined to be present within Reserve 27355 based on observations of animals or their traces (e.g. bones, feathers, scats, tracks, foraging evidence, shells, vocalisations, skins, etc.).

Class	Family	Scientific Name	Vernacular	Introduced	WA Status	Observations
Amphibia	Hylidae	*Litoria cyclorhyncha*	Spotted-thigh frog			Heard
	Myobactrachidae	*Psuedophryne guentheri*	Günther's toadlet			Heard
Arachnida	Areneidae	*Austracantha minax*	Christmas spider			Seen
Aves	Acanthizidae	*Acanthiza chrysorrhoa*	Yellow-rumped thornbill			Seen
		Sericornis frontalis	White-browed scrubwren or koorkal			Seen
		Smicrornis brevirostris	Weebill			Seen
	Accipitridae	*Aquila audax*	Wedge-tailed eagle or waalitj			Seen; nest with chicks.
		Elanus axillaris	Black-shouldered kite			Seen
	Ardeidae	*Egretta novaehollandiae*	White-faced heron			Seen
	Artamidae	*Cracticus torquatus*	Grey butcherbird or kwadalang			Seen
		Gymnorhina tibicen	Australian magpie or koolbardi			Heard
	Cacatuidae	*Eolophus roseicapilla*	Galah			Heard
	Campephagidae	*Coracina novaehollandiae*	Black-faced cuckoo-shrike			Seen
	Columbidae	*Ocyphaps lophotes*	Crested pigeon			Seen
	Corvidae	*Corvus cenchroides*	Australian raven or wardang			Seen
	Hirundinidae	*Petrochelidon nigricans*	Tree martin			Seen
	Locustellidae	*Megalurus cruralis*	Brown songlark			Seen
	Meliphagidae	*Lichmera indistincta*	Brown honeyeater			Heard
		Manorina flavigula	Yellow-throated miner			Heard
		Phylidonyris novaehollandiae	New Holland honeyeater or bandiny			Seen
	Monarchidae	*Grallina cyanoleuca*	Magpie-lark			Seen

Class	Family	Scientific Name	Vernacular	Introduced	WA Status	Observations
Aves	Pachycephalidae	*Colluricincla harmonica*	Grey shrike-thrush			Heard
		Pachycephala fuliginosa	Western whistler			Heard
		Pachycephala rufiventris	Rufous whistler			Heard
	Pardalotidae	*Pardalotus striatus*	Striated pardalote			Heard
	Petroicidae	*Microeca fascinans*	Jacky Winter			Seen
	Psittaculidae	*Purpureicephalus spurius*	Red-capped parrot			Heard
	Rhipiduridae	*Rhipidura albiscapa*	Grey fantail or kadjinak			Seen
		Rhipidura leucophrys	Willie wagtail or djiti-djiti			Seen
	Columbidae	*Spilopelia senegalensis*	Laughing dove	*		Sighted
	Zosteropidae	*Zosterops lateralis chloronotus*	Western silvereye			Seen
Insecta	Apidae	*Apis mellifera*	European honey bee	*		Seen and active hives
Mammalia	Bovidae	*Bos taurus*	Cattle	*		Bones
		Ovis aries	Domestic sheep	*		Skulls
	Canidae	*Vulpes vulpes*	European red fox	*	Declared Pest	Scats
	Leporidae	*Oryctolagus cuniculus*	Rabbit	*	Declared Pest	Scats
	Macropodidae	*Macropus fuliginosus*	Western grey kangaroo or yonga			Seen
	Peramelidae	*Isoodon obesulus fusciventer*	Quenda or southwestern brown bandicoot		P4	Scats, runnels and diggings
Reptilia	Elapidae	*Elapognathus coronatus*	Western crowned snake			Seen

Appendix 3: Threatened and Priority Flora Desktop Results

Data provided by Department of Biodiversity, Conservation and Attractions (DBCA) and Western Australian Herbarium in March 2024 was used to determine Threatened Flora (TF) and Priority Flora (PF) recorded to occur within a 20 km radius of Reserve 27355. Specifically, spatial data included;

- WAHerb extract (DBCA 2024).
- Threatened and Priority Reporting (TPFL; DBCA 2024).
- Esperance District Threatened Flora (DBCA 2022).

