

**Vegetation Flora, Fauna and Environmental  
Considerations Report  
CPS 8400/1 Neds Corner Road Widening, South Coast  
Hwy to Yerritup Road**

Report – Environmental Officer, Katie White BSc (Hons)



## 1 Executive Summary

This survey 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 of CPS 8400/1, to clear 5.4 ha of native vegetation within a 15.23 ha area. Clearing is required for the purpose of road reconstruction along Neds Corner Road, from South Coast Highway to Yerritup Rd. The existing road design along Neds Corner Road is a single-width bitumen with wider spoon drains to allow vehicles to pass, at a current footprint width of 20 to 22 m wide. To meet modern safety requirements that accommodate for road trains during the grain harvest season, a width of 28 m is required to construct a double-width road with appropriate spoon drains, back-slopes and drainage shoots. The entire 28 m width will not be cleared for the whole length of the permit.

## 2 Introduction

The Shire of Esperance has a strategic plan that prioritises specific roads to upgrade from single-width to double. Neds Corner Rd experiences high pressure as a major transport route from the Cascade region and town-site onto South Coast Hwy. It therefore does not meet the safety goals of the Shire of Esperance, being single width bitumen with large road trains and trucks using it regularly, combined with the local traffic within the area. This 'Vegetation, Flora, Fauna and Environmental Considerations and Targeted Flora Report', in conjunction with a future 'Targeted Flora Survey', is a compliance requirement by the Department of Water and Environmental Regulations (DWER) for the purpose of clearing vegetation to widen roads.

Neds Corner Rd, extending from South Coast Hwy to Yerritup Rd, is located approximately 77 km north-north-west of Esperance town-site, and 31 km south of Cascade town-site (Figure 1). It is a major connection between the Cascade town-site and the main highway connecting Esperance to other regional centers.

