



Flora and Vegetation Surveys of Boxwood Hill- Ongerup Road and Meechi Road

12 January 2017



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Shire of Jerramungup

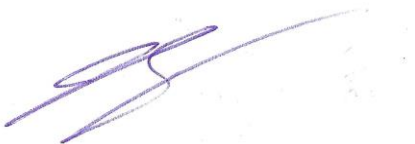
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EXECUTIVE SUMMARY

The Shire of Jerramungup (the Shire) wish to undertake upgrade works on along sections of the Boxwood Hill-Ongerup Road and Meechi Road to cater for regional transport needs by improving sight lines and widening specific sections. In order to achieve this it has been identified that limited clearing of roadside vegetation will be required. As a part of preliminary project planning works the Shire have submitted two clearing applications to the Department of Environmental Regulation (DER). This flora and vegetation survey report aims to assist the DER assessment by providing site specific floristic information and an assessment of each proposal against the ten clearing principles against which proposals are assessed.

The assessments were conducted by Damien Rathbone (SL 011605), an ecologist with over 10 years of experience in South West Western Australia (SWWA) and with specific knowledge of the vegetation communities of the south coast. All assessments were conducted in accordance with “level one surveys” in *Technical Guide - Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA and DPaW 2015). All vegetation boundaries and locations of significant flora or weeds were identified using a handheld GPS (Garmin 60).

The survey areas for both road sections encompassed 2.5 m from the current vegetation edge with an assumed disturbance extent for road widening of 1 m on each side of the road. Boxwood Hill-Ongerup Road was surveyed on the 10 October 2016 and Meechi Road was surveyed on the 24 October 2016.

The climatic characteristics of the survey areas and the seasonal conditions preceding the field work may have influenced the emergence of annual species and the flowering of perennial species. The area occurs within a high rainfall zone and the assessment was conducted in spring after good rainfall in the preceding winter. Consequently, soil moisture conditions were ideal during the assessment for the adequate emergence and flowering of threatened or priority species (particularly orchids) within the assessment area.

The proposed Boxwood Hill-Ongerup clearing area occurs over a gently sloping hill on clay soils. The highest elevated area had outcropping granite while lower areas were potentially underlain by spongeolite or laterite. The vegetation condition was excellent with very limited weed invasion or soil disturbance away from the road edge.

The majority of the Boxwood Hill-Ongerup Road survey area was composed of open mallee woodland of *Eucalyptus pleurocarpa*, *E. ecostata* and *E. phenax* with a small section of open shrubland of *Calothamnus quadrifidus* and *Grevillea tetragonoloba* over a sparse low shrubland of *Hibbertia* spp. and a sedgeland of *Lepidosperma* spp. occurring in association with the outcropping granite. The western section of the survey area was composed of a dense mallet forest of *Eucalyptus platypus* over low sparse shrubland of *Melaleuca* spp. and contained the Priority 4 taxon, *Acrotriche dura*. None of these vegetation communities are concordant with any currently listed Threatened or Priority Ecological Communities and all occur widely throughout the adjacent Corackerup Nature Reserve.

The proposed Meechi Road clearing area occurs over a flat plain with sand and clay duplex soils intersected with several small water accumulating pans and by one moderately incised saline drainage channel. The vegetation condition was excellent with very limited weed invasion or soil disturbance away from the road edge.

The majority of the Meechi Road survey area composed of an open mallee woodland of *Eucalyptus pleurocarpa* and *E. adesmophloia* over a sparse mid shrubland of *Calothamnus gibbosus*, *Hakea marginata* and *Petrophile squamata*. A small section of the survey area was dissected by a moderately

incised saline drainage channel with vegetation composed of a woodland of *Eucalyptus occidentalis* over a shrubland of *Melaleuca viminea*.

From the two survey areas combined a total of 41 families, including 208 native species and 7 weed species were recorded. One Priority 4 species, *Acrotriche dura* was found to be relatively abundant within the Boxwood Hill-Ongerup Road survey area. No other Threatened or Priority flora was recorded in either survey area. No weeds listed under the *Biosecurity and Agriculture Management Act* (DAFWA 2016) or considered to be Weed of National Significance (WoNS) were recorded.



1 INTRODUCTION

1.1 Background

The Shire of Jerramungup (the Shire) wish to undertake upgrade works on along sections of the Boxwood Hill-Ongerup Road and Meechi Road to cater for regional transport needs by improving sight lines and widening specific sections. In order to achieve this it has been identified that limited clearing of roadside vegetation will be required. As a part of preliminary project planning works the Shire have submitted two clearing applications to the Department of Environmental Regulation (DER). This flora and vegetation survey report aims to assist the DER assessment by providing site specific floristic information and an assessment of each proposal against the ten clearing principles against which proposals are assessed.

1.2 Project Areas

The Boxwood Hill-Ongerup Road project area extends from Normans Road, approximately 1.2km along the Boxwood Hill-Ongerup Road alignment in a north-west direction, as shown in Figure 1. Survey was undertaken on both sides of the road.

The Meechi Road project area covers approximately 3km of road alignment located to the north of Swamp Road. It originates immediately south of Devils Creek and extends north before turning north-west where it follows a proposed road re-alignment. The survey area terminates as the proposed re-alignment intersects with the current alignment which also heads north-west at this point. The Meechi Road project area is shown on Figure 2 and both sides of the road were surveyed.

1.3 Objectives

The objectives of the flora and vegetation surveys were to:

- Develop species lists and vegetation descriptions specific to each proposed clearing area;
- Determine the presence/absence of threatened and priority flora species and vegetation communities within the proposed clearing area; and
- Provide information required to determine if the proposals constitute a variation to the clearing principles, as defined in Schedule 5 of the Environmental Protection Act (1986).

1.4 Scope of Works

Flora and vegetation surveys are required to be undertaken at a time when floristic species are in flower. This is typically in spring, however, additional surveys may be required if conservation dependent species known to flower in other seasons are believed to be potentially present within the clearing area.