Species	BC Act Status	Distance (km)
Eucalyptus semiglobosa	P3	1.47
Daviesia pauciflora	P3	1.78
Microtis quadrata	P4	3.58
Lambertia echinata subsp. *echinata*	CR	3.71
Gonocarpus pycnostachyus	P3	4.59
Myriophyllum petraeum	P4	5.27
Astartea elobata	P2	7.48
Atriplex muelleri	P1	10.38
Melaleuca eximia	P2	10.98
Trachymene anisocarpa var. *trichocarpa*	P3	13.54
Leucopogon corymbiformis	P2	13.67
Darwinia sp. Mt Burdett (N.G. Marchant 80/42)	P4	13.81
Bentleya diminuta	P2	13.93
Eucalyptus famelica	P3	13.97
Conostylis seorsiflora subsp. *longissima*	P2	14.00
Platysace haplosciadia	P2	14.06
Rumicastrum chamaecladum	P2	14.88
Verticordia verticordina	P3	15.23
Myoporum velutinum	EN	15.33
Acacia nitidula	P3	15.50
Acacia euthyphylla	P3	15.51
Alyogyne sp. Great Victoria Desert (D.J. Edinger 6212)	P3	15.51
Leucopogon florulentus	P3	15.63
Scaevola archeriana	P1	15.64
Utricularia helix	P2	15.79
Utricularia oppositiflora	P3	15.79
Utricularia westonii	P2	15.79
Eucalyptus x missilis	P4	15.79
Anigozanthos bicolor subsp. *minor*	EN	15.80
Eucalyptus insularis subsp. *continentalis*	EN	15.82
Eucalyptus aquilina	P4	15.96
Eucalyptus ligulata subsp. *ligulata*	P4	15.96
Grevillea baxteri	P4	16.27

Species	BC Act Status	Distance (km)
Lasiopetalum maxwellii	P2	16.29
Persoonia scabra	P3	17.11
Pterostylis faceta	P3	17.11
Caladenia exstans	P4	17.15
Aldrovanda vesiculosa	P2	17.54
Hibbertia hamata	P3	17.81
Pultenaea adunca	P3	18.17
Acacia bartlei	P3	18.60
Gonocarpus simplex	P4	18.99
Isopogon alcicornis	P3	19.07
Acacia incanicarpa	P2	19.42
Patersonia inaequalis	P2	19.54
Austrobaeckea uncinella	P3	19.81
Styphelia multiflora	P2	19.88

Appendix 4: Threatened and Priority Fauna Desktop Results

An assessment of Threatened and Priority Fauna potentially occurring within a 20 km radius of the site was conducted utilising the following sources:

- DBCA Threatened Fauna Database (DBCA 2024x);
- ALA database

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distance (km)
Calidris alba	Sanderling	MI	MI	2.07
Actitis hypoleucos	Common sandpiper	MI	MI	2.07
Calidris acuminata	Sharp-tailed sandpiper	MI	MI	2.07
Calidris ferruginea	Curlew sandpiper	CR	MI	2.07
Calidris ruficollis	Red-necked stint	MI	MI	2.07
Cereopsis novaehollandiae grisea	Recherche Cape Barren goose	VU	VU	2.07
Elanus scriptus	Letter-winged kite	P4	Not listed	2.07
Limosa lapponica	Bar-tailed godwit	MI	MI	2.07
Oxyura australis	Blue-billed duck	P4	Not listed	2.07
Thinornis rubricollis	Hooded plover	P4	Not listed	2.07
Tringa nebularia	Common greenshank	MI	MI	2.07
Zanda latirostris	Carnaby's black cockatoo	EN	EN	2.07
Isoodon obesulus fusciventer	Quenda	P4	Not listed	2.55
Plegadis falcinellus	Glossy ibis	MI	MI	3.30
Falco peregrinus	Peregrine falcon	OS		3.39
Calidris melanotos	Pectoral sandpiper	MI	MI	3.58
Tringa glareola	Wood sandpiper	MI	MI	3.58
Charadrius leschenaultii	Greater sand plover	VU	MI	4.17
Leipoa ocellata	Malleefowl	VU	VU	4.47
Pluvialis squatarola	Grey plover	MI	MI	4.55
Nyctophilus major tor	Central long-eared bat	P3		4.59
Tringa stagnatilis	Marsh sandpiper	MI	MI	4.98
Calidris canutus	Red knot	EN	EN	6.69
Tringa brevipes	Grey-tailed tattler	P4	MI	6.69
Apus pacificus	Fork-tailed swift	MI	MI	7.00
Arenaria interpres	Ruddy turnstone	MI	MI	9.10
Calidris tenuirostris	Great knot	CR	MI	9.10
Notamacropus irma	Western brush wallaby	P4		9.55
Acanthophis antarcticus	Southern death adder	P3		10.45
Charadrius bicinctus	Double-banded plover	MI	MI	13.99
Charadrius mongolus	Siberian sand plover	EN	MI	14.01
Pluvialis fulva	Pacific golden plover	MI	MI	14.01
Numenius phaeopus	Whimbrel	MI	MI	15.42
Ctenotus gemmula	Jewelled sandplain Ctenotus	P3	Not listed	NA