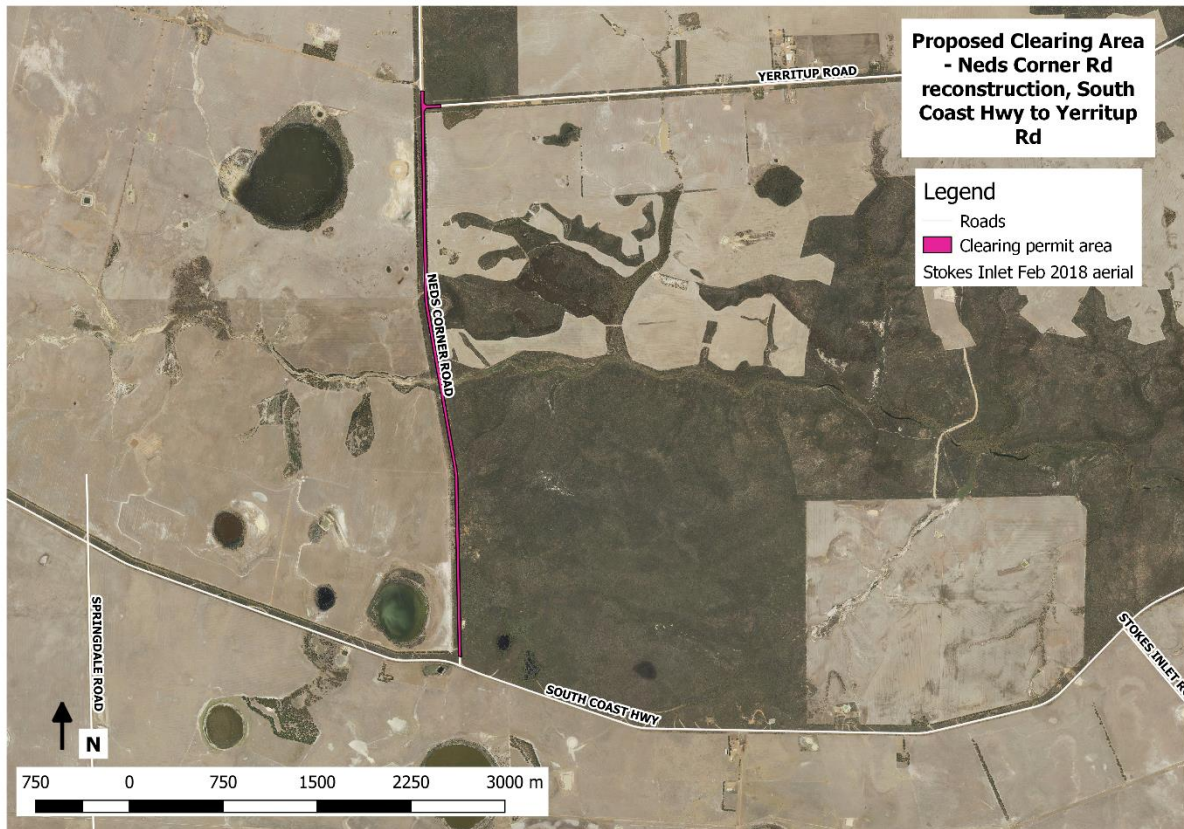


Figure 1. Location of CPS 8400, Neds Corner Rd widening, from South Coast Hwy to Yerritup Rd

### 3 Environmental Background

#### 3.1 Scope

The removal of native vegetation for road widening has the potential to affect multiple environmental factors.

Possible impacts include;

- Threatened Flora and Priority Flora within a twenty kilometre radius.
- Threatened Ecological communities (TEC), specifically the Environmental Protection and Biodiversity Conservation Act 1999 listed 'Proteaceae Dominated Kwongan Shrublands of the Southeast Coastal Floristic Province of Western Australia'.
- Potential feeding sites and roosting habitat of the endangered Carnaby's Black Cockatoo, *Calyptorhynchus latirostris*. Esperance is outside of the natural range of Baudin's Black Cockatoo, *Calyptorhynchus baudinii* and Forest Red-Tailed Black Cockatoo's, *Calyptorhynchus banksii*.

Assessing these impacts involves two approaches; desktop study and field survey. A desktop study will be used for the purpose of gathering background information on the target area. The field survey will allow for detailed understanding of vegetation communities, guide future targeted flora surveys for possible threatened or priority species, environmental condition, presence of threatened ecological communities and potential impact of clearing.

#### 3.2 Catchment

Neds Corner Rd, From South Coast Hwy to Yerritup Rd section is entirely within the Young and Lort River catchments.

### 3.3 Climate

The climate is Mediterranean, with cool wet winters and dry warm summers. The area receives average annual rainfall of 500 mm. Evapotranspiration is similar to rainfall, estimated at 427 mm/pa.

### 3.4 Geology

Using WALGA's Environmental Planning Tool, the underlying geological formations of four groups were identified (Table 1).

**Table 1.** Geology of area at CPS 8400, Neds Corner Rd widening.

Area of permit	Description
7.95 ha	<ul style="list-style-type: none"> <li>Sand or gravel plains</li> <li>Quartz sand sheets commonly with ferruginous pisoliths or pebbles, minor clay</li> <li>Local calcrete, laterite, silcrete, silt, clay, alluvium, colluvium, Aeolian sand</li> </ul>
1.52 ha	<ul style="list-style-type: none"> <li>Lacustrine or residual mud, clay, silt and sand, commonly gypsiferous and/or saline</li> <li>Playa, claypan and swamp deposits</li> <li>Peat</li> <li>Peaty sand and clay</li> <li>Halitic and gypsiferous evaporites</li> </ul>
5.76 ha	<ul style="list-style-type: none"> <li>Colluvium, sheetwash, talus</li> <li>Gravel piedmonts and aprons over and around bedrock</li> <li>Clay-silt-sand with sheet and nodular kankar</li> <li>Alluvial and Aeolian sand-silt-gravel in depressions and broad valleys in Canning Basin</li> <li>Local calcrete, reworked laterite</li> </ul>
0.01 ha	<ul style="list-style-type: none"> <li>Sandstone, siltstone, minor conglomeratic sandstone</li> </ul>

### 3.5 Soils and topography

Using WALGA's Environmental Planning Tool, there are three soil sub-systems, Munglinup 1 Subsystem (245Mu\_1), Young 1 Subsystem (245Yo\_1), and Esperance 1 Subsystem (245Es\_1) that CPS 8400, Neds Corner Rd widening project intersects (Table 2).

**Table 2.** Soil systems of within CPS 8400, Neds Corner Rd widening permit.

Soil Subsystem	Area within permit (ha)	Description
Munglinup 1 Subsystem – 245Mu_1	5.37	Externally drained plains and rises with gently inclined slopes, some level plains on upper slopes and catchment divides. Grey deep and shallow sandy duplex (gravelly), minor pale deep sands, gravelly duplex, and deep sandy gravels.
Young 1 Subsystem – 245Yo_1	4.72	Soil complex dominated by yellow to red solonetzic soils, on sloping valley sides.
Esperance 1 Subsystem – 245Es_1	5.14	Gravelly yellow mottled duplex soils, <30 cm sand over gravel.