Accordingly the scope of works undertaken to achieve the project objective defined above included:

- Completion of a desktop assessment of each site to review available floristic data that may identify potential target species and communities that may be represented across either site.
- Site visits to perform Level 1 flora survey within the project areas. The survey defined vegetation complexes and the extent of any conservation significant taxa and communities. The surveys were conducted by a qualified botanist and performed in accordance with '*Technical Guide - Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment*' (EPA and DPaW 2015).
- Collection of field location data using a hand held GPS unit capable of transferring location data to spatial data files for mapping; and
- Development of this final project report and associated site figures presenting the results of each survey.



2 METHOD

The assessments were conducted by Damien Rathbone (Scientific Licence 011605), an ecologist with over 10 years of experience in South West Western Australia (SWWA) and with specific knowledge of the vegetation communities of the south coast. All assessments were conducted in accordance with “level one surveys” in *Technical Guide - Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA and DPaW 2015). All vegetation boundaries and locations of significant flora or weeds were identified using a handheld GPS (Garmin 60).

The survey areas for both road sections encompassed 2.5 m from the current vegetation edge with an assumed disturbance extent for road widening of 1 m on each side of the road. Boxwood-Ongerup Road was surveyed on the 10 October 2016 and Meechi Road was surveyed on the 24 October 2016.

2.1 Desktop Assessment

A desktop assessment of known or potential significant flora within 5 km of the assessment areas was undertaken using the sources below. An assessment of the likelihood of occurrence was determined for all species based on known habitat information and the vegetation described in the assessment.

- Protected Matters Search Tool (PMST) (DotE 2016) to identify potential flora listed under the Commonwealth *Environmental Protection and Biodiversity Conservation Act* (1999) (EPBC Act).
- NatureMap (DPaW 2007) to identify potential flora protected under Western Australian *Wildlife Conservation Act* (1950) and EPBC Act.
- Department of Parks and Wildlife database of Priority Ecological Communities (PECs) and Threatened Ecological Communities (TECs) to determine known occurrences in the vicinity of the assessment area.

2.2 Vegetation Assessment

Vegetation communities were defined using relevés (100m²) in which the information below was recorded.

- Location, recorder and date.
- Species – dominant vascular plant species present, including weed species. Species not confidently identified during the field survey were collected for later identification in the Albany regional herbarium.
- Foliar cover – the estimated percentage cover for each dominant species in each stratum.
- Vegetation condition – according to the vegetation condition classification adapted by Keighery (1994).
- Disturbance – records of any obvious disturbances such as symptoms of plant disease (i.e. caused by the presence of *Phytophthora* Dieback, aerial canker or *Armillaria* sp.), recent fire, tracks, weed infestation etc.
- Photographs – a photograph was taken of each relevé in the NW corner.

The vegetation was then described according to the National Vegetation Index Survey (NVIS) (ESCAVI 2003).

2.3 Targeted Rare and Priority Search

A targeted search for potential rare and priority flora as listed in DER communications (See Section 3.4) was conducted in the appropriate season to detect threatened or priority species with a high likelihood of occurrence (identified from the desktop assessment). The assessment area was initially surveyed via a meandering traverse to identify vegetation types and condition. Where vegetation types were identified

as potential habitat for threatened or priority flora, an intensive grid of transects spaced at 5-10 m was surveyed.

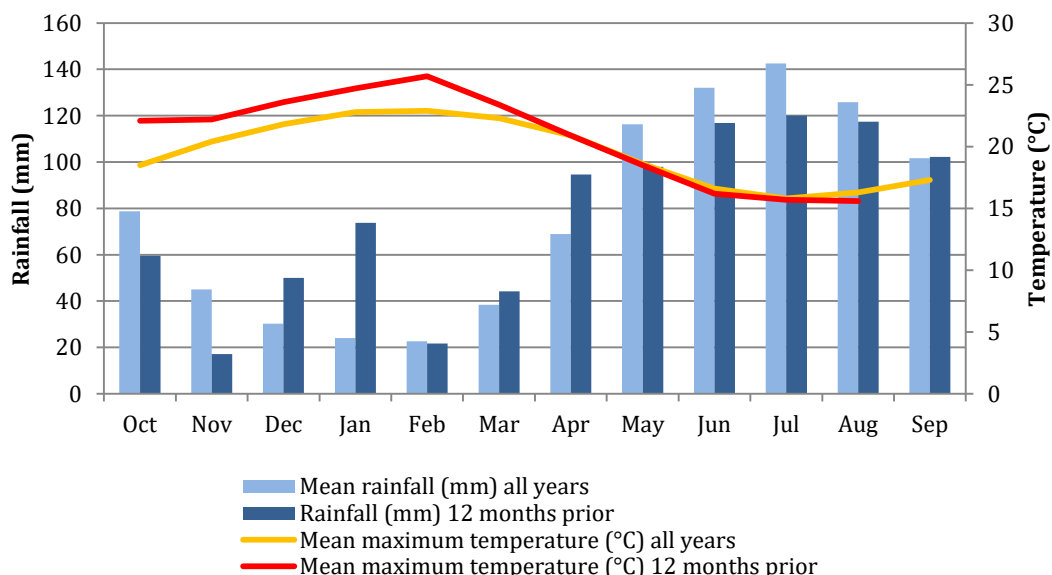
2.4 Survey Timing and Method Limitations

The surveys were conducted during spring by an ecologist with over 10 years of experience in SWWA. Boxwood-Ongerup Road was surveyed on the 10 October 2016 and Meechi Road was surveyed on the 24 October 2016.

The information provided within this report is accurate and correct to the best of the author's knowledge. However, no liability is accepted for loss, damage or injury arising from its use. Plant populations can fluctuate over time, particularly after disturbance events such as fire and drought. Consequently, all mapping, vegetation descriptions and population estimates within this report should not be considered accurate indefinitely. The report was prepared for the applicant of the clearing permit for the purposes set out in the scope and should be read, distributed and referred to in its entirety.

The climatic characteristics of the survey areas and the seasonal conditions preceding the field work may have influenced the emergence of annual species and the flowering perennial species (Graph 1). The area occurs within a high rainfall zone and the assessment was conducted in spring after good rainfall in the preceding winter. Consequently, soil moisture conditions were ideal during the assessment for the adequate emergence and flowering of threatened or priority species (particularly orchids) within the assessment area.

Three taxa could not be identified to species level due to the absence of flowering or fruiting material. There are no Threatened or Priority species from these genera that resemble these unidentified specimens or that are known from similar habitats within the vicinity of survey areas. A level two survey would be required to determine the total flora of the survey areas.



