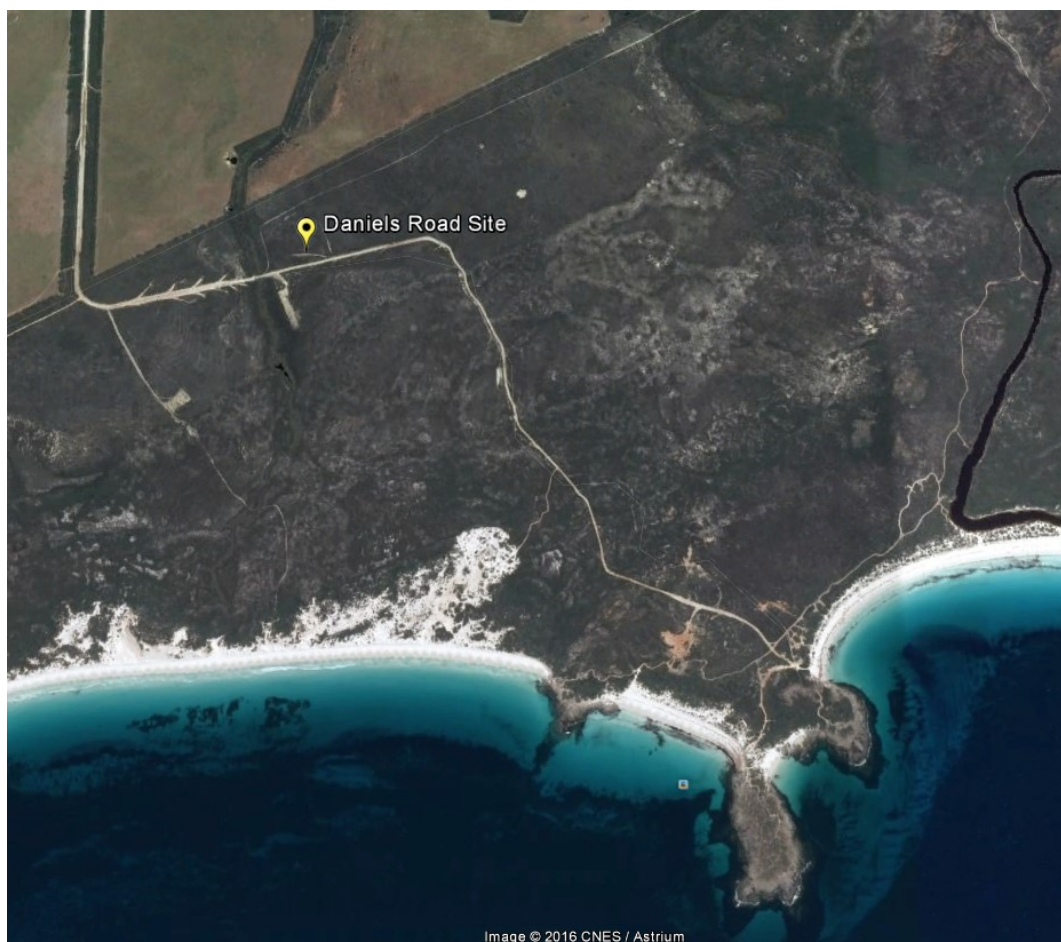


Daniels Road Proposed Limestone Pit

Level 1 Flora and Vegetation Survey

Land: Crown Reserve R41097. Management Order Shire of Esperance. Lot: 509
Plan: 91683

Location description: North side of Daniels Road, Approx 90km east of Esperance.



Area: 1.9ha

The pit is needed for ongoing maintenance of Daniels Road an unsealed road.

The proposed limestone pit was inspected on 16/11/2016 by Julie Waters, Shire of Esperance Environmental Officer (Bachelor of Environmental Science (Hons) with 8 years experience conducting flora surveys in the Esperance area.

Prior to conducting the site inspection a desktop flora survey was conducted using DPaW's Esperance Threatened Flora 2016 shapefiles and all Threatened flora (TF) and Priority flora (PF) within a 10km buffer was identified, listed and specifically searched for.

Results of Desktop survey:

The Beard vegetation mapping for this area is described as Shrublands; mallee and acacia scrub on south coastal dunes

The Proteaceae Dominated Kwongkan Shrublands of the Southeast coastal province of Western Australia Threatened Ecological Community is likely to occur at this site.

The following TF and PF are known from 20km buffer (data Source DPaW Esperance Jan 2016 Threatened flora shapefile):

Table 1: Priority Flora sites within a 10 km radius of the survey area

Number of TF/ PF Sites						
Taxon	DRF	P 1	P 2	P 3	P 4	Total
<i>Lepidium pseudotasmanicum</i>					1	1
<i>Leucopogon rotundifolius</i>				1		1
<i>Myoporum velutinum</i>	7					7
<i>Anigozanthos bicolor subsp. minor</i>	1					1
Total	8			1	1	10

Information was compiled on each of these species including habitat requirements, photos and identification information, and herbarium specimens examined in the Esperance District Herbarium.