### 3.6 Vegetation

The site covers Esperance Plains IBRA regions, totaling 505 000 hectares (DAFWA 2002). Within the Esperance Plains, the site is further defined as located within the Recherche IBRA subregion. Using WALGA's Environmental Planning tool, Beard pre-European vegetation associations are mapped as type 47, 516, and 4048, with all vegetation types having >35% remaining of the pre-European extent (Table 3; Beard 1973).

**Table 3.** Vegetation associations, as mapped by Beard's pre-European extent, within CPS 8400, Neds Corner Rd widening area.

Beard Vegetation Type	Rarity by IBRA region (%)	Rarity by Local Government Area(%)	Description
47	35.5	57.61	Tallerack mallee-heath Shrubland
4048	49.85	44.92	Black Marlock and mallee Shrubland
516	68.96	13.43	Scrub-heath in Esperance plains Shrublands

### 3.7 Land Use

The surrounding land use is dominated by cropping farmland, interspersed with green belts. Directly surrounding the clearing permit area is vegetated road reserve, farmland and DPLH managed crown land Reserve 31765.

## 4 Methodology

### 4.1 Desktop study

A desktop study was conducted of all existing geospatial information. This included using Geographical Information System (GIS) to review digital orthophotos, geology, morphology, native vegetation, IBRA classification, Threatened Flora, Priority Flora, Registered Aboriginal Sites and Threatened Ecological Communities (TECs). The WALGA Environmental Planning Tool was used, and the report generated will be submitted with this report.

State and Commonwealth database searches were also conducted for potential threatened flora, priority flora and TECs, using a twenty km buffer around the survey site. Additional liaison with the Esperance DBCA District Flora Officer was conducted to further refine conservation values of interest.

### 4.2 Field investigation

A field survey was conducted on 09/04/2019 date by Katie White, Environmental Officer at the Shire of Esperance. This is during a period where minimal flora is flowering. Vegetation communities were identified; as dominant species were easily recognizable without flowering. A targeted flora survey will need to be conducted in Spring 2019, when the majority of Esperance flora is flowering and distinguishable, allowing for all priority or threatened species present to be identified.

The survey consists of driving slowly along Neds Corner Rd, with frequent stops and transecting sections by foot into roadside vegetation. During this process, changes in vegetation structure, condition or composition were recorded. Ecological impacts and environmental features were also noted during the field investigation. These included weed load, farming pressures, existing clearing, historical material extraction pits, fire, rehabilitated sites, waterlogging, wetlands, senescence, erosion,

invasive fauna, potential *Phytophthora cinnamomi* dieback infections and illegal dumping of rubbish. The likelihood of roosting and feeding habitat for Carnaby's Black Cockatoo, *Calyptorhynchus latirostris* was also assessed. Assessing these parameters follows the 'Technical Guidance, Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia (2016)'.

The field survey allowed for vegetation types and dominant species to be mapped, allowing to identify whether TECs were present. A TEC, Proteaceae Dominated Kwongkan Shrubland, was identified to be present when meeting the following diagnostic characteristics (DEE 2014):

- 1) Occurs within the Southeast Coastal Floristic Province (*Sensu* Hopper and Gioia 2004; relating to south west Australian phytogeographic boundaries, including the islands of the Recherche Archipelago).

AND

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

The condition of vegetation is a subjective assessment of how healthy the vegetation is. This was categorized as 'Excellent, Very Good, Good, Degraded or Completely Degraded', using Keighery (1994).

The Shire of Esperance uses a mapping system based on a Panasonic FZ-G1 ToughPad, ROAM Program. Spatial data mapped in the field is then downloaded to be used in QGIS. All field data collecting relating to vegetation type, condition, transect coverage and photo points are collated in GIS shapefiles, and used within this report. Mapping of vegetation types is collated and recorded as polygon shapefiles, with area and perimeter parameters calculated.

## 5 Results

### 5.1 Aboriginal considerations

Native title has been extinguished for Neds Corner Rd and Yerritup Rd road reserves, as determined using the Native Title Viewer (DPLH 2019). Using the Aboriginal Heritage Inquiry System (DPLH 2019), no Registered Aboriginal Heritage sites are directly located within the CPS 8400 clearing permit area. The nearest site is 1.6 km west, ID WO1740 'Torrakup North', over a wetland area. As it is a single wetland and not connected within a chain of wetlands, or corresponds to the clearing permit area, it is unlikely that this site relates to the clearing permit area.