Graph 1. Climate statistics 12 months prior to the survey compared with historical averages (all years available) (Albany) (BOM 2016). Total rainfall for the 12 month period prior to the survey was 915 mm compared to the historic average of 926 mm.

3 RESULTS AND DISCUSSION

3.1 Vegetation – Boxwood Hill-Ongerup Road

The proposed road widening occurs over a gently sloping hill on clay soils. The highest elevated area had outcropping granite while lower areas were potentially underlain by spongeolite or laterite. The vegetation condition was excellent with very limited weed invasion or soil disturbance away from the road edge. The survey area is contiguous with an extensive area of native vegetation to the north (Corackerup Nature Reserve) and wide road reserve to the south. Three vegetation communities were identified from the survey area and are described below and shown in Figure 1.

The majority of the survey area was composed of open mallee woodland of *Eucalyptus pleurocarpa*, *E. ecostata* and *E. phenax*, over a sparse tall shrubland of *Banksia media* over a low shrubland of *Melaleuca spathulata* and *M. bracteosa* (Plate 1). This vegetation community is not concordant with any currently listed Threatened or Priority Ecological Community and occurs widely throughout the adjacent Corackerup Nature Reserve.



Plate 1. *Eucalyptus pleurocarpa*/*Eucalyptus ecostata*/*Banksia media*.

Outcropping granite occurred in a small section of the survey area where the vegetation was composed of an open shrubland of *Calothamnus quadrifidus* and *Grevillea tetragonoloba* over a sparse low shrubland of *Hibbertia* spp. and a sedgeland of *Lepidosperma* spp. (Plate 2). This vegetation is not concordant with any currently listed Threatened or Priority Ecological Community. Granite outcrops often contain unique assemblages of species that do not occur widely throughout the landscape. Only a small area of exposed granite was present and no Threatened or Priority species were recorded. The rock exposure is likely to limit the area of disturbance associated with the proposed road works into this community.



Plate 2. *Calothamnus quadrifidus*/*Grevillea tetragonoloba*.

The western section of the survey area was composed of a dense mallet forest of *Eucalyptus platypus* over low sparse shrubland of *Melaleuca* spp. (Plate 3). This vegetation is not concordant with any currently listed Threatened or Priority Ecological Community. *Eucalyptus platypus* commonly forms dense stands with low species richness and is known to occur widely within the south coast region. The Priority 4 taxon, *Acrotriche dura* was found within this community.



Plate 3. *Eucalyptus platypus*.

3.2 Vegetation – Meechi Road

The proposed road widening occurs over a flat plain with sand and clay duplex soils intersected with several small water accumulating pans and by one moderately incised saline drainage channel. The vegetation condition was excellent with very limited weed invasion or soil disturbance away from the road edge. The western road reserve formed a significant corridor of native vegetation, while the eastern side was narrower with some disturbance associated with the adjacent agriculture land use. The survey

area is contiguous to the north with the vegetation surrounding the Bremer River. Two vegetation communities were identified from the survey area and are described below and shown in Figure 2.

The majority of the survey area was composed of an open mallee woodland of *Eucalyptus pleurocarpa* and *E. adesmophloia* over a sparse mid shrubland of *Calothamnus gibbosus*, *Hakea marginata* and *Petrophile squamata* subsp. northern (J. Monks 40) over a sedgeland of *Anarthria* spp. and *Lepidosperma* spp. (Plate 4). Some small water accumulating pans occurred within this community where *Phymatocarpus maxwellii* and *Anarthria laevis* became dominant in lower layers. This vegetation community is not concordant with any currently listed Threatened or Priority Ecological Community and occurs widely throughout the south coast region.



Plate 4. *Eucalyptus pleurocarpa* / *E. adesmophloia*.

A small section of the survey area was dissected by a moderately incised saline drainage channel with vegetation composed of a woodland of *Eucalyptus occidentalis* over a shrubland of *Melaleuca viminea* (Plate 5). This vegetation community is not concordant with any currently listed Threatened or Priority Ecological Community and is common in saline drainage channels in the south coast region.



Plate 5. *Eucalyptus occidentalis*.

3.3 Flora

The full species list developed from each survey area is presented in Appendix A. From 41 families, a total of 208 native and 7 weed species were recorded from the two survey areas. One Priority 4 species, *Acrotriche dura* was found to be relatively abundant within the Boxwood Hill-Ongerup Road survey area. No other Threatened or Priority flora was recorded in either survey area. No weeds listed under the *Biosecurity and Agriculture Management Act* (DAFWA 2016) or considered to be Weed of National Significance (WoNS) were recorded.

3.3.1 *Acrotriche dura* (Priority 4)

Approximately 60 individuals of *Acrotriche dura* were observed from the Boxwood Hill-Ongerup Road survey area that formed a contiguous population into the adjacent Corackerup Nature Reserve (Plate 6). A brief assessment was made in the vicinity and into the adjacent nature reserve where a similar density and abundance of plants was observed. The taxon is apparently locally common and therefore is unlikely to be significantly impacted by the proposed clearing.

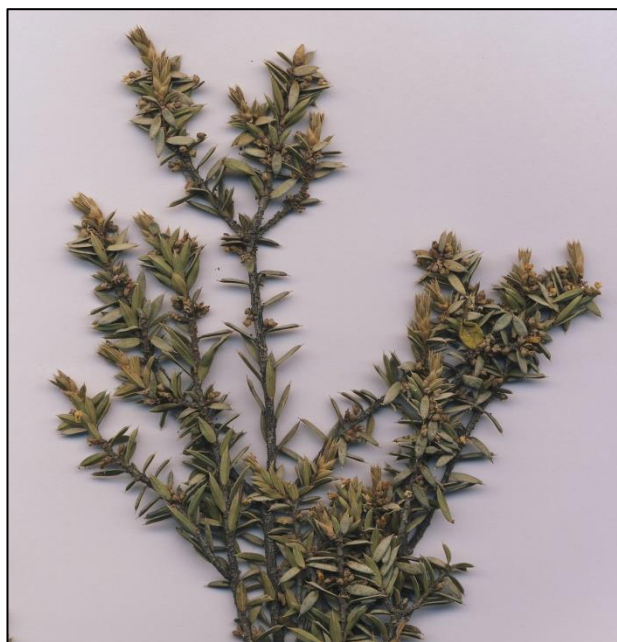


Plate 6. *Acrotriche dura* (Priority 4).