***Lepidium pseudotasmanicum*:** Erect annual or biennial, herb, 0.2-0.4(-1) m high. Flowers. white-green, Feb or Dec. Loam, sand.

***Leucopogon rotundifolius*:** Robust shrub, (0.2-) 0.5-1.5 m high. Flowers white, Jan or Mar to Aug or Nov. Skeletal soils. Granite outcrops, steep hillslopes.

***Myoporum velutinum*:** Shrub, 1-2 m high. Flowers white, September. Sandy soils. Grows on creek banks.

***Anigozanthos bicolor subsp. minor*:** Rhizomatous, perennial, herb, 0.05-0.2 m high. Flowers. Green & red, Aug to Oct. Sand. Grows on well-watered sites.

Results of Field Survey:

The site visit occurred on 16/11/2016, due to the late spring this year in Esperance, it was an ideal time for most species to be still flowering. The site consists of mallee scrub heath.

The site was traversed by foot collecting herbarium specimens, which were later identified by use of reference material including comparing to lodged specimens at the Esperance district herbarium. One Priority three species of flora *Verticordia verticordina* was located within the field survey. There were approximately 100 plants located within the proposed footprint. The species was more abundant at the east end of the site and habitat extended further north and east for the species. It has been confirmed by DPaW's Esperance Office (E. Massenbauer pers. comm.) that this is a new population of the species and a Rare Flora Report form has been completed and Herbarium specimen sent to WAHerb for confirmation.

The vegetation condition is in "very good" condition (Keighery, 1994). The site showing some early signs of dieback infestation including dead and dying *Banksia repens*, and *Xanthorea platyphylla*. The area contains dieback susceptible vegetation and there was evidence of dieback disease within the site during the field survey.

It has been confirmed that the area is part of the Proteaceae Dominated Kwongan Shrublands of the Southeast coastal province of Western Australia Threatened Ecological Community, having more than 30% Proteaceae cover and more than two diagnostic species.



Table 2: Species list for Surveyed area

Family	Genus	Species	subspecies	TF / PF
Anarthriaceae	<i>Anarthria</i>	<i>scabra</i>		
Cyperaceae	<i>Mesomelaena</i>	<i>stygia</i>		
Dilleniaceae	<i>Hibbertia</i>	<i>diamesogenos</i>		
Droseraceae	<i>Drosera</i>	<i>sp.</i>		
Ericaceae	<i>Leucopogon</i>	<i>carinatus</i>		
	<i>Lysinema</i>	<i>ciliatum</i>		
Ericaceae	<i>Leucopogon</i>	<i>carinatus</i>		
Fabaceae	<i>Acacia</i>	<i>subcaerulea</i>		
	<i>Daviesia</i>	<i>lancifolia</i>		
Goodeniaceae	<i>Goodenia</i>	<i>scapigera</i>		
	<i>Dampiera</i>	<i>fasciculata</i>		
	<i>Dampiera</i>	<i>juncea</i>		
	<i>Lechenaultia</i>	<i>formosa</i>		
Haloragaceae	<i>Glischrocaryon</i>	<i>aureum</i>		
Loganiaceae	<i>Logania</i>	<i>micrantha</i>		
Myrtaceae	<i>Astartea</i>	<i>astarteoides</i>		
	<i>Beaufortia</i>	<i>schaueri</i>		
	<i>Calothamnus</i>	<i>quadrifidus</i>		
	<i>Cyathostemon</i>	<i>ambiguus</i>		
	<i>Eucalyptus</i>	<i>angulosa</i>		
	<i>Eucalyptus</i>	<i>leptocalyx</i>	<i>leptocalyx</i>	
	<i>Eucalyptus</i>	<i>cooperiana</i>		
	<i>Eucalyptus</i>	<i>X tetragona</i>		
	<i>Taxandria</i>	<i>marginata</i>		
	<i>Taxandria</i>	<i>spathulata</i>		
	<i>Verticordia</i>	<i>plumosa</i>	<i>grandiflora</i>	
	<i>Verticordia</i>	<i>verticordina</i>		P3
Pittosporaceae	<i>Billardiera</i>	<i>fusiformis</i>		
Polygalaceae	<i>Comesperma</i>	<i>confertum</i>		
Proteaceae	<i>Banksia</i>	<i>armata</i>		
	<i>Banksia</i>	<i>repens</i>		
	<i>Isopogon</i>	<i>formosus</i>	<i>formosus</i>	
	<i>Hakea</i>	<i>corymbosa</i>		
	<i>Hakea</i>	<i>marginata</i>		
	<i>Hakea</i>	<i>trifurcata</i>		
Rutaceae	<i>Boronia</i>	<i>spathulata</i>		
Stylidiaceae	<i>Stylidium</i>	<i>rupestre</i>		
Xanthorrhoeaceae	<i>Xanthorrhoea</i>	<i>platyphylla</i>		

Phytophthora Dieback at site

According to Project Dieback's DIDMS database the site is near the junction of Infested and uninfested areas. Visual indications from the field survey suggest this has spread since time of mapping.