### 5.2 Hydrology

A minor creek course intersects Neds Corner Rd, approximately 2.5 km north of South Coast Hwy (Figure 2). The road has been designed in this area with extremely large drainage pipes and shaped to allow for water flow across the road if the creek rises during a flooding event (Figure 3). The road construction design has therefore been purposefully engineered to prevent disrupting natural hydrological regimes. This will continue to be a consideration during the re-construction and widening phase, with minimal impact on the hydrological flow and course from what has already been historically impacted. Additionally, works will only be conducted during dry soil conditions, without flowing water. The vegetation surrounding the creek-line is already extremely degraded, with dominance of vegetation invasive weeds that have suffocated the native vegetation. This included Thistles, Sunflowers, Kikuyu grass, Cooch grass, African Lovegrass, Rose Pelargonium and Sorrel.

The remainder of the clearing permit area has no distinctive hydrological features or water bodies.



**Figure 2.** Minor creek crossing along Neds Corner Rd, approximately 2.5 km north of South Coast Hwy and within CPS 8400 area. Photo taken facing in a westerly direction.



**Figure 3.** Road design along Neds Corner Rd at minor creek-line crossing been particularly shaped to allow free water flow and not interrupt hydrological water flows. Photo taken facing in a northerly direction.

### 5.3 Dieback

Using Dieback Information Delivery and Management Systems (DIDMS; 2019), no *Phytophthora cinnamomi* dieback sampling or status mapping has been completed for the surrounding roadside reserve or landscape. Following standard Shire of Esperance practices, works will occur in dry soil conditions and appropriate vehicle and machinery hygiene protocols will occur.

Along Neds Corner Rd, directly north of South Coast Hwy intersection for 300 m within Vegetation types 1 and 2, many large *Banksia speciosa* plants were observed dead (Figure 4; Table 5). However, it is evident that vegetation is long unburnt and *B. speciosa* plants are extremely old. It is therefore highly possible vegetation could be just senescing. Many healthy *B. speciosa* plants and other

Proteaceae species were observed as well. It is indeterminable without formal testing, but remains possible, that dieback is present.



**Figure 4.** Dead *Banksia speciosa* plants interspersed with healthy *B. speciosa* and other Proteaceae species. Unknown whether plants have senesced or been killed by *Phytophthora cinnamomi* dieback. Photo taken facing in an easterly direction within Vegetation Type 1 (Table 5).

#### 5.4 Threatened Flora

A desktop survey was conducted using TPFL, WAHerb and local DBCA data to identify threatened and priority species present within a 20 km radius of the permit area. 14 species were identified within 20 km of the clearing permit area, and of these a possible 8 species have habitat requirements corresponding with Neds Corner Rd road reserve (Table 4). A spring targeted flora survey will need to be conducted to determine which of these species is present.

**Table 4.** Threatened or priority flora identified to be present within a 20 km radius of CPS 8400, Neds Corner Rd widening, area. Data used included TPFL, WAHerb and local DBCA data.

Species	Conservation Status	Flowering period	Possible to occur	Comment
<i>Anigozanthos bicolor</i> subsp. <i>minor</i>	EN	Aug to Oct	No	Associated with seasonally damp springs on granite outcrops. No habitat suitable within clearing permit area.
<i>Conostylis lepidospermoides</i>	VU	Sep to Oct	Yes	Suitable vegetation associated with other populations. Only identifiable in September, when it flowers.
<i>Cyathostemon</i> sp. Esperance	P1	Unknown	Unknown; little information	



			available	
<i>Dampiera sericantha</i>	P3	May or Aug to Dec	Possible	
<i>Daviesia pauciflora</i>	P3	Oct to Dec or Jan	Yes	Matching associated vegetation
<i>Eucalyptus missilis x</i>	P4	Jan to Apr	Unlikely	Mostly associated with coastal sandplains.
<i>Eucalyptus preissiana</i> subsp. <i>lobata</i>	P4	Nov	No	Located only within coastal limestone vegetation.
<i>Eucalyptus semiglobosa</i>	P3	May or Oct to Dec or Jan	Unlikely	Associated with hillslopes, granite, cliffs, gullies.
<i>Hopkinsia adscendens ms</i>	P3	Oct	Yes	Associated with seasonally damp streams. Small perennial creek crossing present within clearing permit area.
<i>Leucopogon blepharolepis</i>	P3	Aug to Dec	Possible	Associated vegetation appropriate, but Esperance only been recorded coastally.
<i>Thomasia pygmaea</i>	P3	Aug to Oct	Yes	Matching vegetation/soil type and in surrounding area. Identified in adjacent creekline.
<i>Thysanotus brachiatus</i>	P2	Nov to Dec	Unknown; little information available	
<i>Velleia exigua</i>	P2	Oct	No	Associated with salt lakes.