3.4 Likelihood of Occurrence Assessment

The desktop assessment of existing records determined five Threatened and 19 Priority flora occur within the vicinity of the survey areas. A likelihood of occurrence assessment determined the probability of these species occurring in the survey areas based on known habitat preferences and vegetation recorded during the field surveys. The likelihood of occurrence assessment is presented in Appendix B and is briefly summarised below.

No Threatened flora were considered likely to occur based on potential habitat within the survey areas. Ten Priority flora were considered to possibly occur due to potential habitat within the survey areas.

None of these Priority flora were recorded and no limitations were identified that would have prevented their detection if present.

Preliminary advice from DER identified the following target species as being possibly present within the proposed clearing areas:

- *Myoporum cordifolium* (DRF);
- *Caladenia bryceana* subsp. *Bryceana* (DRF);
- *Thelymitra psammophila*(DRF);
- *Rinzia longifolia* (P1);
- *Trymalium myrtillus* subsp. *Pungens* (P1);
- *Eucalyptus sinuosa* (P2); and
- *Chamelaucium* sp. Cape Riche (P2).

With the exception of *Chamelaucium* sp. Cape Riche, all species were targeted for survey and are listed in the Likelihood of occurrence assessment presented in Appendix B. *Chamelaucium* sp. Cape Riche was not targeted during the survey as was not detected within the 5 km database search. The closest accurate records occur over 10 km south of the survey area. The likelihood of occurrence of *Chamelaucium* sp. Cape Riche in the survey area is considered unlikely as the species usually occurs on spongolite or marine plains that are closer to the coast (Pers Comm. Sarah Barrett, Flora Conservation Officer DPaW Albany).

From the species identified by DER, two threatened orchids, *Thelymitra psammophila* and *Caladenia bryceana* are known within the vicinity of the Boxwood Hill-Ongerup Road survey area. The emergence of many orchid species is highly dependent on seasonal conditions. To ensure adequate survey timing, existing populations of both species were visited to confirm emergence and to compare habitats prior to conducting the surveys. The field assessment determined that most of survey areas were unsuitable habitat for either Threatened orchid.

Myoporum cordifolium was noted to be unlikely to occur within the survey area based on the absence of suitable habitat. This assessment was based on comparison with the habitat of the closest known population located approximately 3.5km north of the survey area, which could be described as white clay flats in a very broad depression. This population was visited during the survey and was observed to be lower in the profile and had very silty, white clay soils that were not present in the survey area.

More broadly *Myoporum cordifolium* has been recorded from a very wide range of habitats, although almost always on clay soils. Recently, a disjunct population was recorded in the Warren Region over 140 km away, highlighting its potential occurrence over a wide area of the south coast. Within its range, *Myoporum cordifolium* has occasionally been recorded from *Eucalyptus platypus* (Moort) thickets. Therefore, it would be more accurate to state that *Myoporum cordifolium* could possibly occur within a small section (*Eucalyptus platypus* thicket) of the Boxwood - Ongerup Rd survey area. It would be unlikely that *Myoporum cordifolium* would have been overlooked if present as it is a relatively conspicuous shrub that is familiar to the author. It is a characteristic of Myoporums to live for a short period, but remain in soil seed banks for extended periods and germinate after disturbance. It could not be confirmed if *Myoporum cordifolium* seed is present within the seedbank potential habitat areas within the survey area.

4 CONCLUSION

The desktop assessment of existing records associated with both the Boxwood Hill-Ongerup Road and Meechi Road proposed clearing areas identified five Threatened and 19 Priority flora that occur within the vicinity of the survey areas. From these species it was considered that the five Threatened species were unlikely to occur and only 10 of the Priority species were considered likely to occur due to the presence of potential habitat within the survey areas. The surveys were conducted during a period considered suitable for survey and no limitations were identified that would have prevented the detection of species present. During the surveys, however, no Threatened species were recorded and only the Priority 4 species *Acrotriche dura* was recorded.

Approximately 60 individuals of *Acrotriche dura* were observed from the Boxwood Hill-Ongerup Road survey area and these formed a contiguous population into the adjacent Corackerup Nature Reserve. A brief assessment was made in the vicinity and into the adjacent nature reserve where a similar density and abundance of plants was observed. The taxon is apparently locally common and therefore is unlikely to be significantly impacted by the proposed clearing.

Two Threatened orchids, *Thelymitra psammophila* and *Caladenia bryceana* are known within the vicinity of the Boxwood Hill-Ongerup Road survey area. The emergence of many orchid species is highly dependent on seasonal conditions. To ensure adequate survey timing, existing populations of both species were visited to confirm emergence and to compare habitats prior to conducting the surveys. The field assessment determined that most of survey areas were unsuitable habitat for either Threatened orchid and neither species was recorded.

Vegetation across the Boxwood Hill-Ongerup Road proposed clearing area comprised of three separate communities, all considered to be common vegetation communities that are well represented across the South Coast region. Within the Meechi Road proposed clearing area there were two separate vegetation communities which were both also considered to be common vegetation communities that are well represented across the South Coast region.

In conclusion it is considered that the proposed clearing within each of the identified areas is unlikely represent a significant impact to any of the identified vegetation communities. Further, while a population of the Priority 4 species *Acrotriche dura* was identified within the proposed clearing area along the Boxwood Hill-Ongerup Road, it is unlikely to be impacted as the species appears to be locally common and well represented within the adjoining Corackerup Nature Reserve.

5 REFERENCES

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6 LIMITATIONS

This report was prepared for The Shire of Jerramungup, solely for the purposes set out in the scope of works and it is not intended that any other person use or rely on the contents of this report.

