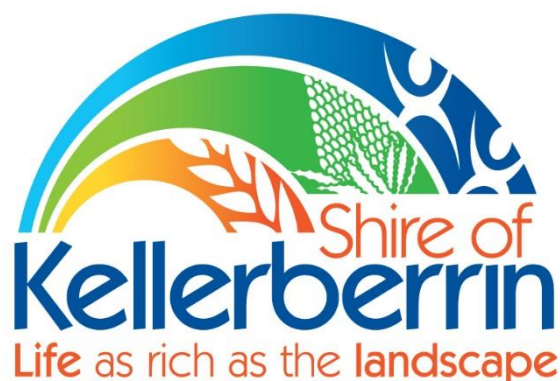


Reference Site Survey

***Revegetation Project on the
Shackleton – Kellerberrin Rd***

Kellerberrin

RE: CPS 8253/1



AUTHORS :

Principal Botanist – Stephen Fry

Santaleuca Consulting

GIS, I.T. and Photos – Dylan Copeland

NRM Consultant

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Santaleuca Consulting
Steve & Michelle Fry (owners and proprietors)
PO Box 278, Narembeen, WA, 6369
0428 647 419 | 0428 647 409 | info@santaleucasandalwood.com.au
www.santaleucasandalwood.com.au | www.facebook.com/Santaleuca



REFERENCE SITE SURVEYS FOR OFFSET PROPOSAL RELATED TO BAANDEE NORTH ROAD.

INTRODUCTION:

The Shire of Kellerberrin in its application to the Department of Water and Environmental Regulation for a Clearing Permit Application (CPS 8253/1) proposes an offset project in accordance with a request from DWER.

The site of the offset proposal is remote from the actual clearing site and is situated at 31°42.903's, 117°46.651'e, on the Kellerberrin – Shackleton road. It is a 12 hectare site of disused agricultural land appropriated by the Shire during recent road upgrades to straighten the main grain haul roads to Kellerberrin. This site has lain idle for approximately 4 years and was previously used as cropping land.

The purpose of this report is to present information to DWER to support the application to clear, by offering a revegetation site and revegetating it with an appropriate list of species. This proposal and report is being prepared according to the requirements of a DWER publication "A Guide to Preparing Revegetation Plans for Clearing Permits".

REVEGETATION SITE:

The revegetation site is approximately 12 hectares in a crescent shape, between the new and old road sections of the Shackleton – Kellerberrin Road, in the Shire of Kellerberrin. It is a sloping site, higher on the ends than the middle, descending to a creek line in the middle of the site running north/south. The creek line runs into a small remnant on the old roadside which is reference site 3.



The soils are mixed, but predominantly granite based. It is generally loamy soils with bare granite extrusions and clay pockets. The site is already showing signs of natural recruitment of endemic species such as *Acacia acuminata*, *Maireana brevifolia* and *Eucalyptus loxophleba* ssp *loxophleba*. These species are even growing in the cracks in the old bitumen road base around the perimeter.

Generally, the site is now overgrown with agricultural weeds such as rye grass, wild oats, radish, cape weed and barley grass, with some native grasses such as *Austrostipa scabra*.

As a revegetation site, it is ideal, in that it will take a large range of species successfully and are easily sourced as seedlings from commercial tree nurseries. Additionally, it will support Eucalyptus species which are considered as Threatened ecological communities such as Salmon gum, Gimlet and York gum. The project will be able to produce a revegetation project which will in the future be able to host arboreal species breeding areas, a habitat which is fundamentally lacking in the wheatbelt.

REFERENCE SITES:

In accordance with Section 5.3 of the aforementioned Guide, there needs to be a reference site selected and surveyed to provide a flora list, which is similar in makeup to the species list suggested for the revegetation site. I believe that it will also allow DWER to devise completion criteria for the project.

Two kilometres south of the revegetation site is a 13 hectare CALM Reserve number A10719. It is exactly similar in slope, soil types and species mix of the proposed species mix for the revegetation site. Two sites within it were selected and 20 metre quadrats were selected.



The third reference site is situated on the north east corner of the revegetation site, where the old road cut a small remnant off from the paddock.