## 5.5 Threatened Fauna

The Esperance region is part of the non-breeding range of Carnaby's Black Cockatoo, *Calyptorhynchus latirostris* (DSEWPC 2012). Therefore, of consideration, is the impact upon foraging habitat and night roosting habitat. Foraging habitat has been identified as usually within 6 km of a night roost.

The entirety of CPS 8400/1 could be considered within either foraging or night roosting habitat. There are multiple areas of scattered Proteaceae Dominated Kwongkan Shrubland, which is considered foraging habitat. In areas without Kwongkan, large tuart trees and scattered pine trees are present, which would be suitable for roosting and feeding. However, minimal large trees or vegetation consisting of foraging material will be removed, relative to the large intact reserve system adjacent to Neds Corner Rd, and the 100 m wide road reserve. Where possible and feasible, the large roosting trees will be avoided.

## 5.6 Threatened Ecological Communities and Vegetation types

The entirety of the clearing permit area has been mapped as likely to occur within Proteaceae Dominated Kwongkan Shrubland Threatened Ecological Community, as determined using WALGA's Environmental Planning tool and shapefiles obtained from DBCA's TEC Officer, Val English.

Within the field survey, vegetation community with key stone species and Threatened Ecological

Community status was identified (Table 5). Mapping indicates that of the vegetation cleared during the widening project, will result in 2.04 ha of Proteaceae Dominated Kwongkan Shrubland, Threatened Ecological Community, being cleared. The remaining 3.36 ha does not meet TEC criteria. Of the 2.04 ha of Proteaceae Dominated Kwongkan Shrubland, 0.642 ha is in 'poor' condition, 0.2 is in 'good' condition and 1.237 is in 'very good' condition. A variety of disturbance impacts, such as rubbish, previous mining of gravel, dead plants and invasive weeds influenced these conditions, as outlined in Table 5. There are 14 vegetation changes along the permit area as a transect, with 8 different vegetation associations identified.