Appendix 5: 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, report writing.
Qualifications	BEnvSc (Hons)
Experience	20 years working in environmental field including Flora Conservation Officer for previous DBCA, and 15 years' experience conducting flora and fauna surveys in the region
Scientific Licence	FT61000787

Name	Katherine Walkerden
Position	Environmental Officer
Project Involvement	Project Coordinator. Desktop and field survey, specimen identification, report review.
Qualifications	BSc, MEnvSc
Experience	Three years' experience as a Botanist in the region
Scientific Licence	FT61000788

Name	Kahree Garnaut
Position	Environmental Officer
Project Involvement	Desktop and field survey, specimen identification, GIS mapping, data analysis and report writing.
Qualifications	BSc (Environmental Science, Conservation Biology)
Experience	Two years' experience as a botanist/ecologist in the Esperance region, with an additional 2 years' experience across the broader South West, South Coast and Midwest regions. Particular experience relating to threatened black cockatoos.
Scientific Licence	FT61001450

Name	Rosamund Mary Hoggart
Position	Environmental Assistant
Project Involvement	Flora specimen identification.
Qualifications	BSc (Hons)Ag
Experience	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

Appendix 6: Existing Management Infrastructure

Item	✓	Comments
Fencing and its condition		
Gates		
Paths		
Path condition		
Fire access tracks		
Signs		
Previous works		

Appendix 7: Significant Social Values

	✓	Comments
Evidence of Community/ Passive recreation/ Education interest		
Landscape amenity (e.g. area screens/ buffers conflicting land uses)		
Scenic features (e.g. high point in landscape)		
Indigenous/ European Heritage (Cultural or Historical)		No known Indigenous heritage areas listed within 8 km of the site; however, unregistered sites likely.
Other		

Appendix 8: Miscellaneous Disturbance Factors and Threatening Processes

Factor/Process	✓	Comments
Evidence of salinisation (e.g. scalding, seeps)		
Erosion (e.g. gullies, bank collapse)		
Wetland eutrophication (e.g. algal blooms)		
Stormwater drains/sumps		
Service corridors (e.g. railroad, Water Corporation, Telstra, Horizon Power, gas pipeline)	Y	Powerline bisecting reserve with 10 m cleared firebreak beneath.
Mining / exploration licences, tenements and activity		
Evidence of past logging or firewood (e.g. selective removal of large trees)		
Previous clearing (may be partially cleared areas or evidence of previous clearing and regrowth over much of site)		
Overgrazing (e.g. rabbits, stock, goats; over-population by kangaroos)		
Firewood collection (e.g. recent chainsaw/axe cuts, sawdust piles)		
Soil movement (dumping or removal)		
Rubbish dumping (note type, e.g. construction, garden waste, weed source?)		
Proliferation of tracks (fire breaks, walk trails)		

Factor/Process	✓	Comments
Off road vehicle use (4WD / trail bikes/ BMX/ mountain bikes)		
Time since last fire (estimate)		<2 yrs/ < 5 yrs/ **<10 yrs**/ <20 yrs / >20 yrs (circle one)
Other disturbance factors or threatening processes	Y	Invasive grasses and shrubs from disturbed road reserve and boundaries.

Appendix 9: NAIA Initial Assessment Summary

Note that several criteria from '1a. regional representation' have been removed due not being relevant to the South Coast region. Criteria surrounding regional and local ecological linkages were evaluated using aerial imagery duty to no ecological linkage models being available for the South Coast region.

NB: [1] Smaller thresholds can be used in areas with high levels of historical clearing

[2] Only applicable to areas with vegetation type mapping at higher levels than vegetation complexes such as vegetation mapping units in the Albany Regional Vegetation Survey (2010).