Species lists were made of all three sites and are projected in the table below. The yellow colouring adjacent to the individual species indicates where each species was recorded and in many cases, species were found in all three quadrats. Where a species was found in only one quadrat, it is coloured against only one quadrat.

SPECIES LIST FOR OFFSET REFERENCE SITE - BAANDEE NTH RD PROJECT.					
GENUS	SPECIES	COMMON NAME	REF SITE 1	REF SITE 2	REF SITE 3
Acacia	erinaceae	prickly acacia			
Acacia	hemetiles	tan wattle			
Acacia	acuminata	jam			
Acacia	microbotrya	manna wattle			
Allocasuarina	campestris	sheoak			
Amphipogon	caracinus	greybeard grass			
Atriplex	semibaccatta	creeping saltbush			
Atriplex	vesicaria	bladder saltbush			
Austrostipa	elegantissima	elegant grass			
Borya	constricta	pincushion			
Daviesia	hakieoides				
Dianella	revoluta	flax			
Enchylaena	tomentosa	Ruby saltbush			
Eremophila	drummondii				
Eucalyptus	salubris	gimlet			
Eucalyptus	salmonophloia	salmon gum			
Eucalyptus	loxophleba ssp loxophleba	york gum			
Hakea	preissii	stand back			
Lawrencella	rosea	pink annual			
Maireana	brevifolia	bluebush			
Melaleuca	adnata	white myrtle			
Melaleuca	uncinata	brushwood			
Pittosporum	angustifolia	native			
Podotheca	gnaphaloides	longhead annuals			
Rhagodia	preissii				
Santalum	acuminatum	quandong			
Senna	artemisioides				
Waitzia	acuminata	orange annual			
OTHER SPECIES WHICH WILL THRIVE AT THIS LOCATION					
Allocasuarina	huegelliana	Rock sheoak			
Melaleuca	elliptica	Red myrtle			
Callistemon	phoeneceous	Red bottlebrush			

The CALM Reserve A10719 is a predominantly *Eucalyptus salmonophloia* dominated vegetation type, with some *E. loxophleba* ssp *loxophleba* and *E. salubris*. Within it are various slight soil changes which explain the different species mixes within the separate quadrats. Granite ecosystems are known for their variable soils and can support a wide range of species within them. In a revegetation

context, a large and diverse species mix will ensure that the correct species will be planted in all the little pockets of soil types which will exist at the revegetation site.

REFERENCE SITE VEGETATION DESCRIPTION:

SITE 1:

Very mature Eucalypts with canopy cover of 65%. Even though only 4 Eucalypts (*E. salubris*, *salmonophloia* and *loxophleba*) are within this quadrat, they dominate the soil biology, creating approximately 50% bare ground. This bare soil is heavily encrusted with lichen at 80% of all bare soil. There is very little senesced material (15%) due to the absence of annuals of any sort and minimal second storey species. Soil is clay with a thin, sandy topsoil. The dominant secondary storey species is *Acacia erinaceae* of which there are 148 individual plants in the quadrat. A grove of *Santalum spicatum* also contributes to the mix. The *Acacia* species is sparse in foliage as is its' nature, which explains the high degree of bare ground. The site is old growth, stable and in pristine condition, with no weeds or disease evident. Understorey species are sparse, which may be explained by the very dry season just gone and the hard clay soils.

Overstorey density is 100 mature trees per hectare, secondary storey density is 3,700 per hectare.

SITE 2:

Only 100 metres to the east, the soil has changed to a more loamy soil type, with a completely different matrix. The overstorey species of only *E. loxophleba* ssp *loxophleba* is still at 100 stems per hectare, but with a canopy cover of only 20%. They are also very mature old growth trees.

The secondary storey species are *Acacia acuminata* and *Allocasuarina campestris* at 600 stems per hectare with one *Meleleuca uncinata*. This site offers a heavy ground cover of perennial grasses, flax, *Borya* and annuals. Secondary storey species, which would otherwise be Jam woodland, if there were no Eucalypts, cover approximately 50-60%.

Ground cover species, both perennial and annual cover 90% of the ground, with very little bare ground. Senesced material covers 80% of the ground and suggests a very active annual growth cycle. Lichens cover any bare ground not covered by other live material. This is a very dynamic ecosystem described as pristine, with no weeds or disease present.