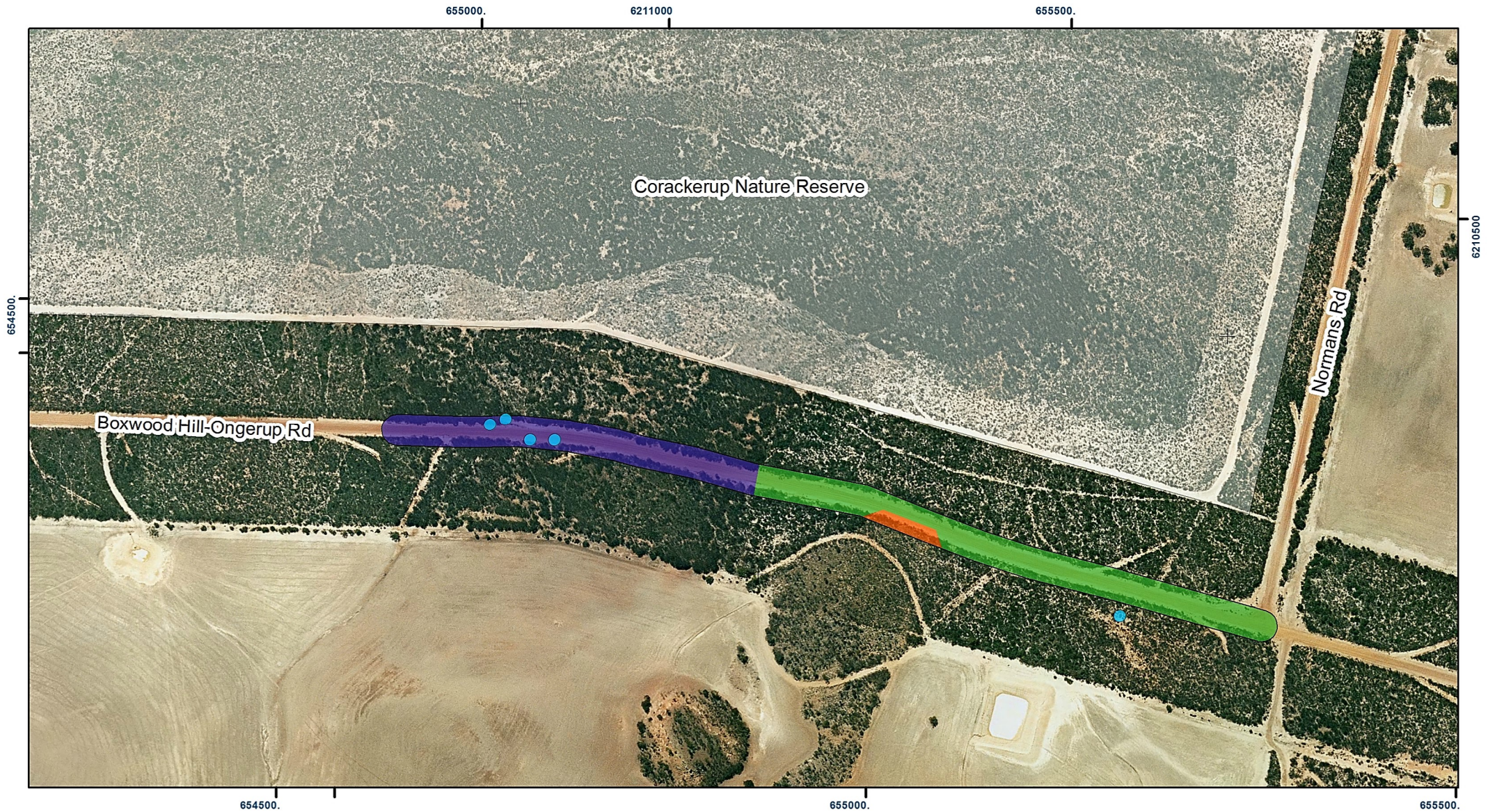
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Great Southern Bio Logic and its agents have exercised reasonable care, skill and diligence in the conduct of project activities and preparation of this report. However, except for any non-excludable statutory provision, Great Southern Bio Logic and its agents provided no warranty in relation to its services or the report, and is not liable for any loss, damage, injury or death suffered by any party (whether caused by negligence or otherwise) arising from or relating to the services or the use or otherwise of this Report.

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Figures

Flora and Vegetation surveys of Boxwood Hill-Ongerup Road and Meechi Road



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Threatened Flora

● *Acrotriche dura* (Priority 4)

Other

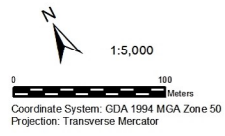
□ Corackerup Nature Reserve

Vegetation

■ *Calothamnus quadrifidus/Grevillea tetragonoloba*

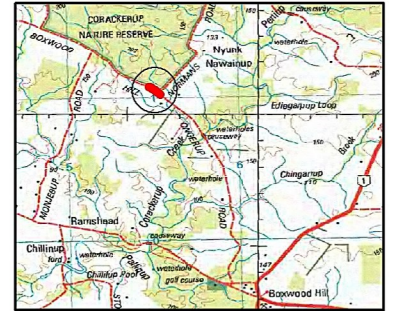
■ *Eucalyptus platypus*

■ *Eucalyptus pleurocarpa/Eucalyptus ecostata/Banksia media*



**Figure 1.
Vegetation and Priority Flora,
Boxwood Hill - Ongerup Road.**

Boxwood-Hill - Ongerup Road Vegetation and Flora survey prepared for Shire of Jerramungup, November, 2016.

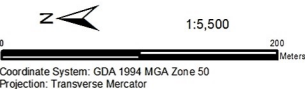




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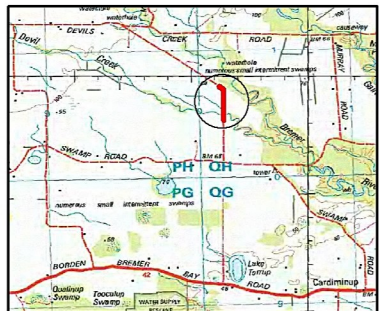
Vegetation

- *Eucalyptus pleurocarpa* / *E. adesmophloia*
- *Eucalyptus occidentalis*



**Figure 2:
Vegetation, Meechi Road.**

Meechi Road Vegetation and Flora Survey prepared for Shire of Jerramungup, November, 2016.



Appendix A

Taxon Inventory for Boxwood Hill-Ongerup and Meechi Rd survey areas



Vascular plant taxa recorded during the surveys. Plant nomenclature and status according to Florabase, Department of Parks and Wildlife (DPaW 2016 a & b). *denotes weed taxon.