ECOLOGICAL CRITERIA		
1. Representation		
1a. Regional Representation		
1.1 Recognised International, National, State or Regional conservation value but not already protected	1/0	0
1.2 of an ecological community with only 1500 ha or 30% or less (whichever is the greater) remaining in IBRA sub-region	1/0	1
1.3 Large (greater than 20 ha), viable natural areas in good or better condition of an ecological community with more than 30% remaining within the IBRA sub-region[1]	0.8/0	
1.4 of an ecological community with natural occurrence limited to the conservation planning area, e.g. 100% or more than 90% of the original mapped extent within a Region Scheme or Local Government area	1/0	
1b. Local Representation		
1.7 of an ecological community with 10% or less remaining of its pre-European extent within the Local Government Area	0.5/0	
1.8 of an ecological community with 30% or less remaining of its pre-European extent within the Local Government Area	0.2/0	0.2
1.9 large (greater than 10 ha), viable natural areas in good or better condition of an ecological community with more than 30% remaining within the Local Government Area	0.2/0	
2. Rarity		
2.1 of an ecological community with only 1500 ha or 10% or less (whichever is the greater) remaining in the IBRA subregion	1/0	
2.3 contains a Threatened Ecological Community	1/0	1
2.4 contains Declared Rare Flora, Specially Protected Fauna or significant habitat for these fauna	1/0	1
3. Diversity		
3.1 natural area in good or better condition that contains both upland and wetland structural plant communities	0.4/0	0.4
3.2 natural areas containing a Priority Ecological Community	1/0	
3.3 contains Priority or other significant flora or fauna or significant habitat for these fauna	1/0	
3.4 natural areas with high diversity of species[2]	0.2/0	
4. Maintaining Ecological Processes or Natural Systems - Connectivity		

4.1 natural areas acting as stepping stones in a Regionally Significant Ecological Linkage	1/0	1
4.2 natural areas acting as stepping stones in a locally significant ecological linkage	0.4/0	
5. Protection of Wetland, Streamline and Estuarine Fringing Vegetation and Coastal Vegetation		
5.1 mapped wetland (Conservation or Resource Enhancement category wetlands) plus buffer	1/0	
5.2 riparian vegetation plus buffer	1/0	1
5.3 floodplain area plus buffer	1/0	
5.4 estuarine fringing vegetation plus buffer	1/0	
5.5 coastal vegetation on foredunes and secondary dunes	1/0	

Appendix 9: Viability Estimate

Criteria surrounding region and local ecological linkages were evaluated using aerial imagery duty to no ecological linkage models being available for the South Coast region.

VIABILITY ESTIMATE			
Viability Factor	**Category**	**Max Score**	**Reserve Score**
Size	Greater than 20 ha	5	5
	Greater than 10 ha less than 20 ha	4	
	Greater than 4 ha less than 10 ha	3	
	Greater than 1 ha less than 4 ha	2	
	Less than 1 ha	1	
Shape	Circle, square or squat rectangle	3.5	
	Oval, rectangle or symmetrical triangle	3	3
	Irregular shape with few indentations	2.5	
	Irregular shape with many indentations	2	
	Long thin shape with large proportion of area greater than 50 m wide	1.5	
	Long thin shape with large proportion of area less than 50 m wide	1	
Perimeter to area ratio	Less than 0.01	4	
	Greater than 0.01 less than 0.02	3	
	Greater than 0.02 less than 0.04	2	
	Greater than 0.04	1	
Vegetation condition NB: based on Keighery (1994) condition scale	Pristine 10 x 0% = 0	10	7.1
	Excellent 8 x 69.5% = 5.56		
	Very Good 6 x 25.3% = 1.52		
	Good 4 x 0% = 0		
	Degraded 2 x 3.1% = 0.06		
	Completely Degraded 0 x 0% = 0		
	Total calculated score = 7.14		
Connectivity	**A.** Is contiguous with a protected natural area greater than 4ha	5	5
	B. Is within 500 m of more than 4 protected natural areas having an area greater than 4 ha	4	

VIABILITY ESTIMATE			
Viability Factor	**Category**	**Max Score**	**Reserve Score**
	C. Is within 500 m of 3 or 4 protected natural areas having an area greater than 4 ha	3	
	D. Is within 500 m of 2 protected natural areas having an area greater than 4 ha	2	
	E. Is within 500 m of 1 protected natural area having an area greater than 4 ha	1	
TOTAL SCORE (Viability Estimate)			**20.1 / 27.5**