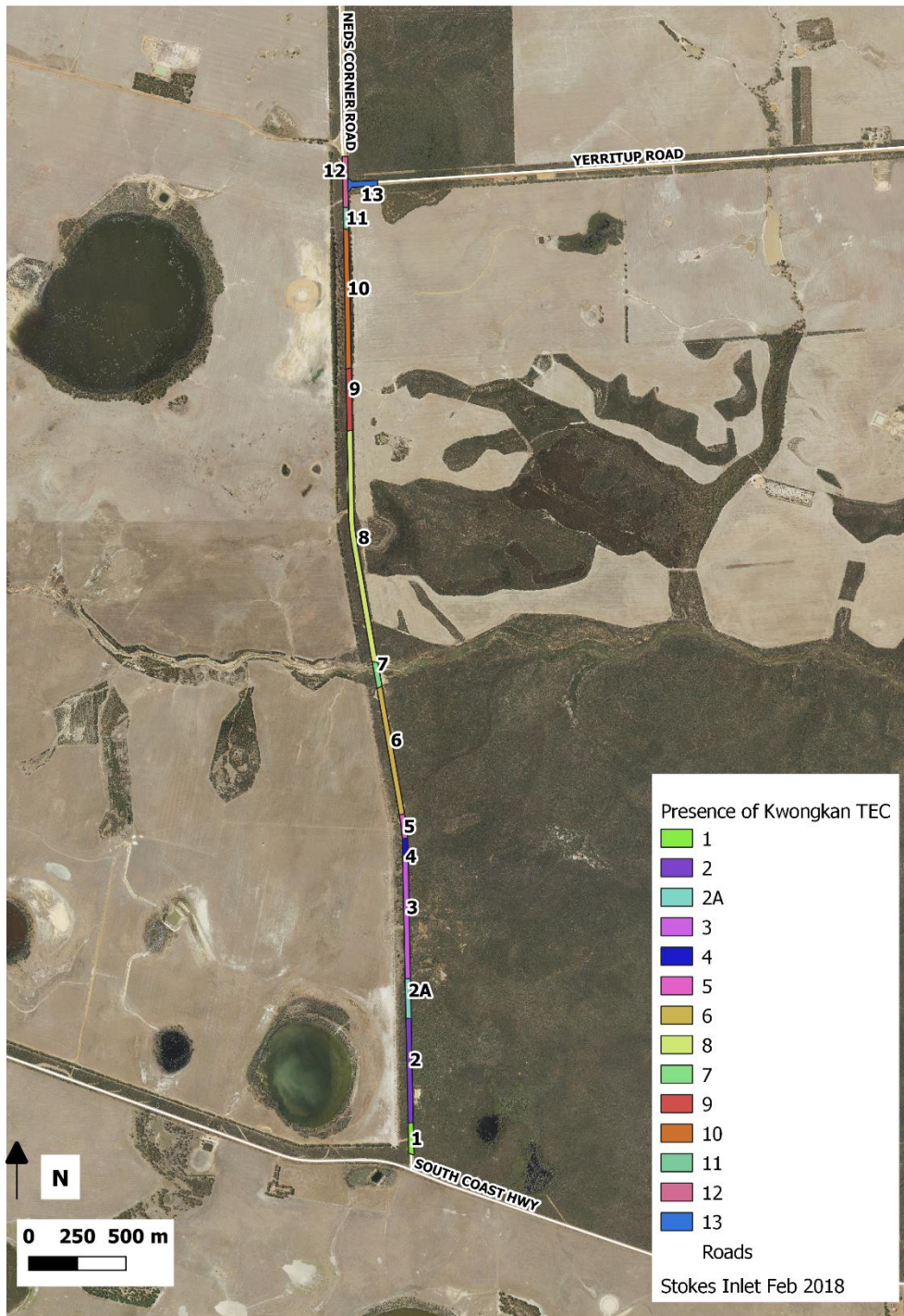
**Table 5.** Vegetation types and associated details of condition, Kwongkan TEC, Disturbance and description.

Vegetation Number	Distance from South Coast Hwy (km)	Figure No.	Kwongkan TEC	Vegetation Condition	Disturbance	Vegetation structure and composition
1	0.08 to 0.25	7	Yes	Very good	Rubbish along periphery. Scattered African Lovegrass.	Scattered <i>Nuytsia floribunda</i> and <i>Eucalyptus pleurocarpa</i> overstorey with dense heathland midstorey, with dominant <i>Calothamnus quadrifidus</i> . Overstorey <i>Callitris</i> sp., <i>Eucalyptus pleurocarpa</i> , <i>Nuytsia floribunda</i> , <i>Hakea trifurcata</i> and <i>Lambertia inermis</i> . Midstorey dominant <i>Calothamnus quadrifidus</i> with <i>Melaleuca</i> sp., <i>Acacia cyclops</i> and <i>Xanthorrhoea platyphylla</i> . Understorey <i>Caustis diocia</i> , <i>Lepidosperma</i> sp. and <i>Synaphea</i> sp.
2	0.25 to 0.8	8, 9	Yes	Very good	Historical sandpit surrounded by Victorian Tea Tree. No lovegrass present. Less rubbish.	<i>Banksia speciosa</i> and <i>Eucalyptus</i> overstorey with dense <i>Melaleuca</i> midstorey and dense sedgeland understorey. Overstorey dominant of <i>Banksia speciosa</i> . Midstorey dominant of <i>Melaleuca striata</i> , <i>Conospermum</i> sp., <i>Adenanthos cuneatus</i> , <i>Lambertia inermis</i> . Understorey of <i>Caustis diocia</i> and <i>Anarthria scabra</i>
2A	0.8 to 1.01	10	Yes	Poor	High weed burden of African Lovegrass and Tuarts	Same as 2
3	1.01 to 1.65	11	Yes	Poor	Highly degraded. Bare areas. Highly weedy with dominant understorey species African Lovegrass and Overstorey Tuart trees. Occasional infestation of Victorian Tea Tree	Same as 1