FAMILY	TAXON	Boxwood/Ongerup Road	Meechi Road
Anarthriaceae	<i>Anarthria gracilis</i>		x
	<i>Anarthria laevis</i>		x
	<i>Anarthria prolifera</i>		x
Apiaceae	<i>Xanthosia huegelii</i>		x
Araliaceae	<i>Trachymene ornata</i>	x	
Asparagaceae	<i>Chamaescilla spiralis</i>		x
Asteraceae	* <i>Arctotheca calendula</i>		x
	<i>Argentipallium niveum</i>	x	x
	* <i>Taraxacum khatoonae</i>		x
Brassicaceae	* <i>Brassica tournefortii</i>		x
Caryophyllaceae	<i>Spergularia ?marina</i>		x
Casuarinaceae	<i>Allocasuarina humilis</i>		x
	<i>Allocasuarina microstachya</i>		x
	<i>Allocasuarina thuyoides</i>		x
Centrolepidaceae	<i>Centrolepis aristata</i>		x
Chenopodiaceae	<i>Rhagodia preissii</i> subsp. <i>preissii</i>		x
	<i>Tecticornia ?halocnemoides</i>		x
Cyperaceae	<i>Baumea juncea</i>		x
	<i>Gahnia aristata</i>		x
	<i>Lepidosperma aphyllum</i>		x
	<i>Mesomelaena stygia</i> subsp. <i>stygia</i>		x
	<i>Schoenus lanatus</i>		x
	<i>Schoenus nanus</i>		x
	<i>Schoenus obtusifolius</i>		x
	<i>Schoenus subfascicularis</i>		x
	<i>Tricostularia neesii</i>		x
Dasyopogonaceae	<i>Calectasia grandiflora</i>		x
Dilleniaceae	<i>Hibbertia gracilipes</i>	x	x
	<i>Hibbertia hamulosa</i>	x	
	<i>Hibbertia mucronata</i>		x
Droseraceae	<i>Drosera erythrorhiza</i>		x
	<i>Drosera menziesii</i> subsp. <i>menziesii</i>		x
Ericaceae	<i>Acrotriche dura</i> (Priority 4)	x	
	<i>Acrotriche ramiflora</i>	x	
	<i>Andersonia lehmanniana</i> subsp. <i>pubescens</i>		x
	<i>Andersonia parvifolia</i>		x
	<i>Leucopogon carinatus</i>		x
	<i>Leucopogon gibbosus</i>		x
	<i>Leucopogon lasiostachyus</i>		x
	<i>Leucopogon</i> sp. Coujinup (M.A. Burgman 1085)		x
	<i>Lysinema ciliatum</i>	x	x
Euphorbiaceae	<i>Stachystemon polyandrus</i>		x
	<i>Stachystemon virgatus</i>		x
Fabaceae	<i>Acacia assimilis</i>	x	
	<i>Acacia chrysocephala</i>	x	x
	<i>Acacia cyclops</i>		x
	<i>Acacia ferocior</i>	x	
	<i>Acacia gonophylla</i>		x
	<i>Acacia</i> sp.		x
	<i>Acacia subcaerulea</i>		x
	<i>Acacia sulcata</i> var. <i>platyphylla</i>		x
	<i>Acacia varia</i> var. <i>parviflora</i>		x

FAMILY	TAXON	Boxwood/Ongerup Road	Meechi Road
	<i>Bossiaea dentata</i>	x	x
	<i>Bossiaea eriocarpa</i>		x
	<i>Bossiaea preissii</i>	x	
	<i>Chorizema nervosum</i>		x
	<i>Chorizema uncinatum</i>		x
	<i>Daviesia argillacea</i>	x	
	<i>Daviesia benthamii</i>	x	
	<i>Daviesia incrassata</i> subsp. <i>incrassata</i>		x
	<i>Daviesia lancifolia</i>	x	
	<i>Daviesia teretifolia</i>		x
	<i>Eutaxia cuneata</i>	x	
	<i>Gastrolobium musaceum</i>	x	
	<i>Gastrolobium reticulatum</i>		x
	<i>Gastrolobium</i> sp.		x
	<i>Gompholobium confertum</i>		x
	<i>Gompholobium knightianum</i>		x
	<i>Jacksonia capitata</i>		x
	<i>Jacksonia condensata</i>	x	
	<i>Jacksonia grevilleoides</i>		x
	<i>Templetonia retusa</i>		x
Goodeniaceae	<i>Cooperhooia polygalacea</i>	x	
	<i>Cooperhooia stropholata</i>	x	
	<i>Dampiera juncea</i>		x
	<i>Dampiera sacculata</i>	x	
	<i>Goodenia pterigosperma</i>		x
	<i>Lechenaultia formosa</i>		x
Haemodoraceae	<i>Anigozanthos rufus</i>		x
	<i>Conostylis pusilla</i>		x
	<i>Haemodorum laxum</i>		x
Hemerocallidaceae	<i>Dianella brevicaulis</i>		x
Iridaceae	<i>Patersonia lanata</i>		x
Lamiaceae	<i>Hemiandra incana</i>	x	
	<i>Microcorys glabra</i>		x
Loganiaceae	<i>Logania micrantha</i>		x
Loranthaceae	<i>Nuytsia floribunda</i>		x
Malvaceae	<i>Lasiopetalum compactum</i>	x	
	<i>Lasiopetalum indutum</i>	x	
	<i>Lasiopetalum quinquenervium</i>		x
	<i>Lasiopetalum rosmarinifolium</i>	x	
	<i>Thomasia angustifolia</i>		x
	<i>Thomasia microphylla</i>	x	
Myrtaceae	<i>Astartea aspera</i> subsp. <i>aspera</i>	x	x
	<i>Beaufortia micrantha</i>		x
	<i>Beaufortia schaueri</i>	x	
	<i>Callistemon phoeniceus</i>		x
	<i>Calothamnus gibbosus</i>	x	x
	<i>Calothamnus quadrifidus</i>	x	
	<i>Conothamnus aureus</i>		x
	<i>Cyathostemon tenuifolius</i>	x	
	<i>Darwinia</i> sp. Ravensthorpe (G.J. Keighery 8030)		x
	<i>Darwinia vestita</i>		x
	<i>Eucalyptus adesmophloia</i>		x
	<i>Eucalyptus buprestium</i>		x
	<i>Eucalyptus captiosa</i>	x	