Recent death (foreground) and yellowing of *Xanthorea platyphylla* associated with Phytophthora Dieback.

Conclusion:

The site will involve clearing of 1.9ha of a Threatened Ecological Community, however it needs to be highlighted that this community is already under threat from *Phytophthora* dieback.

The clearing will also involve clearing of approximately 100 plants of the Priority 3 flora species *Verticordia verticordina*. There are a number of other populations of this species containing tens of thousands of plant so this is unlikely to have a significant impact on the conservation status of this species.

This pit once opened, will be managed as a dieback infested pit. Meaning that limestone from this pit will only be used on roads already infested by dieback. DIDMS data shows that Daniels Road is infested as far north as 2009. 122.62682E 33.87403S (approx 1.3km north of the site). There is a healthy stand of *Banksia speciosa* 3.6km north of the proposed pit, which appears not to be infested by *Phytophthora* dieback. Where the exact boundary of the infestation is between the 1.3 and 3.6km mark can only be accurately determined by a qualified dieback interpreter.

Appendix 1: Bushland Condition Ratings¹

Condition	Description
Excellent	Vegetation structure intact, with disturbance affecting individual species and weeds consist of non-aggressive species. 1 – 5% weed cover
Very Good	Vegetation structure altered, with obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and/or grazing. 5 – 25% weed cover
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and/or grazing. 25 – 50% weed cover
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance of vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and/or grazing. 50 – 75% weed cover
Completely Degraded	The structure of the vegetation is no longer intact and the area is completely, or almost completely, without native species. These areas are often described as “parkland cleared” with the flora comprising weed or crop species with isolated native trees or shrubs. 75 – 100% weed cover

¹ Adapted from Keighery, 1994 and the Braun-Blanquet Scale of Cover Abundance [from Mueller-Dombois and Ellenberg, 1974]

Appendix 2 Conservation status descriptions

Definitions of conservation codes given to declared rare and priority flora.

KJ Atkins, 15 July 1998, Department of Conservation and Land Management

TF: Threatened Flora – Extant Taxa

Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such.

P1: Priority One – Poorly Known Taxa

Taxa that are known from one or a few (generally less than five) populations, which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, or the plants are under threat, e.g. from disease, grazing by feral animals. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.

P2: Priority Two – Poorly Known Taxa

Taxa which are known from one or a few (generally less than five) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.

P3 Priority Three – Poorly Known Taxa

Taxa that are known from several populations, and the taxa are believed to be not under immediate threat (i.e. not currently endangered), either due to the number of known populations (generally more than five), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as 'rare flora', but are in need of further survey.

P4 Priority Four – Rare Taxa

Taxa which are considered to have been adequately surveyed and which, while being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5-10 years.

Note: The need for further survey of poorly known taxa is prioritised into the three categories depending on the perceived urgency for determining the conservation status of those taxa, as indicated by the apparent degree of threat to the taxa on the current information.

Appendix 3 - Extract from: *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

A patch must include the following key diagnostic characteristics to be considered the ecological community:

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

AND

- 2a) Characterised by Proteaceae species having 30% or greater cover of Proteaceae species across all layers where these shrubs occur (crowns measured as if they are opaque),

OR

- 2b) Two or more diagnostic Proteaceae species are present that are likely to form a significant vegetative component when regenerated (see list of diagnostic species in Table below. (NB: The use of diagnostic species is for situations in which the cover of Proteaceae species is reduced due to recent disturbance (e.g. fire).)

List of diagnostic species

Adenanthos cuneatus

Banksia alliacea

Banksia armata

Banksia cirsioides

Banksia media

Banksia nivea

Banksia nutans

Banksia obovata

Banksia occidentalis

Banksia petiolaris

Banksia pilostylis

Banksia plumosa

Banksia prolata

Banksia pulchella

Banksia speciosa

Banksia tenuis

Grevillea concinna

Hakea cinerea

Hakea corymbosa

Hakea drupacea

Hakea nitida

Hakea obliqua

Hakea pandanicaarpa

Hakea trifurcata

Isopogon heterophyllus

Isopogon polycephalus

Esperance (east)

Isopogon trilobus

Lambertia inermis