4	1.65 to 1.74	12	Yes	Very good	Limited disturbance	Same as 1
5	1.74 to 1.86	13	Yes	Very good	Limited disturbance	Scattered mixed Eucalyptus dominant overstorey with dense dominant <i>Banksia armata</i> . Interspersed between dense <i>Banksia armata</i> is <i>Hakea marginata</i> , <i>Acacia chrysocephala</i> , <i>Cassythia</i> sp., <i>Gastrolobium spinosum</i> , <i>Hakea corymbosa</i> .
6	1.86 to 2.64	14, 15	No	Good	Scattered weeds, eg. Thistles. African Lovegrass, Fleabane. and Tuarts scattered throughout. Areas disturbed from previous gravel extraction.	Dense Eucalyptus overstorey, with scattered shrubland midstorey. Observed species in midstorey include <i>Acacia cyclops</i> , <i>Calothamnus quadrifidus</i> , <i>Banksia armata</i> , <i>Hakea trifurcata</i> , <i>Acacia gonophylla</i> , <i>Kennedia</i> sp.
7	2.64 to 2.7	16	No	Degraded	Entirely consisting of weeds.	Creekline crossing
8	2.7 to 3.91		No	Good	Same as 6	Same as 6
9	3.91 to 4.19	17, 18	No	Very good	Vegetation only present on western. Eastern side is highly cleared, with only tuarts remaining	Dense Eucalyptus woodland overstorey. Different to 6 with more diversity in midstorey. Species in midstorey include <i>Kennedia</i> sp., <i>Melaleuca</i> sp., <i>Xanthorrhoea platyphylla</i> , <i>Acacia glaucoptera</i> , <i>Hakea corymbosa</i> , <i>Acacia cyclops</i>
10	4.19 to 4.93	19	No	Poor	Highly disturbed area. Sparse vegetation. Highly weedy with African Lovegrass and Tuarts. Large areas of Victorian Tea Tree	Same as 9
11	4.93 to 5.12	20	Yes	Poor	High amounts of Victorian Tea Tree on roadside edge.	Same as 5. Vegetation only on western road reserve, eastern highly cleared and degraded.
12	5.12 to 5.38	21	No	Poor	Weed invasion and previous clearing	Scattered <i>Eucalyptus pleurocarpa</i> overstorey, with dominant <i>Allocasuarina</i> sp. and Myrtaceae midstorey.
13	Along Yerritup Rd	22, 23	Yes	Good	Victorian Tea Tree Scattered along edge of roadside. Strategic firebreak through area.	Same as 5.



**Figure 5.** Presence of Threatened Ecological Community 'Proteaceae Dominated Kwongkan Shrubland' within CPS 8400, Neds Corner Rd widening area.



**Figure 6.** Change in vegetation associations identified along Neds Corner Rd, CPS 8400, from South Coast Hwy to Yerritup Rd.

## 5.7 Photos



**Figure 7.** Vegetation Type 1 showing Scattered *Nuytsia floribunda* and *Eucalyptus pleurocarpa* overstorey, with dense heathland midstorey, with dominant *Calothamnus quadrifidus*. Scattered rubbish observed along spoon drain edge. Photo facing in an easterly direction.



**Figure 8.** Vegetation Type 2, showing *Banksia speciosa* and scattered *Eucalyptus* overstorey, with dense *Melaleuca* midstorey and dense sedgeland understorey. Scattered Victorian Tea Tree weed on spoon drain edge (central green plant) observed. Photo taken facing in a westerly direction.



**Figure 9.** Historical sand mining pit within Vegetation Type 2. Open sand pit not within CPS 8400 area, but thick Victorian Tea Tree observed around perimeter of disturbed site and within the clearing permit area. Photo taken facing in a north-easterly direction.



**Figure 10.** Vegetation type 2A, with same vegetation community as vegetation type 2, but higher weed density along roadside reserve of African Lovegrass, Tuarts and Victorian Tea Tree. Vegetation within clearing permit (2 to 3 m wide) is in poor condition. Photo taken facing in a easterly direction.



**Figure 11.** Vegetation type 3, showing highly degraded form of vegetation type 1; *Eucalyptus pleurocarpa* overstorey with heathland midstorey. Large amounts of plants dead, previous clearing, and high weed burden of African Lovegrass, Tuarts and Victorian Tea Tree. Vegetation in poor condition. Photo taken facing in a westerly direction.



**Figure 12.** Vegetation type 4, illustrating very good condition of Vegetation type 1; Scattered *Eucalyptus pleurocarpa* over dense mixed heathland midstorey, with dominant *Calothamnus quadrifidus*. Limited disturbance observed, with only scattered African Lovegrass. Photo taken facing in an easterly direction.