FAMILY	TAXON	Boxwood/Ongerup Road	Meechi Road
	<i>Eucalyptus ecostata</i>	x	x
	<i>Eucalyptus incrassata</i>		x
	<i>Eucalyptus latens</i>	x	
	<i>Eucalyptus occidentalis</i>		x
	<i>Eucalyptus phaenophylla</i>	x	
	<i>Eucalyptus phenax</i>	x	x
	<i>Eucalyptus platypus</i> subsp. <i>platypus</i>	x	
	<i>Eucalyptus pleurocarpa</i>	x	x
	<i>Eucalyptus pluricaulis</i> subsp. <i>porphyrea</i>	x	
	<i>Eucalyptus sporadica</i>	x	
	<i>Kunzea affinis</i>	x	x
	<i>Leptospermum oligandrum</i>	x	x
	<i>Leptospermum spinescens</i>		x
	<i>Melaleuca bracteosa</i>	x	x
	<i>Melaleuca carrii</i>		x
	<i>Melaleuca glaberrima</i>		x
	<i>Melaleuca hamata</i>	x	
	<i>Melaleuca hamulosa</i>	x	
	<i>Melaleuca lateriflora</i>	x	
	<i>Melaleuca rigidifolia</i>	x	x
	<i>Melaleuca spathulata</i>	x	x
	<i>Melaleuca striata</i>	x	x
	<i>Melaleuca suberosa</i>	x	x
	<i>Melaleuca subfalcata</i>		x
	<i>Melaleuca undulata</i>		x
	<i>Melaleuca viminea</i> subsp. <i>viminea</i>		x
	<i>Melaleuca violacea</i>	x	
	<i>Phymatocarpus maxwellii</i>		x
	<i>Rinzia communis</i>	x	
	<i>Taxandria spathulata</i>		x
	<i>Tetrapora glomerata</i>	x	
	<i>Verticordia endlicheriana</i> var. <i>endlicheriana</i>		x
	<i>Verticordia habrantha</i>		x
Orchidaceae	* <i>Disa bracteata</i>		x
	<i>Microtis</i> sp.		x
	<i>Pterostylis vittata</i>		x
	<i>Pyrorchis nigricans</i>		x
	<i>Thelymitra crinita</i>		x
Pittosporaceae	<i>Billardiera variifolia</i>		x
Poaceae	<i>Amphipogon debilis</i>		x
	<i>Amphipogon turbinatus</i>		x
	* <i>Briza maxima</i>		x
	* <i>Ehrharta longiflora</i>		x
	<i>Neurachne alopecuroidea</i>		x
Polygalaceae	<i>Comesperma spinosum</i>	x	
Proteaceae	<i>Adenanthos cuneatus</i>		x
	<i>Adenanthos flavidiflorus</i>		x
	<i>Banksia alliacea</i>		x
	<i>Banksia arctotidis</i>		x
	<i>Banksia blechnifolia</i>		x
	<i>Banksia cirsioides</i>		x
	<i>Banksia falcata</i>		x
	<i>Banksia gardneri</i> var. <i>gardneri</i>		x
	<i>Banksia media</i>	x	x



FAMILY	TAXON	Boxwood/Ongerup Road	Meechi Road
	<i>Banksia nutans</i>		x
	<i>Banksia obovata</i>		x
	<i>Banksia obtusa</i>		x
	<i>Banksia plumosa</i>		x
	<i>Banksia repens</i>		x
	<i>Banksia sessilis</i>		x
	<i>Banksia tenuis</i> var. <i>tenuis</i>		x
	<i>Grevillea fasciculata</i>		x
	<i>Grevillea nudiflora</i>		x
	<i>Grevillea oligantha</i>	x	
	<i>Grevillea pectinata</i>	x	
	<i>Grevillea tetragonoloba</i>	x	
	<i>Hakea corymbosa</i>		x
	<i>Hakea denticulata</i>	x	
	<i>Hakea laurina</i>	x	x
	<i>Hakea marginata</i>		x
	<i>Hakea nitida</i>		x
	<i>Hakea obliqua</i>		x
	<i>Hakea pandanycarpa</i>		x
	<i>Hakea prostrata</i>		x
	<i>Hakea strumosa</i>		x
	<i>Hakea sulcata</i>		x
	<i>Isopogon polycephalus</i>		x
	<i>Isopogon</i> sp. Fitzgerald River (D.B. Foreman 813)	x	x
	<i>Isopogon trilobus</i>		x
	<i>Lambertia inermis</i> var. <i>inermis</i>		x
	<i>Persoonia striata</i>		x
	<i>Petrophile phyllicoides</i>	x	x
	<i>Petrophile seminuda</i>	x	x
	<i>Petrophile squamata</i> subsp. northern (J. Monks 40)		x
	<i>Stirlingia tenuifolia</i>		x
	<i>Synaphea gracillima</i>		x
Restionaceae	<i>Chordifex laxus</i>		x
	<i>Chordifex sphacelatus</i>		x
	<i>Desmocladus fasciculatus</i>		x
	<i>Desmocladus flexuosus</i>		x
	<i>Hypolaena fastigiata</i>		x
	<i>Lepidobolus chaetocephalus</i>		x
Rhamnaceae	<i>Spyridium microcephalum</i>		x
Rubiaceae	<i>Opercularia vaginata</i>		x
Rutaceae	<i>Boronia crassifolia</i>		x
	<i>Boronia inornata</i> subsp. <i>inornata</i>	x	
	<i>Boronia subsessilis</i>		x
Santalaceae	<i>Leptomeria pachyclada</i>	x	
	<i>Leptomeria squarrulosa</i>		x
Solanaceae	* <i>Solanum nigrum</i>		x
Stylidiaceae	<i>Stylidium piliferum</i>		x
	<i>Stylidium pingrupense</i>	x	x
	<i>Stylidium rupestre</i>		x
	<i>Stylidium schoenoides</i>		x
Thymelaeaceae	<i>Pimelea angustifolia</i>		x
	<i>Pimelea brachyphylla</i>	x	
	<i>Pimelea brevifolia</i>		x
Violaceae	<i>Hybanthus floribundus</i>		x



FAMILY	TAXON	Boxwood/Ongerup Road	Meechi Road
Xanthorrhoeaceae	<i>Xanthorrhoea platyphylla</i>		x

Appendix B

Likelihood of Occurrence Assessment



Likelihood of occurrence of conservation significant plant species recorded within the vicinity of the survey areas (<5 km). Includes records from the Western Australia Herbarium and the Threatened and Priority Flora database, Department of Parks and Wildlife.