REFERENCE SITES PROXIMITY TO REVEGETATION SITE:



SITE 3:

Site 3 is north-east of the revegetation site, being roadside vegetation of the old retired road. It is at the lowest part of the landscape and is centred on a creek line which runs out of the revegetation site. This site is partly sandy creekline, part loam with granite showing through the loam. The overstorey is approximately 60% cover with secondary storey species making another 50% cover, much of it under the top storey.

This site has a very heavy understorey of about 90%, mainly because of agricultural weeds. Saltbush species, endemic to this environment have also thrived within it and would be a valuable addition to the revegetation species mix. *Atriplex vesicaria*, *A. semibaccata*, *Maireana brevifolia* and *Enchylaena tomentosa* compete well with ag weeds and spread from seed without cultivation. They make up about 30% of the ground cover.

Other Acacias and secondary species such as *Pittosporum angustifolia* and *Sennas* are numerous. This site is described as Very Good to Excellent. Only the presence of agricultural weeds diminishes its' value which would otherwise be described as Excellent.

REFERENCE SITE VALUES TABLE:

Part of the Reference Site Assessment Guide requires that a pro forma table be produced based on the data collected in the Reference Site Surveys. The table is presented below. Three sites were selected which all have similar or averageable values. The DBCA Reserve A10719 sites 1 & 2 do not have a weed burden, whereas the site 3, adjacent to the revegetation site does have weeds. Therefore, I have split the table between weedy and not weedy. Realistically, the revegetation site will have a weed burden after revegetation, no matter how much we try to manipulate it. It is unrealistic to expect that weeds will disappear from the site and expect a totally weed free result. The weed burden value should, when placed into the completion criteria value table, reflect the split values in this table.

Criterion		Measure	Units	Value
A	Species Richness	i. Total species richness (site)	species count	28
		ii. Quadrat species richness (average across quadrats)	species count	17
		iii. Tree species richness	species count	3
		iv. Shrub species richness	species count	19
B	Species Density	i. Tree density (for each dominant species)	stems/ha mixed E. salmonophloia, loxophleba, salubris	100
		ii. Shrub density	stems/ha (large shrubs) or (small shrubs)	900 1400
C	Herbs, sedges, grasses		average percentage cover per quadrat	70%
D	Weed Cover	i. Minor, non-competitive species	percentage cover ref 1&2 ref 3	0% 25%
		ii. Major competitive weeds	percentage cover ref 1&2 ref 3	0 25%
		iii. Declared weeds	percentage cover	0
E	Bare Ground		percentage	30%
F	Vegetation Structure		DPIRD Pre European Veg Description	Wheatbelt Woodland, Mt. Caroline 1023. Woodland medium.
G	Other measures as required			

CONCLUSION:

The proposed revegetation site is an ideal offset location. It is unused agricultural land, owned by the Shire of Kellerberrin with no other possible use. The revegetation is able to be protected under a covenant arrangement to protect it in perpetuity. It will enhance the vegetation adjacent to it on the old disused road reserve and can be advertised as a revegetation scheme on a busy newly constructed road reserve.

The site is a sloping mixed soil type, based on granite ecosystem, with a history of past agricultural use. A large range of species can be used for the revegetation plan, with a high degree of success guaranteed, if it is prepared and implemented properly. The outcome of establishing a Wheatbelt Woodland ecosystem will add to the already present road reserve ecosystem and stabilise the site in

the long term. The site also has old disused road reserves radiating out from it as well as current roads, with remnant vegetation and revegetation sites scattered about the landscape within close proximity to this site (within 1 km). It would make an ideal anchor remnant for this area.

The reference sites all exhibit a slightly different matrix to one another, but can be put together in this landscape to present a very diverse planting of ecological benefit to the site and the overall perennial vegetation of the district.

As the site is larger than the required offset for this project, there is also scope to increase the planting size, at this site and by using further disused farming land across the road. The rationale for this course of action would be to bank extra hectares of offset revegetation to be used in the third stage of the Baandee North Road upgrade, which may itself require further offset projects.