**Figure 13.** Very good condition Vegetation Type 5, showing Scattered mixed Eucalyptus dominant overstorey with dense dominant *Banksia armata*. Photo taken facing in a westerly direction.



**Figure 14.** Vegetation Type 6, illustrating Dense Eucalyptus overstorey with scattered shrubland midstorey. Scattered weeds observed, such as Fleabane and Thistles. Photo facing in an easterly direction.



**Figure 15.** Previously disturbed gravel extraction site located within Vegetation Type 6. Photo taken facing in a north-westerly direction.



**Figure 16.** Vegetation type 7 surrounding minor creek crossing is entirely consisting of invasive weeds. Photo taken facing in a westerly direction.



**Figure 17.** Vegetation Type 9, showing dense Eucalyptus woodland overstorey with more diverse midstorey. Scattered African Lovegrass continues to be an issue. Vegetation only present on the western road reserve. Photo taken facing in a westerly direction.



**Figure 18.** Vegetation on eastern road reserve within Vegetation type 9, which is entirely vegetated by non-native Tuart Trees. Photo taken facing in an easterly direction.



**Figure 19.** Poor condition of Vegetation type 10, with sparse vegetation present that is highly weedy, with African Lovegrass, Tuarts and Victorian Tea Tree. Vegetation community same as Vegetation Type 9; Eucalyptus woodland with diverse mixed midstorey. Photo taken facing in a easterly direction.



**Figure 20.** Poor condition of Vegetation Type 11, with dense Victorian Tea Tree thicket on roads edge. Vegetation community is similar to Vegetation Type 5; scattered *Eucalyptus pleurocarpa* dominant overstorey with dense dominant *Banksia armata* midstorey. Vegetation continues to only be present on western road reserve. Photo taken facing in a westerly direction.



**Figure 21.** Poor condition of Vegetation Type 12, which has likely been previously cleared and is highly invaded by weed species. Vegetation community defined by scattered *Eucalyptus pleurocarpa* overstorey, with mixed *Allocasuarina* sp. and Myrtaceae midstorey. Photo taken facing in a westerly direction.



**Figure 22.** Vegetation type 13, along Yerritup Rd road reserve, with same composition as Vegetation Type 5; Scattered *Eucalyptus pleurocarpa* overstorey and dense *Banksia armata* understory. Photo taken facing a northerly direction.



**Figure 23.** Vegetation type 13, along Yerritup Rd road reserve, showing strategic firebreak along powerline and associated infestation of African Lovegrass. Photo taken facing an easterly direction.

## 6 References

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

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

Department of Agriculture and Food of Western Australia (2002), *Beaumont-Condongup Area: Catchment Appraisal 2002 resource Management technical Report 238*, Department of Agriculture and Food of Western Australia

Department of Biodiversity, Conservation and Attraction (2018) *Florabase*, The Flora of Western Australia Online (and collections housed at the WA Herbarium). < <https://florabase.dpaw.wa.gov.au/search/advanced>.>

Department of Environment and Energy (2014), *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (s266B). Approved Conservation Advice for Proteaceae Dominated Kwongan Shrublands of the southeast coastal floristic province of Western Australia*, Australian Government, Department of Environment and Energy.

Department of Planning, Lands and Heritage (2019), *Aboriginal heritage inquiry system*, Government of Western Australia, Department of Planning Lands and Heritage. < <https://maps.daa.wa.gov.au/AHIS/>>

Department of Planning, Lands and Heritage, *Native Title Vision (NTV)*, Government of Western Australia

Environmental Protection Authority (2016), *Technical Guidance, Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia (2016)*, Government of Western Australia

Department of Sustainability, Environment, Water, Population and Communities, *EPBC Act referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo (endangered) Calyptorhynchys latirostris, Baudin;s cockatoo (vulnerable) Calyptorhynchus baudinii, Forest Red-Tailed Black cockatoo (vulnerable) Calyptorhynchys banksia naso*, Australian Government

Keighery, B. K. (1994), *Bushland Plant Survey, A Guide to Plant Community Survey for the Community*, Wildflower Society of WA (Inc.) Publication

Overhue, T.D., Snell, L.J., Johnston, D.A.W. (1993), *Esperance land resource survey, Western Australia*, Department of Agriculture

Project Dieback (2019), *DIDMS – Dieback Information Delivery and Information System*, Natural Resource Management, Western Australia. <  
<https://didms.gaiaresources.com.au/data/editor/viewdata/>>