Taxon (Status)[Family]	Plant description and flowering time	Likelihood of occurrence
<i>Acacia keigheryi</i> (3) [Fabaceae]	Low shrub with few pairs of bi-pinnate leaves .	Possible: Known from granite and watercourses near survey area. Some potential habitat present.
<i>Acacia newbeyi</i> (3) [Fabaceae]	Openly branched, pungent shrub, 0.3-1 m high. Fl. yellow, Jul to Aug.	Unlikely: Known from lateritic gravelly soils. Limited habitat present.
<i>Acacia trulliformis</i> (4) [Fabaceae]	Spreading shrub, 0.9-2.2 m high. Fl. yellow, Sep.	Possible: Known from sandy loam soils in close proximity.
<i>Acrotriche dura</i> (4) [Ericaceae]	NA	Recorded within survey area.
<i>Adenanthos cacomorpus</i> (2) [Proteaceae]	Erect, lignotuberous shrub, to 1 m high. Fl. pink, Nov to Dec or Jan to Mar.	Unlikely: Known from very few locations in sandy soils.
<i>Boronia clavata</i> (T) [Rutaceae]	Upright, slender shrub, 0.5-1.5(-2.1) m high. Fl. yellow-green, Aug to Oct.	Unlikely: Known from flats in riparian vegetation in the Bremer River an Devils Creek. Section of creek in survey area was narrow and less suitable habitat. Is a very conspicuous shrub unlikely to be overlooked if on roadside.
<i>Caladenia bryceana</i> subsp. <i>bryceana</i> (T) [Orchidaceae]	Tuberous, perennial, herb, 0.05-0.1 m high. Fl. green-yellow, Aug to Oct.	Unlikely: Known from very few locations in watercourses.
<i>Chorizema carinatum</i> (3) [Fabaceae]	Erect or spreading shrub, 0.1-0.6 m high. Fl. yellow, Oct to Dec.	Possible: Known widely from sandy clay soils in vicinity.
<i>Desmodium biflorum</i> (3) [Restionaceae]	Rhizomatous, densely tufted perennial, herb (sedge-like), 0.1-0.2 m high. Fl. Sep to Oct.	Possible: Known from a variety of habitats - sand, sandy clay, lateritic soils in the vicinity.
<i>Eucalyptus melanophitra</i> (4) [Myrtaceae]	Tree (mallet), 4-7 m high, bark rough flaky at base of trunk. Fl. white, Feb.	Unlikely: Known from skeletal soils and stony breakaways. No habitat present.
<i>Eucalyptus nutans</i> (T) [Myrtaceae]	Mallet, to 4 m high, bark smooth grey; leaves dark green, glossy.	Unlikely: Known from very few locations in grey clay in broad depressions.
<i>Eucalyptus sinuosa</i> (2) [Myrtaceae]	Mallee 2-4 m high.	Unlikely: Occurs mainly in Fitzgerald NP, few populations on ridges in Corackerup NR.
<i>Eucalyptus vesiculosa</i> (4) [Myrtaceae]	Mallee, to 3 m high, bark smooth, grey over rich coppery red. Fl. pink, May.	Possible: Known from flats near breakaways in close vicinity.
<i>Kunzea eriocalyx</i> (2) [Myrtaceae]	Shrub, 0.5-1 m high. Fl. pink, Aug to Oct.	Unlikely: Known from few locations in loam, sand, clay over laterite or quartzitic outcrops.
<i>Lasiopetalum parvuliflorum</i> (3) [Malvaceae]	Erect, spreading shrub, 0.35-1 m high. Fl. green-cream, Sep to Oct.	Possible: Known from creeks and seasonal swamps.
<i>Lepidium aschersonii</i> (T) [Brassicaceae]	Erect perennial, herb, 0.04-0.3 m high.	Unlikely: Known from very few locations, north of survey areas.
<i>Leucopogon cymbiformis</i> (2) [Ericaceae]	Dense, erect or spreading shrub, 0.1-0.6(-0.8) m high. Fl. white, various months.	Unlikely: Known from lateritic gravelly soils. sandplains and wet flats, limited habitat present.
<i>Leucopogon florulentus</i> (3) [Ericaceae]	Erect slender shrub, 0.3-0.8 m high. Fl. white, Jun to Nov.	Unlikely: Known from sand and gravelly lateritic soils, limited habitat present.
<i>Myoporum cordifolium</i> (T) [Scrophulariaceae]	Spindly, erect shrub, 0.3-0.8 m high. Fl. white/white-pink, Jul to Nov.	Unlikely: Known from clay flats, no habitat present.
<i>Rinzia longifolia</i> (1) [Myrtaceae]	Prostrate shrub, 0.1-0.4 m high. Fl. pink/white, Aug to Nov.	Possible: Common in vicinity in a variety of habitats.
<i>Stylidium pseudohirsutum</i> (3) [Stylidiaceae]	Rosetted perennial, herb, 0.09-0.42 m high. Fl. white-cream, Nov to Dec.	Possible: Known from a variety of habitats in vicinity.
<i>Thelymitra psammophila</i> (T) [Orchidaceae]	Tuberous, perennial, herb, 0.15-0.25 m high. Fl. yellow, Sep to Oct.	Unlikely: Known from clay flats not present in survey area.
<i>Thysanotus gageoides</i> (3) [Asparagaceae]	Perennial, herb (with tuberous roots), to 0.2 m high. Fl. purple, Oct to Nov.	Possible: Known from variety of habitats (sand, clay, granite, sandstone, and laterite) in vicinity.
<i>Trymalium myrtillus</i> subsp. <i>pungens</i> (1) [Rhamnaceae]	Erect, spreading, spinescent shrub, 0.5-3 m high. Fl. cream-yellow, Sep to Oct.	Possible: Known from clay loam in close vicinity.